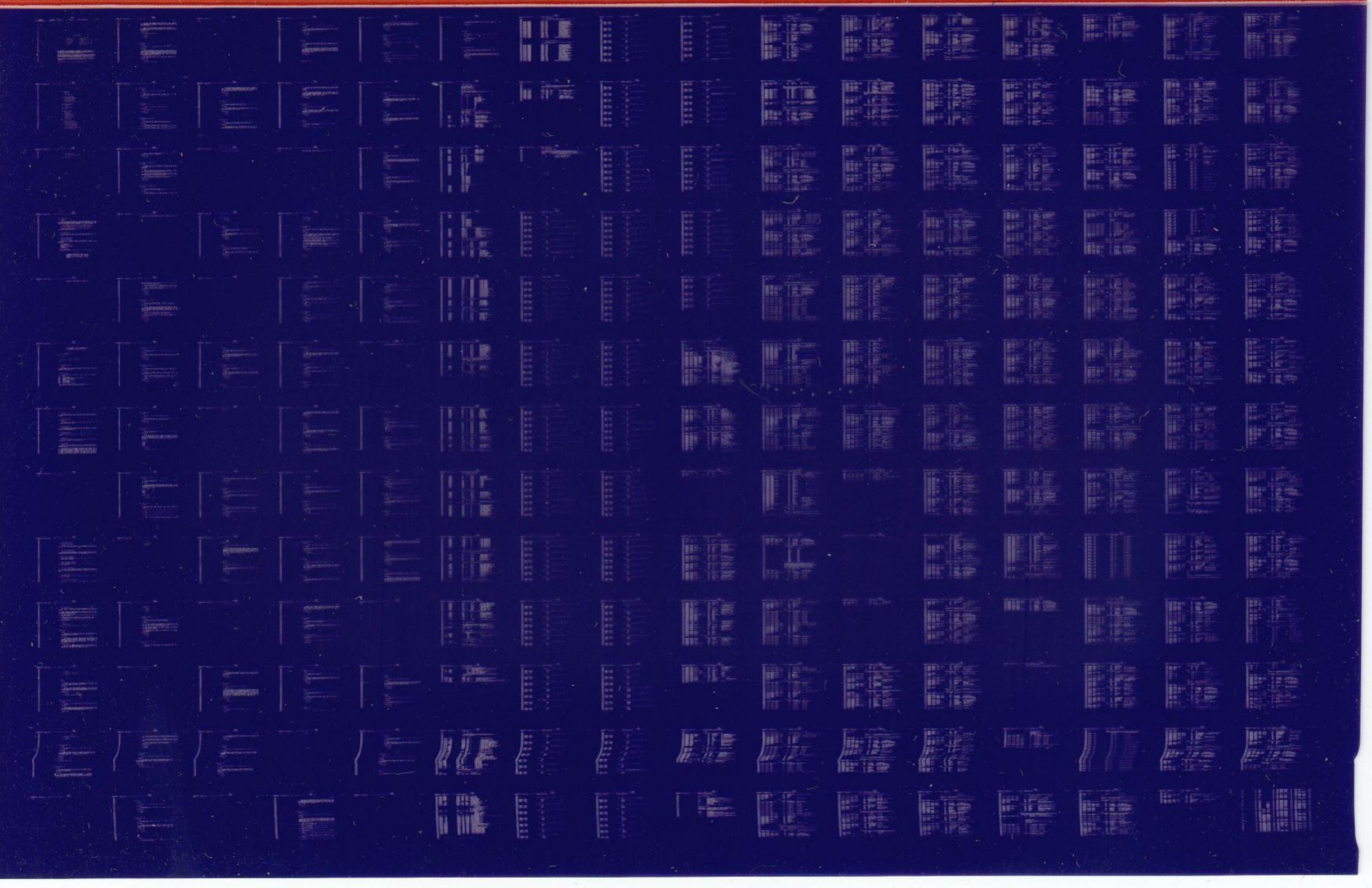
RM03,02

DISKLESS DIAGNOSTIC
CZRMJB0

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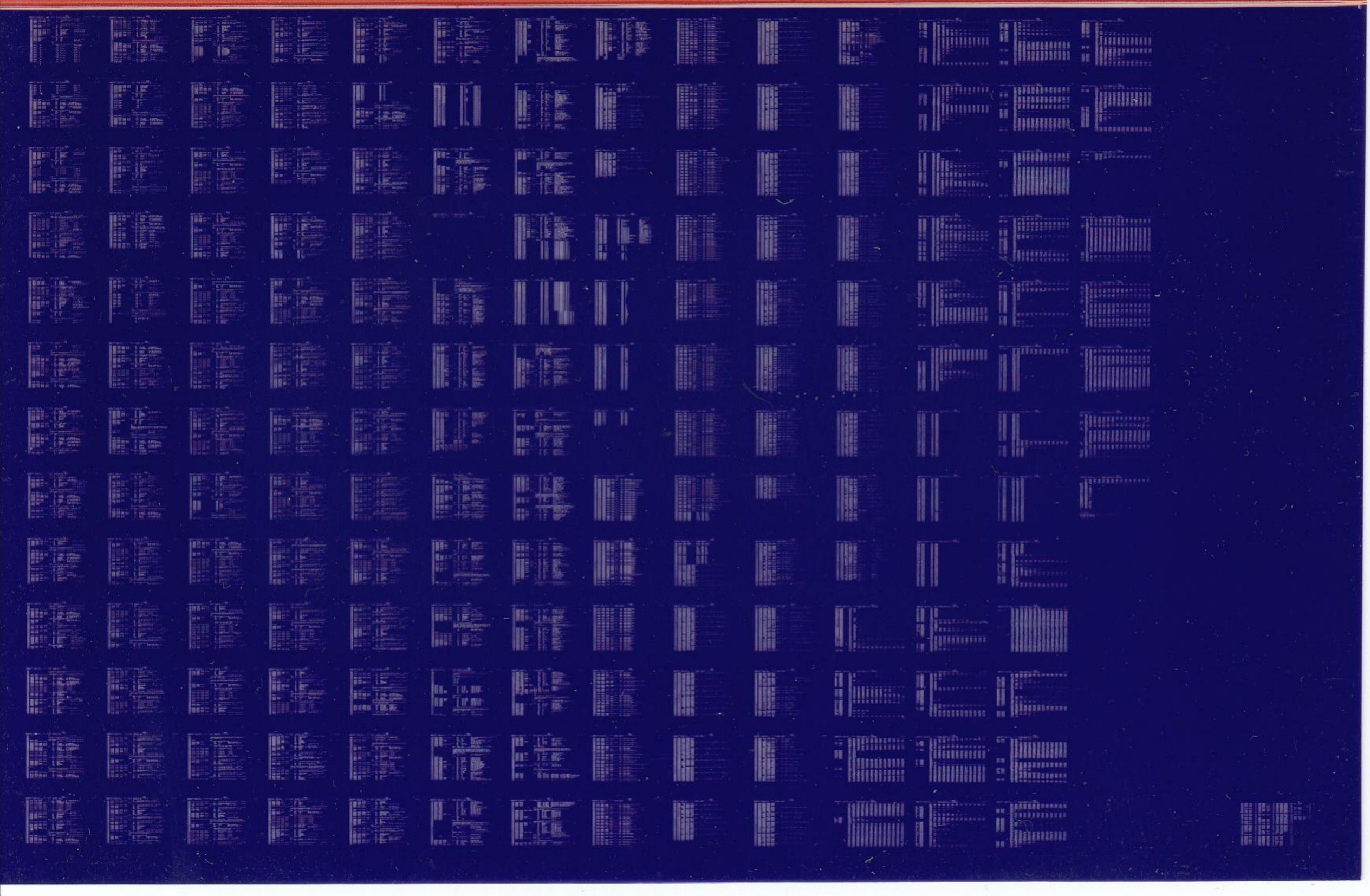


RM03,02

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CZRMJB0

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IDENTIFICATION

PRODUCT CODE:	AC-B018B-MC
PRODUCT NAME:	CZRMJB0 RM03/RM02 DISKLESS DIAGNOSTIC
DATE CREATED:	1 AUGUST 77
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	DOUG RIIKONEN

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1.0 INTRODUCTION

1.1 ABSTRACT

THE RM03 DISKLESS DIAGNOSTIC IS A STAND ALONE PROGRAM WHICH USES FUNCTIONAL AND DIAGNOSTIC MEANS TO VERIFY THE OPERABILITY OF THE RM03 DISK SUBSYSTEM EXCLUDING AND INDEPENDENTLY OF THE STORAGE MODULE DRIVE. IN PARTICULAR, THE PROGRAM SERVES THE FOLLOWING PURPOSES:

TO DETECT ERRORS AND FAULTS IN THE RH70 MASSBUS CONTROLLER;

TO DETECT ERRORS AND FAULTS IN THE RM03 MASSBUS ADAPTER;

TO RESOLVE HARDWARE FAILURES IN THE RH70 AND RM03 TO A FIELD REPLACEABLE MODULE OR MODULES.

1.2 UNIT UNDER TEST

THE UNIT UNDER TEST (UUT) IS THE RM03 DISK SUBSYSTEM, EXCLUDING THE STORAGE MODULE DISK DRIVE AND THE RH70 MASSBUS CONTROLLER.

2.0 OPERATING REQUIREMENTS

2.1 HARDWARE REQUIREMENTS

THE FOLLOWING MINIMUM HARDWARE CONFIGURATION, ASSUMED TO BE OPERATIONAL, IS REQUIRED TO LOAD AND EXECUTE THE RM03 DISKLESS DIAGNOSTIC:

PDP-11 PROCESSOR
24K MEMORY
KW11-L OR KW11-P CLOCK
PROGRAM LOADING DEVICE
TERMINAL
RH CONTROLLER

UNIT UNDER TEST,
WHERE THE UNIT UNDER TEST CONSISTS OF ONE TO EIGHT RM03 ADAPTERS.

NOTE

A STORAGE MODULE DISK DRIVE IS NOT REQUIRED FOR EXECUTING THE RM03 DISKLESS DIAGNOSTIC AS LONG AS THE "DEVICE ADDRESS" AND "PLUG ENABLE" LINES ARE PROVIDED BY SOME OTHER MEANS SUCH AS JUMERS.

```
                                THE DEVICE ADDRESS LINES MAY FLOAT TO
                                ADDRESS 7 IF THERE IS NO OTHER DEVICE
    175
    176
```

WITH ADDRESS 7 ON THE SUBSYSTEM. THE "PLUG ENABLE" LINE MUST BE PROVIDED TO ALLOW MASSBUS DIALOGUE BY THE RM03.

2.2 MEDIA REQUIREMENTS

NONE

2.3 PREREQUISITE DIAGNOSTIC PROGRAMS

NONE

3.0 OPERATING PROCEDURE

3.1 LOADING

THE PROGRAM MAY BE LOADED BY EITHER PAPER TAPE, USING THE STANDARD PAPER TAPE LOADING PROCEDURE, OR XXDP MEDIA, USING THE APPROPRIATE LOADING DEVICE.

3.2 SWITCH OPTIONS

THE FOLLOWING SWITCH OPTIONS ARE INVOKED WHEN THE APPROPRIATE SWITCH IS ON.

SW15 HALT ON ERROR
SW14 LOOP ON TEST (CURRENTLY BEING EXECUTED)
SW13 INHIBIT ERROR TYPEOUTS
SW12 UNUSED
SW11 INHIBIT TEST ITERATIONS
SW10 BELL ON ERROR
SW09 LOOP ON ERROR
SW08 LOOP ON TEST IN SW07-00

THE LOW ORDER 8 SWITCHES ARE USED IN CONJUNCTION WITH SW08 TO SPECIFY A PARTICULAR TEST WHICH THE PROGRAM WILL LOOP ON.

3.3 STARTING

THE PROGRAM STARTS AT LOCATION 200 WHICH USES DEFAULT VALUES OF PARAMETERS AND PROVIDES MAXIMUM TESTING WITH THE SWITCH REGISTER EQUAL TO ZERO.

4.0 OPERATOR INTERFACE

4.1 PROGRAM ID

THE PROGRAM TYPES ITS NAME AND MAINDEC NUMBER THE FIRST TIME IT IS STARTED AFTER BEING LOADED.

4.2 PROGRESS REPORTS

AN END OF PASS REPORT OCCURRS EACH TIME THE PROGRAM IS EXECUTED FOR ALL ADAPTERS IN THE TEST QUE. THE END OF PASS REPORT INCLUDES A MESSAGE AND AN ERROR SUMMARY.

4.3 PERFORMANCE REPORT

NO PERFORMANCE REPORTS ARE GIVEN DURING THE EXECUTION OF THE PROGRAM.

4.4 PROGRAM HALTS

THERE ARE NO SCHEDULED HALTS DURING THE EXECUTION OF THE PROGRAM. PROCESSOR HALTS ARE DUE TO THE TRAP CATCHER.

4.5 ERROR REPORTS

THE RM03 DISKLESS DIAGNOSTIC PROVIDES COMPREHENSIVE ERROR REPORTS INTENDED TO (1) AID IN FAULT RESOLUTION AND (2) MINIMIZE REFERENCES TO PROGRAM LISTINGS.

THE FIRST LINE OF THE ERROR REPORT CONTAINS THE NUMBER OF THE UNIT BEING TESTED, THE TEST NUMBER, THE ERROR NUMBER AND THE VALUE OF THE PROGRAM COUNTER WHERE THE ERROR WAS CALLED. THIS LINE IS FOLLOWED BY THE ERROR MESSAGE: SEVERAL LINES OF TEXT WHICH GIVE A COMPREHENSIVE DESCRIPTION OF THE ERROR, AND A LIST OF FAILING MODULES IN ORDER OF DECREASING PROBABILITY. THE ERROR MESSAGE IS NORMALLY FOLLOWED BY ONE OR MORE PAIRS OF LINES CONTAINING DATA HEADERS AND DATA PERTININENT TO THE ERROR, INCLUDING EXPECTED AND ACTUAL TEST

296 RESULTS.

5.0 ENVIRONMENTAL SUPPORT

5.1 PROCESSOR COMPATIBILITY

THE RM03 DISKLESS DIAGNOSTIC IS EXECUTABLE ON ANY PDP-11 PROCESSOR, PROVIDING PREVIOUSLY MENTIONED HARDWARE REQUIREMENTS ARE MET.

5.2 DUAL PORT CONFIGURATIONS

THE RM03 DISKLESS DIAGNOSTIC IS NOT EXECUTABLE ON RM03 SUBSYSTEMS HAVING THE DUAL PORT OPTION UNLESS THE DUAL PORT SWITCH IS SET TO THE APPROPRIATE PORT (A OR B) AND NOT TO THE PROGRAMMABLE POSITION (A/B).

5.3 MEMORY PARITY HARDWARE

MEMORY PARITY HARDWARE WILL NOT BE USED DURING THE EXECUTION OF THE RM03 DISKLESS DIAGNOSTIC.

5.4 MEMORY MANAGEMENT HARDWARE

MEMORY MANAGEMENT HARDWARE WILL NOT BE USED DURING THE RM03 DISKLESS DIAGNOSTIC.

5.5 ACT11, APT11 COMPATIBILITY

THE RM03 DISKLESS DIAGNOSTIC PROGRAM IS COMPATIBLE WITH ACT11 AND APT11 IN BOTH DUMP AND AUTOMATIC MODES. FURTHER, THE PROGRAM WILL EXECUTE A QUICK PASS DURING THE FIRST PASS IN SUPPORT OF QUICK VERIFY MODE.

5.6 XXDP COMPATIBILITY

THE RM03 DISKLESS DIAGNOSTIC PROGRAM IS COMPATIBLE WITH XXDP IN DUMP AND CHAIN MODES.

5.7 OPERATING SYSTEM COMPATIBILITY

THE PROGRAM IS NOT REQUIRED TO BE COMPATIBLE WITH ANY OPERATING SYSTEM.

6.0 TEST DESCRIPTION

THE PROGRAM IS DESIGNED IN A BOTTOM UP MANNER SUCH THAT EACH TEST GENERALLY USES A MORE COMPLEX SUBSET OF HARDWARE THAN THE PREVIOUS TEST.

MODULE CALLOUT IS PREDICATED ON THE ASSUMPTION THAT EARLIER TESTS HAVE BEEN COMPLETED WITHOUT ERROR AND THAT ERRORS ARE DUE TO SINGLE, NONTRANSIENT HARDWARE FAILURES.

THE "RM03 DISKLES DIAGNOSTIC" CAN BE EXECUTED USING AN RH70 OR AN RH11 MASSBUS CONTROLLER.

UNLESS SPECIFIED BY THE OPERATOR OR BY THE ENVIRONMENT TABLE THE TEST IS REPEATED FOR EACH POSSIBLE DEVICE STARTING WITH DEVICE 0.

THE MODULES WHICH MAY BE CALLED OUT DURING THE EXECUTION OF THE TEST ARE AS FOLLOWS:

IF
CS
DS
MASSBUS MODULE

THE RADIAL MODULE (RD) IS NOT TESTED BY THIS PROGRAM.

TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE RM03 CAN COMPLETE A REGISTER TRANSFER ON THE MASSBUS, AND, IN PARTICULAR, TO VERIFY THAT "TRANSFER" IS NOT STUCK IN AN INACTIVE STATE.

PROCEDURE:

THE PROGRAM WRITES AND READS REMOTE REGISTERS FOR THE SELECTED DEVICE. REGISTER CONTENTS AND PARITY ERRORS ARE IGNORED, AND THE TEST FAILS IF A "NONEXISTENT DEVICE ERROR" OR BUS TIMEOUT OCCURRS FOR EVERY REGISTER ACCESS. IF THE TEST FAILS THE PROGRAM JUMPS TO THE END OF PASS HANDLER WHICH SELECTS THE NEXT DEVICE TO BE TESTED.

PROBABLE FAULT:

THE TEST FAILS IF THE SELECTED DEVICE IS NONEXISTENT OR IS SWITCHED TO THE PROGRAMMABLE POSITION OR TO THE ALTERNATE PORT. THE FOLLOWING FAULTS ARE APPLICABLE ONLY WHEN THE DEVICE IS PRESENT AND IS SWITCHED TO THE APPROPRIATE PORT.

1. IF MODULE
2. ASYNCHRONOUS MASSBUS MODULE
3. CS MODULE

CTOD TEST

PURPOSE:

TO VERIFY THAT DATA CAN BE TRANSFERRED TO AND FROM THE RM03 USING THE CONTROL BUS AND, IN PARTICULAR, TO VERIFY THAT "CONTROLLER TO DEVICE" HAS NOT FAILED.

PROCEDURE:

THE TEST WRITES ONES IN REMOTE REGISTERS THEN READS EACH REGISTER WHICH WILL WRITE ZEROS IN THE REGISTER IF "IF3 CTOD HOLD H" IS STUCK AT ONE. THE TEST THEN READS AS MANY REMOTE REGISTERS AS ARE NECESSARY TO OBTAIN ONE OR MORE ONE BITS.

PROBABLE FAULT:

1. IF MODULE
2. ASYNCHRONOUS MASSBUS MODULE

MASSBUS INITIALIZE TEST

PURPOSE:

TO VERIFY THAT THE MASSBUS ADAPTER IS BEING INITIALIZED BY THE MASS BUS.

PROCEDURE:

USING CONTROLLER CLEAR TO INITIALIZE THE SELECTED UNIT, THIS TEST THEN READS MASSBUS ADAPTER REGISTERS TO VERIFY THAT AT LEAST ONE BIT IS CLEARED. MASSBUS ADAPTER REGISTERS ARE PRESET TO A NON ZERO VALUE PRIOR TO CONTROLLER CLEAR.

PROBABLE FAULT:

1. ASYNCHRONOUS MASSBUS MODULE
2. IF MODULE
3. CS MODULE

CLEAR STUCK ACTIVE TEST

PURPOSE:

TO VERIFY THAT "MBA CLR L" ON THE CS MODULE IS NOT STUCK IN AN ACTIVE STATE.

PROCEDURE:

CONTROLLER CLEAR IS USED TO INITIALIZE THE SELECTED UNIT, AFTER WHICH 1'S ARE WRITTEN IN ERROR REGISTERS 1 AND 2 AND MAINTENANCE REGISTER 1. IF ANY 1 BITS CAN BE READ BACK THE TEST IS OK, ELSE, "MBA CLR L" IS PROBABLY STUCK ACTIVE.

PROBABLE FAULT:

1. CS MODULE
2. IF MODULE
3. ASYNCHRONOUS MASSBUS MODULE

TRISTATE TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE PATH TO AND FROM THE MASSBUS ADAPTER TRI-STATE REGISTER BUS IS NOT STUCK AT ONE OR ZERO AND THAT EACH BIT POSITION IS INDEPENDENT.

PROCEDURE:

THIS TEST PRESETS MASSBUS ADAPTER REGISTERS TO A NONZERO VALUE, THEN, ASSUMING THE REGISTERS ARE PRESET, IT CLEARS THEM USING A MOVE INSTRUCTION. THE TEST THEN READS AS MANY REGISTERS AS IS NECESSARY TO OBTAIN ONE OR MORE ZEROS FROM EACH BIT POSITION.

509

THE TEST CLEARS MASSBUS ADAPTER REGISTERS, THEN, ASSUMING THE REGISTERS ARE CLEARED, IT LOADS THEM WITH ONES AND READS AS MANY REGISTERS AS IS NECESSARY TO OBTAIN ONE OR MORE ONE BITS IN EACH BIT POSITION.

FINALLY, THE TEST WRITES A SINGLE ONE BIT PATTERN IN BIT 0 OF SELECTED REMOTE REGISTERS AND VERIFIES THAT THE PATTERN CAN BE READ BACK. THE ONE BIT IS SHIFTED AND THE TEST REPEATED FOR ALL BIT POSITIONS.

PROBABLE FAULT:

1. ASYNCHRONOUS MASSBUS MODULE
2. IF MODULE
3. CS MODULE
4. DS MODULE

REGISTER SELECT TEST

PURPOSE:

TO VERIFY THAT THE REGISTER SELECT LINES ARE NOT IN A STUCK POSITION.

PROCEDURE:

EACH REGISTER SELECT LINE IS TESTED BY WRITING ZEROS IN THOSE DEVICE REGISTERS FOR WHICH THE LINE MUST BE ZERO, THEN WRITING ONES IN THOSE DEVICE REGISTERS FOR WHICH THE LINE MUST BE ONE. THE ZERO REGISTER IS READ BACK AND IF THE SELECT LINE IS STUCK AT ZERO, THE ZERO REGISTER WILL CONTAIN ONES. THE PROCESS IS REPEATED TO DETECT A STUCK AT ONE FAULT, EXCEPT IN THIS CASE, THE ONES REGISTER IS WRITTEN FIRST.

REGISTER SELECT LINES 1, 2, 4 AND 8 ARE TESTED IN THIS MANNER; SELECT LINE 16 IS EXPLICITLY TESTED IN THE "ILR TEST".

PROBABLE FAULT:

1. IF MODULE
2. ASYNCHRONOUS MASSBUS MODULE

DRIVE TYPE TEST

PURPOSE:

TO TEST THE "DRIVE TYPE" REGISTER, RMDT.

PROCEDURE:

THE PROGRAM READS RMDT AND VERIFIES THAT THE RESULT CORRESPONDS TO A SINGLE PORT OR DUAL PORT RM03 DRIVE.

PROBABLE FAULT:

1. IF MODULE

DEVICE AVAILABLE TEST

PURPOSE:

TO VERIFY THAT DEVICE AVAILABLE STATUS IS SET.

PROCEDURE:

THE PROGRAM TESTS "DVA", BIT 11 OF RMCS1.

PROBABLE FAULT:

1. IF MODULE

HOLDING REGISTER TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE HOLDING REGISTER IS NOT STUCK AT ONE, STUCK AT ZERO, AND THAT THERE IS NO BIT INTERFERENCE.

PROCEDURE:

THE PROGRAM TRANSFERS ONES, THEN ZEROS TO THE HOLDING REGISTER AND VERIFIES THAT NONE OF THE BITS ARE STUCK AT ONE.

THE PROGRAM TRANSFERS ZEROS, THEN ONES TO THE HOLDING REGISTER AND VERIFIES THAT NONE OF THE BITS ARE STUCK AT ZERO.

FINALLY, THE TEST TRANSFERS A SHIFTING ONE BIT PATTERN AND VERIFIES THAT EACH BIT IS INDEPENDENT.

PROBABLE FAULT:

1. IF MODULE

CONTROL STATUS #1 TRANSFER TEST

PURPOSE:

TO VERIFY THAT BITS 01 THROUGH 05 OF CONTROL STATUS REGISTER 1 ARE NOT STUCK AT ONE OR ZERO, AND THAT THERE IS NOT BIT INTERFERENCE.

PROCEDURE:

THIS TEST WRITES ONES IN CONTROL STATUS REGISTER 1, RMCS1, THEN WRITES ZEROS AND VERIFIES THAT THE BITS ARE NOT STUCK AT ONE. THE GO BIT IS NOT TESTED IN THIS TEST.

NEXT, THE TEST CLEARS THE CONTROL STATUS REGISTER, RMCS1, WRITES ONES IN BITS 01 THROUGH 05 AND VERIFIES THAT THE BITS ARE NOT STUCK AT ZERO. THE GO BIT IS NOT TESTED.

THE TEST TRANSFERS A SHIFTING ONE BIT DATA PATTERN TO AND FROM RMCS1 AND CHECKS FOR ADJACENT BIT INTERFERENCE.

PROBABLE FAULT:

1. IF MODULE

ERROR REGISTER #1 TRANSFER TEST

PURPOSE:

TO VERIFY THAT ERROR REGISTER 1 IS NOT STUCK AT ONE OR ZERO, AND THAT THERE IS NOT BIT INTERFERENCE.

PROCEDURE:

THIS TEST WRITES ONES IN ERROR REGISTER 1, RMER1, THEN WRITES ZEROS AND VERIFIES THAT THE REGISTER IS NOT STUCK AT ONE.

```
                        "UNSAFE" IS NOT TESTED DURING THIS TEST.  IN ORDER TO  LIMIT  THE
                        PROBABLE  FAULTS TO ONE OR TWO MODULES, THE TEST IS EXECUTED IN 3
```

PARTS WITH EACH PART TESTING THOSE BITS WHOSE PRESET FUNCTIONS ARE DERIVED FROM THE SAME MODULE.

THE TEST WRITES ZEROS IN ERROR REGISTER 1, RMER1, THEN WRITES ONES AND VERIFIES THAT THE REGISTER IS NOT STUCK AT ZERO.

FINALLY, THE TEST WRITES A SHIFTING ONE BIT PATTERN IN RMER1 AND CHECKS FOR ADJACENT BIT INTERFERENCE.

PROBABLE FAULT:

1. IF MODULE
2. CS MODULE
3. DS MODULE

ERROR REGISTER #2 TRANSFER TEST

PURPOSE:

TO VERIFY THAT ERROR REGISTER 2, RMER2, IS NOT STUCK AT ONE, STUCK AT ZERO, AND THAT THERE IS NOT BIT INTERFERENCE.

PROCEDURE:

THE TEST WRITES ONES THEN WRITES ZEROS IN RMER2 AND VERIFIES THAT NONE OF THE BITS ARE STUCK AT ONE. "SKI" AND "DVC" ARE NOT TESTED. IN ORDER TO LIMIT THE NUMBER OF PROBABLE FAULTS TO ONE OR TWO MODULES, THE TEST IS EXECUTED IN 3 PARTS WITH EACH PART TESTING THOSE BITS WHOSE PRESET FUNCTIONS ARE DERIVED FROM THE SAME MODULE.

THEN THE TEST WRITES ZEROS IN ERROR REGISTER 2, AND WRITES ONES VERIFYING THAT THE REGISTER IS NOT STUCK AT ZERO.

FINALLY, THE TEST WRITES A SHIFTING ONE BIT PATTERN IN THE REGISTER AND VERIFIES THAT ALL BIT POSITIONS ARE INDEPENDENT.

PROBABLE FAULT:

1. IF MODULE
2. CS MODULE
3. DS MODULE

CLEAR OFFSET STUCK ACTIVE TEST

PURPOSE:

TO VERIFY THAT THE SIGNAL WHICH CLEARS OFFSET MODE IS NOT STUCK IN ACTIVE STATE.

PROCEDURE:

THE TEST WRITES A ONE IN THE OFFSET DIRECTION BIT WHICH IS CLEARED BY THE SIGNAL AND VERIFIES THAT A ONE CAN BE READ BACK.

PROBABLE FAULT:

1. IF MODULE

2. DS MODULE

OFFSET REGISTER TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE OFFSET REGISTER IS NOT STUCK AT ONE, STUCK AT ZERO, AND THAT THERE IS NO ADJACENT BIT INTERFERENCE.

PROCEDURE:

THE OFFSET REGISTER, RMOF, IS WRITTEN WITH ONES, THEN WRITTEN WITH ZEROS AND READ TO VERIFY THAT NONE OF THE BITS ARE STUCK AT ONE.

THEN THE OFFSET REGISTER IS WRITTEN WITH ZEROS AND WRITTEN WITH ONES TO VERIFY THAT THE REGISTER IS NOT STUCK AT ZERO.

FINALLY, THE OFFSET REGISTER IS TESTED WITH A SHIFTING ONE BIT PATTERN.

PROBABLE FAULT:

1. IF MODULE

SERIAL NUMBER TEST

PURPOSE:

TO VERIFY THAT THE SERIAL NUMBER CAN BE READ.

PROCEDURE:

THE TEST READS THE SERIAL NUMBER REGISTER SEVERAL TIMES AND VERIFIES THAT THE NUMBER IS THE SAME EACH TIME.

PROBABLE FAULT:

1. CS MODULE

CONTROL BUS PARITY DETECTION TEST

PURPOSE:

TO TEST THE RM03'S PARITY CHECKING LOGIC FOR THE MASSBUS ASYNCHRONOUS CONTROL BUS.

PROCEDURE:

THIS TEST WRITES A SHIFTING ONE BIT DATA PATTERN IN THE DISK ADDRESS REGISTER USING "PAT" TO CONTROL THE STATE OF THE PARITY BIT. "PAR" STATUS, BIT 03 OF RMER1, IS CHECKED AFTER EACH PATTERN IS TRANSFERRED. NOTE THE FOLLOWING TABLE SHOWS A SET OF TEST PATTERNS THAT COULD BE USED INSTEAD OF A SHIFTING ONE BIT PATTERN.

DATA PATTERN	PAT	PAR
000000	1	1
075266	0	0
163753	0	0
116535	1	1

PROBABLE FAULT:

1. IF MODULE

2. ASYNCHRONOUS MASSBUS MODULE

CONTROL BUS PARITY GENERATION TEST

PURPOSE:

TO TEST THE RM03'S PARITY GENERATING LOGIC FOR THE MASSBUS ASYNCHRONOUS CONTROL BUS.

PROCEDURE:

THE TEST TRANSFERS A SHIFTING ONE BIT DATA PATTERN TO THE DISK ADDRESS REGISTER. AFTER EACH PATTERN IS READ BACK, "MASSBUS CONTROL BUS PARITY ERROR" IS TESTED AND SHOULD BE ZERO. NOTE THE FOLLOWING SET OF TEST PATTERNS COULD BE USED INSTEAD OF THE SHIFTING ONE BIT PATTERN.

DATA PATTERN	MCPE
000000	0
056747	0
135672	0
153135	0

PROBABLE FAULT:

1. IF MODULE

2. ASYNCHRONOUS MASSBUS MODULE

RMDA, RMDC FAULT TEST

PURPOSE:

TO VERIFY THAT THERE ARE NOT FAULTS WHICH INHIBIT THE PROGRAM FROM WRITING RMDC AND RMDA. SPECIFICALLY, THESE FAULTS INCLUDE:

."GO H" STUCK HIGH, WHICH WOULD INHIBIT THE REGISTER LOAD FUNCTION,

."RIP L" STUCK LOW, WHICH WOULD CONSTANTLY CLEAR THE REGISTER

."EBL" STUCK, WHICH WOULD INHIBIT THE CLOCK FUNCTION.

PROCEDURE:

THE TEST WRITES AND READS BOTH RMDC, AND RMDA. WITH ZEROS, THEN ONES. THE TEST PASSES IF EITHER REGISTER CAN BE WRITTEN

896 WITH ONES.

PROBABLE FAULT:

1. DS MODULE

2. IF MODULE

3. CS MODULE

DISK ADDRESS TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE DISK ADDRESS REGISTER IS NOT STUCK AT ONE OR ZERO, AND THAT THERE IS NOT BIT INTERFERENCE.

PROCEDURE:

THIS TEST PRESETS THE DISK ADDRESS TO A NONZERO VALUE, THEN USES A MOVE TO CLEAR THE REGISTER.THE TEST THEN READS RMDA AND VERIFIES THAT NONE OF THE BITS ARE STUCK AT ONE.

THEN THE TEST PRECLEARS THE MASSBUS ADAPTER DISK ADDRESS REGISTER (RMDA), LOADS IT TO ALL ONES, AND VERIFIES THAT NONE OF THE BITS ARE STUCK AT ZERO.

A SHIFTING ONE BIT PATTERN IS TRANSFERRED TO AND FROM THE DISK ADDRESS REGISTER, RMDA, AND THE TEST VERIFIES THAT EACH BIT IS INDEPENDENT.

PROBABLE FAULT:

1. DS MODULE

2. IF MODULE

DESIRED CYLINDER TRANSFER TEST

PURPOSE:

TO VERIFY THAT THE DESIRED CYLINDER ADDRESS REGISTER, RMDC, IS NOT STUCK AT ONE OR ZERO, AND THAT THERE IS NOT BIT INTERFERENCE.

953 PROCEDURE:

THIS TEST WRITES ONES IN THE DESIRED CYLINDER REGISTER RMDC, THEN WRITES ZEROS AND VERIFIES THAT THE REGISTER IS NOT STUCK AT ONE.

THEN THE TEST WRITES ZEROS IN THE DESIRED CYLINDER REGISTER, RMDC, WRITES ONES AND VERIFIES THAT THE REGISTER IS NOT STUCK AT ZERO.

FINALLY, A SHIFTING 1 BIT PATTERN IS TRANSFERRED TO AND FROM RMDC AND THE PROGRAM CHECKS FOR BIT INTERFERENCE.

PROBABLE FAULT:

1. DS MODULE
2. IF MODULE

ILLEGAL REGISTER TEST

PURPOSE:

TO TEST ILLEGAL REGISTER ERROR DETECTION IN THE RM03.

PROCEDURE:

THIS TEST READS ALL LEGAL REGISTERS AND VERIFIES THAT "ILR" BIT 2 OF RMER1 DOES NOT SET. THEN, TO THE EXTENT ALLOWED BY THE MASSBUS CONTROLLER, IT READS ILLEGAL REGISTERS AND VERIFIES THAT "ILR" IS SET.

PROBABLE FAULT:

1. IF MODULE
2. ASSYNCHRONOUS MASSBUS MODULE

RESET GO BY INIT TEST

PURPOSE:

TO VERIFY THAT GO CAN BE RESET BY INITIALIZE.

PROCEDURE:

THE TEST SETS GO THEN CLEARS GO USING MASSBUS INITIALIZE, I.E., CONTROLLER CLEAR.

PROBABLE FAULT:

1. CS MODULE
2. IF MODULE

DIAGNOSTIC MODE TEST

PURPOSE:

TO VERIFY THAT "DIAGNOSTIC MODE", BIT 0 OF RMMR1, IS NOT STUCK AT ONE OR ZERO.

PROCEDURE:

THE RM03 IS INITIALIZED AND "DMD" IS CHECKED FOR ZERO. "DMD" IS WRITTEN WITH ONE AND READ TO VERIFY THAT IT IS NOT STUCK AT ZERO, THEN WRITTEN WITH ZERO AND READ TO VERIFY THAT IT IS NOT STUCK AT ONE.

PROBABLE FAULT:

1. CS MODULE
2. IF MODULE

MOL TEST

PURPOSE:

TO VERIFY THAT "MEDIUM ON LINE" STATUS CAN BE SET AND RESET USING MAINTENANCE UNIT READY.

1059
1060 PROCEDURE:

AFTER INITIALIZING THE SUBSYSTEM, THE TEST SETS "DIAGNOSTIC MODE:" AND READS THE DRIVE STATUS REGISTER, RMDS, EXPECTING MOL, BIT 12 TO BE ZERO. "MAINTENANCE UNIT READY", BIT 9 OF RMMR1, IS SET AND MOL SHOULD BE ONE. THE TEST THEN WRITES A ZERO IN MUR AND READS RMDS, VERIFYING THAT "MEDIUM ON LINE" IS ZERO.

PROBABLE FAULT:

1. CS MODULE
2. IF MODULE

WRITE LOCK TEST

PURPOSE:

TO VERIFY THAT "WRITE LOCK" STATUS, WRL, CAN BE SET AND RESET USING "MAINTENANCE WRITE PROTECT", MWP.

PROCEDURE:

WITH DIAGNOSTIC MODE SET, THE PROGRAM SETS MWP, BIT 03 OF RMMR1, AND READS RMDS TO VERIFY THAT WRL, BIT 11 IS SET. THEN MWP IS RESET AND WRL SHOULD BE ZERO.

PROBABLE FAULT:

1. CS MODULE
2. IF MODULE

DRIVE FAULT TEST

PURPOSE:

TO VERIFY THAT "DEVICE CHECK", DVC, AND "UNSAFE", UNS, CAN BE SET AND RESET USING "MAINTENANCE DRIVE FAULT", MDF.

PROCEDURE:

WITH DIAGNOSTIC MODE SET, THE PROGRAM SETS MDF, BIT 06 OF RMMR1, AND READS RMER3 TO VERIFY THAT DVC, BIT 07 IS SET RMER1 IS ALSO READ AND UNS, BIT 14 SHOULD ALSO BE SET. THEN MDF IS RESET

1117 AND DVC AND UNS SHOULD BE RESET.

PROBABLE FAULT:

1. CS MODULE

2. IF MODULE

SEEK ERROR TEST

PURPOSE:

TO VERIFY THAT "SEEK ERROR", SKI, CAN BE SET AND RESET USING "MAINTENANCE SEEK ERROR", MSER.

PROCEDURE:

WITH DIAGNOSTIC MODE SET, THE TEST SETS MSER, BIT 07 OF RMMR1 AND READS RMER3 TO VERIFY THAT SKI, BIT 14 IS SET. MSER IS RESET AND SKI SHOULD RESET.

PROBABLE FAULT:

1. CS MODULE

2. IF MODULE

PIP TEST

PURPOSE:

TO VERIFY THAT "POSITIONING IN PROGRESS", PIP, CAN BE SET AND RESET USING "MAINTENANCE ON CYLINDER", MOC.

PROCEDURE:

DIAGNOSTIC MODE IS SET THEN MOC, BIT 08 OF RMMR1 IS SET AND PIP, BIT 13 OF RMDS, SHOULD BE ZERO. MOC IS THEN RESET AND PIP SHOULD BE ONE.

PROBABLE FAULT:

1. CS MODULE

2. IF MODULE

1174

EBL TEST

PURPOSE:

TO VERIFY THAT END OF BLOCK STATUS "EBL" CAN BE SET AND RESET USING DIAGNOSTIC END OF BLOCK "DEBL".

PROCEDURE:

THE PROGRAM SETS DIAGNOSTIC MODE AND VERIFIES THAT EBL IS RESET. THEN IT SETS DEBL AND VERIFIES THAT EBL IS SET. FINALLY, THE TEST TRANSFERS A SHIFTING ONE BIT TO RMMR1, AND CHECKS FOR DEBL BEING SET BY AN ADJACENT BIT.

PROBABLE FAULT:

1. CS MODULE

LAST SECTOR, LAST TRACK TEST

PURPOSE:

TO VERIFY THE DESIRED TRACK/SECTOR PLA ON THE DS MODULE USING RMMR1, BITS 01 AND 02.

PROCEDURE:

THE TEST WRITES ALL POSSIBLE PATTERNS IN THE DISK ADDRESS REGISTER, RMDA, AND VERIFIES "LS" AND "LS T" STATUS FOR EACH PATTERN. THE PROCEDURE IS DONE ONCE FOR 16 BIT FORMAT AND ONCE FOR 18 BIT FORMAT.

PROBABLE FAULT:

1. DS MODULE

2. CS MODULE

RMDA COUNT TEST

PURPOSE

TO VERIFY THAT THE DISK ADDRESS REGISTER (RMDA) INCREMENTS

1231 PROPERLY.

PROCEDURE:

THE TEST INCREMENTS RMDA USING DIAGNOSTIC END OF BLOCK "DEBL" AND VERIFIES THE RESULT IN BOTH 16 AND 18 BIT FORMAT.

PROBABLE FAULT:

1. DS MODULE

RMDC COUNT TEST

PURPOSE:

TO VERIFY THAT THE DESIRED CYLINDER REGISTER, RMDC, INCREMENTS PROPERLY.

PROCEDURE:

THE PROGRAM INCREMENTS RMDC USING DIAGNOSTIC END OF BLOCK, "DEBL", VERIFYING THAT RMDC INCREMENTS THROUGH A COMPLETE CYCLE.

PROBABLE FAULT:

1. DS MODULE

LBT TEST

PURPOSE:

TO INSURE THAT LAST BLOCK TAKEN STATUS, "LBT", CLEARS WHEN RMDA IS WRITTEN, AND SETS WHEN THE LAST SECTOR IS TRANSFERRED.

PROCEDURE:

THE TEST USES DIAGNOSTIC EBL TO SET LBT, AND TRANSFERS TO RMDA TO RESET LBT.

PROBABLE FAULT:

1. DS MODULE
2. IF MODULE

COMPOSITE ERROR TEST

PURPOSE:

TO TEST "COMPOSITE ERROR", BIT 14 OF RMDS.

PROCEDURE:

THE TEST USES INITIALIZE AND DIAGNOSTIC MODE TO FORCE ALL ERRORS TO ZERO THEN VERIFIES THAT "ERR" IS ZERO. EACH ERROR IS INDIVIDUALLY SET AND "ERR" SHOULD BE ONE FOR EVERY ERROR TESTED. ADDRESSES #2 AND #17 OF THE COMPOSITE ERROR PLA ARE NOT TESTED. "ABORT" AND "EXCEPTION" OUTPUTS OF THE PLA ARE NOT TESTED. THE TEST FAILS IF ERR IS NOT ZERO WITH ALL SET ARGUMENTS ZERO OR IF ERR IS NOT ONE WITH ANY SET ARGUMENT ONE.

PROBABLE FAULT:

1. IF MODULE

WRITE GO TEST

PURPOSE:

TO VERIFY THAT GO CAN BE SET.

PROCEDURE:

THE TEST ENABLES THE DEBUG CLOCK, THEN TRANSFERS A NOP FUNCTION CODE AND GO BIT TO RMCS1, VERIFYING THAT GO SETS. ALL FUNCTION CODES ARE TESTED.

PROBABLE FAULT:

1. IF MODULE

2. CS MODULE

BRANCH MULTIPLEXOR TEST

PURPOSE:

TO VERIFY THAT THE OUTPUT OF THE COMMAND SEQUENCER BRANCH

1344 MULTIPLEXOR DOES NOT HAVE A FAULT.

PROCEDURE:

WITH DEBUG CLOCK ENABLED, THE TEST USES VARIOUS FUNCTION CODES AND REGISTER CONDITIONS TO ADDRESS THE TEST BIT MULTIPLEXOR SUCH THAT THE TEST BIT, BIT12 OF RMMR2, CAN BE CHECKED FOR A STUCK FAULT.

PROBABLE FAULT:

1. CS MODULE

SET/RESET GO TEST

PURPOSE:

TO VERIFY THAT GO CAN BE SET AND RESET.

PROCEDURE:

THE SUBSYSTEM IS INITIALIZED AND PUT IN DIAGNOSTIC MODE WITH "DEBUG CLOCK ENABLE" BIT 14 OF RMMR1 SET.CERTAIN FUNCTION CODES ARE WRITTEN IN RMCS1 AND THE PROGRAM READS RMCS1 TO VERIFY THAT GO IS SET. RMDS IS ALSO READ TO VERIFY THAT "DRY" IS RESET. THEN THE PROGRAM STEPS THE DEBUG CLOCK USING BIT 15 OF RMMR1 AND VERIFIES THAT "GO" RESETS AND "DRY" SETS. USING A FUNCTION CODE THAT RESETS GO AT A DIFFERENT PROM ADDRESS. THE TEST FAILS IF GO DOES NOT SET OR CANNOT BE RESET BY THE COMMAND SEQUENCER. THE TEST ALSO FAILS IF "DRIVE READY" IS NOT THE COMPLIMENT OF GO.

PROBABLE FAULT:

1. CS MODULE

2. IF MODULE

END 1 RESET GO TEST

PURPOSE:

TO VERIFY THAT THE COMMAND SEQUENCER CAN RESET GO AT THE END1 LOCATION.

PROCEDURE:

THE TEST EXECUTES RELEASE, SEARCH AND ILLEGAL FUNCTION CODE 32 IN DIAGNOSTIC MODE AND VERIFIES THAT GO RESETS ON THE SPECIFIED CLOCK CYCLE.

PROBABLE FAULT:

1. CS MODULE

SET PULSE TEST

PURPOSE:

TO VERIFY THAT THE COMMAND SEQUENCER CAN GENERATE SET PULSE.

PROCEDURE:

WHICH DEBUG CLOCK ENABLED, THE TEST STEPS THE COMMAND SEQUENCER THROUGH PARTS OF VARIOUS FUNCTION CODES AND CHECKS CONTINUE, BIT 06 OF RMMR1 TO DETERMINE IF SET PULSE IS BEING GENERATED.

PROBABLE FAULT:

1. CS MODULE

SET/RESET IVC TEST

PURPOSE:

TO TEST "INVALID COMMAND" ST S FOR EACH FUNCTION CODE.

PROCEDURE:

THE PROGRAM RESETS VOLUME VALID USING "MAINTENANCE UNIT READY", BIT09 OF RMMR1, THEN LOADS THE FUNCTION CODE AND GO IN RMCS1. EACH FUNCTION CODE IS TESTED AND "IVC" BIT 12 OF RMER2 IS CHECKED.

PROBABLE FAULT:

1. CS MODULE

2. IF MODULE

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1457
```

SET LSC TEST

PURPOSE:

TO VERIFY THAT "LOSS OF SYSTEM CLOCK" CAN SET AND RESET.

PROCEDURE:

THE TEST ENABLES THE DEBUG CLOCK AND SETS THE GO BIT. AFTER WAITING ENOUGH TIME FOR THE ONE SHOT TO SET, THE TEST DISABLES THE DEBUG CLOCK AND VERIFIES THAT LSC SETS.

PROBABLE FAULT:

1. CS MODULE

2. IF MODULE

DECODE TEST

PURPOSE:

TO VERIFY THAT THE "DECODE" FLOP ON THE IF MODULE SETS WITH THE LEADING EDGE OF "SET PULSE" EXCEPT WHEN "COMPOSITE ERROR" IS ACTIVE.

PROCEDURE:

THE TEST USES "VOLUME VALID" AND "OCCUPPIED" TO DETERMINE IF THE DECODE FLOP IS SET OR RESET. INITIALLY, VV AND OCCUPPIED ARE RESET AND THE TEST EXECUTES THOSE COMMANDS WHICH SET VV OR OCC AND VERIFIES THAT ONE OR BOTH BITS SET. THE SAME COMMANDS ARE EXECUTED AGAIN WITH COMPOSITE ERROR SET, AND THE TEST VERIFIES THAT NEITHER BIT SETS.

PROBABLE FAULT:

1. IF MODULE

SET/RESET VOLUME VALID TEST

PURPOSE:

TO VERIFY THAT "VOLUME VALID" RESETS WITH THE LEADING EDGE OF UNIT READY, AND SETS WITH PACK ACKNOWLEDGE AND READ IN PRESET COMMANDS.

PROCEDURE:

USING "MAINTENANCE UNIT READY", BIT 9 OF RMMR1, THIS TEST FORCES A ZERO TO ONE TRANSITION OF UNIT READY AND VERIFIES THAT VOLUME VALID,BIT 6 OF RMDS IS ZERO. THEN THE TEST EXECUTES A PACK ACKNOWLEDGE COMMAND, VERIFYING THAT VV SETS. THE PROCEDURE IS REPEATED WITH A READ IN PRESET COMMAND.

PROBABLE FAULT:

1. IF MODULE

ILLEGAL FUNCTION TEST

PURPOSE:

TO TEST ILLEGAL FUNCTION ERROR IN THE RM03.

PROCEDURE:

WITH DIAGNOSTIC CLOCK ENABLED TO INHIBIT THE COMMAND SEQUENCER, THIS TEST VERIFIES THAT "ILF", BIT 0 OF RMER1, IS OFF FOR LEGAL FUNCTION CODES AND ON FOR ILLEGAL FUNCTIONCODES. THE STATUS OF THE "GO" BIT IS IGNORED.

PROBABLE FAULT:

1. IF MODULE

OCCUPIED TEST

PURPOSE:

TO VERIFY THAT "OCCUPIED" IS SET DURING DATA TRANSFERS AND IS RESET FOR ALL OTHER COMMANDS.

PROCEDURE:

FOR EACH DATA TRANSFER COMMAND, "OCC", BIT 15 OF RMMR1

```
1569                    SHOULD  BE  ONE,  DEBUG  CLOCK  IS  ENABLED  TO  PREVENT  GO FROM
1570                    RESETTING BEFORE STATUS IS SAMPLED.
```

PROBABLE FAULT:

1. IF MODULE

2. CS MODULE

READ IN PRESET TEST

PURPOSE:

TO VERIFY THAT "READ IN PRESET" COMMAND IS DECODED, AND IN PARTICULAR, TO VERIFY THAT "IFS READ IN CMD L" IS NOT STUCK AT ONE.

PROCEDURE:

EACH VISIBLE STATUS OR REGISTER BIT WHICH IS CLEARED BY "READ IN PRESET" IS SET. THEN THE RIP COMMAND IS EXECUTED AND THE TEST VERIFIES THAT ONE OR MORE BITS ARE CLEARED. THE FOLLOWING ARE USED DURING THE TEST.

. BITS 10-12 OF RMOF ARE SET BY A MOVE INSTRUCTION AND THE TEST PASSES IF THESE BITS ARE ZERO AFTER THE RIP COMMAND.

. THE DESIRED CYLINDER REGISTER, RMDC, IS SET WITH A MOVE INSTRUCTION AND THE TEST PASSES IF BITS 00-03, OR BITS 04-07, OR BITS 08-09 ARE ZERO AFTER THE RIP COMMAND.

. THE DISK ADDRESS REGISTER, RMDA, IS SET WITH A MOVE INSTRUCTION AND THE TEST PASSES IF BITS 00-03, OR BITS 04-07, OR BITS 08-11, OR BITS 12-15 ARE ZERO AFTER THE RIP COMMAND.

THE TEST FAILS IF NONE OF THE PRESET TERMS ARE ZERO AFTER THE RIP COMMAND.

PROBABLE FAULT:

1. IF MODULE

RIP/RMOF TEST

PURPOSE:

TO VERIFY THAT "READ IN PRESET" RESETS FMT16, ECI AND HCI, BITS 10,11 AND 12 OF RMOF.

PROCEDURE:

FMT16, ECI AND HCI ARE SET, THEN A RIP COMMAND IS EXECUTED AND EACH BIT SHOULD BE ZERO.

PROBABLE FAULT:

1. IF MODULE

RMDA/RMDC/RIP TEST

PURPOSE:

TO VERIFY THAT "READ IN PRESET" RESETS THE DESIRED CYLINDER ADDRESS, RMDC, AND THE DISK ADDRESS, RMDA.

PROCEDURE:

RMDA AND RMDC ARE PRESET THEN TESTED FOR ZERO AFTER THE RIP COMMAND.

PROBABLE FAULT:

1. DS MODULE

OFFSET COMMAND TEST

PURPOSE:

TO VERIFY THAT "OFFSET MODE" SETS WITH OFFSET COMMAND.

PROCEDURE:

THE TEST EXECUTES OFFSET COMMAND AND VERIFIES THAT "OM", BIT 00 OF RMDS IS ONE.

PROBABLE FAULT:

1. IF MODULE

RETURN TO CENTER TEST

PURPOSE:

TO VERIFY THAT "RETURN TO CENTER" RESETS OFFSET MODE.

PROCEDURE:

OFFSET MODE, BIT 00 OF RMDS, IS SET WITH OFFSET COMMAND. THEN THE TEST EXECUTES A RETURN TO CENTER COMMAND AND VERIFIES THAT OFFSET MODE RESETS. OFFSET DIRECTION IS ALSO SET AND CHECKED FOR ZERO AFTER THE COMMAND.

PROBABLE FAULT:

1. IF MODULE

RMDC CLEAR OFFSET TEST

PURPOSE:

TO VERIFY THAT CLEAR OFFSET IS ACTIVE WHEN THE DESIRED CYLINDER ADDRESS IS WRITTEN.

PROCEDURE:

THE TEST EXECUTES AN OFFSET COMMAND, WRITES RMDC, AND VERIFIES THAT OM, BIT 00 OF RMDS IS ZERO.

PROBABLE FAULT:

1. DS MODULE
2. IF MODULE

EBL CLEAR OFFSET TEST

PURPOSE:

TO VERIFY THAT OFFSET MODE CLEARS WHEN HEAD SWITCHING OCCURS.

PROCEDURE:

THE TEST EXECUTES AN OFFSET COMMAND TO SET OFFSET MODE. AFTER SETTING THE FORMAT BIT AND LOADING THE LAST SECTOR/TRACK ADDRESS IN RMDA, THE TEST FORCES AN EBL AND VERIFIES THAT OFFSET MODE RESETS.

PROBABLE FAULT:

1. DS MODULE

RUN AND GO TEST

PURPOSE:

TO VERIFY THAT "RUN AND GO" FLOP SETS DURING READ AND WRITE COMMANDS.

PROCEDURE:

THE RM03 IS INITIALIZED AND A DATA TRANSFER COMMAND WITH GO SET IS WRITTEN IN RMCS1. "RUN AND GO", BIT 14 OF RMMR1 SHOULD BE ONE FOR EACH DATA COMMAND. THE DEBUG CLOCK IS ENABLED SO THAT GO DOES NOT RESET BEFORE STATUS IS TESTED.

PROBABLE FAULT:

1. CS MODULE
2. SYNCHRONOUS MASSBUS MODULE

SET IAE TEST

PURPOSE:

TO VERIFY THAT INVALID ADDRESS ERROR CAN SET.

PROCEDURE·

THE TEST LOADS INVALID SECTOR, TRACK AND CYLINDER ADDRESSES AND EXECUTES A SEARCH COMMAND, VERIFYING THAT "IAE" SETS. THE PROCESS IS REPEATED WITH A DIFFERENT COMMAND IF THE IAE DOES NOT SET, AND THE TEST FAILS IF IAE CANNOT BE SET.

PROBABLE FAULT:

1. DS MODULE
2. IF MODULE

SEARCH, SEEK, READ, WRITE TEST

PURPOSE:

TO VERIFY THAT THE "SCH SK R OR W" DECODE ON THE IF MODULE IS CORRECT FOR ALL FUNCTION CODES.

PROCEDURE:

THE TEST LOADS INVALID SECTOR, TRACK AND CYLINDER ADDRESSES AND EXECUTES EACH COMMAND TO WHERE SET PULSE IS ACTIVE AND VERIFIES THE DECODE BY CHECKING "IAE".

PROBABLE FAULT:

1. IF MODULE

INVALID SECTOR/TRACK TEST

PUPOSE:

TO VERIFY THAT INVALID SECTOR AND TRACK ADDRESSES ARE DETECTED.

PROCEDURE:

THE TEST LOADS THE TEST PATTERN IN RMDA AND EXECUTES A SEARCH COMMAND, VERIFYING THAT "IAE" SETS.

PROBABLE FAULT:

1. DS MODULE
2. TRACK ADDRESS OPTION JUMPER

```
1846
1847
1848
1849                    ;   INVALID CYLINDER TEST
1850
1851                            PURPOSE:
1852
1853                                 TO VERIFY THAT INVALID CYLINDER ADDRESSES ARE DETECTED.
1854
1855                            PROCEDURE:
1856
1857                                 THE TEST LOADS THE TEST  PATTERN  IN  RMDC  AND  EXECUTES  A
1858                            SEARCH COMMAND, VERIFYING THAT "IAE" SETS.
1859
1860                            PROBABLE FAULTS:
1861                                                                                          .
1862                            1.  DS MODULE
1863
1864                            2.  CYLINDER ADDRESS OPTION JUMPER
1865
1866
1867
1868
1869
1870
1871                        SET AOE TEST
1872
1873                            PRUPOSE:
1874
1875                                 TO VERIFY THAT ADDRESS OVERFLOW ERROR IS DETECTED.
1876
1877                            PROCEDURE:
1878
1879                                 THE TEST LOADS THE ADDRESS OF THE LAST SECTOR  IN  RMDA  AND
1880                            RMDC,  THEN  INITIATES  A  DATA COMMAND WITH DEBUG CLOCK ENABLED.
1881                            END OF BLOCK IS FORCED TO INCREMENT THE SECTOR ADDRESS,  AND  THE
1882                            TEST VERIFIES THAT "AOE" IS SET.
1883
1884                            PROBABLE FAULT:
1885
1886                            1.  DS MODULE
1887
1888
1889
1890
1891
1892
1893                    SET RMR TEST
1894
1895                            PURPOSE:
1896
1897                                 TO VERIFY THAT "REGISTER MODIFICATION REFUSED" SETS  WHEN  A
1898                            REGISTER IS WRITTEN WHILE GO IS SET, EXCEPT WHEN THE ATTENTION OR
1899                            MAINTENANCE REGISTER IS WRITTEN.
1900
1901                            PROCEDURE:
```

"DEBUG CLOCK ENABLE" IS SET TO INHIBIT THE COMMAND SEQUENCER, THEN A NOP COMMAND AND GO BIT IS WRITTEN IN RMCS1. WITHOUT STEPPING THE DEBUG CLOCK, THE TEST WRITES RMMR AND RMAS, WHICH SHOULD NOT SET RMR STATUS. THEN RMDA IS WRITTEN AND RMR STATUS, BIT 02 OF RMER1, SHOULD BE ONE.

PROBABLE FAULT:

1. IF MODULE

PGM STATUS CHECK

PURPOSE:

TO VERIFY THAT THE PROGRAMMABLE STATUS BIT AND THE DRIVE REQUEST STATUS BIT ARE COMPATABLE.

PROCEDURE:

THE TEST REPORTS AN ERROR IF PGM IS ON AND DRQ IS OFF. PGM IS NOT PREDICTABLE IN THE CASE WHERE DRQ IS ON BECAUSE OF THE PORT SELECT SWITCH.

PROBABLE FAULT:

1. IF MODULE

DVA/DPR STATUS CHECK PURPOSE:

TO VERIFY THAT DRIVE PRESENT STATUS AND DEVICE AVAILABLE STATUS ARE SET.

PROCEDURE:

DPR AND DVA ARE TESTED AND BOTH SHOULD BE ON.

PROBABLE FAULT:

1. IF MODULE

PORT REQUEST TEST, PART 1/3

PURPOSE:

TO VERIFY THAT THE PORT REQUEST FLOPS ON THE IF MODULE SET WHEN THE PROGRAM READS RMCS1.

PROCEDURE:

THE TEST EXECUTES A RELEASE COMMAND, THEN, ASSUMING THE PORT IS RELEASED, IT READS RMCS1, THEN READS RMMR2 AND VERIFIES THAT ONE OF THE PORT REQUEST FLOPS IS SET.

PROBABLE FAULT:

1. IF MODULE
2. CS MODULE

PORT REQUEST TEST, PART 2/3

PURPOSE:

TO VERIFY THAT THE PORT REQUEST FLOPS ON THE IF MODULE SET WHEN THE PROGRAM WRITES RMAS.

PROCEDURE:

THE TEST EXECUTES A RELEASE COMMAND THEN WRITES RMAS AND READS RMMR2, VERIFYING THAT ONE OF THE REQUEST FLOPS IS SET.

PROBABLE FAULT:

1. IF MODULE
2. CS MODULE

DATA COMMAND TESTS

PURPOSE:

TO VERIFY THE COMMAND SEQUENCER DURING DATA COMMANDS.

2011 PROCEDURE:

THIS TEST, LIKE RECALIBRATE, SEEK, AND SEARCH TESTS, USES THE MAINTENANCE REGISTER TO SIMULATE DRIVE CONDITIONS AND FORCE THE COMMAND SEQUENCER THROUGH EACH BRANCH PATH. ADDITIONAL ITEMS WHICH ARE TESTED INCLUDE OFFSET PLUS AND MINUS ON THE TAG BUS AND "ENABLE SEARCH", BIT 11 OF RMMR1.

PROBABLE FAULT:

1. CS MODULE

DATA SEQUENCER READ TEST

PURPOSE:

TO TEST THE CS AND DS MODULES FOR EXECUTION OF A READ COMMAND.

PROCEDURE:

THE RM03 IS INITIALIZED AND, USING DIAGNOSTIC MODE, A READ COMMAND IS STEPPED TO THE POINT WHERE THE COMMAND SEQUENCER ENABLES SEARCH. THE PROGRAM THEN STARTS STEPPING THE DATA SEQUENCER ON THE CS MODULE AND MONITORS HARDWARE OPERATION USING THE FOLLOWING STATUS:

.PLFS, BIT 10 OF RMMR1, SHOWS THE PERIOD WHEN THE DATA PROM HAS ENABLED SYNC BYTE DETECTION;

.PDA, BIT 08 OF RMMR1, SHOWS WHEN THE DATA PROM IS IN THE DATA AREA OF THE SECTOR;

.PHA, BIT 07 OF RMMR1, SHOWS WHEN THE DATA PROM IS IN THE HEADER AREA OF THE SECTOR;

.BB00, BIT00 OF RMMR2, SHOWS THE STATE OF WRITE GATE PROVIDING TAG IS HIGH;

.BB01, BIT 01 OF RMMR2, SHOWS THE STATE OF READ GATE PROVING TAG IS HIGH;

.WC, BIT 05 OF RMMR1, SHOWS THE STATE OF WORD CLOCK;

.EECC, BIT 04 OF RMMR1, SHOWS WHEN ECC CHARACTER IS ENABLED DURING WRITE;

.ECRC, BIT 09 OF RMMR1, SHOWS WHEN CRC CHARACTER IS ENABLED DURING WRITE;

.WD, BIT 03 OF RMMR1, SHOWS THE STATE OF WRITE DATA.

ADDITIONALLY, STATUS BITS IN RMER1 ARE USED TO TEST COMMAND EXECUTION. THE WRITE ONLY BITS OF RMMR1 ARE USED TO SIMULATE DRIVE STATUS AND CONTROL SIGNALS, AND TO SPECIFY READ DATA.

PROBABLE FAULT:

1. CS MODULE
2. DS MODULE

DATA SEQUENCER WRITE TEST

PURPOSE:

TO TEST THE CS AND DS MODULES FOR EXECUTION OF A WRITE COMMAND.

PROCEDURE:

THE PROCEDURE IS THE SAME AS THE DATA SEQUENCER READ TEST.

PROBABLE FAULT:

1. CS MODULE
2. DS MODULE

DATA SEQUENCER FORMAT TEST

PURPOSE:

TO TEST CS AND DS MODULES FOR EXECUTION OF A FORMAT COMMAND.

PROCEDURE:

THE PROCEDURE IS THE SAME AS THE DATA SEQUENCER READ TEST.

PROBABLE FAULT:

1. CS MODULE

2. DS MODULE

18 BIT WORD CLOCK TEST

PURPOSE:

TC TEST THE GENERATION OF WORD CLOCK IN 18 BIT FORMAT.

PROCEDURE:

DIAGNOSTIC MODE IS USED TO EXECUTE A READ COMMAND. THE PROGRAM VERIFIES THAT WORD CLOCK SWITCHES TO 18 BIT FORMAT AT THE DATA AREA AND SWITCHES BACK TO 16 BIT FORMAT DURING ECC. THE TEST IS REPEATED FOR A WRITE COMMAND.

PROBABLE FAULT:

1. CS MODULE

2. DS MODULE

HCRC SET TEST

PURPOSE:

TO VERIFY THAT "HCRC" STATUS SETS WHEN THE HEADER CRC WORD IS IN ERROR.

PROCEDURE:

USING DIAGNOSTIC MODE TO EXECUTE A READ COMMAND, THE PROGRAM STEPS THE DATA SEQUENCER THROUGH THE HEADER AND PROVIDES READ DATA WHICH SHOULD CAUSE A CRC ERROR. THE TEST FAILS IF "HCRC", BIT 08 OF RMER1 DOES NOT SET.

PROBABLE FAULT:

1. DS MODULE

2. IF MODULE

HCE SET TEST

PURPOSE:

TO VERIFY THAT "HCE" STATUS SETS IF THE HEADER DOES NOT COMPARE WITH RMDC AND RMDA.

PROCEDURE:

THE PROGRAM EXECUTES A READ COMMAND USING DIAGNOSTIC MODE. READ DATA IS SUPPLIED WHICH CAUSES A HEADER COMPARE ERROR IN BITS 00-03 OF HEADER WORD ONE AND THE PROGRAM VERIFIES THAT "HCE", BIT 07 OF RMER1 IS ONE. THIS PROCESS IS REPEATED FOR BITS 04-07 AND 08-11.

PROBABLE FAULT:

1. DS MODULE
2. CS MODULE
3. IF MODULE

FER SET TEST

PURPOSE:

TO VERIFY THAT "FER" STATUS SETS WHEN THE FORMAT BIT DOES NOT COMPARE WITH THE HEADER.

PROCEDURE:

THIS PROGRAM EXECUTES A READ COMMAND USING DIAGNOSTIC MODE AND FORCES A FORMAT ERROR IN THE FIRST HEADER WORD. THE TEST FAILS IF "FER", BIT 04 OF RMER1 DOES NOT SET.

PROBABLE FAULT:

1. DS MODULE
2. CS MODULE
3. IF MODULE

DCK SET TEST

PURPOSE:

TO VERIFY THAT "DCK" STATUS SETS WHEN A CORRECTABLE ECC ERROR OCCURRS.

PROCEDURE:

THE PROGRAM SIMULATES A READ OPERATION AND FORCES AN ECC ERROR WHICH IS CORRECTABLE. "DCK", BIT 15 OF RMER1 SHOULD BE SET AND "ECH", BIT 06 OF RMER1 SHOULD BE RESET. RMEC1 AND RMEC2 SHOULD PERMIT DATA CORRECTION.

PROBABLE FAULT:

1. DS MODULE
2. CS MODULE
3. IF MODULE

ECH SET TEST

PURPOSE:

TO VERIFY THAT "ECH" STATUS SETS WHEN A NONCORRECTABLE ECC ERROR OCCURRS DURING READ.

PROCEDURE:

THIS TEST IS LIKE THE DCK SET TEST EXCEPT THE PROGRAM USES AN UNCORRECTABLE ERROR BURST.

PROBABLE FAULT:

1. DS MODULE
2. CS MODULE
3. IF MODULE

DVA/DPR

STATUS CHECK PURPOSE:

TO VERIFY THAT DRIVE PRESENT STATUS AND DEVICE AVAILABLE STATUS ARE SET.

PROCEDURE:

DPR AND DVA ARE TESTED AND BOTH SHOULD BE ON.

PROBABLE FAULT:

1. IF MODULE

PGM STATUS CHECK

PURPOSE:

TO VERIFY THAT THE PROGRAMMABLE STATUS BIT AND THE DRIVE REQUEST STATUS BIT ARE COMPATABLE.

PROCEDURE:

THE TEST REPORTS AN ERROR IF PGM IS ON AND DRQ IS OFF. PGM IS NOT PREDICTABLE IN THE CASE WHERE DRQ IS ON BECAUSE OF THE PORT SELECT SWITCH.

PROBABLE FAULT:

1. IF MODULE

SET AOE TEST

PRUPOSE:

TO VERIFY THAT ADDRESS OVERFLOW ERROR IS DETECTED.

PROCEDURE:

THE TEST LOADS THE ADDRESS OF THE LAST SECTOR IN RMDA AND RMDC, THEN INITIATES A DATA COMMAND WITH DEBUG CLOCK ENABLED.

```
2334                                    END OF BLOCK IS FORCED TO INCREMENT THE SECTOR ADDRESS,  AND  THE
2335                                    TEST VERIFIES THAT "AOE" IS SET.
```

PROBABLE FAULT:

1. DS MODULE

CLEAR OFFSET STUCK ACTIVE TEST

PURPOSE:

TO VERIFY THAT THE SIGNAL WHICH CLEARS OFFSET MODE IS NOT STUCK IN ACTIVE STATE.

PROCEDURE:

THE TEST WRITES A ONE IN THE OFFSET DIRECTION BIT WHICH IS CLEARED BY THE SIGNAL AND VERIFIES THAT A ONE CAN BE READ BACK.

PROBABLE FAULT:

1. IF MODULE
2. DS MODULE

INVALID SECTOR/TRACK TEST

PUPOSE:

TO VERIFY THAT INVALID SECTOR AND TRACK ADDRESSES ARE DETECTED.

PROCEDURE:

THE TEST LOADS THE TEST PATTERN IN RMDA AND EXECUTES A SEARCH COMMAND, VERIFYING THAT "IAE" SETS.

PROBABLE FAULT:

1. DS MODULE
2. TRACK ADDRESS OPTION JUMPER

INVALID CYLINDER TEST

PURPOSE:

TO VERIFY THAT INVALID CYLINDER ADDRESSES ARE DETECTED.

PROCEDURE:

THE TEST LOADS THE TEST PATTERN IN RMDC AND EXECUTES A SEARCH COMMAND, VERIFYING THAT "IAE" SETS.

PROBABLE FAULTS:

1. DS MODULE
2. CYLINDER ADDRESS OPTION JUMPER.

SEARCH, SEEK, READ, WRITE TEST

PURPOSE:

TO VERIFY THAT THE "SCH SK R OR W" DECODE ON THE IF MODULE IS CORRECT FOR ALL FUNCTION CODES.

PROCEDURE:

THE TEST LOADS INVALID SECTOR, TRACK AND CYLINDER ADDRESSES AND EXECUTES EACH COMMAND TO WHERE SET PULSE IS ACTIVE AND VERIFIES THE DECODE BY CHECKING "IAE".

PROBABLE FAULT:

1. IF MODULE

EBL CLEAR OFFSET TEST

PURPOSE:

TO VERIFY THAT OFFSET MODE CLEARS WHEN HEAD SWITCHING OCCURS.

PROCEDURE:

THE TEST EXECUTES AN OFFSET COMMAND TO SET OFFSET MODE. AFTER SETTING THE FORMAT BIT AND LOADING THE LAST SECTOR/TRACK ADDRESS IN RMDA, THE TEST FORCES AN EBL AND VERIFIES THAT OFFSET MODE RESETS.

PROBABLE FAULT:

1. DS MODULE

SET LSC TEST

PURPOSE:

TO VERIFY THAT "LOSS OF SYSTEM CLOCK" CAN SET AND RESET.

PROCEDURE:

THE TEST ENABLES THE DEBUG CLOCK AND SETS THE GO BIT. AFTER WAITING ENOJGH TIME FOR THE ONE SHOT TO SET, THE TEST DISABLES THE DEBUG CLOCK AND VERIFIES THAT LSC SETS.

PROBABLE FAULT:

1. CS MODULE
2. IF MODULE

DECODE TEST

PURPOSE:

TO VERIFY THAT THE "DECODE" FLOP ON THE IF MODULE SETS WITH THE LEADING EDGE OF "SET PULSE" EXCEPT WHEN "COMPOSITE ERROR" IS ACTIVE.

PROCEDURE:

THE TEST USES "VOLUME VALID" AND "OCCUPPIED" TO DETERMINE IF THE DECODE FLOP IS SET OR RESET. INITIALLY, VV AND OCCUPPIED ARE RESET AND THE TEST EXECUTES THOSE COMMANDS WHICH SET VV OR OCC AND VERIFIES THAT ONE OR BOTH BITS SET. THE SAME COMMANDS ARE EXECUTED AGAIN WITH COMPOSITE ERROR SET, AND THE TEST VERIFIES THAT NEITHER BIT SETS.

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2500
2501                                    PROBABLE FAULT:
```

1. IF MODULE

SET IAE TEST

PURPOSE:

TO VERIFY THAT INVALID ADDRESS ERROR CAN SET.

PROCEDURE:

THE TEST LOADS INVALID SECTOR, TRACK AND CYLINDER ADDRESSES AND EXECUTES A SEARCH COMMAND, VERIFYING THAT "IAE" SETS. THE PROCESS IS REPEATED WITH A DIFFERENT COMMAND IF THE IAE DOES NOT SET, AND THE TEST FAILS IF IAE CANNOT BE SET.

PROBABLE FAULT:

1. DS MODULE
2. IF MODULE

PORT REQUEST TEST, PART 3/3

PURPOSE:

TO VERIFY THAT PORT REQUEST SETS WHEN ANY REGISTER EXCEPT RMAS IS WRITTEN.

PROCEDURE:

THE TEST WRITES THE DISK ADDRESS REGISTER AND VERIFIES THAT THE PORT REQUEST FLOP IS ON.

PROBABLE FAULT:

1. IF MODULE
2. CS MODULE

```
2554
2555
2556
2557                    WRITE ATA TEST
2558
2559                         PURPOSE:
2560
2561                              TO VERIFY THAT ATTENTION CAN BE CLEARED BY WRITING THE
2562                         ATTENTION SUMMARY REGISTER.
2563
2564                         PROCEDURE:
2565
2566                              THE PROGRAM RESETS AND SETS UNIT READY WHICH SHOULD CAUSE AN
2567                         ATTENTION,  THEN WRITES THE ATTENTION SUMMARY REGISTER AND
2568                         VERIFIES THAT ATTENTION IS RESET.
2569
2570                         PROBABLE FAULT:
2571
2572                         1.  IF MODULE
2573
2574                         2.  CS MODULE
2575
2576
2577
2578
2579
2580
2581                    RESET ATA BY GO TEST
2582
2583                         PURPOSE:
2584
2585                              TO VERIFY THAT ATA RESETS WHEN GO IS ON AND COMPOSITE ERROR
2586                         IS OFF.
2587
2588                         PROCEDURE:
2589
2590                              THE PROGRAM SETS MAINTENANCE UNIT READY WHICH SHOULD CAUSE
2591                         AN ATTENTION.  THEN, WITH DEBUG CLOCK ENABLED, GO IS SET, AND ATA
2592                         SHOULD BE ZERO.
2593
2594                         PROBABLE FAULT:
2595
2596                         1.  IF MODULE
2597
2598
2599
2600
2601
2602
2603                    UNIT READY ATA TEST
2604
2605                         PURPOSE:
2606
2607                              TO VERIFY THAT ONE-ZERO AND ZERO-ONE TRANSITIONS OF UNIT
2608                         READY SET ATTENTION.
2609
```

2610 PROCEDURE:

THE TEST USES DIAGNOSTIC MODE TO FORCE BOTH TRANSITIONS OF UNIT READY AND VERIFIES THAT ATA SETS WITH EACH TRANSITION.

PROBABLE FAULT:

1. IF MODULE

ERROR ATA TEST

PURPOSE:

TO VERIFY THAT ATTENTION SETS WHEN COMPOSITE ERROR OCCURS WHILE GO IS OFF.

PROCEDURE:

THE PROGRAM CLEARS THE DEVICE AND SETS AN ERROR, THEN VERIFIES ATA IS ON.

PROBABLE FAULT:

1. IF MODULE

REGISTER TRANSFER ATA TEST

TO VERIFY THAT ATTENTION SETS WHEN ANY REGISTER, EXCEPT FOR RMAS AND RMCS, IS WRITTEN WHILE COMP ERROR IS SET.

PROCEDURE:

THE PROGRAM FORCES AN ERROR THEN RESETS ATTENTION FROM THE ERROR. THE PROGRAM THEN WRITES RMAS AND RMCS AND VERIFIES THAT NO ATTENTION OCCURS, AND WRITES RMDC AND VERIFIES THAT ATTENTION DOES OCCUR.

PROBABLE FAULT:

1. IF MODULE

```
                                ;PROGRAM REVISION #001

                                .TITLE  CZRMJB0 RM03/2 DSKLS DIAG
                                ;*COPYRIGHT (C) 1977
                                ;*DIGITAL EQUIPMENT CORP.
                                ;*MAYNARD, MASS. 01754
                                ;*
                                ;*PROGRAM BY DOUG RIIKONEN
                                ;*
                                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                                ;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
                                ;*
000001                          $TN=1
                                .SBTTL  OPERATIONAL SWITCH SETTINGS
                                ;*
                                ;*      SWITCH                  USE
                                ;*      ------          --------------------
                                ;*        15            HALT ON ERROR
                                ;*        14            LOOP ON TEST
                                ;*        13            INHIBIT ERROR TYPEOUTS
                                ;*        11            INHIBIT ITERATIONS
                                ;*        10            BELL ON ERROR
                                ;*         9            LOOP ON ERROR
                                ;*         8            LOOP ON TEST IN SWR<7:0>
                                ;*         7            TN128
                                ;*         6            TN64
                                ;*         5            TN32
                                ;*         4            TN16
                                ;*         3            TN8
                                ;*         2            TN4
                                ;*         1            TN2
                                ;*         0            TN1
                                .SBTTL  BASIC DEFINITIONS

                                ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                          STACK=  1100
                                .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                                .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL

                                ;*MISCELLANEOUS DEFINITIONS
000011                          HT=     11              ;;CODE FOR HORIZONTAL TAB
000012                          LF=     12              ;;CODE FOR LINE FEED
000015                          CR=     15              ;;CODE FOR CARRIAGE RETURN
000200                          CRLF=   200             ;;CODE FOR CARRIAGE RETURN-LINE FEED
177776                          PS=     177776          ;;PROCESSOR STATUS WORD
                                .EQUIV  PS,PSW
177774                          STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                          PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                          DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                          DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

                                ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                          R0=     %0              ;;GENERAL REGISTER
000001                          R1=     %1              ;;GENERAL REGISTER
000002                          R2=     %2              ;;GENERAL REGISTER
000003                          R3=     %3              ;;GENERAL REGISTER
```

```
2721    000004          R4=     %4              ;;GENERAL REGISTER
2722    000005          R5=     %5              ;;GENERAL REGISTER
2723    000006          R6=     %6              ;;GENERAL REGISTER
2724    000007          R7=     %7              ;;GENERAL REGISTER
2725    000006          SP=     %6              ;;STACK POINTER
2726    000007          PC=     %7              ;;PROGRAM COUNTER
2727
2728                    ;*PRIORITY LEVEL DEFINITIONS
2729    000000          PR0=    0               ;;PRIORITY LEVEL 0
2730    000040          PR1=    40              ;;PRIORITY LEVEL 1
2731    000100          PR2=    100             ;;PRIORITY LEVEL 2
2732    000140          PR3=    140             ;;PRIORITY LEVEL 3
2733    000200          PR4=    200             ;;PRIORITY LEVEL 4
2734    000240          PR5=    240             ;;PRIORITY LEVEL 5
2735    000300          PR6=    300             ;;PRIORITY LEVEL 6
2736    000340          PR7=    340             ;;PRIORITY LEVEL 7
2737
2738                    ;*"SWITCH REGISTER" SWITCH DEFINITIONS
2739    100000          SW15=   100000
2740    040000          SW14=   40000
2741    020000          SW13=   20000
2742    010000          SW12=   10000
2743    004000          SW11=   4000
2744    002000          SW10=   2000
2745    001000          SW09=   1000
2746    000400          SW08=   400
2747    000200          SW07=   200
2748    000100          SW06=   100
2749    000040          SW05=   40
2750    000020          SW04=   20
2751    000010          SW03=   10
2752    000004          SW02=   4
2753    000002          SW01=   2
2754    000001          SW00=   1
2755                    .EQUIV  SW09,SW9
2756                    .EQUIV  SW08,SW8
2757                    .EQUIV  SW07,SW7
2758                    .EQUIV  SW06,SW6
2759                    .EQUIV  SW05,SW5
2760                    .EQUIV  SW04,SW4
2761                    .EQUIV  SW03,SW3
2762                    .EQUIV  SW02,SW2
2763                    .EQUIV  SW01,SW1
2764                    .EQUIV  SW00,SW0
2765
2766                    ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
2767    100000          BIT15=  100000
2768    040000          BIT14=  40000
2769    020000          BIT13=  20000
2770    010000          BIT12=  10000
2771    004000          BIT11=  4000
2772    002000          BIT10=  2000
2773    001000          BIT09=  1000
2774    000400          BIT08=  400
2775    000200          BIT07=  200
2776    000100          BIT06=  100
```

```
                        BIT05=  40
                        BIT04=  20
                        BIT03=  10
                        BIT02=  4
                        BIT01=  2
                        BIT00=  1
                        .EQUIV  BIT09,BIT9
                        .EQUIV  BIT08,BIT8
                        .EQUIV  BIT07,BIT7
                        .EQUIV  BIT06,BIT6
                        .EQUIV  BIT05,BIT5
                        .EQUIV  BIT04,BIT4
                        .EQUIV  BIT03,BIT3
                        .EQUIV  BIT02,BIT2
                        .EQUIV  BIT01,BIT1
                        .EQUIV  BIT00,BIT0

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

                        .SBTTL  RM03 REGISTER BIT DEFINITIONS

                        ;RMCS1  CONTROL STATUS REGISTER

004000                  DVA     =       BIT11           ;DEVICE AVAILABLE-READ ONLY
000040                  F4      =       BIT05           ;FUNCTION CODE
000020                  F3      =       BIT04           ;FUNCTION CODE
000010                  F2      =       BIT03           ;FUNCTION CODE
000004                  F1      =       BIT02           ;FUNCTION CODE
000002                  F0      =       BIT01           ;FUNCTION CODE
000001                  GO      =       BIT00           ;GO BIT
000077                  FNCMSK  =       000077          ;FUNCTION CODE MASK

                        ;FUNCTION CODES (BITS 01-05 OF RMCS1)

000000                  NOP     =       000000          ;NOP COMMAND
000002                  ILF02   =       000002          ;ILLEGAL COMMAND
000004                  SEEK    =       000004          ;SEEK COMMAND
000006                  RECAL   =       000006          ;RECALIBRATE COMMAND
000010                  DRVCLR  =       000010          ;DRIVE CLEAR COMMAND
000012                  RLEASE  =       000012          ;RELEASE COMMAND
000014                  OFFSET  =       000014          ;OFFSET COMMAND
000016                  RTC     =       000016          ;RETURN TO CENTERLINE COMMAND
000020                  RIP     =       000020          ;READ IN PRESET COMMAND
000022                  PAKACK  =       000022          ;PACK ACKNOWLEDGE COMMAND
```

```
2833            000022          PACACK  =       PAKACK
2834            000024          ILF24   =       000024          ;ILLEGAL COMMAND
2835            000026          ILF26   =       000026          ;ILLEGAL COMMAND
2836            000030          SEARCH  =       000030          ;SEARCH COMMAND
2837            000030          ILF30   =       000030          ;ILLEGAL COMMAND
2838            000032          ILF32   =       000032          ;ILLEGAL COMMAND
2839            000034          ILF34   =       000034          ;ILLEGAL COMMAND
2840            000036          ILF36   =       000036          ;ILLEGAL COMMAND
2841            000040          ILF40   =       000040          ;ILLEGAL COMMAND
2842            000042          ILF42   =       000042          ;ILLEGAL COMMAND
2843            000044          ILF44   =       000044          ;ILLEGAL COMMAND
2844            000046          ILF46   =       000046          ;ILLEGAL COMMAND
2845            000050          WCD     =       000050          ;WRITE CHECK DATA COMMAND
2846            000052          WCH     =       000052          ;WRITE CHECK HEADER AND DATA
2847            000054          ILF54   =       000054          ;ILLEGAL COMMAND
2848            000056          ILF56   =       000056          ;ILLEGAL COMMAND
2849            000060          WD      =       000060          ;WRITE DATA COMMAND
2850            000062          WH      =       000062          ;WRITE HEADER AND DATA COMMAND
2851            000064          ILF64   =       000064          ;ILLEGAL COMMAND
2852            000066          ILF66   =       000066          ;ILLEGAL COMMAND
2853            000070          RD      =       000070          ;READ DATA COMMAND
2854            000072          RH      =       000072          ;READ HEADER AND DATA COMMAND
2855            000074          ILF74   =       000074          ;ILLEGAL COMMAND
2856            000076          ILF76   =       000076          ;ILLEGAL COMMAND
2857
2858                            ;RMDA   DISK ADDRESS REGISTER
2859
2860            002000          TA4     =       BIT10           ;TRACK ADDRESS 4
2861            001000          TA2     =       BIT09           ;TRACK ADDRESS 2
2862            000400          TA1     =       BIT08           ;TRACK ADDRESS 1
2863            000020          SA16    =       BIT04           ;SECTOR ADDRESS 16
2864            000010          SA8     =       BIT03           ;SECTOR ADDRESS 8
2865            000004          SA4     =       BIT02           ;SECTOR ADDRESS 4
2866            000002          SA2     =       BIT01           ;SECTOR ADDRESS 2
2867            000001          SA1     =       BIT00           ;SECTOR ADDRESS 1
2868
2869                            ;TRACK,SECTOR MASKS
2870
2871            003400          TADMSK  =       003400          ;TRACK ADDRESS MASK
2872            000037          SADMSK  =       000037          ;SECTOR ADDRESS MASK
2873
2874                            ;RMDS   DRIVE STATUS REGISTER
2875
2876            100000          ATA     =       BIT15           ;ATTENTION ACTIVE
2877            040000          ERR     =       BIT14           ;COMPOSITE ERROR
2878            020000          PIP     =       BIT13           ;POSITIONING IN PROGRESS
2879            010000          MOL     =       BIT12           ;MEDIUM ON LINE
2880            004000          WRL     =       BIT11           ;WRITE LOCK
2881            002000          LBT     =       BIT10           ;LAST BLOCK TRANSFERRED
2882            001000          PGM     =       BIT09           ;PROGRAMMABLE
2883            000400          DPR     =       BIT08           ;DRIVE PRESENT
2884            000200          DRY     =       BIT07           ;DRIVE READY
2885            000100          VV      =       BIT06           ;VOLUME VALID
2886            000001          OM      =       BIT00           ;OFFSET MODE ACTIVE
2887
2888                            ;RMER1  ERROR REGISTER #1
```

```
2889
2890            100000          DCK     =       BIT15           ;DATA CHECK ERROR
2891            040000          UNS     =       BIT14           ;DRIVE UNSAFE
2892            020000          OPI     =       BIT13           ;OPERATION INCOMPLETE
2893            010000          DTE     =       BIT12           ;DRIVE TIMING ERROR
2894            004000          WLE     =       BIT11           ;WRITE LOCK ERROR
2895            002000          IAE     =       BIT10           ;INVALID ADDRESS ERROR
2896            001000          AOE     =       BIT09           ;ADDRESS OVERFLOW ERROR
2897            000400          HCRC    =       BIT08           ;HEADER CRC ERROR
2898            000200          HCE     =       BIT07           ;HEADER COMPARE ERROR
2899            000100          ECH     =       BIT06           ;ECC "HARD" ERROR
2900            000040          WCF     =       BIT05           ;WRITE CLOCK FAILURE
2901            000020          FER     =       BIT04           ;FORMAT ERROR
2902            000010          PAR     =       BIT03           ;PARITY ERROR
2903            000004          RMR     =       BIT02           ;REGISTER MODIFICATION REFUSED
2904            000002          ILR     =       BIT01           ;ILLEGAL REGISTER
2905            000001          ILF     =       BIT00           ;ILLEGAL FUNCTION
2906
2907            115760          NDTMSK  =       DCK!DTE!WLE!AOE!HCRC!HCE!ECH!WCF!FER
2908                            ;"NDTMSK" IS USED TO MASK ERROR REGISTER 1 DURING NON - DATA
2909                            ;COMMANDS, I.E., HOUSEKEEPING AND POSITIONING COMMANDS
2910
2911                            ;RMAS   ATTENTION SUMMARY REGISTER
2912
2913            000377          ATNMSK  =       377             ;MASK FOR ATTENTION BITS
2914
2915                            ;RMLA   LOOK AHEAD REGISTER
2916
2917            002000          SC4     =       BIT10           ;SECTOR COUNT = 16
2918            001000          SC3     =       BIT09           ;SECTOR COUNT = 8
2919            000400          SC2     =       BIT08           ;SECTOR COUNT = 4
2920            000200          SC1     =       BIT07           ;SECTOR COUNT = 2
2921            000100          SC0     =       BIT06           ;SECTOR COUNT = 1
2922
2923            003700          SCTMSK  =       003700          ;SECTOR COUNT MASK
2924
2925                            ;RMMR   MAINTENANCE REGISTER
2926
2927                            ;       WRITE ONLY BITS
2928
2929            100000          DBCK    =       BIT15           ;DEBUG CLOCK
2930            040000          DBEN    =       BIT14           ;DEBUG CLOCK ENABLE
```

```
2931            020000          DEBL    =       BIT13           ;DIAGNOSTIC END OF BLOCK
2932            010000          DTO     =       BIT12           ;DIAGNOSTIC TIMEOUT
2933            004000          MCLK    =       BIT11           ;MAINTENANCE CLOCK
2934            002000          MRD     =       BIT10           ;READ DATA
2935            001000          MUR     =       BIT09           ;UNIT READY
2936            000400          MOC     =       BIT08           ;ON CYLINDER
2937            000200          MSER    =       BIT07           ;SEEK ERROR
2938            000100          MDF     =       BIT06           ;DRIVE FAULT
2939            000040          MS      =       BIT05           ;SECTOR PULSE
2940            000010          MWP     =       BIT03           ;WRITE PROTECT
2941            000004          MI      =       BIT02           ;INDEX PULSE
2942            000002          MSC     =       BIT01           ;SECTOR COMPARE
2943            000001          DMD     =       BIT00           ;DIAGNOSTIC MODE
2944
2945                            ;       READ ONLY BITS
2946
2947            100000          OCC     =       BIT15           ;OCCUPIED
2948            040000          RG      =       BIT14           ;RUN AND GO
2949            020000          EBL     =       BIT13           ;END OF BLOCK
2950            010000          REX     =       BIT12           ;EXCEPTION
2951            004000          ESRC    =       BIT11           ;ENABLE SEARCH
2952            002000          PLFS    =       BIT10           ;LOOKING FOR SYNC
2953            001000          ECRC    =       BIT09           ;ENABLE CRC OUT
2954            000400          PDA     =       BIT08           ;DATA AREA
2955            000200          PHA     =       BIT07           ;HEADER AREA
2956            000100          CONT    =       BIT06           ;CONTINUE
2957            000040          WC      =       BIT05           ;WORD CLOCK
2958            000020          EECC    =       BIT04           ;ENABLE ECC OUT
2959            000010          MWD     =       BIT03           ;WRITE DATA BIT
2960            000004          LS      =       BIT02           ;LAST SECTOR
2961            000002          LST     =       BIT01           ;LAST SECTOR AND TRACK
2962            000001          DMD     =       BIT00           ;DIAGNOSTIC MODE
2963
2964                            ;RMDT   DRIVE TYPE REGISTER
2965
2966            100000          NSA     =       BIT15           ;NOT SECTOR ADDRESSED=0
2967            040000          TAP     =       BIT14           ;TAPE DRIVE = 0
2968            020000          MOH     =       BIT13           ;MOVING HEAD = 1
2969            004000          DRQ     =       BIT11           ;DRIVE REQUEST REQUIRED
2970
2971            020024          SNGPRT  =       020024          ;SINGLE PORT DRIVE TYPE
2972            024024          DULPRT  =       024024          ;DUAL PORT DRIVE TYPE
2973
2974                            ;RMOF   OFFSET REGISTER
2975
2976            010000          FMT16   =       BIT12           ;16 BIT WORD FORMAT
2977            004000          ECI     =       BIT11           ;ECC INHIBIT
2978            002000          HCI     =       BIT10           ;HEADER COMPARE INHIBIT
2979            000200          OFD     =       BIT07           ;OFFSET FORWARD
2980            161577          XNUOF   =       161577          ;UNUSED BITS OF RMOF
2981
2982
2983                            ;RMDC   DESIRED CYLINDER ADDRESS REGISTER
2984            001777          CYLMSK  =       1777            ;MASK FOR CYLINDER ADDRESS
2985            176000          XNUDC   =       176000          ;UNUSED BITS OF RMDC
2986
```

```
                        ;RMMR2  MAINTENANCE REGISTER #2
                        ;
                        ;       READ ONLY BITS
100000                  RQA     =       BIT15           ;PORT A REQUEST
040000                  RQB     =       BIT14           ;PORT B REQUEST
020000                  TAG     =       BIT13           ;TAG CONTROL
010000                  TST     =       BIT12           ;COMMAND SEQUENCE TEST BIT
004000                  CC      =       BIT11           ;CONTROL OR CYLINDER TAG
002000                  CH      =       BIT10           ;CONTROL OR HEAD TAG
001000                  BB09    =       BIT09           ;TAG BUS
000400                  BB08    =       BIT08           ;TAG BUS
000200                  BB07    =       BIT07           ;TAG BUS
000100                  BB06    =       BIT06           ;TAG BUS
000040                  BB05    =       BIT05           ;TAG BUS
000020                  BB04    =       BIT04           ;TAG BUS
000010                  BB03    =       BIT03           ;TAG BUS
000004                  BB02    =       BIT02           ;TAG BUS
000002                  BB01    =       BIT01           ;TAG BUS
000001                  BB00    =       BIT00           ;TAG BUS

                        ;RMER2  ERROR REGISTER 2
                        ;
100000                  BSE     =       BIT15           ;BAD SECTOR ERROR
040000                  SKI     =       BIT14           ;SEEK INCOMPLETE
020000                  OPE     =       BIT13           ;OPERATOR PLUG ERROR
010000                  IVC     =       BIT12           ;INVALID COMMAND ERROR
004000                  LSC     =       BIT11           ;LOSS OF SYSTEM CLOCK
002000                  LBC     =       BIT10           ;LOSS OF BIT CLOCK
000200                  DVC     =       BIT07           ;DEVICE CHECK
000010                  DPE     =       BIT03           ;DATA PARITY ERROR
001567                  XNUER2  =       001567          ;UNUSED BITS OF RMER2

                        .SBTTL  PROGRAM MNEMONICS

100000                  MSE     =       BIT15           ;MANUFACTURING DETECTED SECTOR ERROR
040000                  USE     =       BIT14           ;USER DETECTED SECTOR ERROR

                        .SBTTL  RM03 REGISTER INDEX VALUES

000000                  RMCS1   =       00              ;CONTROL STATUS REGISTER
000006                  RMDA    =       06              ;DISK ADDRESS REGISTER
000012                  RMDS    =       12              ;DRIVE STATUS REGISTER
000014                  RMER1   =       14              ;ERROR REGISTER 1
000016                  RMAS    =       16              ;ATTENTION SUMMARY REGISTER
000020                  RMLA    =       20              ;LOOK AHEAD REGISTER
000024                  RMMR1   =       24              ;MAINTENANCE REGISTER
000026                  RMDT    =       26              ;DRIVE TYPE REGISTER
000030                  RMSN    =       30              ;SERIAL NUMBER REGISTER
000032                  RMOF    =       32              ;OFFSET REGISTER
000034                  RMDC    =       34              ;DESIRED CYLINDER REGISTER
000036                  RMHR    =       36              ;HOLDING REGISTER
000040                  RMMR2   =       40              ;MAINTENANCE REGISTER 2
000042                  RMER2   =       42              ;ERROR REGISTER 2
000044                  RMEC1   =       44              ;ECC POSITION REGISTER
000046                  RMEC2   =       46              ;ECC PATTERN REGISTER
```

```
3043            000050          ILRG50  =       50              ;ILLEGAL REGISTER 50
3044            000052          ILRG52  =       52              ;ILLEGAL REGISTER 52
3045            000054          ILRG54  =       54              ;ILLEGAL REGISTER 54
3046            000056          ILRG56  =       56              ;ILLEGAL REGISTER 56
3047            000060          ILRG60  =       60              ;ILLEGAL REGISTER 60
3048            000062          ILRG62  =       62              ;ILLEGAL REGISTER 62
3049            000064          ILRG64  =       64              ;ILLEGAL REGISTER 64
3050            000066          ILRG66  =       66              ;ILLEGAL REGISTER 66
3051            000070          ILRG70  =       70              ;ILLEGAL REGISTER 70
3052            000072          ILRG72  =       72              ;ILLEGAL REGISTER 72
3053            000074          ILRG74  =       74              ;ILLEGAL REGISTER 74
3054            000076          ILRG76  =       76              ;ILLEGAL REGISTER 76
3055
3056
3057            000077          IDXMSK  =       77              ;MASK FOR REGISTER INDEX NUMBER
3058
3059                            .SBTTL  RH CONTROLLER REGISTER BIT DEFINITIONS
3060
3061                            ;RMCS1  CONTROL STATUS REGISTER #1
3062
3063            100000          SC      =       BIT15           ;SPECIAL CONDITION-READ ONLY
3064            040000          TRE     =       BIT14           ;TRANSFER ERROR
3065            020000          MCPE    =       BIT13           ;MASSBUS CONTROL BUS PARITY
3066                                                            ;ERROR-READ ONLY
3067            002000          PSEL    =       BIT10           ;PORT B SELECT
3068            001000          A17     =       BIT09           ;ADDRESS EXTENSION
3069            000400          A16     =       BIT08           ;ADDRESS EXTENSION
3070            000200          RDY     =       BIT07           ;READY-READ ONLY
3071            000100          IE      =       BIT06           ;INTERRUPT ENABLE
3072
3073                            ;RMCS2  RH CONTROL STATUS REGISTER #2
3074
3075            100000          DLT     =       BIT15           ;DATA LATE-READ ONLY
3076            040000          WCE     =       BIT14           ;WRITE CHECK ERROR-READ ONLY
3077            020000          UPE     =       BIT13           ;UNIBUS PARITY ERROR
3078            010000          NED     =       BIT12           ;NONEXISTANT DRIVE-READ ONLY
3079            004000          NEM     =       BIT11           ;NONEXISTANT MEMORY-READ ONLY
3080            002000          PGE     =       BIT10           ;PROGRAM ERROR-READ ONLY
3081            001000          MXF     =       BIT09           ;MISSED TRANSFER
3082            000400          MDPE    =       BIT08           ;MASSBUS DATA BUS PARITY
3083                                                            ;ERROR-READ ONLY
3084            000200          OR      =       BIT07           ;OUTPUT READY-READ ONLY
3085            000100          IR      =       BIT06           ;INPUT READY-READ ONLY
3086            000040          CLR     =       BIT05           ;CONTROLLER CLEAR
3087            000020          PAT     =       BIT04           ;PARITY TEST
3088            000010          BAI     =       BIT03           ;UNIBUS ADDRESS INCREMENT
3089                                                            ;INHIBIT
3090            000004          U2      =       BIT02           ;UNIT SELECT
3091            000002          U1      =       BIT01           ;UNIT SELECT
3092            000001          U0      =       BIT00           ;UNIT SELECT
3093
3094                            ;UNIT SELECT MASK
3095            000007          UNTMSK  =       7               ;UNIT SELECT MASK
3096
3097                            ;RMCS3  RH70 CONTROL STATUS REGISTER #3
3098            100000          APE     =       BIT15           ;ADDRESS PARITY ERROR
```

```
3099            040000                  DPEHI   =       BIT14           ;DATA PARITY ERROR HIGH WORD
3100            020000                  DPELO   =       BIT13           ;DATA PARITY ERROR LOW WORD
3101            010000                  WCEHI   =       BIT12           ;WRITE CHECK ERROR HIGH WORD
3102            004000                  WCELO   =       BIT11           ;WRITE CHECK ERROR LOW WORD
3103            002000                  DBL     =       BIT10           ;DOUBLE WORD TRANSFER
3104            000100                  IE      =       BIT06           ;INTERRUPT ENABLE
3105            000010                  IPCK3   =       BIT03           ;INVERT PARITY CHECK
3106            000004                  IPCK2   =       BIT02           ;INVERT PARITY CHECK
3107            000002                  IPCK1   =       BIT01           ;INVERT PARITY CHECK
3108            000001                  IPCK0   =       BIT00           ;INVERT PARITY CHECK
3109                                    .SBTTL  RH CONTROLLER REGISTER INDEX VALUES
3110
3111            000000                  RMCS1   =       00              ;CONTROL, STATUS REGISTER
3112            000002                  RMWC    =       02              ;WORD COUNT REGISTER
3113            000004                  RMBA    =       04              ;BUS ADDRESS REGISTER
3114            000010                  RMCS2   =       10              ;CONTROLLER STATUS REGISTER
3115            000022                  RMDB    =       22              ;DATA BUFFER
3116            000050                  RMBAE   =       50              ;BUS ADDRESS EXTENSION
3117            000052                  RMCS3   =       52              ;CONTROL STATUS REGISTER #3
3118
3119            176700                  ABASE   =       176700          ;UNIBUS ADDRESS
3120            120254                  AVECT1  =       120254          ;UNIBUS VECTOR ADDRESS AND PRIORITY
3121
3122
3123                                    .SBTTL  TRAP CATCHER
3124
3125            000000                          .=0
3126                                    ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
3127                                    ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
3128                                    ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
3129            000174                          .=174
3130  000174    000000                DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
3131  000176    000000                SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER
3132
3133
3134                                    .SBTTL  ACT11 HOOKS
3135
3136                                    ;;******************************************************************
3137                                    ;HOOKS REQUIRED BY ACT11
3138            000200                          $SVPC=.                 ;SAVE PC
3139            000046                          .=46
3140  000046    057422                          $ENDAD                  ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
3141            000052                          .=52
3142  000052    000000                          .WORD   0               ;;2)SET LOC.52 TO ZERO
3143            000200                          .=$SVPC                 ;; RESTORE PC
3144
3145                                    .SBTTL  STARTING ADDRESS
3146
3147                                    ;THE PROGRAM STARTS AT LOCATION 200
3148            000200                  .       =       200
3149  000200    000137  004542                  JMP     START           ;JUMP TO START OF PROGRAM
3150
3151            001100                  .=1100
3152                                    .SBTTL  APT PARAMETER BLOCK
3153
3154                                    ;;******************************************************************
```

```
3155                                    ;SET LOCATIONS 24 AND 44 AS REQUIRED FOR APT
3156                                    ;;*****************************************************************
3157            001100                          .$X=.   ;;SAVE CURRENT LOCATION
3158            000024                          .=24    ;;SET POWER FAIL TO POINT TO START OF PROGRAM
3159  000024    000200                          200     ;;FOR APT START UP
3160            000044                          .=44    ;;POINT TO APT INDIRECT ADDRESS PNTR.
3161  000044    001100                          $APTHDR ;;POINT TO APT HEADER BLOCK
3162            001100                          .=.$X   ;;RESET LOCATION COUNTER
3163                                    ;;*****************************************************************
3164                                    ;SETUP APT PARAMETER BLOCK AS DEFINED IN THE APT-PDP11 DIAGNOSTIC
3165                                    ;INTERFACE SPEC.
3166
3167  001100                            $APTHD:
3168  001100    000000                  $HIBTS: .WORD   0       ;;TWO HIGH BITS OF 18 BIT MAILBOX ADDR.
3169  001102    001222                  $MBADR: .WORD   $MAIL   ;;ADDRESS OF APT MAILBOX (BITS 0-15)
3170  001104    000001                  $TSTM:  .WORD   1       ;;RUN TIM OF LONGEST TEST
3171  001106    000002                  $PASTM: .WORD   2       ;;RUN TIME IN SECS. OF 1ST PASS ON 1 UNIT (QUICK VERIFY)
3172  001110    000002                  $UNITM: .WORD   2       ;;ADDITIONAL RUN TIME (SECS) OF A PASS FOR EACH ADDITIONAL UNIT
3173  001112    000042                          .WORD   $ETEND-$MAIL/2 ;;LENGTH MAILBOX-ETABLE(WORDS)
3174            001114                  TAGADR  =       .
```

```
                                .SBTTL  COMMON TAGS

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

                        001114          .=TAGADR
001114                  001114  $CMTAG:                      ;;START OF COMMON TAGS
001114  000000                  .WORD   0
001116      000         001116  $TSTNM: .BYTE   0            ;;CONTAINS THE TEST NUMBER
001117      000         001117  $ERFLG: .BYTE   0            ;;CONTAINS ERROR FLAG
001120  000000          001120  $ICNT:  .WORD   0            ;;CONTAINS SUBTEST ITERATION COUNT
001122  000000          001122  $LPADR: .WORD   0            ;;CONTAINS SCOPE LOOP ADDRESS
001124  000000          001124  $LPERR: .WORD   0            ;;CONTAINS SCOPE RETURN FOR ERRORS
001126  000000          001126  $ERTTL: .WORD   0            ;;CONTAINS TOTAL ERRORS DETECTED
001130      000         001130  $ITEMB: .BYTE   0            ;;CONTAINS ITEM CONTROL BYTE
001131      001         001131  $ERMAX: .BYTE   1            ;;CONTAINS MAX. ERRORS PER TEST
001132  000000          001132  $ERRPC: .WORD   0            ;;CONTAINS PC OF LAST ERROR INSTRUCTION
001134  000000          001134  $GDADR: .WORD   0            ;;CONTAINS ADDRESS OF 'GOOD' DATA
001136  000000          001136  $BDADR: .WORD   0            ;;CONTAINS ADDRESS OF 'BAD' DATA
001140  000000          001140  $GDDAT: .WORD   0            ;;CONTAINS 'GOOD' DATA
001142  000000          001142  $BDDAT: .WORD   0            ;;CONTAINS 'BAD' DATA
001144  000000                  .WORD   0                    ;;RESERVED--NOT TO BE USED
001146  000000                  .WORD   0
001150      000         001150  $AUTOB: .BYTE   0            ;;AUTOMATIC MODE INDICATOR
001151      000         001151  $INTAG: .BYTE   0            ;;INTERRUPT MODE INDICATOR
001152  000000                  .WORD   0
001154  177570          001154  SWR:    .WORD   DSWR         ;;ADDRESS OF SWITCH REGISTER
001156  177570          001156  DISPLAY: .WORD  DDISP        ;;ADDRESS OF DISPLAY REGISTER
001160  177560          001160  $TKS:   177560               ;;TTY KBD STATUS
001162  177562          001162  $TKB:   177562               ;;TTY KBD BUFFER
001164  177564          001164  $TPS:   177564               ;;TTY PRINTER STATUS REG. ADDRESS
001166  177566          001166  $TPB:   177566               ;;TTY PRINTER BUFFER REG. ADDRESS
001170      000         001170  $NULL:  .BYTE   0            ;;CONTAINS NULL CHARACTER FOR FILLS
001171      002         001171  $FILLS: .BYTE   2            ;;CONTAINS # OF FILLER CHARACTERS REQUIRED
001172      012         001172  $FILLC: .BYTE   12           ;;INSERT FILL CHARS. AFTER A "LINE FEED"
001173      000         001173  $TPFLG: .BYTE   0            ;;"TERMINAL AVAILABLE" FLAG (BIT<07>=0=YES)
001174  000000          001174  $TMP0:  .WORD   0            ;;USER DEFINED
001176  000000          001176  $TMP1:  .WORD   0            ;;USER DEFINED
001200  000000          001200  $TMP2:  .WORD   0            ;;USER DEFINED
001202  000000          001202  $TMP3:  .WORD   0            ;;USER DEFINED
001204  000000          001204  $TMP4:  .WORD   0            ;;USER DEFINED
001206  000000          001206  $TIMES: 0                    ;;MAX. NUMBER OF ITERATIONS
001210  000000          001210  $ESCAPE:0                    ;;ESCAPE ON ERROR ADDRESS
001212  177607  000377    001212  $BELL:  .ASCIZ  <207><377><377> ;;CODE FOR BELL
001216      077         001216  $QUES:  .ASCII  /?/           ;;QUESTION MARK
001217      015         001217  $CRLF:  .ASCII  <15>          ;;CARRIAGE RETURN
001220  000012          001220  $LF:    .ASCIZ  <12>          ;;LINE FEED
                                ;;**************************************************************
                                .SBTTL  APT MAILBOX-ETABLE

                                ;;**************************************************************
                                .EVEN
001222                  001222  $MAIL:                       ;;APT MAILBOX
001222  000000          001222  $MSGTY: .WORD   AMSGTY        ;;MESSAGE TYPE CODE
001224  000000          001224  $FATAL: .WORD   AFATAL        ;;FATAL ERROR NUMBER
```

```
3231  001226  000000                $TESTN: .WORD   ATESTN  ;;TEST NUMBER
3232  001230  000000                $PASS:  .WORD   APASS   ;;PASS COUNT
3233  001232  000000                $DEVCT: .WORD   ADEVCT  ;;DEVICE COUNT
3234  001234  000000                $UNIT:  .WORD   AUNIT   ;;I/O UNIT NUMBER
3235  001236  000000                $MSGAD: .WORD   AMSGAD  ;;MESSAGE ADDRESS
3236  001240  000000                $MSGLG: .WORD   AMSGLG  ;;MESSAGE LENGTH
3237  001242                        $ETABLE:                ;;APT ENVIRONMENT TABLE
3238  001242     000                $ENV:   .BYTE   AENV    ;;ENVIRONMENT BYTE
3239  001243     000                $ENVM:  .BYTE   AENVM   ;;ENVIRONMENT MODE BITS
3240  001244  000000                $SWREG: .WORD   ASWREG  ;;APT SWITCH REGISTER
3241  001246  000000                $USWR:  .WORD   AUSWR   ;;USER SWITCHES
3242  001250  000000                $CPUOP: .WORD   ACPUOP  ;;CPU TYPE,OPTIONS
3243                                ;*                      BITS 15-11=CPU TYPE
3244                                ;*                           11/04=01,11/05=02,11/20=03,11/40=04,11/45=05
3245                                ;*                           11/70=06,PDQ=07,Q=10
3246                                ;*                      BIT 10=REAL TIME CLOCK
3247                                ;*                      BIT  9=FLOATING POINT PROCESSOR
3248                                ;*                      BIT  8=MEMORY MANAGEMENT
3249  001252     000                $MAMS1: .BYTE   AMAMS1  ;;HIGH ADDRESS,M.S. BYTE
3250  001253     000                $MTYP1: .BYTE   AMTYP1  ;;MEM. TYPE,BLK#1
3251                                ;*                      MEM.TYPE BYTE    --  (HIGH BYTE)
3252                                ;*                           900 NSEC CORE=001
3253                                ;*                           300 NSEC BIPOLAR=002
3254                                ;*                           500 NSEC MOS=003
3255  001254  000000                $MADR1: .WORD   AMADR1  ;;HIGH ADDRESS,BLK#1
3256                                ;*                      MEM.LAST ADDR.=3 BYTES,THIS WORD AND LOW OF "TYPE" ABOVE
3257  001256     000                $MAMS2: .BYTE   AMAMS2  ;;HIGH ADDRESS,M.S. BYTE
3258  001257     000                $MTYP2: .BYTE   AMTYP2  ;;MEM.TYPE,BLK#2
3259  001260  000000                $MADR2: .WORD   AMADR2  ;;MEM.LAST ADDRESS,BLK#2
3260  001262     000                $MAMS3: .BYTE   AMAMS3  ;;HIGH ADDRESS,M.S.BYTE
3261  001263     000                $MTYP3: .BYTE   AMTYP3  ;;MEM.TYPE,BLK#3
3262  001264  000000                $MADR3: .WORD   AMADR3  ;;MEM.LAST ADDRESS,BLK#3
3263  001266     000                $MAMS4: .BYTE   AMAMS4  ;;HIGH ADDRESS,M.S.BYTE
3264  001267     000                $MTYP4: .BYTE   AMTYP4  ;;MEM.TYPE,BLK#4
3265  001270  000000                $MADR4: .WORD   AMADR4  ;;MEM.LAST ADDRESS,BLK#4
3266  001272  120254                $VECT1: .WORD   AVECT1  ;;INTERRUPT VECTOR#1,BUS PRIORITY#1
3267  001274  000000                $VECT2: .WORD   AVECT2  ;;INTERRUPT VECTOR#2BUS PRIORITY#2
3268  001276  176700                $BASE:  .WORD   ABASE   ;;BASE ADDRESS OF EQUIPMENT UNDER TEST
3269  001300  000000                $DEVM:  .WORD   ADEVM   ;;DEVICE MAP
3270  001302  000000                $CDW1:  .WORD   ACDW1   ;;CONTROLLER DESCRIPTION WORD#1
3271  001304  000000                $CDW2:  .WORD   ACDW2   ;;CONTROLLER DESCRIPTION WORD#2
3272  001306  000000                $DDW0:  .WORD   ADDW0   ;;DEVICE DESCRIPTOR WORD#0
3273  001310  000000                $DDW1:  .WORD   ADDW1   ;;DEVICE DESCRIPTOR WORD#1
3274  001312  000000                $DDW2:  .WORD   ADDW2   ;;DEVICE DESCRIPTOR WORD#2
3275  001314  000000                $DDW3:  .WORD   ADDW3   ;;DEVICE DESCRIPTOR WORD#3
3276  001316  000000                $DDW4:  .WORD   ADDW4   ;;DEVICE DESCRIPTOR WORD#4
3277  001320  000000                $DDW5:  .WORD   ADDW5   ;;DEVICE DESCRIPTOR WORD#5
3278  001322  000000                $DDW6:  .WORD   ADDW6   ;;DEVICE DESCRIPTOR WORD#6
3279  001324  000000                $DDW7:  .WORD   ADDW7   ;;DEVICE DESCRIPTOR WORD#7
3280  001326                        $ETEND:
3281                                .MEXIT
3282
3283
3284
3285                                .SBTTL  REGISTER INPUT BUFFER
3286
```

```
3287                                    ;       THE REGISTER INPUT BUFFER IS USED FOR STORING REGISTER
3288                                    ;CONTENTS AS THEY ARE READ FROM THE DEVICE.
3289
3290   001326  000000                   RMCS1I: .WORD                   ;CONTROL,STATUS REGISTER #1
3291   001330  000000                   RMWCI:  .WORD                   ;WORD COUNT REGISTER
3292   001332  000000                   RMBAI:  .WORD                   ;BUS ADDRESS REGISTER
3293   001334  000000                   RMDAI:  .WORD                   ;DISK ADDRESS REGISTER
3294   001336  000000                   RMCS2I: .WORD                   ;CONTROL, STATUS REGISTER #2
3295   001340  000000                   RMDSI:  .WORD                   ;DRIVE STATUS REGISTER
3296   001342  000000                   RMER1I: .WORD                   ;ERROR REGISTER 1
3297   001344  000000                   RMASI:  .WORD                   ;ATTENTION SUMMARY REGISTER
3298   001346  000000                   RMLAI:  .WORD                   ;LOOK AHEAD REGISTER
3299   001350  000000                   RMDBI:  .WORD                   ;DATA BUFFER
3300   001352  000000                   RMMR1I: .WORD                   ;MAINTENANCE REGISTER #1
3301   001354  000000                   RMDTI:  .WORD                   ;DRIVE TYPE REGISTER
3302   001356  000000                   RMSNI:  .WORD                   ;SERIAL NUMBER REGISTER
3303   001360  000000                   RMOFI:  .WORD                   ;OFFSET REGISTER
3304   001362  000000                   RMDCI:  .WORD                   ;DESIRED CYLINDER REGISTER
3305   001364  000000                   RMHRI:  .WORD                   ;HOLDING REGISTER
3306   001366  000000                   RMMR2I: .WORD                   ;MAINTENANCE REGISTER #2
3307   001370  000000                   RMER2I: .WORD                   ;ERROR REGISTER 2
3308   001372  000000                   RMEC1I: .WORD                   ;ECC POSITION REGISTER
3309   001374  000000                   RMEC2I: .WORD                   ;ECC PATTERN REGISTER
3310   001376  000000                   RMBAEI: .WORD           ;BUS ADDRESS EXTENSION REGISTER
3311   001400  000000                   RMCS3I: .WORD           ;CONTROL, STATUS REGISTER #3
3312
3313
3314
3315                                    .SBTTL  REGISTER OUTPUT BUFFER
3316
3317                                    ;       THE REGISTER OUTPUT BUFFER IS USED FOR ASSEMBLING DATA TO
3318                                    ;BE WRITTEN TO THE DEVICE.
3319
3320   001402  000000                   RMCS10: .WORD                   ;CONTROL,STATUS REGISTER #1
3321   001404  000000                   RMWC0:  .WORD                   ;WORD COUNT REGISTER
3322   001406  000000                   RMBA0:  .WORD                   ;BUS ADDRESS REGISTER
3323   001410  000000                   RMDA0:  .WORD                   ;DISK ADDRESS REGISTER
3324   001412  000000                   RMCS20: .WORD                   ;CONTROL, STATUS REGISTER #2
3325   001414  000000                   RMDS0:  .WORD                   ;DRIVE STATUS REGISTER
3326   001416  000000                   RMER10: .WORD                   ;ERROR REGISTER 1
3327   001420  000000                   RMAS0:  .WORD                   ;ATTENTION SUMMARY REGISTER
3328   001422  000000                   RMLA0:  .WORD                   ;LOOK AHEAD REGISTER
3329   001424  000000                   RMDB0:  .WORD                   ;DATA BUFFER
3330   001426  000000                   RMMR10: .WORD                   ;MAINTENANCE REGISTER #1
3331   001430  000000                   RMDT0:  .WORD                   ;DRIVE TYPE REGISTER
3332   001432  000000                   RMSN0:  .WORD                   ;SERIAL NUMBER REGISTER
3333   001434  000000                   RMOF0:  .WORD                   ;OFFSET REGISTER
3334   001436  000000                   RMDC0:  .WORD                   ;DESIRED CYLINDER REGISTER
3335   001440  000000                   RMHR0:  .WORD                   ;HOLDING REGISTER
3336   001442  000000                   RMMR20: .WORD                   ;MAINTENANCE REGISTER #2
3337   001444  000000                   RMER20: .WORD                   ;ERROR REGISTER 2
3338   001446  000000                   RMEC10: .WORD                   ;ECC POSITION REGISTER
3339   001450  000000                   RMEC20: .WORD                   ;ECC PATTERN REGISTER
3340   001452  000000                   RMBAE0: .WORD           ;BUS ADDRESS EXTENSION REGISTER
3341   001454  000000                   RMCS30: .WORD           ;CONTROL, STATUS REGISTER #3
3342
```

```
3343                                    .SBTTL  TEST QUE
3344
3345                                    ;       EACH WORD OF THE TEST QUE CONTAINS THE DEVICE NUMBER IN
3346                                    ;THE LOW BYTE AND THE ATTENTION BIT IN THE HIGH BYTE. A ZERO
3347                                    ;WORD IS A BLANK AND REPRESENTS THE END OF THE QUE.
3348
3349  001456  000012                    TSTQUE: .BLKW   10.     ;TEST QUE
3350
3351  001502  172540                    $LPCSR: .WORD   172540          ;KW11-P CONTROL + STATUS REGISTER
3352  001504  172542                    $LPCSB: .WORD   172542          ;KW11-P COUNT SET BUFFER
3353  001506  000104                    $LPVEC: .WORD   104             ;KW11-P INTERRUPT VECTOR
3354  001510  000106                            .WORD   106
3355  001512  177546                    $LLCSR: .WORD   177546          ;KW11-L CONTROL + STATUS REGISTER
3356  001514  000100                    $LLVEC: .WORD   100             ;KW11-L INTERRUPT VECTOR
3357  001516  000102                            .WORD   102
3358  001520  000000                    $PSW:   .WORD                   ;STORAGE FOR PRIORITY
3359  001522  000000                    TIME:   .WORD                   ;STORAGE FOR ELAPSED TIME
3360  001524  000000                    WATCH:  .WORD                   ;STORAGE FOR REMAINING TIME
3361  001526  000000                    CLOCK:  .WORD                   ;ADDRESS OF START CLOCK SUB
3362  001530  000000                    STOP:   .WORD                   ;ADDRESS OF STOP CLOCK SUB
3363
3364                                    ;PUT TAGS HERE
3365
```

```
3366                                    .SBTTL  ERROR POINTER TABLE
3367
3368                                    ;*THIS TABLE CONTAINS THE INFORMATION FOR EACH ERROR THAT CAN OCCUR.
3369                                    ;*THE INFORMATION IS OBTAINED BY USING THE INDEX NUMBER FOUND IN
3370                                    ;*LOCATION $ITEMB. THIS NUMBER INDICATES WHICH ITEM IN THE TABLE IS PERTINENT.
3371                                    ;*NOTE1:        IF $ITEMB IS 0 THE ONLY PERTINENT DATA IS ($ERRPC).
3372                                    ;*NOTE2:        EACH ITEM IN THE TABLE CONTAINS 4 POINTERS EXPLAINED AS FOLLOWS:
3373
3374                                    ;*      EM              ;;POINTS TO THE ERROR MESSAGE
3375                                    ;*      DH              ;;POINTS TO THE DATA HEADER
3376                                    ;*      DT              ;;POINTS TO THE DATA
3377                                    ;*      DF              ;;POINTS TO THE DATA FORMAT
3378
3379
3380  001532                            $ERRTB:
3381
3382
```

```
3383
3384                                    ;ERROR  1       CANNOT CLEAR NED STATUS
3385
3386  001532  066700                            EMT1
3387  001534  074556                            EHT1
3388  001536  074652                            EDT1
3389  001540  074700                            EFT1
3390
3391
3392                                    ;ERROR  2       CANNOT READ OR WRITE ANY DEVICE REG WITHOUT NED
3393
3394  001542  066706                            EMT2
3395  001544  074562                            EHT2
3396  001546  074654                            EDT2
3397  001550  074702                            EFT2
3398
3399
3400                                    ;ERROR  3       CANNOT WRITE/READ ONES TO ANY DEVICE REGISTER
3401
3402  001552  066734                            EMT3
3403  001554  000000                            0
3404  001556  000000                            0
3405  001560  000000                            0
3406
3407
3408                                    ;ERROR  4       CANNOT CLEAR ANY DEVICE REGISTER BITS W/MASSBUS INIT
3409
3410  001562  066754                            EMT4
3411  001564  000000                            0
3412  001566  000000                            0
3413  001570  000000                            0
3414
3415
3416                                    ;ERROR  5       CANNOT WRITE/READ ZEROS TO ALL BIT POSITIONS
3417
3418  001572  066776                            EMT5
3419  001574  074566                            EHT5
3420  001576  074656                            EDT5
3421  001600  074704                            EFT5
3422
3423
3424                                    ;ERROR  6       CANNOT WRITE/READ ONES TO ALL BIT POSITIONS
3425
3426  001602  067022                            EMT6
3427  001604  074566                            EHT5
3428  001606  074656                            EDT5
3429  001610  074704                            EFT5
3430
3431
3432                                    ;ERROR  7       CANNOT WRITE/READ SHIFTING ONE BIT TO ALL BIT POSITIONS
3433                                    ;               OF DEVICE REGISTERS
3434
3435  001612  067044                            EMT7
3436  001614  074572                            EHT7
3437  001616  074656                            EDT5
3438  001620  074704                            EFT5
```

```
3439
3440
3441                                    ;ERROR  10      REGISTER SELECT 1 APPEARS S-A-0
3442
3443  001622  067066                            EMT10
3444  001624  000000                            0
3445  001626  000000                            0
3446  001630  000000                            0
3447
3448
3449                                    ;ERROR  11      REGISTER SELECT 1 APPEARS S-A-1
3450
3451  001632  067104                            EMT11
3452  001634  000000                            0
3453  001636  000000                            0
3454  001640  000000                            0
3455
3456
3457                                    ;ERROR  12      REGISTER SELECT 2 APPEARS S-A-0
3458
3459  001642  067122                            EMT12
3460  001644  000000                            0
3461  001646  000000                            0
3462  001650  000000                            0
3463
3464
3465                                    ;ERROR  13      REGISTER SELECT 2 APPEARS S-A-1
3466
3467  001652  067140                            EMT13
3468  001654  000000                            0
3469  001656  000000                            0
3470  001660  000000                            0
3471
3472
3473                                    ;ERROR  14      REGISTER SELECT 4 APPEARS S-A-0
3474
3475  001662  067156                            EMT14
3476  001664  000000                            0
3477  001666  000000                            0
3478  001670  000000                            0
3479
3480
3481                                    ;ERROR  15      REGISTER SELECT 4 APPEARS S-A-1
3482
3483  001672  067174                            EMT15
3484  001674  000000                            0
3485  001676  000000                            0
3486  001700  000000                            0
3487
3488
3489                                    ;ERROR  16      REGISTER SELECT 8 APPEARS S-A-0
3490
3491  001702  067212                            EMT16
3492  001704  000000                            0
3493  001706  000000                            0
3494  001710  000000                            0
```

```
3495
3496
3497                                    ;ERROR  17      REGISTER SELECT 8 APPEARS S-A-1
3498
3499  001712  067230                            EMT17
3500  001714  000000                            0
3501  001716  000000                            0
3502  001720  000000                            0
3503
3504
3505                                    ;ERROR  20      CANT WRITE ZEROS RMDA
3506
3507  001722  067246                            EMT20
3508  001724  074556                            EHT1
3509  001726  074652                            EDT1
3510  001730  074700                            EFT1
3511
3512
3513                                    ;ERROR  21      CANT WRITE ONES RMDA
3514
3515  001732  067266                            EMT21
3516  001734  074556                            EHT1
3517  001736  074652                            EDT1
3518  001740  074700                            EFT1
3519
3520
3521                                    ;ERROR  22      BIT INTERFERENCE IN WRITING/READING RMDA
3522
3523  001742  067306                            EMT22
3524  001744  074556                            EHT1
3525  001746  074652                            EDT1
3526  001750  074700                            EFT1
3527
3528
3529                                    ;ERROR  23      CANT WRITE ZEROS RMCS1
3530
3531  001752  067322                            EMT23
3532  001754  074556                            EHT1
3533  001756  074652                            EDT1
3534  001760  074700                            EFT1
3535
3536
3537                                    ;ERROR  24      CANT WRITE ONES RMCS1
3538
3539  001762  067342                            EMT24
3540  001764  074556                            EHT1
3541  001766  074652                            EDT1
3542  001770  074700                            EFT1
3543
3544
3545                                    ;ERROP  25      BIT INTERFERENCE IN WRITING/READING RMCS1
3546
3547  001772  067362                            EMT25
3548  001774  074556                            EHT1
3549  001776  074652                            EDT1
3550  002000  074700                            EFT1
```

```
3551
3552
3553                                    ;ERROR  26      MBA CLR L IS STUCK ACTIVE
3554
3555   002002  067376                           EMT26
3556   002004  000000                           0
3557   002006  000000                           0
3558   002010  000000                           0
3559
3560
3561                                    ;ERROR  27      CANNOT CLEAR RMER1-PAR,RMR,ILF,ILR
3562
3563   002012  067430                           EMT27
3564   002014  074556                           EHT1
3565   002016  074652                           EDT1
3566   002020  074700                           EFT1
3567
3568
3569                                    ;ERROR  30      CANNOT CLEAR RMER1-DCK,IAE,AOE,HCRC,HCE,ECH,WCF,FER
3570
3571   002022  067442                           EMT30
3572   002024  074556                           EHT1
3573   002026  074652                           EDT1
3574   002030  074700                           EFT1
3575
3576
3577                                    ;ERROR  31      CANNOT CLEAR RMER1-OPI,DTE
3578
3579   002032  067456                           EMT31
3580   002034  074556                           EHT1
3581   002036  074652                           EDT1
3582   002040  074700                           EFT1
3583
3584
3585                                    ;ERROR  32      CANNOT WRITE 0 IN RMER1-PAR,RMR,ILF,ILR
3586
3587   002042  067472                           EMT32
3588   002044  074556                           EHT1
3589   002046  074652                           EDT1
3590   002050  074700                           EFT1
3591
3592
3593                                    ,ERROR  33      CANNOT WRITE 0 IN RMER1-DCK,IAE,AOE,HCRC,HCE,ECH,WCF,FER
3594
3595   002052  067506                           EMT33
3596   002054  074556                           EHT1
3597   002056  074652                           EDT1
3598   002060  074700                           EFT1
3599
3600
3601                                    ;ERROR  34      CANNOT WRITE 0 IN RMER1-OPI,DTE
3602
3603   002062  067524                           EMT34
3604   002064  074556                           EHT1
3605   002066  074652                           EDT1
3606   002070  074700                           EFT1
```

```
3607
3608
3609                                    ;ERROR  35      CANNOT WRITE 1 IN RMER1
3610
3611  002072  067542                            EMT35
3612  002074  074556                            EHT1
3613  002076  074652                            EDT1
3614  002100  074700                            EFT1
3615
3616
3617                                    ;ERROR  36      CANNOT WRITE SHIFTING 1 IN RMER1
3618
3619  002102  067556                            EMT36
3620  002104  074556                            EHT1
3621  002106  074652                            EDT1
3622  002110  074700                            EFT1
3623
3624
3625                                    ;ERROR  37      CANNOT WRITE ZEROS IN RMDC
3626
3627  002112  067572                            EMT37
3628  002114  074556                            EHT1
3629  002116  074652                            EDT1
3630  002120  074700                            EFT1
3631
3632
3633                                    ;ERROR  40      CANNOT WRITE ONES IN RMDC
3634
3635  002122  067606                            EMT40
3636  002124  074556                            EHT1
3637  002126  074652                            EDT1
3638  002130  074700                            EFT1
3639
3640
3641                                    ;ERROR  41      BIT INTERFERENCE IN WRITING/READING RMDC
3642
3643  002132  067626                            EMT41
3644  002134  074556                            EHT1
3645  002136  074652                            EDT1
3646  002140  074700                            EFT1
3647
3648
3649                                    ;ERROR  42      CANNOT WRITE 1'S IN RMDC OR RMDA
3650
3651  002142  067642                            EMT42
3652  002144  000000                            0
3653  002146  000000                            0
3654  002150  000000                            0
3655
3656
3657                                    ;ERROR  43      CANNOT CLEAR RMCS1-FUNCTION CODE
3658
3659  002152  067666                            EMT43
3660  002154  074556                            EHT1
3661  002156  074652                            EDT1
3662  002160  074700                            EFT1
```

```
3663
3664
3665                                    ;ERROR  44      UNUSED BITS OF RMER2 NOT ZERO
3666
3667  002162  067700                            EMT44
3668  002164  074556                            EHT1
3669  002166  074652                            EDT1
3670  002170  074700                            EFT1
3671
3672
3673                                    ;ERROR  45      CANNOT CLEAR RMER2-OPE,IVC,LSC
3674
3675  002172  067714                            EMT45
3676  002174  074556                            EHT1
3677  002176  074652                            EDT1
3678  002200  074700                            EFT1
3679
3680
3681                                    ;ERROR  46      CANNOT CLEAR RMER2-LBC,DPE
3682
3683  002202  067730                            EMT46
3684  002204  074556                            EHT1
3685  002206  074652                            EDT1
3686  002210  074700                            EFT1
3687
3688
3689                                    ;ERROR  47      CANNOT WRITE ZEROS RMER2-OPE,IVC,LSC
3690
3691  002212  067744                            EMT47
3692  002214  074556                            EHT1
3693  002216  074652                            EDT1
3694  002220  074700                            EFT1
3695
3696
3697                                    ;ERROR  50      CANNOT WRITE ZEROS RMER2-LBC,DPE
3698
3699  002222  067766                            EMT50
3700  002224  074556                            EHT1
3701  002226  074652                            EDT1
3702  002230  074700                            EFT1
3703
3704
3705                                    ;ERROR  51      CANNOT WRITE ONES RMER2
3706
3707  002232  070010                            EMT51
3708  002234  074556                            EHT1
3709  002236  074652                            EDT1
3710  002240  074700                            EFT1
3711
3712
3713                                    ;ERROR  52      CANNOT WRITE SHIFTING ONES RMER2
3714
3715  002242  070030                            EMT52
3716  002244  074556                            EHT1
3717  002246  074652                            EDT1
3718  002250  074700                            EFT1
```

```
3719
3720
3721                                    ;ERROR  53      UNUSED BITS OF RMOF ARE NOT ZERO
3722
3723  002252  070044                              EMT53
3724  002254  074556                              EHT1
3725  002256  074652                              EDT1
3726  002260  074700                              EFT1
3727
3728
3729                                    ;ERROR  54      CANNOT WRITE ZEROS RMOF-FMT,ECI,HCI,OFD
3730
3731  002262  070060                              EMT54
3732  002264  074556                              EHT1
3733  002266  074652                              EDT1
3734  002270  074700                              EFT1
3735
3736
3737                                    ;ERROR  55      CANNOT WRITE ONES RMOF-FMT,ECI,HCI,OFD
3738
3739  002272  070100                              EMT55
3740  002274  074556                              EHT1
3741  002276  074652                              EDT1
3742  002300  074700                              EFT1
3743
3744
3745                                    ;ERROR  56      CANNOT WRITE SHIFTING ONES RMOF
3746
3747  002302  070120                              EMT56
3748  002304  074556                              EHT1
3749  002306  074652                              EDT1
3750  002310  074700                              EFT1
3751
3752
3753                                    ;ERROR  57      DEVICE IS NOT AN RM03
3754
3755  002312  070134                              EMT57
3756  002314  074576                              EHT57
3757  002316  074660                              EDT57
3758  002320  074706                              EFT57
3759
3760
3761                                    ;ERROR  60      DEVICE AVAILABLE IS NOT SET
3762
3763  002322  070150                              EMT60
3764  002324  074556                              EHT1
3765  002326  074652                              EDT1
3766  002330  074700                              EFT1
3767
3768
3769                                    ;ERROR  61      CANNOT WRITE ZEROS RMHR
3770
3771  002332  070164                              EMT61
3772  002334  074556                              EHT1
3773  002336  074652                              EDT1
3774  002340  074700                              EFT1
```

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3775
3776
3777                                    ;ERROR  62      CANNOT WRITE ONES RMHR
3778
3779  002342  070204                            EMT62
3780  002344  074556                            EHT1
3781  002346  074652                            EDT1
3782  002350  074700                            EFT1
3783
3784
3785                                    ;ERROR  63      CANNOT WRITE SHIFTING ONES RMHR
3786
3787  002352  070224                            EMT63
3788  002354  074556                            EHT1
3789  002356  074652                            EDT1
3790  002360  074700                            EFT1
3791
3792
3793                                    ;ERROR  64      CANNOT CLEAR ILR STATUS
3794
3795  002362  070240                            EMT64
3796  002364  074556                            EHT1
3797  002366  074652                            EDT1
3798  002370  074700                            EFT1
3799
3800
3801                                    ;ERROR  65      ILR ERROR SHOULD NOT BE SET
3802
3803  002372  070252                            EMT65
3804  002374  074602                            EHT65
3805  002376  074662                            EDT65
3806  002400  074710                            EFT65
3807
3808
3809                                    ;ERROR  66      ILR ERROR SHOULD BE SET
3810
3811  002402  070266                            EMT66
3812  002404  074602                            EHT65
3813  002406  074662                            EDT65
3814  002410  074710                            EFT65
3815
3816
3817                                    ;ERROR  67      CANNOT CLEAR PAR STATUS-DPE IS RESET
3818
3819  002412  070302                            EMT67
3820  002414  074556                            EHT1
3821  002416  074652                            EDT1
3822  002420  074700                            EFT1
3823
3824
3825                                    ;ERROR  70      CANNOT CLEAR PAR AND DPE STATUS
3826
3827  002422  070320                            EMT70
3828  002424  074556                            EHT1
3829  002426  074652                            EDT1
3830  002430  074700                            EFT1
```

```
3831
3832
3833                                    ;ERROR  71      "PAR" ERROR SHOULD NOT BE SET-"PAT" IS OFF
3834
3835  002432  070340                            EMT71
3836  002434  074606                            EHT71
3837  002436  074664                            EDT71
3838  002440  074712                            EFT71
3839
3840
3841                                    ;ERROR  72      "PAR" ERROR SHOULD BE SET-"PAT" IS ON
3842
3843  002442  070364                            EMT72
3844  002444  074606                            EHT71
3845  002446  074664                            EDT71
3846  002450  074712                            EFT71
3847
3848
3849                                    ;ERROR  73      "MCPE" ERROR SHOULD NOT BE SET
3850
3851  002452  070410                            EMT73
3852  002454  074606                            EHT71
3853  002456  074664                            EDT71
3854  002460  074712                            EFT71
3855
3856
3857                                    ;ERROR  74      UNEXPECTED BUS TIMEOUT
3858
3859  002462  070430                            EMT74
3860  002464  074612                            EHT74
3861  002466  074666                            EDT74
3862  002470  074714                            EFT74
3863
3864
3865                                    ;ERROR  75      CANT CLEAR "DMD"
3866
3867  002472  070440                            EMT75
3868  002474  074556                            EHT1
3869  002476  074652                            EDT1
3870  002500  074700                            EFT1
3871
3872
3873                                    ;ERROR  76      CANT WRITE ZERO "DMD"
3874
3875  002502  070452                            EMT76
3876  002504  074556                            EHT1
3877  002506  074652                            EDT1
3878  002510  074700                            EFT1
3879
3880
3881                                    ;ERROR  77      CANT WRITE ONE "DMD"
3882
3883  002512  070466                            EMT77
3884  002514  074556                            EHT1
3885  002516  074652                            EDT1
3886  002520  074700                            EFT1
```

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3887
3888
3889                                    ;ERROR  100     DMD SET BY WRONG BIT
3890
3891  002522  070502                            EMT100
3892  002524  074606                            EHT71
3893  002526  074662                            EDT65
3894  002530  074710                            EFT65
3895
3896
3897                                    ;ERROR  101     CANT CLEAR "MOL" IN DIAGNOSTIC MODE
3898
3899  002532  070522                            EMT101
3900  002534  074556                            EHT1
3901  002536  074652                            EDT1
3902  002540  074700                            EFT1
3903
3904
3905                                    ;ERROR  102     CANT SET "MOL" IN DIAGNOSTIC MODE
3906
3907  002542  070542                            EMT102
3908  002544  074556                            EHT1
3909  002546  074652                            EDT1
3910  002550  074700                            EFT1
3911
3912
3913                                    ;ERROR  103     "MUR" SET BY WRONG BIT
3914
3915  002552  070562                            EMT103
3916  002554  074606                            EHT71
3917  002556  074662                            EDT65
3918  002560  074710                            EFT65
3919
3920
3921                                    ;ERROR  104     CANT RESET "WRL" IN DIAGNOSTIC MODE
3922
3923  002562  070606                            EMT104
3924  002564  074556                            EHT1
3925  002566  074652                            EDT1
3926  002570  074700                            EFT1
3927
3928
3929                                    ;ERROR  105     CANT SET "WRL" IN DIAGNOSTIC MODE
3930
3931  002572  070626                            EMT105
3932  002574  074556                            EHT1
3933  002576  074652                            EDT1
3934  002600  074700                            EFT1
3935
3936
3937                                    ;ERROR  106     "MWP" SET BY WRONG BIT
3938
3939  002602  070646                            EMT106
3940  002604  074606                            EHT71
3941  002606  074662                            EDT65
3942  002610  074710                            EFT65
```

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3943
3944
3945                                    ;ERROR  107     CANT RESET "DVC" USING "MDVC"
3946
3947  002612  070672                              EMT107
3948  002614  074556                              EHT1
3949  002616  074652                              EDT1
3950  002620  074700                              EFT1
3951
3952
3953                                    ;ERROR  110     "DVC" IS RESET BUT "UNS" IS SET
3954
3955  002622  070712                              EMT110
3956  002624  074556                              EHT1
3957  002626  074652                              EDT1
3958  002630  074700                              EFT1
3959
3960
3961                                    ;ERROR  111     "DVC" IS SET BUT "UNS" IS NOT SET
3962
3963  002632  070734                              EMT111
3964  002634  074556                              EHT1
3965  002636  074652                              EDT1
3966  002640  074700                              EFT1
3967
3968
3969                                    ;ERROR  112     CANT SET "DVC" USING MDVC"
3970
3971  002642  070754                              EMT112
3972  002644  074556                              EHT1
3973  002646  074652                              EDT1
3974  002650  074700                              EFT1
3975
3976
3977                                    ;ERROR  113     "DVC" IS RESET BUT "UNS" IS SET
3978
3979  002652  070774                              EMT113
3980  002654  074556                              EHT1
3981  002656  074652                              EDT1
3982  002660  074700                              EFT1
3983
3984
3985                                    ;ERROR  114     "DVC" IS SET BUT "UNS" IS NOT SET
3986
3987  002662  071020                              EMT114
3988  002664  074556                              EHT1
3989  002666  074652                              EDT1
3990  002670  074700                              EFT1
3991
3992
3993                                    ;ERROR  115     "MDF" IS SET BY WRONG BIT
3994
3995  002672  071042                              EMT115
3996  002674  074616                              EHT115
3997  002676  074670                              EDT115
3998  002700  074716                              EFT115
```

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3999
4000
4001                                    ;ERROR  116     CANT RESET "SKI" USING "MSER"
4002
4003  002702  071066                            EMT116
4004  002704  074556                            EHT1
4005  002706  074652                            EDT1
4006  002710  074700                            EFT1
4007
4008
4009                                    ;ERROR  117     CANT SET "SKI" USING "MSER"
4010
4011  002712  071106                            EMT117
4012  002714  074556                            EHT1
4013  002716  074652                            EDT1
4014  002720  074700                            EFT1
4015
4016
4017                                    ;ERROR  120     "SKI" SET BY WRONG BIT
4018
4019  002722  071126                            EMT120
4020  002724  074616                            EHT115
4021  002726  074670                            EDT115
4022  002730  074716                            EFT115
4023
4024
4025                                    ;ERROR  121     CANT RESET "PIP" USING "MOC"
4026
4027  002732  071152                            EMT121
4028  002734  074556                            EHT1
4029  002736  074652                            EDT1
4030  002740  074700                            EFT1
4031
4032
4033                                    ;ERROR  122     CANT SET "PIP" USING "MOC"
4034
4035  002742  071172                            EMT122
4036  002744  074556                            EHT1
4037  002746  074652                            EDT1
4038  002750  074700                            EFT1
4039
4040
4041                                    ;ERROR  123     "MOC" SET BY WRONG BIT
4042
4043  002752  071212                            EMT123
4044  002754  074616                            EHT115
4045  002756  074670                            EDT115
4046  002760  074716                            EFT115
4047
4048
4049                                    ;ERROR  124     CANT CLEAR "EBL"
4050
4051  002762  071236                            EMT124
4052  002764  074556                            EHT1
4053  002766  074652                            EDT1
4054  002770  074700                            EFT1
```

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4055
4056
4057                                    ;ERROR  125     "EBL" NOT ZERO IN DIAGNOSTIC MODE
4058
4059  002772  071254                            EMT125
4060  002774  074556                            EHT1
4061  002776  074652                            EDT1
4062  003000  074700                            EFT1
4063
4064
4065                                    ;ERROR  126     CANT SET "EBL" USING "DEBL"
4066
4067  003002  071274                            EMT126
4068  003004  074556                            EHT1
4069  003006  074652                            EDT1
4070  003010  074700                            EFT1
4071
4072
4073                                    ;ERROR  127     "DEBL" SET BY WRONG BIT
4074
4075  003012  071312                            EMT127
4076  003014  074616                            EHT115
4077  003016  074670                            EDT115
4078  003020  074716                            EFT115
4079
4080
4081                                    ;ERROR  130     "LS" NOT CORRECT ACCORDING TO RMDA
4082
4083  003022  071336                            EMT130
4084  003024  074622                            EHT130
4085  003026  074672                            EDT130
4086  003030  074720                            EFT130
4087
4088
4089                                    ;ERROR  131     "LST" NOT CORRECT ACCORDING TO RMDA
4090
4091  003032  071354                            EMT131
4092  003034  074622                            EHT130
4093  003036  074672                            EDT130
4094  003040  074720                            EFT130
4095
4096
4097                                    ;ERROR  132     CANNOT INCREMENT SECTOR ADDRESS USING "DEBL"
4098
4099  003042  071372                            EMT132
4100  003044  074626                            EHT132
4101  003046  074674                            EDT132
4102  003050  074722                            EFT132
4103
4104
4105                                    ;ERROR  133     CANNOT INCREMENT TRACK ADDRESS USING "DEBL"
4106
4107  003052  071412                            EMT133
4108  003054  074626                            EHT132
4109  003056  074674                            EDT132
4110  003060  074722                            EFT132
```

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4111
4112
4113                                    ;ERROR  134     UNUSED BITS OF RMDC NOT ZERO
4114
4115  003062  071432                            EMT134
4116  003064  074556                            EHT1
4117  003066  074652                            EDT1
4118  003070  074700                            EFT1
4119
4120
4121                                    ;ERROR  135     "VV" NOT RESET BY UNIT READY
4122
4123  003072  071446                            EMT135
4124  003074  074556                            EHT1
4125  003076  074652                            EDT1
4126  003100  074700                            EFT1
4127
4128
4129                                    ;ERROR  136     SERIAL NUMBER IS INCONSISTENT
4130
4131  003102  071464                            EMT136
4132  003104  074556                            EHT1
4133  003106  074652                            EDT1
4134  003110  074700                            EFT1
4135
4136
4137                                    ;ERROR  137     CANT CLEAR "GO" BIT
4138
4139  003112  071476                            EMT137
4140  003114  074556                            EHT1
4141  003116  074652                            EDT1
4142  003120  074700                            EFT1
4143
4144
4145                                    ;ERROR  140     CANT INCREMENT CYLINDER USING "DEBL"
4146
4147  003122  071514                            EMT140
4148  003124  074626                            EHT132
4149  003126  074674                            EDT132
4150  003130  074722                            EFT132
4151
4152
4153                                    ;ERROR  141     CANT RESET "LBT" BY WRITING RMDA
4154
4155  003132  071534                            EMT141
4156  003134  074556                            EHT1
4157  003136  074652                            EDT1
4158  003140  074700                            EFT1
4159
4160
4161                                    ;ERROR  142     CANT SET "LBT" USING "DEBL"
4162
4163  003142  071550                            EMT142
4164  003144  074556                            EHT1
4165  003146  074652                            EDT1
4166  003150  074700                            EFT1
```

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4167
4168
4169                                    ;ERROR  143     CANT READ ZERO FROM COMP ERROR
4170
4171  003152  071566                            EMT143
4172  003154  074556                            EHT1
4173  003156  074652                            EDT1
4174  003160  074700                            EFT1
4175
4176
4177                                    ;ERROR  144     CANT SET COMP ERROR WITH RMER1 OR RMER2
4178
4179  003162  071602                            EMT144
4180  003164  074556                            EHT1
4181  003166  074652                            EDT1
4182  003170  074700                            EFT1
4183
4184
4185                                    ;ERROR  145     COMP ERROR DID NOT SET
4186
4187  003172  071624                            EMT145
4188  003174  074632                            EHT145
4189  003176  074672                            EDT130
4190  003200  074720                            EFT130
4191
4192
4193                                    ;ERROR  146     CANT SET "GO" BIT
4194
4195  003202  071646                            EMT146
4196  003204  074556                            EHT1
4197  003206  074652                            EDT1
4198  003210  074700                            EFT1
4199
4200
4201                                    ;ERROR  147     CANT READ A ONE FROM "TST"
4202
4203  003212  071664                            EMT147
4204  003214  074556                            EHT1
4205  003216  074652                            EDT1
4206  003220  074700                            EFT1
4207
4208
4209                                    ;ERROR  150     "TST" IS INCORRECT FOR THE FUNCTION CODE
4210
4211  003222  071676                            EMT150
4212  003224  074636                            EHT150
4213  003226  074670                            EDT115
4214  003230  074716                            EFT115
4215
4216
4217                                    ;ERROR  151     CANT SET THE "GO" BIT
4218
4219  003232  071720                            EMT151
4220  003234  074556                            EHT1
4221  003236  074652                            EDT1
4222  003240  074700                            EFT1
```

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                                        ;ERROR  152     "DRY" NOT THE COMPLEMENT OF "GO"
003242  071732                                  EMT152
003244  074556                                  EHT1
003246  074652                                  EDT1
003250  074700                                  EFT1


                                        ;ERROR  153     "GO" RESET EARLY
003252  071746                                  EMT153
003254  074556                                  EHT1
003256  074652                                  EDT1
003260  074700                                  EFT1


                                        ;ERROR  154     "GO" DIDNT RESET ON TIME
003262  071766                                  EMT154
003264  074556                                  EHT1
003266  074652                                  EDT1
003270  074700                                  EFT1


                                        ;ERROR  155     CANT CLEAR CONTINUE
003272  072006                                  EMT155
003274  074556                                  EHT1
003276  074652                                  EDT1
003300  074700                                  EFT1


                                        ;ERROR  156     CONTINUE IS INCORRECT FOR THE FUNCTION CODE
003302  072024                                  EMT156
003304  074636                                  EHT150
003306  074670                                  EDT115
003310  074716                                  EFT115


                                        ;ERROR  157     CANT CLEAR IVC
003312  072046                                  EMT157
003314  074556                                  EHT1
003316  074652                                  EDT1
003320  074700                                  EFT1


                                        ;ERROR  160     IVC IS INCORRECT FOR THE FUNCTION CODE
003322  072064                                  EMT160
003324  074636                                  EHT150
003326  074670                                  EDT115
003330  074716                                  EFT115
```

```
4279
4280
4281                                    ;ERROR  161     CANT CLEAR LSC
4282
4283  003332  072114                            EMT161
4284  003334  074556                            EHT1
4285  003336  074652                            EDT1
4286  003340  074700                            EFT1
4287
4288
4289                                    ;ERROR  162     CANT SET LSC
4290
4291  003342  072132                            EMT162
4292  003344  074556                            EHT1
4293  003346  074652                            EDT1
4294  003350  074700                            EFT1
4295
4296
4297                                    ;ERROR  163     COMMAND DECODE WAS ENABLED WITH COMP ERROR SET
4298
4299  003352  072150                            EMT163
4300  003354  074556                            EHT1
4301  003356  074652                            EDT1
4302  003360  074700                            EFT1
4303
4304
4305                                    ;ERROR  164     COMMAND DECODE WAS ENABLED WITH COMP ERROR SET
4306
4307  003362  072172                            EMT164
4308  003364  074556                            EHT1
4309  003366  074652                            EDT1
4310  003370  074700                            EFT1
4311
4312
4313                                    ;ERROR  165     DECODE DOES NOT SET
4314
4315  003372  072214                            EMT165
4316  003374  000000                            0
4317  003376  000000                            0
4318  003400  000000                            0
4319
4320
4321                                    ;ERROR  166     CANT CLEAR OCCUPIED
4322
4323  003402  072240                            EMT166
4324  003404  074556                            EHT1
4325  003406  074652                            EDT1
4326  003410  074700                            EFT1
4327
4328
4329                                    ;ERROR  167     ILF SET WITHOUT GO BIT
4330
4331  003412  072260                            EMT167
4332  003414  074556                            EHT1
4333  003416  074652                            EDT1
4334  003420  074700                            EFT1
```

```
4335
4336
4337                                    ;ERROR  170     CANT SET VOLUME VALID
4338
4339  003422  072302                            EMT170
4340  003424  074636                            EHT150
4341  003426  074670                            EDT115
4342  003430  074716                            EFT115
4343
4344
4345                                    ;ERROR  171     ILF IS INCORRECT
4346
4347  003432  072314                            EMT171
4348  003434  074636                            EHT150
4349  003436  074670                            EDT115
4350  003440  074716                            EFT115
4351
4352
4353                                    ;ERROR  172     CANT SET OFFSET DIRECTION BIT
4354
4355  003442  072330                            EMT172
4356  003444  074556                            EHT1
4357  003446  074652                            EDT1
4358  003450  074700                            EFT1
4359
4360
4361                                    ;ERROR  173     OCCUPIED IS INCORRECT FOR FUNCTION CODE
4362
4363  003452  072346                            EMT173
4364  003454  074636                            EHT150
4365  003456  074670                            EDT115
4366  003460  074716                            EFT115
4367
4368
4369                                    ;ERROR  174     READ IN PRESET DIDNT CLEAR RMDA, RMDC OR RMOF
4370
4371  003462  072370                            EMT174
4372  003464  000000                            0
4373  003466  000000                            0
4374  003470  000000                            0
4375
4376
4377                                    ;ERROR  175     READ IN PRESET DIDNT CLEAR RMOF
4378
4379  003472  072416                            EMT175
4380  003474  074556                            EHT1
4381  003476  074652                            EDT1
4382  003500  074700                            EFT1
4383
4384
4385                                    ;ERROR  176     READ IN PRESET DIDNT CLEAR RMDA
4386
4387  003502  072434                            EMT176
4388  003504  074556                            EHT1
4389  003506  074652                            EDT1
4390  003510  074700                            EFT1
```

```
4391
4392
4393                                    ;ERROR  177     READ IN PRESET DIDNT CLEAR RMDC
4394
4395  003512  072452                            EMT177
4396  003514  074556                            EHT1
4397  003516  074652                            EDT1
4398  003520  074700                            EFT1
4399
4400
4401                                    ;ERROR  200     CANT SET OFFSET MODE BY OFFSET COMMAND
4402
4403  003522  072470                            EMT200
4404  003524  074556                            EHT1
4405  003526  074652                            EDT1
4406  003530  074700                            EFT1
4407
4408
4409                                    ;ERROR  201     CANT RESET OFFSET MODE BY RTC COMMAND
4410
4411  003532  072506                            EMT201
4412  003534  074556                            EHT1
4413  003536  074652                            EDT1
4414  003540  074700                            EFT1
4415
4416
4417                                    ;ERROR  202     CANT RESET OFD BY RTC COMMAND
4418
4419  003542  072524                            EMT202
4420  003544  074556                            EHT1
4421  003546  074652                            EDT1
4422  003550  074700                            EFT1
4423
4424
4425                                    ;ERROR  203     CANT RESET OM BY RMDC
4426
4427  003552  072542                            EMT203
4428  003554  074556                            EHT1
4429  003556  074652                            EDT1
4430  003560  074700                            EFT1
4431
4432
4433                                    ;ERROR  204     CANT RESET OM BY EBL
4434
4435  003562  072564                            EMT204
4436  003564  074556                            EHT1
4437  003566  074652                            EDT1
4438  003570  074700                            EFT1
4439
4440
4441                                    ;ERROR  205     RUN AND GO NOT CORRECT FOR FUNCTION CODE
4442
4443  003572  072604                            EMT205
4444  003574  074636                            EHT150
4445  003576  074670                            EDT115
4446  003600  074716                            EFT115
```

```
4447
4448
4449                                    ;ERROR  206     CANT SET IAE ERROR
4450
4451  003602  072624                            EMT206
4452  003604  000000                            0
4453  003606  000000                            0
4454  003610  000000                            0
4455
4456
4457                                    ;ERROR  207     IAE IS INCORRECT FOR FUNCTION CODE
4458
4459  003612  072654                            EMT207
4460  003614  074636                            EHT150
4461  003616  074670                            EDT115
4462  003620  074716                            EFT115
4463
4464
4465                                    ;ERROR  210     IAE IS INCORRECT FOR RMDA
4466
4467  003622  072670                            EMT210
4468  003624  074616                            EHT115
4469  003626  074670                            EDT115
4470  003630  074716                            EFT115
4471
4472
4473                                    ;ERROR  211     IAE IS INCORRECT FOR RMDC
4474
4475  003632  072706                            EMT211
4476  003634  074616                            EHT115
4477  003636  074670                            EDT115
4478  003640  074716                            EFT115
4479
4480
4481                                    ;ERROR  212     CANT SET AOE
4482
4483  003642  072724                            EMT212
4484  003644  074556                            EHT1
4485  003646  074652                            EDT1
4486  003650  074700                            EFT1
4487
4488
4489                                    ;ERROR  213     RMR SET WHEN WRITING RMAS OR RMCS
4490
4491  003652  072736                            EMT213
4492  003654  074642                            EHT213
4493  003656  074670                            EDT115
4494  003660  074716                            EFT115
4495
4496
4497                                    ;ERROR  214     CANT SET RMR
4498
4499  003662  072766                            EMT214
4500  003664  074642                            EHT213
4501  003666  074670                            EDT115
4502  003670  074716                            EFT115
```

```
4503
4504
4505                                    ;ERROR  215     DRQ IS 0 AND PGM IS 1
4506
4507  003672  073000                            EMT215
4508  003674  074556                            EHT1
4509  003676  074652                            EDT1
4510  003700  074700                            EFT1
4511
4512
4513                                    ;ERROR  216     DVA IS NOT SET
4514
4515  003702  073020                            EMT216
4516  003704  074556                            EHT1
4517  003706  074652                            EDT1
4518  003710  074700                            EFT1
4519
4520
4521                                    ;ERROR  217     DPR IS NOT SET
4522
4523  003712  073034                            EMT217
4524  003714  074556                            EHT1
4525  003716  074652                            EDT1
4526  003720  074700                            EFT1
4527
4528
4529                                    ,ERROR  220     CANT SET PORT REQUEST BY READING RMCS1
4530
4531  003722  073050                            EMT220
4532  003724  074646                            EHT220
4533  003726  074676                            EDT220
4534  003730  074724                            EFT220
4535
4536
4537                                    ;ERROR  221     CANT SET PORT REQUEST BY WRITING RMAS
4538
4539  003732  073066                            EMT221
4540  003734  074646                            EHT220
4541  003736  074676                            EDT220
4542  003740  074724                            EFT220
4543
4544
4545                                    ;ERROR  222     CANT SET PORT REQUEST BY WRITING RMDA
4546
4547  003742  073104                            EMT222
4548  003744  074646                            EHT220
4549  003746  074676                            EDT220
4550  003750  074724                            EFT220
4551
4552
4553                                    ;ERROR  223     CANT RESET PORT REQUEST BY RELEASE COMMAND
4554
4555  003752  073122                            EMT223
4556  003754  074646                            EHT220
4557  003756  074676                            EDT220
4558  003760  074724                            EFT220
```

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4559
4560
4561                                    ;ERROR  224     CANT CLEAR ATA BY RMAS
4562
4563  003762  073140                              EMT224
4564  003764  074556                              EHT1
4565  003766  074652                              EDT1
4566  003770  074700                              EFT1
4567
4568
4569                                    ;ERROR  225     ATA IS RESET BUT RMAS NOT ZERO
4570
4571  003772  073160                              EMT225
4572  003774  074556                              EHT1
4573  003776  074652                              EDT1
4574  004000  074700                              EFT1
4575
4576
4577                                    ;ERROR  226     CANT RESET ATA BY GO
4578
4579  004002  073202                              EMT226
4580  004004  074556                              EHT1
4581  004006  074652                              EDT1
4582  004010  074700                              EFT1
4583
4584
4585                                    ;ERROR  227     ATA NOT SET BY UNIT READY
4586
4587  004012  073220                              EMT227
4588  004014  074556                              EHT1
4589  004016  074652                              EDT1
4590  004020  074700                              EFT1
4591
4592
4593                                    ;ERROR  230     ATA NOT SET BY UNIT READY
4594
4595  004022  073236                              EMT230
4596  004024  074556                              EHT1
4597  004026  074652                              EDT1
4598  004030  074700                              EFT1
4599
4600
4601                                    ;ERROR  231     ATA NOT SET BY COMP ERROR
4602
4603  004032  073254                              EMT231
4604  004034  074556                              EHT1
4605  004036  074652                              EDT1
4606  004040  074700                              EFT1
4607
4608
4609                                    ;ERROR  232     ATA SET/DID NOT SET WHEN REGISTER WRITTEN
4610                                    ;               WHILE COMP ERROR WAS SET
4611
4612  004042  073270                              EMT232
4613  004044  074642                              E4T213
4614  004046  074670                              EDT115
```

```
4615  004050  074716                        EFT115
4616
4617
4618                                ;ERROR  233     ATA NOT SET BY COMMAND SEQUENCER
4619
4620  004052  073312                        EMT233
4621  004054  074636                        EHT150
4622  004056  074670                        EDT115
4623  004060  074716                        EFT115
4624
4625
4626                                ;ERROR  234     WLE INCORRECT ACCORDING TO FUNCTION CODE
4627
4628  004062  073334                        EMT234
4629  004064  074636                        EHT150
4630  004066  074670                        EDT115
4631  004070  074716                        EFT115
4632
4633
4634                                ;ERROR  235     CANT CLEAR EXCEPTION
4635
4636  004072  073362                        EMT235
4637  004074  074556                        EHT1
4638  004076  074652                        EDT1
4639  004100  074700                        EFT1
4640
4641
4642                                ;ERROR  236     CANT SET EXCEPTION
4643
4644  004102  073402                        EMT236
4645  004104  074616                        EHT115
4646  004106  074670                        EDT115
4647  004110  074716                        EFT115
4648
4649
4650                                ;ERROR  237     CANT CLEAR OPI
4651
4652  004112  073434                        EMT237
4653  004114  074556                        EHT1
4654  004116  074652                        EDT1
4655  004120  074700                        EFT1
4656
4657
4658                                ;ERROR  240     CANT SET OPI
4659
4660  004122  073434                        EMT237
4661  004124  074636                        EHT150
4662  004126  074670                        EDT115
4663  004130  074716                        EFT115
4664
4665
4666                                ;ERROR  241     OPI NOT SET DURING RECALIBRATE
4667
4668  004132  073500                        EMT241
4669  004134  074556                        EHT1
4670  004136  074652                        EDT1
```

```
4671  004140  074700                        EFT1
4672
4673
4674                                ;ERROR  242     RECALIBRATE DID NOT ABORT WHEN DRIVE FAULT SET
4675
4676  004142  073524                        EMT242
4677  004144  074556                        EHT1
4678  004146  074652                        EDT1
4679  004150  074700                        EFT1
4680
4681
4682                                ;ERROR  243     OPI SHOULD HAVE SET BECAUSE ON CYLINDER NEVER
4683                                ;               DROPPED DURING RECALIBRATE
4684
4685  004152  073550                        EMT243
4686  004154  074556                        EHT1
4687  004156  074652                        EDT1
4688  004160  074700                        EFT1
4689
4690
4691                                ;ERROR  244     ATA NOT SET DURING RECALIBRATE
4692
4693  004162  073574                        EMT244
4694  004164  074556                        EHT1
4695  004166  074652                        EDT1
4696  004170  074700                        EFT1
4697
4698
4699                                ;ERROR  245     GO RESET EARLY DURING RECALIBRATE
4700
4701  004172  073612                        EMT245
4702  004174  074556                        EHT1
4703  004176  074652                        EDT1
4704  004200  074700                        EFT1
4705
4706
4707                                ;ERROR  246     GO NOT RESET DURING RECALIBRATE
4708
4709  004202  073630                        EMT246
4710  004204  074556                        EHT1
4711  004206  074652                        EDT1
4712  004210  074700                        EFT1
4713
4714
4715                                ;ERROR  247     INCORRECT TAG BUS DURING RECALIBRATE
4716
4717  004212  073654                        EMT247
4718  004214  074556                        EHT1
4719  004216  074652                        EDT1
4720  004220  074700                        EFT1
4721
4722
4723                                ;ERROR  250     OPI SHOULD HAVE SET DURING SEEK BECAUSE UNIT
4724                                ;               READY DROPPED
4725
4726  004222  073672                        EMT250
```

```
4727  004224  074556                        EHT1
4728  004226  074652                        EDT1
4729  004230  074700                        EFT1
4730
4731
4732                              ;ERROR  251     SEEK DID NOT ABORT WHEN DRIVE FAULT SET
4733
4734  004232  073716                        EMT251
4735  004234  074556                        EHT1
4736  004236  074652                        EDT1
4737  004240  074700                        EFT1
4738
4739
4740                              ;ERROR  252     OPI SHOULD HAVE SET BECAUSE ON CYLINDER NEVER
4741                              ;               DROPPED DURING SEEK
4742
4743  004242  073742                        EMT252
4744  004244  074556                        EHT1
4745  004246  074652                        EDT1
4746  004250  074700                        EFT1
4747
4748
4749                              ;ERROR  253     ATA NOT SET DURING SEEK
4750
4751  004252  073766                        EMT253
4752  004254  074556                        EHT1
4753  004256  074652                        EDT1
4754  004260  074700                        EFT1
4755
4756
4757                              ;ERROR  254     GO RESET EARLY DURING SEEK
4758
4759  004262  074004                        EMT254
4760  004264  074556                        EHT1
4761  004266  074652                        EDT1
4762  004270  074700                        EFT1
4763
4764
4765                              ;ERROR  255     GO DID NOT RESET DURING SEEK
4766
4767  004272  074022                        EMT255
4768  004274  074556                        EHT1
4769  004276  074652                        EDT1
4770  004300  074700                        EFT1
4771
4772
4773                              ;ERROR  256     INCORRECT TAG BUS DURING SEEK
4774
4775  004302  074046                        EMT256
4776  004304  074556                        EHT1
4777  004306  074652                        EDT1
4778  004310  074700                        EFT1
4779
4780
4781                              ;ERROR  257     OPI NOT SET DURING SEARCH
4782
```

```
4783  004312  074064                        EMT257
4784  004314  074556                        EHT1
4785  004316  074652                        EDT1
4786  004320  074700                        EFT1
4787
4788
4789                              ;ERROR  260     SEARCH DID NOT ABORT WHEN DRIVE FAULT SET
4790
4791  004322  074110                        EMT260
4792  004324  074556                        EHT1
4793  004326  074652                        EDT1
4794  004330  074700                        EFT1
4795
4796
4797                              ;ERROR  261     OPI SHOULD HAVE SET BECAUSE ON CYLINDER NEVER
4798                              ;               DROPPED DURING SEARCH
4799
4800  004332  074134                        EMT261
4801  004334  074556                        EHT1
4802  004336  074652                        EDT1
4803  004340  074700                        EFT1
4804
4805
4806                              ;ERROR  262     ATA NOT SET DURING SEARCH
4807
4808  004342  074160                        EMT262
4809  004344  074556                        EHT1
4810  004346  074652                        EDT1
4811  004350  074700                        EFT1
4812
4813
4814                              ;ERROR  263     GO RESET EARLY DURING SEARCH
4815
4816  004352  074176                        EMT263
4817  004354  074556                        EHT1
4818  004356  074652                        EDT1
4819  004360  074700                        EFT1
4820
4821
4822                              ;ERROR  264     GO DID NOT RESET DURING SEARCH
4823
4824  004362  074214                        EMT264
4825  004364  074556                        EHT1
4826  004366  074652                        EDT1
4827  004370  074700                        EFT1
4828
4829
4830                              ;ERROR  265     SEARCH ENABLE DIDNT SET DURING SEARCH
4831
4832  004372  074240                        EMT265
4833  004374  074556                        EHT1
4834  004376  074652                        EDT1
4835  004400  074700                        EFT1
4836
4837
4838                              ;ERROR  266     INCORRECT TAG BUS DURING SEARCH
```

```
4839
4840  004402  074256                    EMT266
4841  004404  074556                    EHT1
4842  004406  074652                    EDT1
4843  004410  074700                    EFT1
4844
4845
4846                              ;ERROR  267     OPI NOT SET BY SEARCH TIMEOUT
4847
4848  004412  074274                    EMT267
4849  004414  074556                    EHT1
4850  004416  074652                    EDT1
4851  004420  074700                    EFT1
4852
4853
4854                              ;ERROR  270     OPI NOT SET DURING DATA COMMAND
4855
4856  004422  074310                    EMT270
4857  004424  074556                    EHT1
4858  004426  074652                    EDT1
4859  004430  074700                    EFT1
4860
4861
4862                              ;ERROR  271     DATA COMMAND DID NOT ABORT WHEN DRIVE FAULT SET
4863
4864  004432  074334                    EMT271
4865  004434  074556                    EHT1
4866  004436  074652                    EDT1
4867  004440  074700                    EFT1
4868
4869
4870                              ;ERROR  272     EBL RESET EARLY DURING DATA COMMAND
4871
4872  004442  074360                    EMT272
4873  004444  074556                    EHT1
4874  004446  074652                    EDT1
4875  004450  074700                    EFT1
4876
4877
4878                              ;ERROR  273     EBL DIDNT RESET ON TIME DURING DATA COMMAND
4879
4880  004452  074376                    EMT273
4881  004454  074556                    EHT1
4882  004456  074652                    EDT1
4883  004460  074700                    EFT1
4884
4885
4886                              ;ERROR  274     GO NOT RESET DURING DATA COMMAND
4887
4888  004462  074414                    EMT274
4889  004464  074556                    EHT1
4890  004466  074652                    EDT1
4891  004470  074700                    EFT1
4892
4893
4894                              ;ERROR  275     RUN AND GO NOT SET DURING DATA COMMAND
```

```
4895
4896  004472  074432                        EMT275
4897  004474  074556                        EHT1
4898  004476  074652                        EDT1
4899  004500  074700                        EFT1
4900
4901
4902                                ;ERROR  276     INCORRECT TAG BUS DURING DATA COMMAND
4903
4904  004502  074452                        EMT276
4905  004504  074556                        EHT1
4906  004506  074652                        EDT1
4907  004510  074700                        EFT1
4908
4909
4910                                ;ERROR  277     OPI NOT SET DURING DATA COMMAND WHEN ON
4911                                ;               CYLINDER DIDNT DROP
4912
4913  004512  074470                        EMT277
4914  004514  074556                        EHT1
4915  004516  074652                        EDT1
4916  004520  074700                        EFT1
4917
4918
4919                                ;ERROR  300     DATA COMMAND DID NOT ABORT WHEN SEEK ERROR SET
4920
4921  004522  074514                        EMT300
4922  004524  074556                        EHT1
4923  004526  074652                        EDT1
4924  004530  074700                        EFT1
4925
4926
4927                                ;ERROR  301     SEARCH NOT ENABLED DURING DATA COMMAND
4928
4929  004532  074540                        EMT301
4930  004534  074556                        EHT1
4931  004536  074652                        EDT1
4932  004540  074700                        EFT1
4933
4934
4935                                ;PUT ERROR TABLE HERE
4936
```

```
                                        .SBTTL  START OF PROGRAM


004542                                  START:

                                        ;CLEAR AND SETUP FOR TEST EXECUTION
004542  000240                                 NOP
004544  000005                                 RESET                          ;INITIALIZE THE SYSTEM

                                        .SBTTL  INITIALIZE THE COMMON TAGS
                                        ;;CLEAR THE COMMON TAGS ($CMTAG) AREA
004546  012706  001114                         MOV     #$CMTAG,R6             ;;FIRST LOCATION TO BE CLEARED
004552  005026                                 CLR     (R6)+                  ;;CLEAR MEMORY LOCATION
004554  022706  001154                         CMP     #SWR,R6 ;;DONE?
004560  001374                                 BNE     .-6                    ;;LOOP BACK IF NO
004562  012706  001100                         MOV     #STACK,SP              ;;SETUP THE STACK POINTER
                                        ;;INITIALIZE A FEW VECTORS
004566  012737  062212  000020                 MOV     #$SCOPE,@#IOTVEC ;;IOT VECTOR FOR SCOPE ROUTINE
004574  012737  000340  000022                 MOV     #340,@#IOTVEC+2 ;;LEVEL 7
004602  012737  062766  000030                 MOV     #$ERROR,@#EMTVEC ;;EMT VECTOR FOR ERROR ROUTINE
004610  012737  000340  000032                 MOV     #340,@#EMTVEC+2 ;;LEVEL 7
004616  012737  064526  000034                 MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
004624  012737  000340  000036                 MOV     #340,@#TRAPVEC+2;LEVEL 7
004632  012737  064634  000024                 MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
004640  012737  000340  000026                 MOV     #340,@#PWRVEC+2 ;;LEVEL 7
004646  013737  057266  057260                 MOV     $ENDCT,$EOPCT          ;;SETUP END-OF-PROGRAM COUNTER
004654  005037  001206                         CLR     $TIMES                 ;;INITIALIZE NUMBER OF ITERATIONS
004660  005037  001210                         CLR     $ESCAPE                ;;CLEAR THE ESCAPE ON ERROR ADDRESS
004664  112737  000001  001131                 MOVB    #1,$ERMAX              ;;ALLOW ONE ERROR PER TEST
004672  012737  004672  001122                 MOV     #.,$LPADR              ;;INITIALIZE THE LOOP ADDRESS FOR SCOPE
004700  012737  004700  001124                 MOV     #.,$LPERR              ;;SETUP THE ERROR LOOP ADDRESS
                                        ;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
                                        ;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
004706  013746  000004                         MOV     @#ERRVEC,-(SP)         ;;SAVE ERROR VECTOR
004712  012737  004746  000004                 MOV     #64$,@#ERRVEC          ;;SET UP ERROR VECTOR
004720  012737  177570  001154                 MOV     #DSWR,SWR              ;;SETUP FOR A HARDWARE SWICH REGISTER
004726  012737  177570  001156                 MOV     #DDISP,DISPLAY         ;;AND A HARDWARE DISPLAY REGISTER
004734  022777  177777  174212                 CMP     #-1,@SWR               ;;TRY TO REFERENCE HARDWARE SWR
004742  001012                                 BNE     66$                    ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
                                                                               ;;AND  THE HARDWARE SWR IS NOT = -1
004744  000403                                 BR      65$                    ;;BRANCH IF NO TIMEOUT
004746  012716  004754          64$:          MOV     #65$,(SP)              ;;SET UP FOR TRAP RETURN
004752  000002                                 RTI
004754  012737  000176  001154  65$:          MOV     #SWREG,SWR             ;;POINT TO SOFTWARE SWR
004762  012737  000174  001156                 MOV     #DISPREG,DISPLAY
004770  012637  000004          66$:          MOV     (SP)+,@#ERRVEC         ;;RESTORE ERROR VECTOR

004774  005037  001230                         CLR     $PASS                  ;;CLEAR PASS COUNT
005000  132737  000200  001243                 BITB    #APTSIZE,$ENVM         ;;TEST USER SIZE UNDER APT
005006  001403                                 BEQ     67$                    ;;YES,USE NON-APT SWITCH
005010  012737  001244  001154                 MOV     #$SWREG,SWR            ;;NO,USE APT SWITCH REGISTER
005016                          67$:
005016  012746  000140                         MOV     #PR3,-(SP)             ;;PUT NEW PS ON STACK
005022  012746  005030                         MOV     #68$,-(SP)             ;;PUT NEW PC ON  STACK
005026  000002                                 RTI                            ;;POP NEW PC AND PS
005030                          68$:
```

```
                                        .SBTTL  TYPE PROGRAM NAME
                                        ;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
005030  005227  177777                          INC     #-1             ;;FIRST TIME?
005034  001060                                  BNE     69$             ;;BRANCH IF NO
005036  022737  057422  000042                  CMP     #$ENDAD,@#42    ;;ACT-11?
005044  001454                                  BEQ     69$             ;;BRANCH IF YES
005046  104401  005114                          TYPE    ,70$            ;;TYPE ASCIZ STRING
                                        .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
005052  005737  000042                          TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
005056  001012                                  BNE     71$             ;;BRANCH IF YES
005060  123727  001242  000001                  CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
005066  001406                                  BEQ     71$             ;;BRANCH IF YES
005070  023727  001154  000176                  CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
005076  001005                                  BNE     72$             ;;BRANCH IF NO
005100  104407                                  GTSWR                   ;;GET SOFT-SWR SETTINGS
005102  000403                                  BR      72$
005104  112737  000001  001150          71$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
005112                                  72$:
005112  000431                                  BR      69$             ;;GET OVER THE ASCIZ
                                        ;;70$:  .ASCIZ  <CRLF>@CZRMJB0, RM03/RM02 DISKLESS DIAGNOSTIC PROGRAM @<CRLF>
005176                                  69$:


                                        ;FIND OUT IF PROGRAM IS RUNNING IN STANDALONE MODE
005176  005737  000042                          TST     42              ;IS LOC 42 ZERO ??
005202  001003                                  BNE     10$             ;NO - NOT IN STANDALONE
005204  105737  001242                          TSTB    $ENV            ;IS APT ENVIRONMENT ZERO ??
005210  001451                                  BEQ     STANDALONE      ;YES - PROGRAM IN STANDALONE
005212                                  10$:


                                        ;PROGRAM NOT RUNNING IN STANDALONE - SEE IF SIZING IS ALLOWED
005212  132737  000200  001243          XSIZ:   BITB    #BIT7,$ENVM     ;SIZING ALLOWED ??
005220  001043                                  BNE     20$             ;NO
                                        ;       MOV     #377,$DEVM      ;YES - SET DEVICE MAP FOR ALL DEVICES
005222  005037  001300                          CLR     $DEVM           ;CLEAR THE BIT MAP
005226  005001                                  CLR     R1              ;START FROM THE DRIVE 0
005230  012704  000001                          MOV     #BIT0,R4        ;BIT MAP DOR DRIVE 0
005234  013700  001276                          MOV     $BASE,R0                ;BASE ADDRESS
005240  012760  000040  000010  15$:     MOV     #CLR,RMCS2(R0)  ;LOAD THE DRIVE ADDRESS
005246  010160  000010                          MOV     R1,RMCS2(R0)    ;LOAD THE DRIVE ADDRESS
005252  016003  000010                          MOV     RMCS2(R0),R3    ;NED BIT SET ?
005256  032703  010000                          BIT     #NED,R3         ;BRANCH IF SO
005262  001010                                  BNE     16$             ;TO NEXT DRIVE
005264  016003  000000                          MOV     RMCS1(R0),R3    ;CHECK THE DVA BIT
005270  032703  004000                          BIT     #DVA,R3         ;DRIVE AVAILABLE ?
005274  001403                                  BEQ     16$             ;BRANCH IF DRIVE NOT AVAILABLE
005276  050437  001300                          BIS     R4,$DEVM        ;SET THE BIT MAP FOR ALL AVAILABLE DRIVE
005302  000405                                  BR      17$             ;DONT TYPE THE NONE EXIST MESG
005304                                  16$:
005304  104401  066115                          TYPE    ,NOTEX          ;TYPE NOT EXIT MESSAGE
005310  010146                                  MOV     R1,-(SP)        ;DRIVE NUMBER
005312  104403                                  TYPOS
005314     006                                  .BYTE   6
005315     000                                  .BYTE   0
005316  005201                          17$:    INC     R1              ;INCREMENT THE DRIVE ADDRESS
005320  006304                                  ASL     R4              ;SET UP THE BIT MAP FOR NEXT DRIVE
```

```
 5049  005322  022701  000007                 CMP     #7,R1           ;ALL DRIVE ARE CHECKED ?
 5050  005326  103344                         BHIS    15$             ;BRANCH IF NOT
 5051  005330                         20$:
 5052
 5053                                 ;GO TO COMMON START CODE
 5054  005330  000137  006162                 JMP     CMNSTART
```

```
5055  005334                                  STANDALONE:
5056
5057  005334  004737  063176                          JSR     PC,$TKINT
5058                                          ;SEE IF THIS IS THE FIRST START AFTER PROGRAM WAS LOADED
5059  005340  005327  000001                          DEC     #1              ;FIRST START ??
5060  005344  100024                                  BPL     10$             ;YES !!
5061
5062
5063                                          ;SEE IF THE USER WANTS TO KEEP SAME DEVICES FOR TESTING
5064  005346  104401  065424                5$:     TYPE    ,CNSL00         ;MAINTAIN PREVIOUS PARAMETERS??
5065  005352  104411                                  RDCHR                   ;GET RESPONSE
5066  005354  012637  001176                          MOV     (SP)+,$TMP1     ;ECHO RESPONSE
5067  005360  104401  001176                          TYPE    ,$TMP1
5068  005364  123727  001176  000131                  CMPB    $TMP1,#'Y       ;YES RESPONSE??
5069  005372  001002                                  BNE     6$              ;NO!!
5070  005374  000137  006322                          JMP     READY           ;KEEP PREVIOUS PARAMETERS
5071  005400  123727  001176  000116          6$:     CMPB    $TMP1,#'N       ;NO RESPONSE??
5072  005406  001420                                  BEQ     20$             ;GET NEW PARAMETERS
5073  005410  104401  065267                          TYPE    ,QSTMRK         ;NOT YES OR NO, TYPE "?"
5074  005414  000754                                  BR      5$              ;RETRY
5075  005416                                  10$:
5076
5077                                          ;SEE IF OPERATOR WANTS HELP FILE
5078  005416  104401  065271                          TYPE    ,HELPQST        ;WANT HELP ??
5079  005422  104411                                  RDCHR                   ;GET RESPONSE
5080  005424  012637  001176                          MOV     (SP)+,$TMP1     ;SAVE AND ECHO RESPONSE
5081  005430  104401  001176                          TYPE    ,$TMP1
5082  005434  123727  001176  000131                  CMPB    $TMP1,#'Y       ;WAS IT A YES RESPONSE ??
5083  005442  001002                                  BNE     20$             ;NO - DONT TYPE HELP
5084  005444  104401  107030                          TYPE    ,HELP           ;YES - TYPE HELP TEXT
5085  005450                                  20$:
5086
5087                                          ;SEE IF USER WANTS TO CHANGE RM03 UNIBUS ADDRESS
5088  005450  104401  065325                          TYPE    ,UBUSQST        ;WANT TO CHANGE ADDRESS ??
5089  005454  104411                                  RDCHR                   ;GET RESPONSE
5090  005456  012637  001176                          MOV     (SP)+,$TMP1     ;SAVE AND ECHO RESPONSE
5091  005462  104401  001176                          TYPE    ,$TMP1
5092  005466  104411                                  RDCHR                   ;READ S CR
5093  005470  005726                                  TST     (SP)+           ;CLEAR THE STACK
5094  005472  123727  001176  000131                  CMPB    $TMP1,#'Y       ;WAS IT A YES RESPONSE ??
5095  005500  001137                                  BNE     90$             ;NO !!
5096  005502                                  30$:
5097
5098                                          ;DIALOGUE TO CHANGE THE UNIBUS ADDRESS, AND INTERRUPT VECTOR
5099  005502  104401  065463                          TYPE    ,CNSL01         ;TYPE CURRENT BUS ADDRESS
5100  005506  013746  001276                          MOV     $BASE,-(SP)     ;;SAVE $BASE FOR TYPEOUT
5101  005512  104402                                  TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
5102  005514  104401  065260                          TYPE    ,CLSPRN
5103  005520  104413                                  RDOCT                   ;GET NEW BUS ADDRESS
5104  005522  012637  001176                          MOV     (SP)+,$TMP1     ;CARRIAGE RETURN??
5105  005526  001412                                  BEQ     50$             ;YES-SKIP TO NEXT ENTRY
5106  005530  022737  160000  001176                  CMP     #160000,$TMP1   ;BASE ADDRESS IN I/O PAGE??
5107  005536  101403                                  BLOS    40$             ;YES
5108  005540  104401  065510                          TYPE    ,CNSL02         ;TYPE WARNING MESSAGE
5109  005544  000756                                  BR      30$             ;RETRY
5110  005546  013737  001176  001276          40$:    MOV     $TMP1,$BASE     ;STORE NEW BUS ADDRESS
```

```
 5111  005554  113737  001272  001176  50$:    MOVB    $VECT1,$TMP1    ;TYPE CURRENT VECTOR ADDRESS
 5112  005562  105037  001177                  CLRB    $TMP1+1
 5113  005566  104401  065571                  TYPE    ,CNSL03
 5114  005572  013746  001176                  MOV     $TMP1,-(SP)     ;;SAVE $TMP1 FOR TYPEOUT
 5115  005576  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 5116  005600     003                          .BYTE   3               ;;TYPE 3 DIGIT(S)
 5117  005601     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 5118  005602  104401  065260                  TYPE    ,CLSPRN
 5119  005606  104413                          RDOCT                   ;GET NEW VECTOR ADDRESS
 5120  005610  012637  001176                  MOV     (SP)+,$TMP1     ;CARRIAGE RETURN?
 5121  005614  001412                          BEQ     70$             ;YES-SKIP TO NEXT ENTRY
 5122  005616  022737  001000  001176          CMP     #1000,$TMP1     ;VECTOR ADDRESS < 1000??
 5123  005624  101003                          BHI     60$             ;YES!!
 5124  005626  104401  065621                  TYPE    ,CNSL04         ;TYPE WARNING MESSAGE
 5125  005632  000750                          BR      50$             ;RETRY
 5126  005634  113737  001176  001272  60$:    MOVB    $TMP1,$VECT1    ;STORE NEW VECTOR ADDRESS
 5127  005642  113737  001273  001176  70$:    MOVB    $VECT1+1,$TMP1  ;TYPE CURRENT PRIORITY
 5128  005650  006237  001176                  ASR     $TMP1
 5129  005654  006237  001176                  ASR     $TMP1
 5130  005660  006237  001176                  ASR     $TMP1
 5131  005664  006237  001176                  ASR     $TMP1
 5132  005670  006237  001176                  ASR     $TMP1
 5133  005674  105037  001177                  CLRB    $TMP1+1
 5134  005700  104401  065675                  TYPE    ,CNSL05
 5135  005704  013746  001176                  MOV     $TMP1,-(SP)     ;;SAVE $TMP1 FOR TYPEOUT
 5136  005710  104403                          TYPOS                   ;;GO TYPE--OCTAL ASCII
 5137  005712     001                          .BYTE   1               ;;TYPE 1 DIGIT(S)
 5138  005713     000                          .BYTE   0               ;;SUPPRESS LEADING ZEROS
 5139  005714  104401  065260                  TYPE    ,CLSPRN
 5140  005720  104413                          RDOCT                   ;GET NEW PRIORITY
 5141  005722  012637  001176                  MOV     (SP)+,$TMP1     ;CARRIAGE RETURN??
 5142  005726  001424                          BEQ     90$             ;YES-SKIP TO NEXT ENTRY
 5143  005730  023727  001176  000007          CMP     $TMP1,#7        ;LEGAL PRIORITY??
 5144  005736  002403                          BLT     80$             ;YES!!
 5145  005740  104401  065731                  TYPE    ,CNSL06         ;TYPE WARNING MESSAGE
 5146  005744  000736                          BR      70$             ;RETRY
 5147  005746                          80$:                            ;STORE NEW PRIORITY
 5148  005746  006337  001176                  ASL     $TMP1
 5149  005752  006337  001176                  ASL     $TMP1
 5150  005756  006337  001176                  ASL     $TMP1
 5151  005762  006337  001176                  ASL     $TMP1
 5152  005766  006337  001176                  ASL     $TMP1
 5153  005772  113737  001176  001273          MOVB    $TMP1,$VECT1+1
 5154  006000                          90$:
 5155
 5156                                  ;DIALOGUE TO INPUT DEVICE NUMBERS
 5157  006000  005037  001300                  CLR     $DEVM           ;CLEAR DEVICE MAP
 5158  006004  104401  065756                  TYPE    ,CNSL07         ;TYPE INPUT INSTRUCTIONS
 5159  006010  104401  065263                  TYPE    ,PROMPT         ;TYPE PROMPTING CHARACTER
 5160  006014  104411                          RDCHR                   ;GET RESPONSE
 5161  006016  012637  001176                  MOV     (SP)+,$TMP1     ;ECHO RESPONSE
 5162  006022  104401  001176                  TYPE    ,$TMP1
 5163  006026  023727  001176  000101          CMP     $TMP1,#'A       ;TEST ALL DRIVES??
 5164  006034  001021                          BNE     110$            ;NO
 5165  006036  000137  005212                  JMP     XSIZ            ;TO SIZE ALL POWER UP DRIVES
 5166  006042  012737  000377  001300          MOV     #377,$DEVM      ;TEST ALL DEVICES
```

```
5167  006050  000444                          BR      140$            ;SKIP TO NEXT ENTRY
5168  006052  104401  065263          100$:   TYPE    ,PROMPT         ;TYPE PROMPTING CHARACTER
5169  006056  104411                          RDCHR                   ;GET RESPONSE
5170  006060  012637  001176                  MOV     (SP)+,$TMP1     ;ECHO RESPONSE
5171  006064  104401  001176                  TYPE    ,$TMP1
5172  006070  023727  001176  000015          CMP     $TMP1,#CR       ;CARRIAGE RETURN??
5173  006076  001431                          BEQ     140$
5174  006100  023727  001176  000060  110$:   CMP     $TMP1,#'0       ;NUMBER < 0??
5175  006106  002404                          BLT     120$            ;YES!!
5176  006110  023727  001176  000067          CMP     $TMP1,#'7       ;NUMBER > 7??
5177  006116  003403                          BLE     130$            ;NO!!
5178  006120  104401  065267          120$:   TYPE    ,QSTMRK         ;TYPE "?"
5179  006124  000752                          BR      100$            ;RETRY
5180  006126  013701  001176          130$:   MOV     $TMP1,R1        ;R1=DRIVE NUMBER
5181  006132  042701  177770                  BIC     #^C7,R1
5182  006136  116102  066242                  MOVB    ATNTBL(R1),R2           ;DECODE DEVICE NUMBER
5183  006142  042702  177400                  BIC     #^C377,R2               ;CLEAR UNUSED BITS
5184  006146  050237  001300                  BIS     R2,$DEVM                ;SET DEVICE # IN MAP
5185  006152  122737  000377  001300          CMPB    #377,$DEVM      ;DONE ??
5186  006160  101334                          BHI     100$            ;NO
5187  006162                          140$:
5188
```

```
                                        ;GET VALUE FOR SOFTWARE SWITCH REGISTER

006162                                  CMNSTART:
                                        ;
                                        ;ASSEMBLE TEST QUE FROM DEVICE MAP
006162  013700  001300                          MOV     $DEVM,R0        ;R0 = DEVICE MAP
006166  012701  001460                          MOV     #TSTQUE+2,R1    ;R1 = ADDRESS OF FIRST ENTRY IN QUE
006172  010137  001456                          MOV     R1,TSTQUE       ;INITIALIZE ENTRY POINTER
006176  012702  000001                          MOV     #1,R2           ;R2 = DEVICE POINTER
006202  005003                                  CLR     R3              ;R3 = DEVICE NUMBER
006204  030200                          10$:    BIT     R2,R0           ;IS THIS DEVICE IN MAP ??
006206  001406                                  BEQ     20$             ;NO !!
006210  010311                                  MOV     R3,(R1)         ;YES - ENTER DEVICE NUMBER IN QUE
006212  116361  066242  000001                  MOVB    ATNTBL(R3),1(R1);ENTER ATTENTION BIT IN QUE
006220  062701  000002                          ADD     #2,R1           ;ADVANCE ENTRY POINTER
006224  006302                          20$:    ASL     R2              ;ADVANCE DEVICE POINTER
006226  105702                                  TSTB    R2              ;DONE ALL DEVICES ??
006230  001402                                  BEQ     25$             ;YES
006232  005203                                  INC     R3              ;ADVANCE DEVICE NUMBER
006234  000763                                  BR      10$             ;ENTER NEXT DEVICE
006236  005011                          25$:    CLR     (R1)            ;TERMINATE TEST QUE
                                        ;
                                        ;SIZE FOR CLOCK
006240  004737  060244                          JSR     PC,SIZCLK       ;SEE IF CLOCK PRESENT
006244  000403                                  BR      40$             ;YES - CLOCK IS PRESENT
006246  104000                          30$:    ERROR                   ;NO CLOCK
006250  000000                                  HALT
006252  000775                                  BR      30$
006254                                  40$:
                                        .SBTTL  GET VALUE FOR SOFTWARE SWITCH REGISTER
006254  005737  000042                          TST     @#42            ;;ARE WE RUNNING UNDER XXDP/ACT?
006260  001012                                  BNE     64$             ;;BRANCH IF YES
006262  123727  001242  000001                  CMPB    $ENV,#1         ;;ARE WE RUNNING UNDER APT?
006270  001406                                  BEQ     64$             ;;BRANCH IF YES
006272  023727  001154  000176                  CMP     SWR,#SWREG      ;;SOFTWARE SWITCH REG SELECTED?
006300  001005                                  BNE     65$             ;;BRANCH IF NO
006302  104407                                  GTSWR                   ;;GET SOFT-SWR SETTINGS
006304  000403                                  BR      65$
006306  112737  000001  001150  64$:    MOVB    #1,$AUTOB       ;;SET AUTO-MODE INDICATOR
006314                          65$:
006314  012737  000140  000032          MOV     #PR3,@#EMTVEC+2 ;DROP PRIORITY DURING ERROR TYPEOUT
006322  000240                  READY:  NOP                     ;READY TO START TEST
006324  004737  063176                  JSR     PC,$TKINT       ;INITIALIZE TTY
006330  117737  173122  001234          MOVB    @TSTQUE,$UNIT   ;LOAD UNIT NUMBER
```

```
5231                            .SBTTL  REGISTER AND STORAGE USAGE
5232
5233                            ;REGISTER ASSIGNMENTS
5234                            ;
5235                            ;R0      =       UNIBUS ADDRESS OF RH CONTROLLER
5236                            ;R1      =       ADDRESS OF ENTRY IN TEST QUE CORRESPONDING TO THE
5237                            ;                UNIT UNDER TEST
5238                            ;R2,R3   =       WORKING REGISTERS FOR TEST IN PROGRESS, MUST BE
5239                            ;                SAVED BY SUBROUTINES
5240                            ;R4,R5   =       GENERAL WORKING REGISTERS, ARE NOT SAVED BY
5241                            ;                SUBROUTINES
5242                            ;R6      =       STACK POINTER
5243                            ;R7      =       LINKAGE REGISTER TO SUBROUTINES
5244
5245                            ;STORAGE ASSIGNMENTS
5246                            ;
5247                            ;$TMP0-$TMP4     TEMPORARY STORAGE, NOT SAVED BY SUBROUTINES
5248                            ;$GDDAT,$BDDAT   EXPECTED AND RRECEIVED STATUS FOR ERROR TYPEOUT
5249                            ;$GDADR,$BDADR   ADDRESS OF EXPECTED AND RECEIVED STATUS IF APPLICABLE.
5250                            ;                ALSO THE ADDRESS OF A REGISTER ERROR
5251                            ;
5252                            ;$TSTN   =       TEST NUMBER
5253                            ;$UNIT   =       NUMBER OF DEVICE BEING TESTED
5254                            ;RGINBF  =       THE REGISTER INPUT BUFFER HAS A STORAGE LOCATION FOR
5255                            ;                EACH REGISTER, AND IS USED WHEN READING STATUS AND
5256                            ;                CONTROL DATA
5257                            ;RGOTBF  =       THE REGISTER OUTPUT BUFFER HAS A STORAGE LOCATION FOR
5258                            ;                EACH REGISTER, AND IS USED FOR ASSEMBLING DATA TO BE
5259                            ;                WRITTEN IN REGISTERS
```

```
                                        ;;*****************************************************************
                                        ;*TEST 1         TRANSFER TEST
                                        ;;*****************************************************************
006336  000004                  TST1:   SCOPE
006340  012737  000001  001226          MOV     #1,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
006346  000240                          NOP
006350  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
006356  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
006364  012737  006400  001122          MOV     #T1,$LPADR  ;LOAD LOOP ON TEST ADDRESS
006372  012737  006400  001124          MOV     #T1,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
006400                          T1:
006400  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
006404  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UNIT
006410  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
006414  012702  000000                  MOV     #0,R2           ;R2 = REGISTER INDEX
006420                          10$:
                                ;CLEAR THE MASSBUS AND VERIFY THAT NONEXISTANT DEVICE ERROR IS RESET
006420  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
006426  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT

006432  016037  000010  001142          MOV     RMCS2(R0),$BDDAT        ;STORE RMCS2 AT $BDDAT
006440  032737  010000  001142          BIT     #NED,$BDDAT
006446  001417                          BEQ     20$
006450  111137  001140                  MOVB    (R1),$GDDAT
006454  042737  177770  001140          BIC     #^CUNTMSK,$GDDAT
006462  052737  000100  001140          BIS     #IR,$GDDAT
006470  010037  001136                  MOV     R0,$BDADR
006474  062737  000010  001136          ADD     #RMCS2,$BDADR
006502  104001                          ERROR   1
006504  000500                          BR      60$
006506                          20$:
                                ;READ THE REGISTER WHOSE INDEX IS IN R2 AND EXIT TEST IF THE READ
                                ;DOES NOT SET "NED" ERROR
006506  010003                          MOV     R0,R3           ;R3 = REGISTER ADDRESS
006510  060203                          ADD     R2,R3
006512  011304                          MOV     (R3), R4                ;READ REGISTER
006514  032760  010000  000010          BIT     #NED, RMCS2(R0)         ;IS "NED" SET??
006522  001473                          BEQ     70$             ;NO!!
006524  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
006532  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT

006536  016037  000010  001142          MOV     RMCS2(R0),$BDDAT        ;STORE RMCS2 AT $BDDAT
006544  032737  010000  001142          BIT     #NED,$BDDAT
006552  001417                          BEQ     30$
006554  111137  001140                  MOVB    (R1),$GDDAT
006560  042737  177770  001140          BIC     #^CUNTMSK,$GDDAT
006566  052737  000100  001140          BIS     #IR,$GDDAT
006574  010037  001136                  MOV     R0,$BDADR
006600  062737  000010  001136          ADD     #RMCS2,$BDADR
006606  104001                          ERROR   1
006610  000436                          BR      60$
006612                          30$:
                                ;WRITE THE REGISTER WHOSE INDEX IS IN R2 AND EXIT TEST IF THE WRITE
                                ;DOES NOT SET "NED" ERROR
```

```
5316  006612  012713  000000          MOV     #0,(R3)         ;WRITE REGISTER
5317  006616  032760  010000  000010  BIT     #NED, RMCS2     (R0)    ;IS "NED" SET??
5318  006624  001432                  BEQ     70$             ;NO!!
5319
5320  006626                  40$:
5321                          ;COULD NOT READ OR WRITE THE REGISTER WITHOUT SETING "NED" ERROR -
5322                          ;ADVANCE THE REGISTER INDEX AND REPEAT THE TEST FOR THE NEXT
5323                          ;AVAILABLE DEVICE REGISTER
5324  006626  062702  000002          ADD     #2,R2           ;ADVANCE TO NEXT REGISTER
5325  006632  022702  000002          CMP     #RMWC,R2                ;IS THIS RMWC??
5326  006636  001773                  BEQ     40$             ;YES - TRY NEXT REGISTER
5327  006640  022702  000004          CMP     #RMBA,R2                ;IS THIS RMBA??
5328  006644  001770                  BEQ     40$             ;YES - TRY NEXT REGISTER
5329  006646  022702  000010          CMP     #RMCS2,R2               ;IS THIS RMCS5??
5330  006652  001765                  BEQ     40$             ;YES - TRY ANOTHER REGISTER
5331  006654  022702  000016          CMP     #RMAS,R2                ;IS THIS RMAS ??
5332  006660  001762                  BEQ     40$             ;YES - TRY ANOTHER REGISTER
5333  006662  022702  000022          CMP     #RMDB,R2                ;IS THIS RMDB??
5334  006666  001757                  BEQ     40$             ;YES - TRY ANOTHER REGISTER
5335  006670  022702  000046          CMP     #RMEC2,R2               ;IS THIS A LEGAL REGISTER
5336  006674  103251                  BHIS    10$             ;YES - TRY THIS REGISTER
5337
5338  006676                  50$:
5339
5340                          ;GOT 'NONEXISTENT DEVICE' ERROR FOR EVERY REMOTE REGISTER ADDRESS
5341  006676  013737  001276  001136          MOV     $BASE, $BDADR           ;STORE BASE ADDRESS
5342  006704  104002                  ERROR   2               ;DEMAND OR TRANSFER FAILED
5343  006706  000137  057176  60$:    JMP     $EOSP           ;GO SELECT NEXT DEVICE
5344
5345  006712                  70$:
5346
5347                          ;;*****************************************************************
5348                          ;*TEST 2         CTOD TEST
5349
5350                          ;;*****************************************************************
5351  006712  000004          TST2:   SCOPE
5352  006714  012737  000002  001226          MOV     #2,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5353  006722  000240                  NOP
5354  006724  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
5355  006732  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
5356  006740  012737  006754  001122          MOV     #T2,$LPADR  ;LOAD LOOP ON TEST ADDRESS
5357  006746  012737  006754  001124          MOV     #T2,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
5358  006754                  T2:
5359  006754  012706  001100          MOV     #STACK,SP       ;LOAD THE STACK POINTER
5360  006760  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
5361  006764  013701  001456          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
5362  006770  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5363  006776  111160  000010          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5364                          ;WRITE ONES IN REMOTE REGISTERS
5365
5366  007002  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
5367
5368  007010  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
5369
5370  007016  012760  001777  000034          MOV     #CYLMSK,RMDC(R0)        ;LOAD RMDC
5371
```

```
5372  007024  012760  016200  000032          MOV     #FMT16!ECI!HCI!OFD,RMOF(R0)     ;LOAD RMOF
5373                                ;READ REMOTE REGISTERS TWICE
5374  007032  012702  000001                  MOV     #1,R2
5375  007036                            10$:
5376
5377  007036  016037  000000  001326          MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
5378
5379  007044  016037  000006  001334          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
5380
5381  007052  016037  000034  001362          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
5382
5383  007060  016037  000032  001360          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
5384  007066  005302                          DEC     R2
5385  007070  100362                          BPL     10$
5386                                ;SEE IF ANY ONE BITS CAME BACK
5387  007072  042737  177701  001326          BIC     #^CILF76,RMCS1I ;IS RMCS1 0??
5388  007100  001014                          BNE     20$             ;NO!!
5389  007102  005737  001334                  TST     RMDAI           ;IS RMDA 0??
5390  007106  001011                          BNE     20$             ;NO!!
5391  007110  042737  176000  001362          BIC     #XMUDC,RMDCI    ;IS RMDC 0??
5392  007116  001005                          BNE     20$             ;NO!!
5393  007120  042737  161577  001360          BIC     #XMUOF,RMOFI    ;IS RMOF 0 ??
5394  007126  001001                          BNE     20$             ;NO!!
5395                                ;CANNOT READ ANY ONE BITS FROM REMOTE REGISTERS
5396  007130  104003                          ERROR   3               ;CTOD MUST BE STUCK
5397  007132                            20$:
5398
5399                                ;;*****************************************************************
5400                                ;*TEST 3        MASSBUS INITIALIZE TEST
5401
5402                                ;;*****************************************************************
5403  007132  000004                  TST3:   SCOPE
5404  007134  012737  000003  001226          MOV     #3,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5405
5406  007142  000240                          NOP
5407  007144  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
5408  007152  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
5409  007160  012737  007174  001122          MOV     #T3,$LPADR  ;LOAD LOOP ON TEST ADDRESS
5410  007166  012737  007174  001124          MOV     #T3,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
5411  007174                            T3:
5412  007174  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
5413  007200  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
5414  007204  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
5415  007210  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5416  007216  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5417                                ;WRITE ONES IN SELECTED REGISTERS
5418
5419  007222  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
5420
5421  007230  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
5422
5423  007236  012760  177777  000042          MOV     #-1,RMER2(R0)   ;LOAD RMER2
5424                                ;USING CONTROLLER CLEAR, IE., BIT 5 OF RMCS2, INITIALIZE THE MASSBUS
5425  007244  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5426  007252  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5427                                ;READ THE REGISTERS THAT WERE WRITTEN
```

```
                                                                                
                                                                                
007256  016037  000000  001326          MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
                                                                                
007264  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
                                                                                
007272  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
                                ;SEE IF ANY REGISTER BITS WERE CLEARED
007300  052737  177701  001326          BIS     #^CIL$76,RMCS1I         ;SET ANY BIT NOT WRITTEN
007306  052737  001567  001370          BIS     #XNUER2,RMER2I
007314  022737  177777  001326          CMP     #-1,RMCS1I              ;ANY ZEROS IN RMCS1??
007322  001011                          BNE     10$             ;YES!!
007324  022737  177777  001342          CMP     #-1,RMER1I              ;ANY ZEROS IN RMER1??
007332  001005                          BNE     10$             ;YES!!
007334  022737  177777  001370          CMP     #-1,RMER2I              ;ANY ZEROS IN RMER2??
007342  001001                          BNE     10$
                                ;NONE OF THE BITS WERE CLEARED
007344  104004                          ERROR   4                       ;MASSBUS INIT FAILED
007346                          10$:
                                                                                
                                ;;*****************************************************************
                                ;*TEST 4         CLEAR STUCK ACTIVE TEST
                                                                                
                                ;;*****************************************************************
007346  000004                  T$T4:   SCOPE
007350  012737  000004  001226          MOV     #4,$TESTN               ;;SET TEST NUMBER IN APT MAIL BOX
                                                                                
007356  000240                          NOP
007360  012737  000024  001120          MOV     #20.,$ICNT              ;20 ITERATIONS
007366  112737  000001  001131          MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
007374  012737  007410  001122          MOV     #T4,$LPADR      ;LOAD LOOP ON TEST ADDRESS
007402  012737  007410  001124          MOV     #T4,$LPERR      ;LOAD LOOP ON ERROR ADDRESS
007410                          T4:
007410  012706  001100                  MOV     #STACK,SP               ;LOAD THE STACK POINTER
007414  013700  001276                  MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
007420  013701  001456                  MOV     TSTQUE,R1               ;R1 = POINTER TO DEVICE
007424  012760  000040  000010          MOV     #CCLR,RMCS2(R0) ;CLEAR THE MASSBUS
007432  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
                                ;WRITE ONES IN TEST REGISTERS
                                                                                
007436  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
                                                                                
007444  012760  177777  000042          MOV     #-1,RMER2(R0)   ;LOAD RMER2
                                                                                
007452  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
                                ;READ TEST REGISTERS AND SEE IF ANY BITS ARE ON
                                                                                
007460  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
                                                                                
007466  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
                                                                                
007474  016037  000024  001352          MOV     RMMR1(R0),RMMR1I        ;STORE RMMR1 IN INPUT BUFFER
007502  042737  040000  001342          BIC     #UNS,RMER1I     ;DONT ACCEPT UNSAFE
007510  001011                          BNE     10$             ;BRANCH IF ANY OTHER BITS ON
007512  042737  040200  001370          BIC     #SKI!DVC,RMER2I ;DONT ACCEPT SKI OR DVC
007520  001005                          BNE     10$             ;BRANCH IF ANY OTHER BITS ON
007522  032737  000001  001352          BIT     #DMD,RMMR1I     ;BRANCH IF DMD IS ON
```

```
5484  007530  001001                        BNE     10$
5485  007532  104026                        ERROR   26              ;MBA CLR IS STUCK ACTIVE
5486  007534                        10$:
5487
5488
5489                                ;;*****************************************************************
5490                                ;*TEST 5         TRISTATE TRANSFER TEST
5491
5492                                ;;*****************************************************************
5493  007534  000004                TSTS:   SCOPE
5494  007536  012737  000005  001226        MOV     #5,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5495  007544  000240                        NOP
5496  007546  012737  000024  001120        MOV     #20.,$ICNT      ;20 ITERATIONS
5497  007554  112737  000001  001131        MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
5498  007562  012737  007576  001122        MOV     #T5,$LPADR  ;LOAD LOOP ON TEST ADDRESS
5499  007570  012737  007576  001124        MOV     #T5,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
5500  007576                        15:
5501  007576  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
5502  007602  013700  001276                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
5503  007606  013701  001456                MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
5504  007612  005002                        CLR     R2              ;CLEAR ERROR FLAGS
5505  007614  012760  000040  000010        MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5506  007622  111160  000010                MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5507                                ;WRITE ONES IN SELECTED REGISTERS
5508
5509  007626  012760  000076  000000        MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
5510
5511  007634  012760  177777  000006        MOV     #-1,RMDA(R0)    ;LOAD RMDA
5512
5513  007642  012760  177777  000014        MOV     #-1,RMER1(R0)   ;LOAD RMER1
5514
5515  007650  012760  177777  000032        MOV     #-1,RMOF(R0)    ;LOAD RMOF
5516
5517  007656  012760  177777  000042        MOV     #-1,RMER2(R0)   ;LOAD RMER2
5518                                ;WRITE ZEROS IN SELECTED REGISTERS
5519
5520  007664  012760  000000  000000        MOV     #0,RMCS1(R0)    ;LOAD RMCS1
5521
5522  007672  012760  000000  000006        MOV     #0,RMDA(R0)     ;LOAD RMDA
5523
5524  007700  012760  000000  000014        MOV     #0,RMER1(R0)    ;LOAD RMER1
5525
5526  007706  012760  000000  000032        MOV     #0,RMOF(R0)     ;LOAD RMOF
5527
5528  007714  012760  000000  000034        MOV     #0,RMDC(R0)     ;LOAD RMDC
5529
5530  007722  012760  000000  000042        MOV     #0,RMER2(R0)    ;LOAD RMER2
5531                                ;READ BACK ALL REGISTERS
5532
5533  007730  016037  000000  001326        MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
5534
5535  007736  016037  000006  001334        MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
5536
5537  007744  016037  000014  001342        MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
5538
5539  007752  016037  000032  001360        MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
```

```
5540
5541  007760  016037  000034  001362          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
5542
5543  007766  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
5544                        ;CHECK EACH REGISTER CONTENT FOR ZERO BITS WRITTEN & READ
5545  007774  012702  177777                  MOV     #-1,R2          ;ACCUMULATE ZEROS IN R2
5546  010000  052737  177701  001326          BIS     #^CILF76,RMCS1I ;SET ALL BITS NOT WRITTEN
5547  010006  052737  161577  001360          BIS     #XNUOF,RMOFI
5548  010014  052737  176000  001362          BIS     #XNUDC,RMDCI
5549  010022  052737  001567  001370          BIS     #XNUER2,RMER2I
5550  010030  005137  001326                  COM     RMCS1I          ;COMPLEMENT REGISTER CONTENTS
5551  010034  005137  001334                  COM     RMDAI
5552  010040  005137  001342                  COM     RMER1I
5553  010044  005137  001360                  COM     RMOFI
5554  010050  005137  001362                  COM     RMDCI
5555  010054  005137  001370                  COM     RMER2I
5556  010060  043702  001326                  BIC     RMCS1I,R2               ;ACCUMULATE ALL ZERO BITS
5557  010064  043702  001334                  BIC     RMDAI,R2
5558  010070  043702  001342                  BIC     RMER1I,R2
5559  010074  043702  001360                  BIC     RMOFI,R2
5560  010100  043702  001362                  BIC     RMDCI,R2
5561  010104  043702  001370                  BIC     RMER2I,R2
5562  010110  001407                          BEQ     10$             ;BRANCH IF EACH BIT IS ZERO
5563                        ;ONE OR MORE BIT POSITIONS ARE NOT ZERO
5564  010112  010237  001142                  MOV     R2,$BDDAT               ;SAVE RESULT FOR TYPE
5565  010116  005037  001140                  CLR     $GDDAT          ;LOAD EXPECTED RESULT
5566  010122  104005                          ERROR   5               ;TRISTATE BUS IS STUCK AT ONE
5567  010124  052702  000001                  BIS     #BIT0,R2        ;SET ERROR FLAG
5568  010130                        10$:
5569
5570  010130  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5571  010136  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5572                        ;PRESET SELECTED REGISTERS TO ZEROS
5573                        ;(ASSUME RMCS1, RMER1, RMER2 WERE CLEARED BY INIT)
5574
5575  010142  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
5576
5577  010150  012760  000000  000032          MOV     #0,RMOF(R0)     ;LOAD RMOF
5578
5579  010156  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
5580                        ;WRITE ONES IN SELECTED REGISTERS
5581
5582  010164  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
5583
5584  010172  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
5585
5586  010200  012760  016200  000032          MOV     #^CXNUOF,RMOF(R0)       ;LOAD RMOF
5587
5588  010206  012760  001777  000034          MOV     #^CXNUDC,RMDC(R0)       ;LOAD RMDC
5589
5590  010214  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
5591
5592  010222  012760  176210  000042          MOV     #^CXNUER2,RMER2(R0)     ;LOAD RMER2
5593                        ;READ ALL REGISTERS
5594
5595  010230  016037  000000  001326          MOV     RMCS1(R0),RMCS1I        ;STORE RMCS1 IN INPUT BUFFER
```

```
5596
5597  010236  016037  000006  001334          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
5598
5599  010244  016037  000032  001360          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
5600
5601  010252  016037  000034  001362          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
5602
5603  010260  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
5604
5605  010266  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
5606                          ;CHECK EACH REGISTER CONTENT FOR ONE BITS WRITTEN & READ
5607  010274  042737  177701  001326          BIC     #^CILF76,RMCS1I         ;CLEAR ALL BITS NOT WRITTEN
5608  010302  042737  161577  001360          BIC     #XNUOF,RMOFI
5609  010310  042737  176000  001362          BIC     #XNUDC,RMDCI
5610  010316  042737  001567  001370          BIC     #XNUER2,RMER2I
5611  010324  005002                          CLR     R2              ;ACCUMULATE ONES IN R2
5612  010326  053702  001326                  BIS     RMCS1I,R2               ;ACCUMULATE ALL ONE BITS
5613  010332  053702  001334                  BIS     RMDAI,R2
5614  010336  053702  001360                  BIS     RMOFI,R2
5615  010342  053702  001362                  BIS     RMDCI,R2
5616  010346  053702  001342                  BIS     RMER1I,R2
5617  010352  053702  001370                  BIS     RMER2I,R2
5618  010356  022702  177777                  CMP     #-1,R2          ;SEE IF EACH BIT POSITION WAS ONE
5619  010362  001410                          BEQ     20$             ;BRANCH IF NONE STUCK
5620                          ;ONE OR MORE BIT POSITIONS ARE NOT ONE
5621  010364  010237  001142                  MOV     R2,$DDAT                ;SAVE RESULT FOR TYPE
5622  010370  012737  177777  001140          MOV     #-1,$GDDAT              ;EXPECTED RESULT
5623  010376  104006                          ERROR   6
5624  010400  052702  000002                  BIS     #BIT1,R2        ;SET ERROR FLAG
5625  010404                          20$:
5626
5627  010404  005702                          TST     R2              ;ANY ERRORS DETECTED ??
5628  010406  001131                          BNE     30$             ;YES - DONT DO BIT TEST
5629  010410  012702  000001                  MOV     #1,R2           ;R2=BIT POSITION
5630  010414                          25$:
5631  010414  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5632  010422  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5633                          ;WRITE THE BIT PATTERN IN SELECTED DEVICE REGISTERS
5634
5635  010426  010260  000006                  MOV     R2,RMDA(R0)     ;LOAD RMDA
5636
5637  010432  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF
5638
5639  010436  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
5640
5641  010442  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
5642
5643  010446  010260  000042                  MOV     R2,RMER2(R0)    ;LOAD RMER2
5644                          ;READ BACK THE REGISTERS
5645
5646  010452  016037  000006  001334          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
5647
5648  010460  016037  000032  001360          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
5649
5650  010466  016037  000034  001362          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
5651
```

```
5652  010474  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
5653
5654  010502  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
5655                                  ;CHECK REGISTER CONTENTS FOR CORRECT PATTERN
5656  010510  005003                          CLR     R3                      ;R3=ACCUMULATED ONE BIT
5657  010512  012704  177777                  MOV     #-1,R4                  ;R4=ACCUMULATED ZERO BITS
5658  010516  013705  001334                  MOV     RMDAI,R5                ;GET ANY GOOD BITS FROM RMDA
5659  010522  050503                          BIS     R5,R3
5660  010524  005105                          COM     R5
5661  010526  040504                          BIC     R5,R4
5662  010530  013705  001360                  MOV     RMOFI,R5                ;GET GOOD BITS FROM RMOF
5663  010534  042705  161577                  BIC     #XNUOF,R5
5664  010540  050503                          BIS     R5,R3
5665  010542  005105                          COM     R5
5666  010544  042705  161577                  BIC     #XNUOF,R5
5667  010550  040504                          BIC     R5,R4
5668  010552  013705  001362                  MOV     RMDCI,R5                ;GET GOOD BITS FROM RMDC
5669  010556  042705  176000                  BIC     #XNUDC,R5
5670  010562  050503                          BIS     R5,R3
5671  010564  005105                          COM     R5
5672  010566  042705  176000                  BIC     #XNUDC,R5
5673  010572  040504                          BIC     R5,R4
5674  010574  013705  001342                  MOV     RMER1I,R5               ;GET GOOD BITS FROM RMER1
5675  010600  050503                          BIS     R5,R3
5676  010602  005105                          COM     R5
5677  010604  040504                          BIC     R5,R4
5678  010606  013705  001370                  MOV     RMER2I,R5               ;GET GOOD BITS FROM RMER2
5679  010612  042705  001567                  BIC     #XNUER2,R5
5680  010616  050503                          BIS     R5,R3
5681  010620  005105                          COM     R5
5682  010622  042705  001567                  BIC     #XNUER2,R5
5683  010626  040504                          BIC     R5,R4
5684  010630  010205                          MOV     R2,R5                   ;RESET ALL ONES IN R3 EXCEPT
5685  010632  005105                          COM     R5                      ;FOR THE TEST BIT
5686  010634  040503                          BIC     R5,R3
5687  010636  040204                          BIC     R2,R4                   ;RESET TEST BIT IN R4
5688  010640  050403                          BIS     R4,R3                   ;COMBINE ACCUMULATED 1'S + 0'S
5689  010642  020302                          CMP     R3,R2                   ;IS PATTERN OK??
5690  010644  001406                          BEQ     26$                     ;YES!!
5691  010646  010237  001140                  MOV     R2,$GDDAT                       ;SAVE TEST PATTERN
5692  010652  010337  001142                  MOV     R3,$BDDAT                       ;SAVE RESULT
5693  010656  104007                          ERROR   7                       ;BIT INTERFERENCE IN TRISTATE BUS
5694  010660  000404                          BR      30$                     ;SKIP TO NEXT
5695  010662                          26$:
5696                                  ;ADVANCE R2 TO THE NEXT PATTERN AND REPEAT TEST
5697  010662  006302                          ASL     R2                      ;SHIFT THE BIT
5698  010664  001402                          BEQ     30$                     ;EXIT IF DONE
5699  010666  000137  010414                  JMP     25$
5700  010672                          30$:
5701
5702                                  ;;*****************************************************************
5703                                  ;*TEST 6        REGISTER SELECT TEST
5704
5705                                  ;;*****************************************************************
5706  010672  000004                  TST6:   SCOPE
5707  010674  012737  000006  001226          MOV     #6,$TESTN               ;;SET TEST NUMBER IN APT MAIL BOX
```

```
                                        NOP
010702  000240                          MOV     #20.,$ICNT      ;20 ITERATIONS
010704  012737  000024  001120          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
010712  112737  000001  001131          MOV     #T6,$LPADR  ;LOAD LOOP ON TEST ADDRESS
010720  012737  010734  001122          MOV     #T6,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
010726  012737  010734  001124
010734                          T6:
010734  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
010740  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
010744  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
                                ;THE FOLLOWING TABLE GIVES MASSBUS REGISTER SELECT VALUES FOR
                                ;EACH DEVICE REGISTER

                                ;       REGISTER        REG SEL
                                ;       NAME            (16,8,4,2,1)
                                ;
                                ;       RMCS1           00000
                                ;       RMDS            00001
                                ;       RMER1           00010
                                ;       RMMR1           00011
                                ;       RMAS            00100
                                ;       RMDA            00101
                                ;       RMDT            00110
                                ;       RMLA            00111
                                ;       RMSN            01000
                                ;       RMOF            01001
                                ;       RMDC            01010
                                ;       RMHR            01011
                                ;       RMMR2           01100
                                ;       RMER2           01101
                                ;       RMEC1           01110
                                ;       RMEC2           01111

                                ;EACH REGISTER SELECT LINE IS TESTED FOR A STUCK AT ONE,
                                ;STUCK AT ZERO FAULT. AS AN EXAMPLE, TO TEST REG SEL 1:
                                ;FOR S-A-0, RMER1 IS WRITTEN WITH ZEROS. THEN THE REGISTER
                                ;THAT HAS THE SAME SELECT VALUE, EXCEPT FOR THE SELECT LINE
                                ;BEING TESTED, IS WRITTEN WITH ONES. IN THIS EXAMPLE,
                                ;RMMR1 IS WRITTEN WITH ONES. IF SELECT LINE 1 IS S-A-0,
                                ;THE ALL ONES WORD WILL BE WRITTEN IN RMER1, AND RMER1
                                ;WILL NOT BE 0 WHEN READ BACK.

010750  005002                          CLR     R2              ;R2= ZEROS SOURCE
010752  012703  177777                  MOV     #-1,R3          ;R3= ONES  SOURCE
                                ;TEST REG SEL 1 FOR S-A-0
010756  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
010764  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT

010770  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1

010774  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC

011000  010360  000024                  MOV     R3,RMMR1(R0)    ;LOAD RMMR1

011004  010360  000036                  MOV     R3,RMHR(R0)       OAD RMHR
```

```
5764  011010  016037  000014  001342          MOV     RMER1(R0),RMER1I         ;STORE RMER1 IN INPUT BUFFER
5765
5766  011016  016037  000034  001362          MOV     RMDC(R0),RMDCI   ;STORE RMDC IN INPUT BUFFER
5767  011024  020337  001342                  CMP     R3,RMER1I
5768  011030  001007                          BNE     10$
5769  011032  052737  176000  001362          BIS     #XNUDC,RMDCI
5770  011040  020337  001362                  CMP     R3,RMDCI
5771  011044  001001                          BNE     10$
5772  011046  104010                          ERROR   10               ;REG SEL 1 IS S-A-0
5773  011050                          10$:
5774
5775                                  ;TEST REG SEL 1 FOR S-A-1
5776  011050  012760  000040  000010          MOV     #CLR,RMCS2(R0)   ;CLEAR THE MASSBUS
5777  011056  111160  000010                  MOVB    (R1),RMCS2(R0)   ;SELECT UNIT
5778
5779  011062  010260  000006                  MOV     R2,RMDA(R0)      ;LOAD RMDA
5780
5781  011066  010260  000032                  MOV     R2,RMOF(R0)      ;LOAD RMOF
5782
5783  011072  010260  000042                  MOV     R2,RMER2(R0)     ;LOAD RMER2
5784
5785  011076  010360  000016                  MOV     R3,RMAS(R0)      ;LOAD RMAS
5786
5787  011102  010360  000030                  MOV     R3,RMSN(R0)      ;LOAD RMSN
5788
5789  011106  010360  000040                  MOV     R3,RMMR2(R0)     ;LOAD RMMR2
5790
5791  011112  016037  000006  001334          MOV     RMDA(R0),RMDAI   ;STORE RMDA IN INPUT BUFFER
5792
5793  011120  016037  000032  001360          MOV     RMOF(R0),RMOFI   ;STORE RMOF IN INPUT BUFFER
5794
5795  011126  016037  000042  001370          MOV     RMER2(R0),RMER2I         ;STORE RMER2 IN INPUT BUFFER
5796  011134  020337  001334                  CMP     R3,RMDAI
5797  011140  001015                          BNE     20$
5798  011142  052737  161577  001360          BIS     #XNUOF,RMOFI
5799  011150  020337  001360                  CMP     R3,RMOFI
5800  011154  001007                          BNE     20$
5801  011156  052737  001567  001370          BIS     #XNUER2,RMER2I
5802  011164  020337  001370                  CMP     R3,RMER2I
5803  011170  001001                          BNE     20$
5804  011172  104011                          ERROR   11               ;REG SEL 1 IS S-A-1
5805  011174                          20$:
5806
5807                                  ;TEST REG SEL 2 FOR S-A-0
5808  011174  012760  000040  000010          MOV     #CLR,RMCS2(R0)   ;CLEAR THE MASSBUS
5809  011202  111160  000010                  MOVB    (R1),RMCS2(R0)   ;SELECT UNIT
5810
5811  011206  010260  000006                  MOV     R2,RMDA R0)      ;LOAD RMDA
5812
5813  011212  010260  000032                  MOV     R2,RMOF(R0)      ;LOAD RMOF
5814
5815  011216  010260  000042                  MOV     R2,RMER2(R0)     ;LOAD RMER2
5816
5817  011222  010360  000020                  MOV     R3,RMLA(R0)      ;LOAD RMLA
5818
5819  011226  010360  000036                  MOV     R3,RMHR(R0)      ;LOAD RMHR
```

```
5820
5821  011232  010360  000046                  MOV     R3,RMEC2(R0)    ;LOAD RMEC2
5822
5823  011236  016037  000006  001334          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
5824
5825  011244  016037  000032  001360          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
5826
5827  011252  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
5828  011260  020337  001334                  CMP     R3,RMDAI
5829  011264  001015                          BNE     30$
5830  011266  052737  161577  001360          BIS     #XNUOF,RMOFI
5831  011274  020337  001360                  CMP     R3,RMOFI
5832  011300  001007                          BNE     30$
5833  011302  052737  001567  001370          BIS     #XNUER2,RMER2I
5834  011310  020337  001370                  CMP     R3,RMER2I
5835  011314  001001                          BNE     30$
5836  011316  104012                          ERROR   12              ;REG SEL 2 IS S-A-0
5837  011320                          30$:
5838
5839                                  ;TEST REG SEL 2 FOR S-A-1
5840  011320  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5841  011326  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5842
5843  011332  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
5844
5845  011336  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
5846
5847  011342  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
5848
5849  011350  010360  000030                  MOV     R3,RMSN(R0)     ;LOAD RMSN
5850
5851  011354  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
5852
5853  011362  016037  000034  001362          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
5854  011370  052737  177701  001342          BIS     #^CILF76,RMER1I
5855  011376  020337  001342                  CMP     R3,RMER1I
5856  011402  001007                          BNE     40$
5857  011404  052737  176000  001362          BIS     #XNUDC,RMDCI
5858  011412  020337  001362                  CMP     R3,RMDCI
5859  011416  001001                          BNE     40$
5860  011420  104013                          ERROR   13              ;REG SEL 2 IS S-A-1
5861  011422                          40$:
5862
5863                                  ;TEST REG SEL 4 FOR S-A-0
5864  011422  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5865  011430  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5866
5867  011434  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
5868
5869  011440  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF
5870
5871  011444  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
5872
5873  011450  010360  000026                  MOV     R3,RMDT(R0)     ;LOAD RMDT
5874
5875  011454  010360  000042                  MOV     R3,RMER2(R0)    ;LOAD RMER2
```

```
5876
5877  011460  010360  000044                  MOV     R3,RMEC1(R0)     ;LOAD RMEC1
5878
5879  011464  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
5880
5881  011472  016037  000032  001360          MOV     RMOF(R0),RMOFI   ;STORE RMOF IN INPUT BUFFER
5882
5883  011500  016037  000034  001362          MOV     RMDC(R0),RMDCI   ;STORE RMDC IN INPUT BUFFER
5884  011506  020337  001342                  CMP     R3,RMER1I
5885  011512  001015                          BNE     50$
5886  011514  052737  161577  001360          BIS     #XNUOF,RMOFI
5887  011522  020337  001360                  CMP     R3,RMOFI
5888  011526  001007                          BNE     50$
5889  011530  052737  176000  001362          BIS     #XNUDC,RMDCI
5890  011536  020337  001362                  CMP     R3,RMDCI
5891  011542  001001                          BNE     50$
5892  011544  104014                          ERROR   14               ;REG SEL 4 IS S-A-0
5893  011546                          50$:
5894
5895                                  ;TEST REG SEL 4 FOR S-A-1
5896  011550  012760  000040  000010          MOV     #CLR,RMCS2(R0)   ;CLEAR THE MASSBUS
5897  011554  111160  000010                  MOVB    (R1),RMCS2(R0)   ;SELECT UNIT
5898
5899  011560  010260  000006                  MOV     R2,RMDA(R0)      ;LOAD RMDA
5900
5901  011564  010260  000042                  MOV     R2,RMER2(R0)     ;LOAD RMER2
5902
5903  011570  010360  000012                  MOV     R3,RMDS(R0)      ;LOAD RMDS
5904
5905  011574  010360  000032                  MOV     R3,RMOF(R0)      ;LOAD RMOF
5906
5907  011600  016037  000006  001334          MOV     RMDA(R0),RMDAI   ;STORE RMDA IN INPUT BUFFER
5908
5909  011606  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
5910  011614  020337  001334                  CMP     R3,RMDAI
5911  011620  001007                          BNE     60$
5912  011622  052737  001567  001370          BIS     #XNUER2,RMER2I
5913  011630  020337  001370                  CMP     R3,RMER2I
5914  011634  001001                          BNE     60$
5915  011636  104015                          ERROR   15               ;REG SEL 4 IS S-A-1
5916  011640                          60$:
5917
5918                                  ;TEST REG SEL 8 FOR S-A-0
5919  011640  012760  000040  000010          MOV     #CLR,RMCS2(R0)   ;CLEAR THE MASSBUS
5920  011646  111160  000010                  MOVB    (R1),RMCS2(R0)   ;SELECT UNIT
5921
5922  011652  010260  000014                  MOV     R2,RMER1(R0)     ;LOAD RMER1
5923
5924  011656  010260  000006                  MOV     R2,RMDA(R0)      ;LOAD RMDA
5925
5926  011662  010360  000034                  MOV     R3,RMDC(R0)      ;LOAD RMDC
5927
5928  011666  010360  000042                  MOV     R3,RMER2(R0)     ;LOAD RMER2
5929
5930  011672  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
5931
```

```
5932  011700  016037  000006  001334          MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
5933  011706  020337  001342                  CMP     R3,RMER1I
5934  011712  001004                          BNE     70$
5935  011714  020337  001334                  CMP     R3,RMDAI
5936  011720  001001                          BNE     70$
5937  011722  104016                          ERROR   16              ;REG SEL 8 IS S-A-0
5938  011724                          70$:
5939
5940                                  ;TEST REG SEL 8 FOR S-A-1
5941  011724  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
5942  011732  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
5943
5944  011736  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF
5945
5946  011742  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
5947
5948  011746  010260  000042                  MOV     R2,RMER2(R0)    ;LOAD RMER2
5949
5950  011752  010360  000012                  MOV     R3,RMDS(R0)     ;LOAD RMDS
5951
5952  011756  010360  000014                  MOV     R3,RMER1(R0)    ;LOAD RMER1
5953
5954  011762  010360  000006                  MOV     R3,RMDA(R0)     ;LOAD RMDA
5955
5956  011766  016037  000032  001360          MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
5957
5958  011774  016037  000034  001362          MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
5959
5960  012002  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
5961  012010  052737  161577  001360          BIS     #XNUOF,RMOFI
5962  012016  001015                          BNE     80$
5963  012020  022737  176000  001362          CMP     #XNUDC,RMDCI
5964  012026  020337  001362                  CMP     R3,RMDCI
5965  012032  001007                          BNE     80$
5966  012034  052737  001567  001370          BIS     #XNUER2,RMER2I
5967  012042  020337  001370                  CMP     R3,RMER2I
5968  012046  001001                          BNE     80$
5969  012050  104017                          ERROR   17              ;REG SEL 8 IS S-A-1
5970  012052                          80$:
5971
5972                                  ;REGISTER SELECT 16 IS TESTED BY THE ILR TEST
5973
5974                                  ;;*****************************************************************
5975                                  ;*TEST 7         DRIVE TYPE TEST
5976
5977                                  ;;*****************************************************************
5978  012052  000004                  TST7:   SCOPE
5979  012054  012737  000007  001226          MOV     #7,$TESTN       ;;SET TEST NUMBER IN APT MAIL BOX
5980
5981  012062  000240                          NOP
5982  012064  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
5983  012072  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
5984  012100  012737  012114  001122          MOV     #T7,$LPADR  ;LOAD LOOP ON TEST ADDRESS
5985  012106  012737  012114  001124          MOV     #T7,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
5986  012114                          T7:
5987  012114  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
```

```
5988  012120  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
5989  012124  013701  001456          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
5990
5991  012130  016037  000026  001142  MOV     RMDT(R0),$BDDAT ;STORE RMDT AT $BDDAT
5992  012136  022737  020024  001142  CMP     #SNGPRT,$BDDAT  ;SINGLE PORT RM03??
5993  012144  001432                  BEQ     10$             ;YES!!
5994  012146  022737  024024  001142  CMP     #DULPRT,$BDDAT  ;DUAL PORT RM03??
5995  012154  001426                  BEQ     10$             ;YES!!
5996  012156  022737  020025  001142  CMP     #SNGPRT!BIT0,$BDDAT     ;SINGLE PROT RM02 ?
5997  012164  001422                  BEQ     10$             ;BRANCH IF SO
5998  012166  022737  024025  001142  CMP     #DULPRT!BIT0,$BDDAT     ;DUAL PORT RM02 ?
5999  012174  001416                  BEQ     10$             ;BRANCH IF SO
6000  012176  012737  020024  001174  MOV     #SNGPRT,$TMP0   ;LOAD ACCEPTABLE VALUES
6001  012204  012737  024024  001176  MOV     #DULPRT,$TMP1
6002  012212  010037  001136          MOV     R0,$BDADR       ;LOAD BAD ADDRESS
6003  012216  062737  000026  001136  ADD     #RMDT,$BDADR
6004  012224  104057                  ERROR   57              ;DEVICE NOT AN RM03
6005  012226  000137  057176          JMP     $EOSP           ;GO TO NEXT DEVICE
6006  012232                  10$:
6007
6008                          ;;*****************************************************************
6009                          ;*TEST 10        DEVICE AVAILABLE TEST
6010
6011                          ;;*****************************************************************
6012  012232  000004          ^ST10:  SCOPE
6013  012234  012737  000010  001226          MOV     #10,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6014
6015  012242  000240                  NOP
6016  012244  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
6017  012252  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
6018  012260  012737  012274  001122          MOV     #T10,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6019  012266  012737  012274  001124          MOV     #T10,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
6020  012274                  T10:
6021  012274  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
6022  012300  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
6023  012304  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
6024  012310  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6025  012316  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6026
6027  012322  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
6028  012330  042737  173777  001142          BIC     #^CDVA,$BDDAT   ;CLEAR ALL BUT DVA
6029  012336  001006                  BNE     10$             ;BRANCH IF DVA SET
6030  012340  012737  004000  001140          MOV     #DVA,$GDDAT     ;SETUP EXPECTED
6031  012346  010037  001136                  MOV     R0,$BDADR       ;SETUP REG ADDRESS
6032  012352  104060                  ERROR   60              ;DEVICE NOT AVAILABLE
6033  012354                  10$:
6034
6035                          ;;*****************************************************************
6036                          ;*TEST 11        HOLDING REGISTER TRANSFER TEST
6037
6038                          ;;*****************************************************************
6039  012354  000004          ^ST11:  SCOPE
6040  012356  012737  000011  001226          MOV     #11,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6041
6042  012364  000240                  NOP
6043  012366  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
```

```
6044  012374  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
6045  012402  012737  012416  001122          MOV     #T11,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6046  012410  012737  012416  001124          MOV     #T11,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
6047  012416                                T11:
6048  012416  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
6049  012422  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
6050  012426  013701  001456                  MOV     TSTOUE,R1       ;R1 = POINTER TO DEVICE
6051  012432  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6052  012440  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6053  012444  005003                          CLR     R3              ;CLEAR ERROR FLAGS
6054  012446  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
6055  012452  062737  000036  001136          ADD     #RMHR,$BDADR
6056                                        ;WRITE ONES THEN ZEROS IN RMHR AND CHECK FOR S-A-1 BITS.
6057                                        ;NOTE THAT IT IS NECESSARY TO WRITE SOME OTHER REGISTER IN
6058                                        ;ORDER TO WRITE THE HOLDING REGISTER, AND RMDA IS USED FOR THIS
6059                                        ;PURPOSE.
6060
6061  012460  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
6062
6063  012466  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
6064
6065  012474  016037  000036  001142          MOV     RMHR(R0),$BDDAT ;STORE RMHR AT $BDDAT
6066  012502  005137  001142                  COM     $BDDAT          ;ANY ERROR??
6067  012506  001405                          BEQ     10$             ;NO!!
6068  012510  005037  001140                  CLR     $GDDAT          ;LOAD EXPECTED
6069  012514  104061                          ERROR   61
6070  012516  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAGS
6071  012522                                10$:
6072                                        ;;*****************************************************************
6073                                        ;WRITE ZEROS THEN ONES IN RMHR AND CHECK FOR S-A-0 BITS.
6074
6075  012522  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
6076
6077  012530  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
6078
6079  012536  016037  000036  001142          MOV     RMHR(R0),$BDDAT ;STORE RMHR AT $BDDAT
6080  012544  005137  001142                  COM     $BDDAT          ;RMHR IS COMPLEMENTED WHEN READ
6081  012550  012737  177777  001140          MOV     #-1,$GDDAT      ;SETUP EXPECTED
6082  012556  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;ANY ERROR??
6083  012564  001403                          BEQ     20$             ;NO!!
6084  012566  104062                          ERROR   62
6085  012570  052703  000002                  BIS     #BIT1,R3        ;SET ERROR FLAG
6086  012574                                20$:
6087                                        ;;*****************************************************************
6088                                        ;IF NO PREVIOUS ERRORS, WRITE AND READ SHIFTING ONE BIT PATTERN.
6089  012574  005703                          TST     R3              ;ANY FLAGS SET??
6090  012576  001025                          BNE     50$             ;YES!!
6091  012600  012702  000001                  MOV     #1,R2           ;R2=DATA PATTERN
6092
6093  012604                                30$:
6094
6095  012604  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
6096
6097  012612  010260  000006                  MOV     R2,RMDA(R0)     ;LOAD RMDA
6098
6099  012616  016037  000036  001142          MOV     RMHR(R0),$BDDAT ;STORE RMHR AT $BDDAT
```

```
6100  012624  005137  001142          COM     $BDDAT          ;RMHR IS COMPLEMENTED
6101  012630  023702  001142          CMP     $BDDAT,R2       ;ANY ERROR??
6102  012634  001404                  BEQ     40$             ;NO!!
6103  012636  010237  001140          MOV     R2,$GDDAT       ;SETUP EXPECTED
6104  012642  104063                  ERROR   63
6105  012644  000402                  BR      50$             ;DO NOT COLLECT ALL ERRORS
6106
6107  012646  006302          40$:    ASL     R2              ;SHIFT TO NEXT PATTERN
6108  012650  001355                  BNE     30$             ;CONTINUE IF NOT DONE
6109
6110  012652                  50$:
6111
6112                          ;;*****************************************************************
6113                          ;*TEST 12        CONTROL STATUS #1 TRANSFER TEST
6114
6115                          ;;*****************************************************************
6116  012652  000004          T$T12:  SCOPE
6117  012654  012737  000012  001226          MOV     #12,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6118
6119  012662  000240                  NOP
6120  012664  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
6121  012672  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
6122  012700  012737  012714  001122          MOV     #T12,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6123  012706  012737  012714  001124          MOV     #T12,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
6124  012714                  T12:
6125  012714  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
6126  012720  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
6127  012724  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
6128  012730  005003                          CLR     R3              ;R3 = ERROR INDICATOR
6129  012732  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6130  012740  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6131                          ;WRITE ONES IN RMCS1, BITS 01-05, THEN CLEAR. READ AND
6132                          ;CHECK FOR S-A-1 BITS.
6133
6134  012744  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
6135  012752  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6136  012760  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6137
6138  012764  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
6139  012772  042737  177701  001142          BIC     #^CILF76,$BDDAT
6140  013000  001410                  BEQ     5$
6141  013002  005037  001140                  CLR     $GDDAT
6142  013006  010037  001136                  MOV     R0,$BDADR
6143  013012  062737  000000  001136          ADD     #RMCS1,$BDADR
6144  013020  104043                  ERROR   43              ;CANT CLEAR RMCS1
6145  013022                  5$:
6146                          ;WRITE ONES IN RMCS1, BITS 01-05, THEN WRITE ZEROS. READ AND CHECK FOR
6147                          ;S-A-1 BITS.
6148
6149  013022  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
6150
6151  013030  012760  000000  000000          MOV     #0,RMCS1(R0)    ;LOAD RMCS1
6152
6153  013036  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
6154  013044  042737  177701  001142          BIC     #^CILF76,$BDDAT
6155  013052  001412                  BEQ     10$
```

```
6156  013054  005037  001140                  CLR     $GDDAT
6157  013060  010037  001136                  MOV     R0,$BDADR
6158  013064  062737  000000  001136          ADD     #RMCS1,$BDADR
6159  013072  104023                          ERROR   23              ;CANT WRITE 0'S
6160  013074  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
6161  013100                          10$:
6162                                  ;WRITE ZEROS IN RMCS1, THEN ONES, READ AND CHECK S-A-0 BITS.
6163
6164  013100  012760  000000  000000          MOV     #0,RMCS1(R0)    ;LOAD RMCS1
6165
6166  013106  012760  000076  000000          MOV     #ILF76,RMCS1(R0)        ;LOAD RMCS1
6167
6168  013114  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
6169  013122  042737  177701  001142          BIC     #^CILF76,$BDDAT
6170  013130  012737  000076  001140          MOV     #ILF76,$GDDAT
6171  013136  023737  001140  001142          CMP     $GDDAT,$BDDAT
6172  013144  001410                          BEQ     20$
6173  013146  010037  001136                  MOV     R0,$BDADR
6174  013152  062737  000000  001136          ADD     #RMCS1,$BDADR
6175  013160  104024                          ERROR   24              ;CANT WRITE ONES
6176  013162  052703  000002                  BIS     #BIT1,R3        ;SET ERROR FLAG
6177  013166                          20$:
6178                                  ;WRITE A SHIFTING ONE BIT PATTERN IN RMCS1, READ AND CHECK FOR STUCK BITS.
6179  013166  005703                          TST     R3              ;OMIT IF ANY ERRORS
6180  013170  001035                          BNE     50$
6181  013172  012702  000002                  MOV     #2,R2           ;R2 = TEST PATTERN
6182  013176                          30$:
6183  013176  010203                          MOV     R2,R3           ;R3 = EXPECTED RESULT, BITS 1-5
6184  013200  042703  177701                  BIC     #^CILF76,R3
6185
6186  013204  012760  000000  000000          MOV     #0,RMCS1(R0)    ;LOAD RMCS1
6187
6188  013212  010260  000000                  MOV     R2,RMCS1(R0)    ;LOAD RMCS1
6189
6190  013216  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        :STORE RMCS1 AT $BDDAT
6191  013224  042737  177701  001142          BIC     #^CILF76,$BDDAT
6192  013232  020337  001142                  CMP     R3,$BDDAT
6193  013236  001410                          BEQ     40$
6194  013240  010337  001140                  MOV     R3,$GDDAT
6195  013244  010037  001136                  MOV     R0,$BDADR
6196  013250  062737  000000  001136          ADD     #RMCS1,$BDADR
6197  013256  104025                          ERROR   25              ;CANT WRITE SHIFTING ONES
6198  013260  006302                  40$:    ASL     R2              ;SHIFT TO NEXT BIT
6199  013262  001345                          BNE     30$             ;CONTINUE IF R2 NOT ZERO
6200  013264                          50$:
6201
6202                                  ;;*****************************************************************
6203                                  ;*TEST 13        ERROR REGISTER 1 TRANSFER TEST
6204
6205                                  ;;*****************************************************************
6206  013264  000004                  ^ST13:  SCOPE
6207  013266  012737  000013  001226          MOV     #13,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6208
6209  013274  000240                          NOP
6210  013276  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
6211  013304  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
```

```
6212  013312  012737  013326  001122          MOV     #T13,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6213  013320  012737  013326  001124          MOV     #T13,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
6214  013326                                T13:
6215  013326  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
6216  013332  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
6217  013336  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
6218  013342  005003                          CLR     R3              ;CLEAR ERROR FLAG
6219                                        ;WRITE ONES IN RMER1, CLEAR AND CHECK FOR S-A-1 BITS
6220
6221  013344  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
6222  013352  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6223  013360  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6224
6225  013364  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
6226  013372  013737  001342  001142          MOV     RMER1I,$BDDAT
6227  013400  042737  177760  001142          BIC     #^C<PAR!RMR!ILF!ILR>,$BDDAT
6228  013406  001410                          BEQ     10$
6229  013410  005037  001140                  CLR     $GDDAT
6230  013414  010037  001136                  MOV     R0,$BDADR
6231  013420  062737  000014  001136          ADD     #RMER1,$BDADR
6232  013426  104027                          ERROR   27              ;CANT CLEAR RMER1
6233  013430                                10$:
6234  013430  013737  001342  001142          MOV     RMER1I,$BDDAT
6235  013436  042737  074017  001142          BIC     #^C<DCK!IAE!AOE!HCRC!HCE!ECH!WCF!FER>,$BDDAT
6236  013444  001410                          BEQ     20$
6237  013446  005037  001140                  CLR     $GDDAT
6238  013452  010037  001136                  MOV     R0,$BDADR
6239  013456  062737  000014  001136          ADD     #RMER1,$BDADR
6240  013464  104030                          ERROR   30
6241  013466                                20$:
6242  013466  013737  001342  001142          MOV     RMER1I,$BDDAT
6243  013474  042737  147777  001142          BIC     #^C<OPI!DTE>,$BDDAT
6244  013502  001410                          BEQ     30$
6245  013504  005037  001140                  CLR     $GDDAT
6246  013510  010037  001136                  MOV     R0,$BDADR
6247  013514  062737  000014  001136          ADD     #RMER1,$BDADR
6248  013522  104031                          ERROR   31
6249  013524                                30$:
6250                                        ;WRITE ONES THEN ZEROS IN RMER1, READ AND CHECK FOR S-A-1 BITS
6251
6252  013524  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
6253
6254  013532  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
6255
6256  013540  016037  000014  001342          MOV     RMER1(R0),RMER1I        ;STORE RMER1 IN INPUT BUFFER
6257  013546  013737  001342  001142          MOV     RMER1I,$BDDAT
6258  013554  042737  177770  001142          BIC     #^C<RMR!ILF!ILR>,$BDDAT
6259  013562  001412                          BEQ     40$
6260  013564  005037  001140                  CLR     $GDDAT
6261  013570  010037  001136                  MOV     R0,$BDADR
6262  013574  062737  000014  001136          ADD     #RMER1,$BDADR
6263  013602  104032                          ERROR   32
6264  013604  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
6265  013610  013737  001342  001142  40$:     MOV     RMER1I,$BDDAT
6266  013616  042737  074017  001142          BIC     #^C<DCK!IAE!AOE!HCRC!HCE!ECH!WCF!FER>,$BDDAT
6267  013624  001412                          BEQ     50$
```

```
6268  013626  005037  001140                  CLR     $GDDAT
6269  013632  010037  001136                  MOV     R0,$BDADR
6270  013636  062737  000014  001136          ADD     #RMER1,$BDADR
6271  013644  104033                          ERROR   33
6272  013646  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
6273  013652                          50$:
6274  013652  013737  001342  001142          MOV     RMER1I,$BDDAT
6275  013660  042737  147777  001142          BIC     #^C<OPI!DTE>,$BDDAT
6276  013666  001412                          BEQ     60$
6277  013670  005037  001140                  CLR     $GDDAT
6278  013674  010037  001136                  MOV     R0,$BDADR
6279  013700  062737  000014  001136          ADD     #RMER1,$BDADR
6280  013706  104034                          ERROR   34
6281  013710  052703  030000                  BIS     #BIT,R3
6282  013714                          60$:
6283                                  ;WRITE ZEROS THEN ONES IN RMER1,READ AND CHECK FOR S-A-0 BITS
6284
6285  013714  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
6286
6287  013722  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
6288
6289  013730  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
6290  013736  012737  177777  001140          MOV     #-1,$GDDAT
6291  013744  023737  001140  001142          CMP     $GDDAT,$BDDAT
6292  013752  001410                          BEQ     70$
6293  013754  010037  001136                  MOV     R0,$BDADR
6294  013760  062737  000014  001136          ADD     #RMER1,$BDADR
6295  013766  104035                          ERROR   35
6296  013770  052703  000002                  BIS     #BIT1,R3
6297  013774                          70$:
6298                                  ;WRITE A SHIFTING 1 BIT IN RMER1 AND CHECK FOR STUCK BITS
6299                                  ;NOTE:  DONT TEST UNSAFE OR PARITY
6300  013774  005703                          TST     R3              ;SKIP THIS PART IF ANY ERRORS
6301  013776  001045                          BNE     120$
6302  014000  012702  000001                  MOV     #1,R2           ;R2 = TEST PATTERN
6303  014004                          80$:
6304  014004  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6305  014012  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6306
6307  014016  010260  000014                  MOV     R2,RMER1(R0)    ;LOAD RMER1
6308
6309  014022  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
6310  014030  032702  000010                  BIT     #PAR,R2         ;DONT TEST PAR = 0
6311  014034  001003                          BNE     90$
6312  014036  042737  000010  001142          BIC     #PAR,$BDDAT
6313  014044  032702  040000          90$:    BIT     #UNS,R2         ;DONT TEST UNS = 0
6314  014050  001003                          BNE     100$
6315  014052  042737  040000  001142          BIC     #UNS,$BDDAT
6316  014060  020237  001142          100$:   CMP     R2,$BDDAT
6317  014064  001410                          BEQ     110$
6318  014066  010237  001140                  MOV     R2,$GDDAT
6319  014072  010037  001136                  MOV     R0,$BDADR
6320  014076  062737  000014  001136          ADD     #RMER1,$BDADR
6321  014104  104036                          ERROR   36
6322
6323  014106  006302          110$:   ASL     R2              ;SHIFT TO NEXT BIT
```

```
014110  001335                          BNE     80$             ;CONTINUE IF R2 NOT ZERO
014112                          120$:
                        ;;*************************************************************
                        ;*TEST 14       ERROR REGISTER 2 TRANSFER TEST
                        ;;*************************************************************
014112  000004          TST14:  SCOPE
014114  012737  000014  001226        MOV     #14,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
014122  000240                  NOP
014124  012737  000024  001120        MOV     #20.,$ICNT      ;20 ITERATIONS
014132  112737  000001  001131        MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
014140  012737  014154  001122        MOV     #T14,$LPADR  ;LOAD LOOP ON TEST ADDRESS
014146  012737  014154  001124        MOV     #T14,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
014154                          T14:
014154  012706  001100                MOV     #STACK,SP       ;LOAD THE STACK POINTER
014160  013700  001276                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
014164  013701  001456                MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
014170  005003                        CLR     R3              ;RESET ERROR FLAGS
014172  010037  001136                MOV     R0,$BDADR       ;SETUP BAD ADDRESS
014176  062737  000042  001136        ADD     #RMER2,$BDADR
014204  005037  001140                CLR     $GDDAT          ;SETUP EXPECTED DATA
                        ;;*************************************************************
                        ;WRITE ONES IN RMER2, CLEAR AND CHECK FOR S-A-1 BITS
014210  012760  177777  000042        MOV     #-1,RMER2(R0)   ;LOAD RMER2
014216  012760  000040  000010        MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
014224  111160  000010                MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
014230  016037  000042  001370        MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
                        ;       TEST UNUSED BITS FOR ZERO-FAILURE ON IF
014236  013737  001370  001142        MOV     RMER2I,$BDDAT
014244  042737  176210  001142        BIC     #^CXNUER2,$BDDAT
014252  001403                        BEQ     10$             ;BRANCH IF NO ERROR
014254  104044                        ERROR   44              ;UNUSED BITS NOT ZERO
014256  052703  000001                BIS     #BIT0,R3        ;SET ERROR FLAG
014262                          10$:
                        ;       TEST "OPE", "IVC", "LSC" FOR ZERO-FAILURE ON CS, IF
014262  013737  001370  001142        MOV     RMER2I,$BDDAT
014270  042737  143777  001142        BIC     #^C<OPE!IVC!LSC>,$BDDAT
014276  001403                        BEQ     20$             ;BRANCH IF NO ERROR
014300  104045                        ERROR   45              ;CANT CLEAR OPE, IVC, LSC
014302  052703  000001                BIS     #BIT0,R3        ;SET ERROR FLAG
014306                          20$:
                        ;       TEST "LBC", "DPE" FOR ZERO-FAILURE ON DS, IF
014306  013737  001370  001142        MOV     RMER2I,$BDDAT
014314  042737  175767  001142        BIC     #^C<LBC!DPE>,$BDDAT
014322  001403                        BEQ     30$             ;BRANCH IF NO ERROR
014324  104046                        ERROR   46              ;CANT CLEAR LBC, DPE
014326  052703  000001                BIS     #BIT0,R3        ;SET ERROR FLAG
014332                          30$:
                        ;;*************************************************************
```

```
 6380                                   ;WRITE ONES IN RMER2 THEN WRITE ZEROS AND CHECK FOR S-A-1 BITS.
 6381
 6382  014332  012760  177777  000042          MOV     #-1,RMER2(R0)   ;LOAD RMER2
 6383
 6384  014340  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
 6385
 6386  014346  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
 6387
 6388                                  ;       TEST "OPE", "IVC", "LSC" FOR ZERO-FAILURE ON CS, IF
 6389  014354  013737  001370  001142          MOV     RMER2I,$BDDAT
 6390  014362  042737  143777  001142          BIC     #^C<OPE!IVC!LSC>,$BDDAT
```

```
  6391  014370  001403                        BEQ     40$             ;BRANCH IF NO ERROR
```

```
 6392  014372  104047                          ERROR   47              ;CANT WRITE ZEROS
 6393  014374  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
 6394  014400                          40$:
 6395                                  ;       TEST "LBC", "DPE" FOR ZERO-FAILURE ON DS, IF
 6396  014400  013737  001370  001142          MOV     RMER2I,$BDDAT
```

```
 6397  014406  042737  175767  001142          BIC     #↑C<LBC!DPE>,$BDDAT
 6398  014414  001403                          BEQ     50$                 ;BRANCH IF NO ERROR
 6399  014416  104050                          ERROR   50                  ;CANT WRITE ZEROS
 6400  014420  052703  000001                  BIS     #BIT0,R3            ;SET ERROR FLAG
 6401  014424                          50$:
 6402
 6403                                  ;;*****************************************************************
 6404                                  ;WRITE ZEROS IN RMER2 THEN WRITE ONES AND CHECK FOR S-A-0 BITS.
 6405
 6406  014424  012760  000000  000042          MOV     #0,RMER2(R0)        ;LOAD RMER2
 6407
 6408  014432  012760  177777  000042          MOV     #-1,RMER2(R0)       ;LOAD RMER2
 6409
 6410  014440  016037  000042  001370          MOV     RMER2(R0),RMER2I            ;STORE RMER2 IN INPUT BUFFER
 6411                                  ;       TEST UNUSED BITS FOR ZERO-FAILURE ON IF
 6412  014446  013737  001370  001142          MOV     RMER2I,$BDDAT
 6413  014454  042737  176210  001142          BIC     #↑CXNUER2,$BDDAT
 6414  014462  001403                          BEQ     60$                 ;BRANCH IF NO ERROR
 6415  014464  104044                          ERROR   44                  ;UNUSED BITS NOT ZERO
 6416  014466  052703  000001                  BIS     #BIT0,R3            ;SET ERROR FLAG
 6417  014472                          60$:
 6418                                  ;       TEST USED BITS FOR ONE-FAILURE ON IF
 6419  014472  013737  001370  001142          MOV     RMER2I,$BDDAT
 6420  014500  042737  001567  001142          BIC     #XNUER2,$BDDAT
 6421  014506  012737  176210  001140          MOV     #↑CXNUER2,$GDDAT
 6422  014514  023737  001140  001142          CMP     $GDDAT,$BDDAT
 6423  014522  001403                          BEQ     70$                 ;BRANCH IF NO ERROR
 6424  014524  104051                          ERROR   51                  ;CANT WRITE ONES
 6425  014526  052703  000002                  BIS     #BIT1,R3            ;SET ERROR FLAG
 6426  014532                          70$:
 6427
 6428                                  ;;*****************************************************************
 6429                                  ;IF NO PREVIOUS ERROR, TEST BIT INTERFERENCE WITH SHIFTING ONE BIT.
 6430  014532  005703                          TST     R3                  ;ANY ERRORS?
 6431  014534  001044                          BNE     120$                ;YES!!
 6432  014536  012702  000001                  MOV     #1,R2               ;R2=DATA PATTERN
 6433  014542                          80$:
 6434  014542  012760  000040  000010          MOV     #CLR,RMCS2(R0)      ;CLEAR THE MASSBUS
 6435  014550  111160  000010                  MOVB    (R1),RMCS2(R0)      ;SELECT UNIT
 6436
 6437  014554  010260  000042                  MOV     R2,RMER2(R0)        ;LOAD RMER2
 6438
 6439  014560  016037  000042  001142          MOV     RMER2(R0),$BDDAT            ;STORE RMER2 AT $BDDAT
 6440  014566  032702  040000                  BIT     #SKI,R2             ;IS SKI BEING SET?
 6441  014572  001003                          BNE     90$                 ;YES!!
 6442  014574  042737  040000  001142          BIC     #SKI,$BDDAT         ;DONT TEST SKI FOR ZERO
 6443  014602  032702  000200                  BIT     #DVC,R2             ;IS DVC BEING SET??
 6444  014606  001003                          BNE     100$                ;YES!!
 6445  014610  042737  000200  001142          BIC     #DVC,$BDDAT         ;DONT TEST DVC FOR ZERO
 6446  014616  010237  001140                  MOV     R2,$GDDAT
 6447  014622  042737  001567  001140          BIC     #XNUER2,$GDDAT      ;UNUSED BITS SHOULD BE ZERO
 6448  014630  023737  001140  001142          CMP     $GDDAT,$BDDAT       ;ANY ERRORS??
 6449  014636  001401                          BEQ     110$                ;NO!!
 6450  014640  104052                          ERROR   52                  ;CANT WRITE SHIFTING ONES
 6451
 6452  014642  006302                  110$:   ASL     R2                  ;SHIFT TO NEXT DATA BIT
```

```
                                        BNE     80$             ;CONTINUE IF NOT DONE

                                120$:

                                ;;*****************************************************************
                                ;*TEST 15        CLEAR OFFSET STUCK ACTIVE TEST

                                ;;*****************************************************************
014646  000004                  T15:    SCOPE
014650  012737  000015  001226          MOV     #15,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
014654
014656  000240                          NOP
014660  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
014666  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
014674  012737  014710  001122          MOV     #T15,$LPADR  ;LOAD LOOP ON TEST ADDRESS
014702  012737  014710  001124          MOV     #T15,$LPERR  ;LOOP ON ERROR ADDRESS
014710                          T15:
014710  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
014714  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
014720  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
014724  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
014732  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT

014736  012760  177777  000032          MOV     #-1,RMOF(R0)    ;LOAD RMOF

014744  016037  000032  001142          MOV     RMOF(R0),$BDDAT ;STORE RMOF AT $BDDAT
014752  042737  177577  001142          BIC     #^COFD,$BDDAT
014760  001011                          BNE     10$             ;BRANCH IF OFD IS A ONE
014762  012737  000200  001140          MOV     #OFD,$GDDAT     ;SETUP ERROR MESSAGE
014770  010037  001136                  MOV     R0,$BDADR
014774  062737  000032  001136          ADD     #RMOF,$BDADR
015002  104172                          ERROR   172             ;CANT SET OFD BIT
015004                          10$:                            ;END OF TEST

                                ;;*****************************************************************
                                ;*TEST 16        OFFSET REGISTER TRANSFER TEST

                                ;;*****************************************************************
015004  000004                  T16:    SCOPE
015006  012737  000016  001226          MOV     #16,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

015014  000240                          NOP
015016  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
015024  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
015032  012737  015046  001122          MOV     #T16,$LPADR  ;LOAD LOOP ON TEST ADDRESS
015040  012737  015046  001124          MOV     #T16,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
015046                          T16:
015046  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
015052  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
015056  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
015062  005003                          CLR     R3              ;RESET ERROR FLAGS
015064  010037  001136                  MOV     R0,$BDADR       ;SETUP BAD ADDRESS
015070  062737  000032  001136          ADD     #RMOF,$BDADR
015076  005037  001140                  CLR     $GDDAT          ;SETUP EXPECTED DATA

                                ;;*****************************************************************
```

```
                                        ;WRITE ONES THEN ZEROS IN RMOF AND CHECK FOR S-A-1 BITS.

015102  012760  177777  000032                MOV     #-1,RMOF(R0)    ;LOAD RMOF

015110  012760  000000  000032                MOV     #0,RMOF(R0)     ;LOAD RMOF

015116  016037  000032  001360                MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
                                        ;       CHECK UNUSED BITS OF RMOF FOR ZERO
015124  013737  001360  001142          ;       MOV     RMOFI,$BDDAT    ;GET UNUSED BITS
015132  042737  016200  001142                BIC     #^CXNUOF,$BDDAT
015140  001403                                BEQ     10$             ;BRANCH IF NO ERROR
015142  104053                                ERROR   53              ;UNUSED BITS NOT ZERO RMOF
015144  052703  000001                        BIS     #BIT0,R3        ;SET ERROR FLAG
015150                                  10$:
                                        ;       CHECK USED BITS OF RMOF FOR ZERO
015150  013737  001360  001142          ;       MOV     RMOFI,$BDDAT    ;GET USED BITS
015156  042737  161577  001142                BIC     #XNUOF,$BDDAT
015164  001403                                BEQ     20$             ;BRANCH IF NO ERROR
015166  104054                                ERROR   54              ;USED BITS RMOF S-A-1
015170  052703  000001                        BIS     #BIT0,R3        ;SET ERROR FLAG
015174                                  20$:

                                        ;;*************************************************************
                                        ;WRITE ZEROS THEN ONES ON RMOF AND CHECK FOR S-A-0 BITS.

015174  012760  000000  000032                MOV     #0,RMOF(R0)     ;LOAD RMOF

015202  012760  177777  000032                MOV     #-1,RMOF(R0)    ;LOAD RMOF

015210  016037  000032  001360                MOV     RMOF(R0),RMOFI  ;STORE RMOF IN INPUT BUFFER
                                        ;       CHECK UNUSED BITS OF RMOF FOR ZERO.
015216  013737  001360  001142          ;       MOV     RMOFI,$BDDAT    ;GET UNUSED BITS
015224  042737  016200  001142                BIC     #^CXNUOF,$BDDAT
015232  001403                                BEQ     30$             ;BRANCH IF NO ERROR
015234  104053                                ERROR   53              ;UNUSED BITS OF RMOF NOT ZERO
015236  052703  000001                        BIS     #BIT0,R3
015242                                  30$:
                                        ;       CHECK USED BITS OF RMOF FOR ONE.
015242  013737  001360  001142          ;       MOV     RMOFI,$BDDAT    ;GET USED BITS
015250  042737  161577  001142                BIC     #XNUOF,$BDDAT
015256  012737  016200  001140                MOV     #FMT16!ECI!HCI!OFD,$GDDAT
015264  023737  001140  001142                CMP     $GDDAT,$BDDAT
015272  001403                                BEQ     40$             ;BRANCH IF NO ERROR
015274  104055                                ERROR   55              ;USED BITS RMOF S-A-0
015276  052703  000002                        BIS     #BIT1,R3
015302                                  40$:

                                        ;;*************************************************************
                                        ;IF NO PREVIOUS ERRORS, TEST RMOF WITH SHIFTING ONE BIT PATTERN.
015302  005703                                TST     R3              ;ANY ERROR??
015304  001025                                BNE     70$             ;YES!!
015306  012702  000001                        MOV     #1,R2           ;STARTING DATA PATTERN
015312                                  50$:

015312  012760  000000  000032                MOV     #0,RMOF(R0)     ;LOAD RMOF
```

```
015320  010260  000032                  MOV     R2,RMOF(R0)     ;LOAD RMOF

015324  016037  000032  001142          MOV     RMOF(R0),$BDDAT ;STORE RMOF AT $BDDAT
015332  010203                          MOV     R2,R3           ;SETUP EXPECTED RESULT
015334  042703  161577                  BIC     #XNLOF,R3       ;CLEAR UNUSED BITS
015340  023737  001142                  CMP     R3,$BDDAT       ;COMPARE EXPECTED & RECEIVED
015344  001403                          BEQ     60$             ;BRANCH IF NO ERROR
015346  010337  001140                  MOV     R3,$GDDAT       ;LOAD EXPECTED
015352  104056                          ERROR   56              ;CANT WRITE SHIFTING 1 BIT
015354  006302                  60$:    ASL     R2              ;SHIFT TO NEXT BIT
015356  001355                          BNE     50$             ;CONTINUE IF NOT DONE

015360                          70$:

                                ;;**************************************************************
                                ;*TEST 17        SERIAL NUMBER TEST

                                ;;**************************************************************
015360  000004                  TST17:  SCOPE
015362  012737  000017  001226          MOV     #17,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

015370  000240                          NOP
015372  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
015400  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
015406  012737  015422  001122          MOV     #T17,$LPADR     ;LOAD LOOP ON TEST ADDRESS
015414  012737  015422  001124          MOV     #T17,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
015422                          T17:
015422  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
015426  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
015432  013701  001456                  MOV     TSTOUE,R1       ;R1 = POINTER TO DEVICE
015436  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
015444  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
015450  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS FOR TYPEOUT
015454  062737  000030  001136          ADD     #RMSN,$BDADR
015462  012702  000031                  MOV     #25.,R2         ;READ RMSN 25 TIMES
                                ;READ RMSN AND USE THE RESULT AS EXPECTED VALUE

015466  016037  000030  001140  10$:     MOV     RMSN(R0),$GDDAT ;STORE RMSN AT $GDDAT
015474                          ;READ RMSN AND COMPARE WITH INITIAL VALUE

015474  016037  000030  001142          MOV     RMSN(R0),$BDDAT ;STORE RMSN AT $BDDAT
015502  023737  001140  001142          CMP     $GDDAT,$BDDAT
015510  001401                          BEQ     20$             ;BRANCH IF SERIAL NUMBER CONSISTENT
015512  104136                          ERROR   136             ;SERIAL NUMBER INCONSISTENT
0155.4                          20$:
                                ;DECREMENT COUNT AND CONTINUE IF NOT DONE
015514  005302                          DEC     R2
015516  100366                          BPL     10$
015520                          30$:                            ;END OF TEST

                                ;;**************************************************************
                                ;*TEST 20        CONTROL BUS PARITY DETECTION TEST

                                ;;**************************************************************
015520  000004                  TST20:  SCOPE
```

```
6621  015522  012737  000020  001226          MOV     #20,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6622
6623  015530  000240                          NOP
6624  015532  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
6625  015540  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
6626  015546  012737  015562  001122          MOV     #T20,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6627  015554  012737  015562  001124          MOV     #T20,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
6628  015562                          T20:
6629  015562  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
6630  015566  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
6631  015572  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
6632                          ;SETUP FOR FIRST TEST LOOP (NO ERROR)
6633  015576  005037  001140                  CLR     $GDDAT          ;"PAR" SHOULD BE ZERO
6634  015602  111137  001412                  MOVB    (R1),RMCS20     ;SETUP RMCS2 VALUE
6635  015606  042737  177770  001412          BIC     #^CUNTMSK,RMCS20
6636  015614  012737  000001  001440          MOV     #1,RMHR0        ;INITIALIZE DATA PATTERN
6637  015622  000402                          BR      6$              ;SKIP INCREMENT FIRST TIME
6638  015624  006337  001440          5$:     ASL     RMHR0           ;SHIFT TO NEXT PATTERN
6639  015630                          6$:
6640                          ;CLEAR AND VERIFY THAT "PAR" IS RESET
6641  015630  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6642  015636  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6643
6644  015642  01603.  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
6645
6646  015650  016037  000042  001370          MOV     RMER2(R0),RMER2I        ;STORE RMER2 IN INPUT BUFFER
6647  015656  042737  177767  001142          BIC     #^CPAR,$BDDAT   ;DID "PAR" RESET?
6648  015664  001415                          BEQ     20$             ;YES!!
6649  015666  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
6650  015672  062737  000014  001136          ADD     #RMER1,$BDADR
6651  015700  032737  000010  001370          BIT     #DPE,RMER2I     ;IS "DPE" SET??
6652  015706  001002                          BNE     10$             ;YES!!
6653  015710  104067                          ERROR   67              ;CANT CLEAR "PAR"
6654  015712  000453                          BR      50$
6655  015714  104070                  10$:    ERROR   70              ;CANT CLEAR "PAR", "DPE"
6656  015716  000451                          BR      50$
6657  015720                          20$:
6658
6659                          ;WRITE TEST PATTERN AND VERIFY "PAR" STATUS
6660
6661  015720  013760  001412  000010          MOV     RMCS20,RMCS2(R0)        ;LOAD RMCS2
6662
6663  015726  013760  001440  000036          MOV     RMHR0,RMHR(R0)  ;LOAD RMHR
6664
6665  015734  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
6666  015742  042737  177767  001142          BIC     #^CPAR,$BDDAT
6667  015750  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;IS "PAR" CORRECT??
6668  015756  001410                          BEQ     40$             ;YES!!
6669  015760  032737  000020  001412          BIT     #PAT,RMCS20     ;SHOULD "PAR" BE SET?
6670  015766  001002                          BNE     30$             ;YES!!
6671  015770  104071                          ERROR   71              ;"PAR" SHOULD NOT BE SET
6672  015772  000423                          BR      50$
6673  015774  104072                  30$:    ERROR   72              ;"PAR" SHOULD BE SET
6674  015776  000421                          BR      50$             ;SKIP TO NEXT
6675                          ;GO TO NEXT PATTERN
6676  016000  005737  001440          40$:    TST     RMHR0           ;IS DATA PATTERN COMPLETE??
```

```
6677  016004  001307                          BNE     5$                      ;NO!!
6678  016006  032737  000020  001412          BIT     #PAT,RMCS20             ;IS TEST COMPLETE??
6679  016014  001012                          BNE     50$                     ;YES!!
6680                                  ;SETUP FOR SECOND TEST LOOP (ERROR)
6681  016016  052737  000020  001412          BIS     #PAT,RMCS20             ;TURN ON BAD PARITY
6682  016024  012737  000010  001140          MOV     #PAR,$GDDAT             ;EXPECT ERROR
6683  016032  012737  000001  001440          MOV     #1,RMHRO                ;INITIALIZE DATA PATTERN
6684  016040  000673                          BR      6$                      ;START LOOP
6685
6686  016042                              50$:                                ;END OF TEST
6687
6688                                  ;;*****************************************************************
6689                                  ;*TEST 21        CONTROL BUS PARITY GENERATION TEST
6690
6691                                  ;;*****************************************************************
6692  016042  000004                  T$T21:  SCOPE
6693  016044  012737  000021  001226          MOV     #21,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX
6694
6695  016052  000240                          NOP
6696  016054  012737  000024  001120          MOV     #20.,$ICNT              ;20 ITERATIONS
6697  016062  112737  000001  001131          MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
6698  016070  012737  016104  001122          MOV     #T21,$LPADR     ;LOAD LOOP ON TEST ADDRESS
6699  016076  012737  016104  001124          MOV     #T21,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
6700  016104                              T21:
6701  016104  012706  001100                  MOV     #STACK,SP               ;LOAD THE STACK POINTER
6702  016110  013700  001276                  MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
6703  016114  013701  001456                  MOV     T$TQUE,R1               ;R1 = POINTER TO DEVICE
6704
6705                                  ;SETUP FOR TEST (NO ERROR)
6706  016120  012737  000001  001440          MOV     #1,RMHRO                ;INITIALIZE DATA PATTERN
6707  016126  005037  001140                  CLR     $GDDAT                  ;MCPE SHOULD BE ZERO
6708  016132  000402                          BR      20$                     ;DONT SHIFT FIRST TIME
6709  016134                              10$:
6710                                  ;SHIFT DATA PATTERN
6711  016134  006337  001440                  ASL     RMHRO
6712  016140                              20$:
6713                                  ;CLEAR, THEN TRANSFER DATA TO RM03
6714  016140  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6715  016146  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6716
6717  016152  013760  001440  000036          MOV     RMHRO,RMHR(R0)  ;LOAD RMHR
6718                                  ;TRANSFER DATA TO RH, VERIFY NO "MCPE" ERROR
6719
6720  016160  016037  000036  001364          MOV     RMHR(R0),RMHRI  ;STORE RMHR IN INPUT BUFFER
6721
6722  016166  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
6723  016174  042737  157777  001142          BIC     #^CMCPE,$BDDAT  ;WAS BAD PARITY DETECTED??
6724  016202  001402                          BEQ     30$                     ;NO!!
6725  016204  104073                          ERROR   73                      ;BAD PARITY DETECTED BY RH
6726  016206  000403                          BR      40$
6727
6728  016210                              30$:
6729                                  ;GO TO NEXT PATTERN
6730  016210  005737  001440                  TST     RMHRO                   ;DONE ALL PATTERNS??
6731  016214  001347                          BNE     10$                     ;NO!!
6732
```

```
6733  016216                                  40$:                                    ;END OF TEST
6734
6735                                          ;;*****************************************************************
6736                                          ;*TEST 22        RMDA,RMDC FAULT TEST
6737
6738                                          ;;*****************************************************************
6739  016216  000004                          T$T22:  SCOPE
6740  016220  012737  000022  001226                  MOV     #22,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6741
6742  016226  000240                                  NOP
6743  016230  012737  000024  001120                  MOV     #20.,$ICNT      ;20 ITERATIONS
6744  016236  112737  000001  001131                  MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
6745  016244  012737  016260  001122                  MOV     #T22,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6746  016252  012737  016260  001124                  MOV     #T22,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
6747  016260                                  T22:
6748  016260  012706  001100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
6749  016264  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
6750  016270  013701  001456                          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
6751  016274  012760  000040  000010                  MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6752  016302  111160  000010                          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6753
6754                                          ;WRITE ZEROS, THEN ONES IN RMDA,RMDC-READ AND TEST FOR S-A-0
6755
6756  016306  012760  000000  000006                  MOV     #0,RMDA(R0)     ;LOAD RMDA
6757
6758  016314  012760  000000  000034                  MOV     #0,RMDC(R0)     ;LOAD RMDC
6759
6760  016322  012760  177777  000006                  MOV     #-1,RMDA(R0)    :LOAD RMDA
6761
6762  016330  012760  177777  000034                  MOV     #-1,RMDC(R0)    ;LOAD RMDC
6763
6764  016336  016037  000006  001334                  MOV     RMDA(R0),RMDAI  ;STORE RMDA IN INPUT BUFFER
6765
6766  016344  016037  000034  001362                  MOV     RMDC(R0),RMDCI  ;STORE RMDC IN INPUT BUFFER
6767  016352  022737  177777  001334                  CMP     #-1,RMDAI       ;IS ANY REGISTER ALL ONES??
6768  016360  001410                                  BEQ     10$             ;YES!!
6769  016362  052737  176000  001362                  BIS     #XNUDC,RMDCI    ;SET UNUSED BITS
6770  016370  022737  177777  001362                  CMP     #-1,RMDCI
6771  016376  001401                                  BEQ     10$             ;YES!!
6772  016400  104042                                  ERROR   42              ;RMDC AND RMDA S-A-0
6773
6774  016402                                  10$:
6775
6776
6777
6778                                          ;;*****************************************************************
6779                                          ;*TEST 23        DISK ADDRESS TRANSFER TEST
6780
6781                                          ;;*****************************************************************
6782  016402  000004                          T$T23:  SCOPE
6783  016404  012737  000023  001226                  MOV     #23,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6784  016412  000240                                  NOP
6785  016414  012737  000024  001120                  MOV     #20.,$ICNT      ;20 ITERATIONS
6786  016422  112737  000001  001131                  MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
6787  016430  012737  016444  001122                  MOV     #T23,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6788  016436  012737  016444  001124                  MOV     #T23,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
```

```
 6789  016444                                  T23:
 6790  016444  012706  001100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
 6791  016450  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 6792  016454  013701  001456                          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 6793  016460  005003                                  CLR     R3              ;R3 = ERROR INDICATOR
 6794  016462  012760  000040  000010                  MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
 6795  016470  111160  000010                          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
 6796                                  ;WRITE ONES IN RMDA, THEN WRITE ZEROS, READ BACK AND CHECK FOR S-A-1 BITS
 6797
 6798  016474  012760  177777  000006                  MOV     #-1,RMDA(R0)    ;LOAD RMDA
 6799
 6800  016502  012760  000000  000006                  MOV     #0,RMDA(R0)     ;LOAD RMDA
 6801
 6802  016510  016037  000006  001142                  MOV     RMDA(R0),$BDDAT ;STORE RMDA AT $BDDAT
 6803  016516  005737  001142                          TST     $BDDAT
 6804  016522  001412                                  BEQ     10$
 6805  016524  005037  001140                          CLR     $GDDAT
 6806  016530  010037  001136                          MOV     R0,$BDADR
 6807  016534  062737  000006  001136                  ADD     #RMDA,$BDADR
 6808  016542  104020                                  ERROR   20
 6809  016544  052703  000001                          BIS     #BIT0,R3        ;SET ERROR FLAG
 6810                                  ;WRITE ZEROS IN RMDA, THEN WRITE ONES, READ BACK AND CHECK FOR S-A-0 BITS
 6811  016550                          10$:
 6812
 6813  016550  012760  000000  000006                  MOV     #0,RMDA(R0)     ;LOAD RMDA
 6814
 6815  016556  012760  177777  000006                  MOV     #-1,RMDA(R0)    ;LOAD RMDA
 6816
 6817  016564  016037  000006  001142                  MOV     RMDA(R0),$BDDAT ;STORE RMDA AT $BDDAT
 6818  016572  023727  001142  177777                  CMP     $BDDAT,#-1
 6819  016600  001413                                  BEQ     20$
 6820  016602  012737  177777  001140                  MOV     #-1,$GDDAT
 6821  016610  010037  001136                          MOV     R0,$BDADR
 6822  016614  062737  000006  001136                  ADD     #RMDA,$BDADR
 6823  016622  104021                                  ERROR   21
 6824  016624  052703  000002                          BIS     #BIT1,R3        ;SET ERROR FLAG
 6825                                  ;WRITE A SHIFTING 1 BIT PATTERN IN RMDA, READ, AND CHECK FOR STUCK BITS
 6826  016630  005703                  20$:    TST     R3              ;OMIT BIT TEST IF ANY ERROR
 6827  016632  001027                          BNE     50$
 6828  016634  012702  000001                  MOV     #1,R2           ;R2 = TEST PATTERN
 6829  016640                          30$:
 6830
 6831  016640  012760  000000  000006                  MOV     #0,RMDA(R0)     ;LOAD RMDA
 6832
 6833  016646  010260  000006                          MOV     R2,RMDA(R0)     ;LOAD RMDA
 6834
 6835  016652  016037  000006  001142                  MOV     RMDA(R0),$BDDAT ;STORE RMDA AT $BDDAT
 6836  016660  023702  001142                          CMP     $BDDAT,R2
 6837  016664  001410                                  BEQ     40$
 6838  016666  010237  001140                          MOV     R2,$GDDAT
 6839  016672  010037  001136                          MOV     R0,$BDADR
 6840  016676  062737  000006  001136                  ADD     #RMDA,$BDADR
 6841  016704  104022                                  ERROR   22
 6842  016706  006302                  40$:    ASL     R2              ;SHIFT TO NEXT BIT
 6843  016710  001353                          BNE     30$             ;CONTINUE IF R2 NOT ZERO
 6844  016712                          50$:
```

```
                                        ;;*****************************************************************
                                        ;*TEST 24        DESIRED CYLINDER TRANSFER TEST
                                        ;;*****************************************************************
016712  000004                  TST24:  SCOPE
016714  012737  000024  001226          MOV     #24,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX

016722  000240                          NOP
016724  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
016732  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
016740  012737  016754  001122          MOV     #T24,$LPADR  ;LOAD LOOP ON TEST ADDRESS
016746  012737  016754  001124          MOV     #T24,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
016754                          T24:
016754  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
016760  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
016764  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
016770  005003                          CLR     R3              ;RESET ERROR FLAGS
016772  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
017000  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
017004  005037  001140                  CLR     $GDDAT          ;LOAD EXPECTED
017010  010037  001136                  MOV     R0,$BDADR       ;LOAD REG ADDRESS
017014  062737  000034  001136          ADD     #RMDC,$BDADR

                                        ;WRITE ONES IN RMDC AND VERIFY THAT UNUSED BITS ARE ZERO

017022  012760  177777  000034          MOV     #-1,RMDC(R0)    ;LOAD RMDC

017030  016037  000034  001142          MOV     RMDC(R0),$BDDAT ;STORE RMDC AT $BDDAT
017036  042737  001777  001142          BIC     #^CXNUDC,$BDDAT         ;CLEAR ALL USED BITS
017044  001403                          BEQ     5$                      ;BRANCH IF NO ERROR
017046  104134                          ERROR   134             ;UNUSED BITS OF RMDC NOT ZERO
017050  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
017054                          5$:
                                        ;WRITE ONES IN RMDC, THEN WRITE ZEROS, READ AND CHECK FOR S-A-1 BITS

017054  012760  177777  000034          MOV     #-1,RMDC(R0)    ;LOAD RMDC

017062  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC

017070  016037  000034  001142          MOV     RMDC(R0),$BDDAT ;STORE RMDC AT $BDDAT
017076  042737  176000  001142          BIC     #XNUDC,$BDDAT   ;CLEAR UNUSED BITS
017104  001403                          BEQ     10$             ;BRANCH IF NO ERROR
017106  104037                          ERROR   37              ;CANT WRITE ONES RMDC
017110  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
017114                          10$:
                                        ;WRITE ZEROS, THEN ONES IN RMDC, READ AND CHECK FOR S-A-0 BITS

017114  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC

017122  012760  177777  000034          MOV     #-1,RMDC(R0)    ;LOAD RMDC

017130  016037  000034  001142          MOV     RMDC(R0),$BDDAT ;STORE RMDC AT $BDDAT
017136  052737  176000  001142          BIS     #XNUDC,$BDDAT   ;SET UNUSED BITS
017144  012737  177777  001140          MOV     #-1,$GDDAT      ;LOAD EXPECTED RESULT
017152  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;IS RMDC ALL ONES ??
```

```
6901  017160  001403                          BEQ     20$             ;YES !!
6902  017162  104040                          ERROR   40
6903  017164  052703  000002                  BIS     #BIT1,R3        ;SET ERROR FLAG
6904  017170                          20$:
6905                                  ;OMIT BIT TEST IF ANY ERRORS
6906  017170  005703                          TST     R3
6907  017172  001026                          BNE     60$
6908  017174  012702  000001                  MOV     #1,R2           ;R2 = TEST PATTERN
6909  017200                          30$:
6910                                  ;TEST RMDC WITH SHIFTING ONE BIT
6911
6912  017200  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
6913
6914  017206  010260  000034                  MOV     R2,RMDC(R0)     ;LOAD RMDC
6915  017212  010203                          MOV     R2,R3           ;R3 = EXPECTED RESULT
6916  017214  042703  176000                  BIC     #XNUDC,R3       ;CLEAR ANY UNUSED BITS
6917
6918  017220  016037  000034  001142          MOV     RMDC(R0),$BDDAT ;STORE RMDC AT $BDDAT
6919  017226  023703  001142                  CMP     $BDDAT,R3
6920  017232  001404                          BEQ     50$
6921  017234  010337  001140                  MOV     R3,$GDDAT
6922  017240  104041                          ERROR   41
6923  017242  000402                          BR      60$             ;SKIP TO NEXT
6924
6925  017244  006302                  50$:    ASL     R2              ;SHIFT TO NEXT BIT
6926  017246  001354                          BNE     30$             ;CONTINUE IF R2 NOT ZERO
6927
6928  017250                          60$:
6929
6930                                  ;;*****************************************************************
6931                                  ;TEST 25        ILLEGAL REGISTER TEST
6932                                  ;;*****************************************************************
6933
6934  017250  000004                  T25:    SCOPE
6935  017252  012737  000025  001226          MOV     #25,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
6936  017260  000240                          NOP
6937  017262  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
6938  017270  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
6939  017276  012737  017312  001122          MOV     #T25,$LPADR  ;LOAD LOOP ON TEST ADDRESS
6940  017304  012737  017312  001124          MOV     #T25,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
6941  017312                          T25:
6942  017312  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
6943  017316  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
6944  017322  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
6945  017326  005037  001140                  CLR     $GDDAT          ;"ILR" SHOULD BE ZERO
6946  017332  012702  000000                  MOV     #0,R2           ;R2=REGISTER INDEX
6947  017336                          10$:
6948                                  ;;*****************************************************************
6949                                  ;CLEAR AND VERIFY THAT "ILR" STATUS IS ZERO
6950  017336  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
6951  017344  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
6952
6953  017350  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
6954  017356  042737  177775  001142          BIC     #^CILR,$BDDAT
6955  017364  001411                          BEQ     20$             ;BRANCH IF ILR IS RESET
6956  017366  005037  001140                  CLR     $GDDAT          ;SETUP GOOD DATA, REG ADR
```

```
 6957  017372  010037  001136                MOV     R0,$BDADR
 6958  017376  062737  000014  001136        ADD     #RMER1,$BDADR
 6959  017404  104064                        ERROR   64                      ;CANT CLEAR ILR
 6960  017406  000550                        BR      140$
 6961  017410                          20$:
 6962                                  ;;**************************************************************
 6963                                  ;WRITE THE REGISTER (INDEX=R2) AND TEST ILR STATUS
 6964  017410  010003                        MOV     R0,R3                   ;R3=REG ADDRESS
 6965  017412  060203                        ADD     R2,R3
 6966  017414  013746  000004                MOV     ERRVEC,-(SP)            ;;PUSH ERRVEC ON STACK
 6967  017420  013746  000006                MOV     ERRVEC+2,-(SP)                  ;;PUSH ERRVEC+2 ON STACK
 6968  017424  012737  017466  000004        MOV     #40$,ERRVEC             ;SETUP FOR BUS TIMEOUT
 6969  017432  012737  000300  000006        MOV     #PR6,ERRVEC+2
 6970  017440  005004                        CLR     R4                      ;R4=REGISTER VALUE
 6971  017442  022702  000010                CMP     #RMCS2,R2
 6972  017446  001001                        BNE     30$
 6973  017450  111104                        MOVB    (R1),R4                 ;SELECT DRIVE IF RMCS2
 6974  017452  010413                  30$:  MOV     R4,(R3)                 ;WRITE TEST REGISTER
 6975  017454  012637  000006                MOV     (SP)+,ERRVEC+2                  ;;POP STACK INTO ERRVEC+2
 6976  017460  012637  000004                MOV     (SP)+,ERRVEC            ;;POP STACK INTO ERRVEC
 6977  017464  000416                        BR      60$
 6978  017466  012716  017474          40$:  MOV     #45$,(SP)               ;DUMMY RTI ADDRESS
 6979  017472  000002                        RTI                             ;RESTORE PRIORITY
 6980  017474                          45$:
 6981  017474  012637  000006                MOV     (SP)+,ERRVEC+2                  ;;POP STACK INTO ERRVEC+2
 6982  017500  012637  000004                MOV     (SP)+,ERRVEC            ;;POP STACK INTO ERRVEC
 6983  017504  020227  000046                CMP     R2,#RMEC2               ;WERE ALL RM03 REGISTERS READ??
 6984  017510  101003                        BHI     50$                     ;YES!!
 6985  017512  010337  001136                MOV     R3,$BDADR
 6986  017516  104074                        ERROR   74                      ;UNEXPECTED BUS TIMEOUT
 6987  017520  000503                  50$:  BR      140$
 6988
 6989  017522                          60$:
 6990
 6991  017522  016037  000014  001142        MOV     RMER1(R0),$BDDAT                ;STORE RMER1 AT $BDDAT
 6992  017530  042737  177775  001142        BIC     #^CILR,$BDDAT
 6993  017536  023737  001140  001142        CMP     $GDDAT,$BDDAT           ;IS "ILR" OK??
 6994  017544  001411                        BEQ     80$                     ;YES!!
 6995  017546  010337  001174                MOV     R3,$TMP0                ;SAVE ADDRESS
 6996  017552  032737  000002  001140        BIT     #ILR,$GDDAT             ;SHOULD "ILR" BE SET??
 6997  017560  001002                        BNE     70$                     ;YES!!
 6998  017562  104065                        ERROR   65                      ;"ILR" SHOULD NOT BE SET
 6999  017564  000401                        BR      80$
 7000  017566  104066                  70$:  ERROR   66                      ;"ILR" SHOULD BE SET
 7001
 7002  017570                          80$:
 7003                                  ;ADVANCE TO THE NEXT REGISTER ADDRESS
 7004  017570  062702  000002                ADD     #2,R2                   ;INCREMENT INDEX
 7005  017574  022702  000050                CMP     #50,R2                  ;TIME TO TRY RH70 ?
 7006  017600  101256                        BHI     10$                     ;BRANCH IF NOT
 7007  017602  103437                        BLO     110$                    ;BRANCH IF ALREADY CHECKED
 7008                                  ;       CMP     #RMBAE,R2               ;IS THIS RMBAE??
 7009                                  ;       BNE     100$                    ;NO!!
 7010  017604  013746  000004                MOV     ERRVEC,-(SP)            ;;PUSH ERRVEC ON STACK
 7011  017610  013746  000006                MOV     ERRVEC+2,-(SP)                  ;;PUSH ERRVEC+2 ON STACK
 7012  017614  012737  017712  000004        MOV     #130$,ERRVEC            ;SETUP FOR TIMEOUT
```

```
 7013  017622  012737  000300  000006          MOV     #PR6,ERRVEC+2
 7014                                  ;         PUTCS1  #A17!A16
 7015                                  ;         GETBAE
 7016                                  ;         BIC     #↑C<BIT1!BIT0>,RMBAEI
 7017                                  ;         BNE     90$             ;BRANCH IF RH70 CONTROLLER
 7018                                  ;         BIS     #ILR,$GDDAT     ;"ILR" SHOULD BE SET
 7019                                  ;90$:     POP     ERRVEC+2
 7020                                  ;         POP     ERRVEC
 7021                                  ;100$:    CMP     #RMCS3+2,R2     ;DONE ALL LEGAL REGISTERS
 7022                                  ;         BNE     110$
 7023                                  ;         BIS     #ILR,$GDDAT     ;"ILR" SHOULD BE SET
 7024  017630  052737  000002  001140          BIS     #ILR,$GDDAT     ;SET ILR
 7025  017636  012702  000054                  MOV     #54,R2          ;START AT INDEX 54 IF RH70/22REG
 7026  017642  012760  001400  000000          MOV     #A17!A16,RMCS1(R0)      ;SET EXTEND BITS
 7027  017650  016037  000050  001376          MOV     50(R0),RMBAEI   ;READ THE EXTENDED BITS
 7028  017656  042737  177774  001376          BIC     #177774,RMBAEI  ;CHOP OFF
 7029  017664  001002                          BNE     90$             ;BRANCH IF RH70/22-REG
 7030  017666  012702  000050                  MOV     #50,R2          ;OTHERWISE NOT A RH70 OR RH70 WITH32REG
 7031  017672  012637  000006          90$:    MOV     (SP)+,ERRVEC+2  ;
 7032  017676  012637  000004                  MOV     (SP)+,ERRVEC    ;
 7033  017702  022702  000074          110$:   CMP     #74,R2          ;DONE ALL TESTS
 7034  017706  101410                          BLOS    140$            ;YES!!
 7035  017710  000612                  120$:   BR      10$
 7036
 7037  017712  012716  017720          130$:   MOV     #135$,(SP)      ;DUMMY RTI ADDRESS
 7038  017716  000002                          RTI                     ;RESTORE PRIORITY
 7039  017720                          135$:
 7040  017720  012637  000004                  MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
 7041  017724  012637  000006                  MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
 7042  017730                          140$:                           ;END OF TEST
 7043
 7044                                  ;;*****************************************************************
 7045                                  ;*TEST 26        RESET GO BY INIT TEST
 7046
 7047                                  ;;*****************************************************************
 7048  017730  000004                  TST26:  SCOPE
 7049  017732  012737  000026  001226          MOV     #26,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
 7050
 7051  017740  000240                          NOP
 7052  017742  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
 7053  017750  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
 7054  017756  012737  017772  001122          MOV     #T26,$LPADR  ;LOAD LOOP ON TEST ADDRESS
 7055  017764  012737  017772  001124          MOV     #T26,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
 7056  017772                          T26:
 7057  017772  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 7058  017776  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 7059  020002  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 7060  020006  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
 7061  020014  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
 7062  020020  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS FOR MSG
 7063                                  ;SET GO, INITIALIZE AND VERIFY THAT GO IS RESET
 7064
 7065  020024  012760  000001  000000          MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
 7066  020032  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
 7067  020040  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
 7068
```

```
7069  020044  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
7070  020052  042737  177776  001142          BIC     #^CGO,$BDDAT
7071  020060  001403                          BEQ     10$                     ;BRANCH IF GO IS RESET
7072  020062  005037  001140                  CLR     $GDDAT
7073  020066  104137                          ERROR   137                     ;GO NOT CLEARED BY INIT
7074
7075  020070                          10$:                                    ;END OF TEST
7076
7077                                  ;;*****************************************************************
7078                                  ;*TEST 27        DIAGNOSTIC MODE TEST
7079
7080                                  ;;*****************************************************************
7081  020070  000004                  T$T27:  SCOPE
7082  020072  012737  000027  001226          MOV     #27,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX
7083
7084  020100  000240                          NOP
7085  020102  012737  000024  001120          MOV     #20.,$ICNT              ;20 ITERATIONS
7086  020110  112737  000001  001131          MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
7087  020116  012737  020132  001122          MOV     #T27,$LPADR     ;LOAD LOOP ON TEST ADDRESS
7088  020124  012737  020132  001124          MOV     #T27,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
7089  020132                          T27:
7090  020132  012706  001100                  MOV     #STACK,SP               ;LOAD THE STACK POINTER
7091  020136  013700  001276                  MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
7092  020142  013701  001456                  MOV     TSTQUE,R1               ;R1 = POINTER TO DEVICE
7093  020146  010037  001136                  MOV     R0,$BDADR               ;SETUP REGISTER ADDRESS
7094  020152  062737  000024  001136          ADD     #RMMR1,$BDADR
7095  020160  005003                          CLR     R3                      ;INITIALIZE ERROR FLAGS
7096                                  ;INITIALIZE AND VERIFY THAT "DMD" IS RESET
7097  020162  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7098  020170  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7099
7100  020174  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
7101  020202  042737  177776  001142          BIC     #^CDMD,$BDDAT
7102  020210  001403                          BEQ     10$                     ;BRANCH IF "DMD" IS ZERO
7103  020212  005037  001140                  CLR     $GDDAT
7104  020216  104075                          ERROR   75                      ;CANT CLEAR "DMD"
7105  020220                          10$:
7106                                  ;SET AND RESET "DMD" USING REGISTER TRANSFER-VERIFY "DMD" NOT S-A-1
7107
7108  020220  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7109
7110  020226  012760  000000  000024          MOV     #0,RMMR1(R0)    ;LOAD RMMR1
7111
7112  020234  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
7113  020242  042737  177776  001142          BIC     #^CDMD,$BDDAT
7114  020250  001405                          BEQ     20$                     ;BRANCH IF DMD NOT S-A-1
7115  020252  005037  001140                  CLR     $GDDAT
7116  020256  104076                          ERROR   76                      ;CANT WRITE DMD=0
7117  020260  052703  000001                  BIS     #BIT0,R3                ;SET ERROR FLAG
7118  020264                          20$:
7119                                  ;RESET AND SET "DMD" USING REGISTER TRANSFER-VERIFY "DMD" NOT S-A-0
7120
7121  020264  012760  000000  000024          MOV     #0,RMMR1(R0)    ;LOAD RMMR1
7122
7123  020272  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7124
```

```
7125  020300  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
7126  020306  042737  177776  001142          BIC     #^tCDMD,$BDDAT
7127  020314  001006                          BNE     30$             ;BRANCH IF DMD NOT S-A-0
7128  020316  012737  000001  001140          MOV     #DMD,$GDDAT
7129  020324  104077                          ERROR   77              ;CAN'T WRITE DMD=1
7130  020326  052703  000002                  BIS     #BIT1,R3        ;SET ERROR FLAG
7131  020332                          30$:
7132                                  ;IF NO PREVIOUS ERROR, TEST FOR BIT INTERFERENCE WITH SHIFTING
7133                                  ;ONE BIT PATTERN
7134  020332  005703                          TST     R3              ;ANY ERRORS DETECTED??
7135  020334  001027                          BNE     60$             ;YES!!
7136  020336  012702  000002                  MOV     #BIT1,R2        ;INITAILIZE DATA PATTERN
7137  020342                          40$:
7138
7139  020342  012760  000000  000024          MOV     #0,RMMR1(R0)    ;LOAD RMMR1
7140
7141  020350  010260  000024                  MOV     R2,RMMR1(R0)    ;LOAD RMMR1
7142
7143  020354  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
7144  020362  042737  177776  001142          BIC     #^tCDMD,$BDDAT
7145  020370  001407                          BEQ     50$             ;BRANCH IF DMD NOT SET
7146  020372  010237  001174                  MOV     R2,$TMP0        ;SAVE DATA
7147  020376  010237  001174                  MOV     R2,$TMP0        ;SAVE DATA
7148  020402  005037  001140                  CLR     $GDDAT          ;DMD SHOULD BE ZERO
7149  020406  104100                          ERROR   100             ;DMD SET BY WRONG BIT
7150  020410                          50$:
7151                                  ;       SHIFT TO NEXT DATA BIT AND CONTINUE TEST IF NOT DONE
7152  020410  006302                          ASL     R2
7153  020412  001353                          BNE     40$
7154  020414                          60$:                            ;END OF TEST
7155                                  ;;*****************************************************************
7156                                  ;^TEST 30       MOL TEST
7157
7158                                  ;;*****************************************************************
7159  020414  000004                  ^tST30:  SCOPE
7160  020416  012737  000030  001226          MOV     #30,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7161
7162  020424  000240                          NOP
7163  020426  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
7164  020434  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
7165  020442  012737  020456  001122          MOV     #T30,$LPADR  ;LOAD LOOP ON TEST ADDRESS
7166  020450  012737  020456  001124          MOV     #T30,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
7167  020456                          T30:
7168  020456  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
7169  020462  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
7170  020466  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
7171  020472  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7172  020500  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7173  020504  010037  001136                  MOV     R0,$BDADR       ;R0=REGISTER ADDRESS
7174  020510  062737  000012  001136          ADD     #RMDS,$BDADR
7175  020516  005003                          CLR     R3              ;R3=ERROR FLAG
7176                                  ;SET DIAGNOSTIC MODE AND VERIFY ^tHAT "MOL" IS ZERO
7177
7178  020520  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7179
7180  020526  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
```

```
7181  020534  042737  167777  001142          BIC     #↑CMOL,$BDDAT
7182  020542  001405                          BEQ     10$
7183  020544  005037  001140                  CLR     $GDDAT
7184  020550  104101                          ERROR   101             ;"MOL" NOT ZERO
7185  020552  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
7186  020556                          10$:
7187                                  ;SET MAINTENANCE UNIT READY AND VERIFY THAT "MOL" IS ONE
7188
7189  020556  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7190
7191  020564  012760  001001  000024          MOV     #DMD!MUR,RMMR1(R0)      ;LOAD RMMR1
7192
7193  020572  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7194  020600  042737  167777  001142          BIC     #↑CMOL,$BDDAT
7195  020606  001006                          BNE     20$
7196  020610  012737  010000  001140          MOV     #MOL,$GDDAT
7197  020616  104102                          ERROR   102             ;"MOL" NOT ONE
7198  020620  052703  000002                  BIS     #BIT1,R3
7199  020624                          20$:
7200                                  ;IF NO PREVIOUS ERROR, VERIFY VOLUME VALID IS RESET AND
7201                                  ;TEST FOR BIT INTERFERENCE
7202  020624  005703                          TST     R3              ;ANY ERROR DETECTED??
7203  020626  001057                          BNE     70$             ;YES!!
7204
7205  020630  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7206  020636  042737  177677  001142          BIC     #↑CVV,$BDDAT
7207  020644  001403                          BEQ     25$             ;BRANCH IF VV RESET
7208  020646  005037  001140                  CLR     $GDDAT
7209  020652  104135                          ERROR   135             ;VV NOT RESET
7210  020654                          25$:
7211  020654  012702  000001                  MOV     #1,R2           ;INITIALIZE DATA PATTERN
7212  020660                          30$:
7213
7214  020660  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7215
7216  020666  010260  000024                  MOV     R2,RMMR1(R0)    ;LOAD RMMR1
7217
7218  020672  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7219  020700  042737  167777  001142          BIC     #↑CMOL,$BDDAT
7220  020706  005003                          CLR     R3              ;SETUP EXPECTED "MOL"
7221  020710  032702  001000                  BIT     #MUR,R2
7222  020714  001402                          BEQ     40$
7223  020716  052703  010000                  BIS     #MOL,R3         ;"MOL" SHOULD BE ONE
7224  020722  020337  001142          40$:    CMP     R3,$BDDAT       ;IS MOL OK??
7225  020726  001405                          BEQ     50$             ;YES!!
7226  020730  010237  001174                  MOV     R2,$TMP0        ;SAVE TEST PATTERN
7227  020734  010337  001140                  MOV     R3,$GDDAT
7228  020740  104103                          ERROR   103             ;MUR SET BY WRONG BIT
7229  020742                          50$:
7230                                  ;SHIFT TO NEXT PATTERN
7231  020742  042702  000001                  BIC     #DMD,R2         ;DONT SHIFT DMD
7232  020746  001002                          BNE     60$
7233  020750  012702  000001                  MOV     #DMD,R2         ;DONT TRUNCATE TEST
7234  020754  006302                  60$:    ASL     R2              ;SHIFT TO NEXT BIT
7235  020756  001403                          BEQ     70$             ;BRANCH IF DONE
7236  020760  052702  000001                  BIS     #DMD,R2         ;KEEP DMD ON
```

```
7237  020764  000765                    BR      30$             ;CONTINUE
7238
7239  020766                    70$:                            ;END OF TEST
7240
7241                            ;;*****************************************************************
7242                            ;*TEST 31        WRITE LOCK TEST
7243
7244                            ;;*****************************************************************
7245  020766  000004            T31:    SCOPE
7246  020770  012737  000031  001226    MOV     #31,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7247
7248  020776  000240                    NOP
7249  021000  012737  000024  001120    MOV     #20.,$ICNT      ;20 ITERATIONS
7250  021006  112737  000001  001131    MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
7251  021014  012737  021030  001122    MOV     #T31,$LPADR  ;LOAD LOOP ON TEST ADDRESS
7252  021022  012737  021030  001124    MOV     #T31,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
7253  021030                    T31:
7254  021030  012706  001100            MOV     #STACK,SP       ;LOAD THE STACK POINTER
7255  021034  013700  001276            MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
7256  021040  013701  001456            MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
7257  021044  005003                    CLR     R3              ;R3=ERROR FLAG
7258  021046  010037  001136            MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7259  021052  062737  000012  001136    ADD     #RMDS,$BDADR
7260  021060  005037  001140            CLR     $GDDAT          ;WRL SHOULD BE ZERO
7261  021064  012760  000040  000010    MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7262  021072  111160  000010            MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7263                            ;SET DIAGNOSTIC MODE AND VERIFY "WRL" IS ZERO
7264
7265  021076  012760  000001  000024    MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7266
7267  021104  016037  000012  001142    MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7268  021112  042737  173777  001142    BIC     #^CWRL,$BDDAT
7269  021120  001403                    BEQ     10$             ;BRANCH IF WRL IS ZERO
7270  021122  104104                    ERROR   104             ;WRL NOT ZERO
7271  021124  052703  000001            BIS     #BIT0,R3        ;SET ERROR FLAG
7272  021130                    10$:
7273                            ;SET MAINTENANCE WRITE PROTECT AND VERIFY "WRL" IS ONE
7274
7275  021130  012760  000001  000024    MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7276
7277  021136  012760  000011  000024    MOV     #DMD!MWP,RMMR1(R0)      ;LOAD RMMR1
7278
7279  021144  016037  000012  001142    MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7280  021152  042737  173777  001142    BIC     #^CWRL,$BDDAT
7281  021160  001006                    BNE     20$             ;BRANCH IF WRL IS NOE
7282  021162  012737  004000  001140    MOV     #WRL,$GDDAT     ;WRL SHOULD BE SET
7283  021170  104105                    ERROR   105             ;CANT SET WRL
7284  021172  052703  000002            BIS     #BIT1,R3        ;SET ERROR FLAG
7285  021176                    20$:
7286                            ;IF NO PREVIOUS ERROR, TEST FOR BIT INTERFERENCE ON "MWP"
7287  021176  005703                    TST     R3              ;ANY OTHER ERROR??
7288  021200  001045                    BNE     70$             ;YES!!
7289  021202  012702  000001            MOV     #1,R2           ;INITIALIZE DATA PATTERN
7290
7291  021206                    30$:
7292                            ;       TRANSFER DATA TO RMMR1, READ RMDS AND VERIFY WRL
```

```
7293
7294  021206  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7295
7296  021214  010260  000024                  MOV     R2,RMMR1(R0)    ;LOAD RMMR1
7297
7298  021220  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7299  021226  042737  173777  001142          BIC     #^CWRL,$BDDAT   ;CLEARUP RECEIVED "WRL"
7300  021234  005003                          CLR     R3              ;GENERATE EXPECTED "WRL"
7301  021236  032702  000010                  BIT     #MWP,R2
7302  021242  001402                          BEQ     40$
7303  021244  052703  004000                  BIS     #WRL,R3         ;WRL SHOULD BE SET
7304  021250  020337  001142          40$:    CMP     R3,$BDDAT       ;IS WRL OK??
7305  021254  001405                          BEQ     50$             ;YES!!
7306  021256  010337  001140                  MOV     R3,$GDDAT       ;SAVE EXPECTED
7307  021262  010237  001174                  MOV     R2,$TMP0        ;SAVE DATA PATTERN
7308  021266  104106                          ERROR   106             ;BIT INTERFERENCE WITH MWP
7309  021270                          50$:
7310                                  ;       ADVANCE TO NEXT DATA BIT
7311  021270  042702  000001                  BIC     #DMD,R2         ;DONT SHIFT DMD
7312  021274  001002                          BNE     60$
7313  021276  012702  000001                  MOV     #DMD,R2         ;DONT TRUNCATE TEST
7314  021302  006302                  60$:    ASL     R2              ;SHIFT DATA BIT
7315  021304  001403                          BEQ     70$             ;EXIT IF DONE
7316  021306  052702  000001                  BIS     #DMD,R2         ;KEEP DIAGNOSTIC MODE ON
7317  021312  000735                          BR      30$             ;CONTINUE TEST
7318
7319  021314                          70$:                            ;END OF TEST
7320
7321                                  ;;**************************************************************
7322                                  ;*TEST 32        DRIVE FAULT TEST
7323
7324                                  ;;**************************************************************
7325  021314  000004                  ^ST32:  SCOPE
7326  021316  012737  000032  001226          MOV     #32,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7327
7328  021324  000240                          NOP
7329  021326  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
7330  021334  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
7331  021342  012737  021356  001122          MOV     #T32,$LPADR  ;LOAD LOOP ON TEST ADDRESS
7332  021350  012737  021356  001124          MOV     #T32,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
7333  021356                          T32:
7334  021356  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
7335  021362  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
7336  021366  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
7337  021372  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7338  021400  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7339  021404  005003                          CLR     R3              ;INITIALIZE ERROR FLAGS
7340  021406  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7341  021412  062737  000042  001136          ADD     #RMER2,$BDADR
7342  021420  005037  001140                  CLR     $GDDAT          ;"DVC" AND "UNS" SHOULD BE ZERO
7343                                  ;SET AND RESET MAINTENANCE DRIVE FAULT, VERIFY THAT "DVC" IS NOT
7344                                  ;STUCK-AT-ONE.
7345
7346  021424  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7347
7348  021432  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
```

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7349
7350  021440  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
7351
7352  021446  016037  000042  001142          MOV     RMER2(R0),$BDDAT        ;STORE RMER2 AT $BDDAT
7353  021454  042737  177577  001142          BIC     #^tCDVC,$BDDAT  ;IS "DVC" RESET??
7354  021462  001406                          BEQ     10$             ;YES!!
7355  021464  104107                          ERROR   107             ;CANT RESET DVC
7356  021466  052703  000001                  BIS     #BIT0,R3        ;SET ERROR FLAG
7357  021472  012737  040000  001140          MOV     #UNS,$GDDAT
7358  021500                          10$:
7359
7360                                  ;VERIFY THAT "UNS" IS SAME AS "DVC"
7361
7362  021500  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
7363  021506  042737  137777  001142          BIC     #^tCUNS,$BDDAT
7364  021514  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;IS "UNS" OK??
7365  021522  001414                          BEQ     30$             ;YES!!
7366  021524  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7367  021530  062737  000014  001136          ADD     #RMER1,$BDADR
7368  021536  032737  040000  001140          BIT     #UNS,$GDDAT     ;SHOULD "UNS" BE ON??
7369  021544  001002                          BNE     20$             ;YES!!
7370  021546  104110                          ERROR   110             ;UNS IS SET, DVS IS RESET
7371  021550  000401                          BR      30$
7372  021552                          20$:
7373  021552  104111                          ERROR   111             ;UNS IS RESET, DVC IS SET
7374  021554                          30$:
7375
7376                                  ;RESET AND SET 'MDF", VERIFY THAT "DVC" IS NOT S-A-0.
7377  021554  012737  000200  001140          MOV     #DVC,$GDDAT     ;DVC SHOULD BE ON
7378
7379  021562  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7380
7381  021570  012760  000101  000024          MOV     #DMD!MDF,RMMR1(R0)      ;LOAD RMMR1
7382
7383  021576  016037  000042  001142          MOV     RMER2(R0),$BDDAT        ;STORE RMER2 AT $BDDAT
7384  021604  042737  177577  001142          BIC     #^tCDVC,$BDDAT
7385  021612  001012                          BNE     40$             ;BRANCH IF DVC IS SET
7386  021614  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7387  021620  062737  000042  001136          ADD     #RMER2,$BDADR
7388  021626  104112                          ERROR   112             ;CANT SET DVC
7389  021630  052703  000002                  BIS     #BIT1,R3        ;SET ERROR FLAG
7390  021634  005037  001140                  CLR     $GDDAT          ;UNS SHOULD BE OFF
7391  021640                          40$:
7392
7393                                  ;VERIFY THAT "UNS" IS SAME AS "DVC"
7394  021640  005737  001140                  TST     $GDDAT          ;CHANGE DVC TO UNS
7395  021644  001403                          BEQ     50$
7396  021646  012737  040000  001140          MOV     #UNS,$GDDAT
7397  021654                          50$:
7398
7399  021654  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
7400  021662  042737  137777  001142          BIC     #^tCUNS,$BDDAT
7401  021670  023737  001140  001142          CMP     $GDDAT,$BDDAT
7402  021676  001414                          BEQ     70$             ;BRANCH IF UNS IS OK
7403  021700  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7404  021704  062737  000014  001136          ADD     #RMER1,$BDADR
```

```
7405  021712  032737  040000  001140          BIT     #UNS,$GDDAT     ;SHOULD UNS BE ON??
7406  021720  001002                          BNE     60$             ;YES!!
7407  021722  104113                          ERROR   113             ;UNS IS SET, DVC IS RESET
7408  021724  000401                          BR      70$
7409  021726                          60$:
7410  021726  104114                          ERROR   114             ;UNS IS RESET, DVC IS SET
7411  021730                          70$:
7412
7413                                  ;IF THERE WERE NO PREVIOUS ERRORS, TEST FOR BIT INTERFERENCE ON
7414                                  ;"MDF"
7415  021730  005703                          TST     R3
7416  021732  001056                          BNE     120$            ;BRANCH IF ANY OTHER ERRORS
7417  021734  012702  000001                  MOV     #1,R2           ;INITIALIZE TEST PATTERN
7418  021740                          80$:
7419
7420  021740  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7421
7422  021746  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
7423
7424  021754  010260  000024                  MOV     R2,RMMR1(R0)    ;LOAD RMMR1
7425
7426  021760  016037  000042  001142          MOV     RMER2(R0),$BDDAT        ;STORE RMER2 AT $BDDAT
7427  021766  042737  177577  001142          BIC     #^CDVC,$BDDAT   ;GET RESULTS
7428  021774  005037  001140                  CLR     $GDDAT          ;SETUP EXPECTED
7429  022000  032702  000100                  BIT     #MDF,R2         ;WAS MDF SET??
7430  022004  001403                          BEQ     90$             ;NO!!
7431  022006  052737  000200  001140          BIS     #DVC,$GDDAT     ;YES-DVC SHOULD BE ON
7432  022014  023737  001140  001142  90$:    CMP     $GDDAT,$BDDAT
7433  022022  001410                          BEQ     100$            ;BRANCH IF DVC IS OK
7434  022024  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7435  022030  062737  000042  001136          ADD     #RMER2,$BDADR
7436  022036  010237  001174                  MOV     R2,$TMP0        ;SAVE TEST PATTERN
7437  022042  104115                          ERROR   115             ;MDF SET BY WRONG BIT
7438  022044                          100$:
7439                                  ;SHIFT TO NEXT BIT POSITION
7440  022044  042702  000001                  BIC     #DMD,R2         ;DONT SHIFT DMD
7441  022050  001002                          BNE     110$
7442  022052  012702  000001                  MOV     #DMD,R2         ;DONT TRUNCATE TEST
7443  022056  006302                  110$:   ASL     R2              ;SHIFT
7444  022060  001403                          BEQ     120$            ;EXIT IF DONE
7445  022062  052702  000001                  BIS     #DMD,R2         ;KEEP DMD ON
7446  022066  000724                          BR      80$             ;CONTINUE
7447
7448  022070                          120$:                           ;END OF TEST
7449
7450                                  ;;*****************************************************************
7451                                  ;*TEST 33        SEEK ERROR TEST
7452
7453                                  ;;*****************************************************************
7454  022070  000004                  TST33:  SCOPE
7455  022072  012737  000033  001226          MOV     #33,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7456
7457  022100  000240                          NOP
7458  022102  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
7459  022110  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
7460  022116  012737  022132  001122          MOV     #T33,$LPADR  ;LOAD LOOP ON TEST ADDRESS
```

```
7461  022124  012737  022132  001124          MOV     #T33,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
7462  022132                          T33:
7463  022132  012706  001100                  MOV     #STACK,SP        ;LOAD THE STACK POINTER
7464  022136  013700  001276                  MOV     $BASE,R0         ;R0 = UNIBUS ADDRESS OF UUT
7465  022142  013701  001456                  MOV     TSTQUE,R1        ;R1 = POINTER TO DEVICE
7466  022146  012760  000040  000010          MOV     #CLR,RMCS2(R0)   ;CLEAR THE MASSBUS
7467  022154  111160  000010                  MOVB    (R1),RMCS2(R0)   ;SELECT UNIT
7468  022160  005003                          CLR     R3               ;CLEAR ERROR FLAGS
7469  022162  010037  001136                  MOV     R0,$BDADR        ;SETUP REGISTER ADDRESS
7470  022166  062737  000042  001136          ADD     #RMER2,$BDADR
7471
7472                                  ;SET DIAGNOSTIC MODE AND VERIFY THAT "SKI" CAN BE RESET
7473
7474  022174  012760  000001  000024          MOV     #DMD,RMMR1(R0)   ;LOAD RMMR1
7475
7476  022202  012760  000000  000042          MOV     #0,RMER2(R0)     ;LOAD RMER2
7477
7478  022210  016037  000042  001142          MOV     RMER2(R0),$BDDAT         ;STORE RMER2 AT $BDDAT
7479  022216  042737  137777  001142          BIC     #^CSKI,$BDDAT
7480  022224  001405                          BEQ     10$              ;BRANCH IF SKI IS RESET
7481  022226  005037  001140                  CLR     $GDDAT           ;SKI SHOULD BE ZERO
7482  022232  104116                          ERROR   116              ;CANT RESET "SKI"
7483  022234  052703  000001                  BIS     #BIT0,R3         ;SET ERROR FLAG
7484  022240                          10$:
7485
7486                                  ;SET MAINTENANCE SEEK ERROR AND VERIFY THAT "SKI" CAN BE SET
7487
7488  022240  012760  000001  000024          MOV     #DMD,RMMR1(R0)   ;LOAD RMMR1
7489
7490  022246  012760  000000  000042          MOV     #0,RMER2(R0)     ;LOAD RMER2
7491
7492  022254  012760  000201  000024          MOV     #DMD!MSER,RMMR1(R0)      ;LOAD RMMR1
7493
7494  022262  016037  000042  001142          MOV     RMER2(R0),$BDDAT         ;STORE RMER2 AT $BDDAT
7495  022270  042737  137777  001142          BIC     #^CSKI,$BDDAT
7496  022276  001005                          BNE     20$              ;BRANCH IF SKI IS SET
7497  022300  012737  040000  001140          MOV     #SKI,$GDDAT      ;CANT SET SKI
7498  022306  052703  000002                  BIS     #BIT1,R3         ;SET ERROR FLAG
7499  022312                          20$:
7500
7501                                  ;IF NO PREVIOUS ERROR, CHECK FOR BIT INTERFERENCE SETTING MAINTENANCE
7502                                  ;SEEK ERROR.
7503  022312  005703                          TST     R3
7504  022314  001051                          BNE     70$              ;BRANCH IF ANY OTHER ERRORS
7505  022316  012702  000001                  MOV     #1,R2            ;INITIALIZE TEST PATTERN
7506  022322                          30$:
7507
7508  022322  012760  000001  000024          MOV     #DMD,RMMR1(R0)   ;LOAD RMMR1
7509
7510  022330  012760  000000  000042          MOV     #0,RMER2(R0)     ;LOAD RMER2
7511
7512  022336  010260  000024                  MOV     R2,RMMR1(R0)     ;LOAD RMMR1
7513
7514  022342  016037  000042  001142          MOV     RMER2(R0),$BDDAT         ;STORE RMER2 AT $BDDAT
7515  022350  042737  137777  001142          BIC     #^CSKI,$BDDAT    ;GET SKI STATUS
7516  022356  005037  001140                  CLR     $GDDAT           ;SETUP EXPECTED RESULT
```

```
7517  022362  032702  000200            BIT     #MSER,R2
7518  022366  001403                    BEQ     40$
7519  022370  052737  040000  001140    BIS     #SKI,$GDDAT     ;SKI SHOULD BE ON
7520  022376  023737  001140  001142 40$:  CMP   $GDDAT,$BDDAT
7521  022404  001403                    BEQ     50$             ;BRANCH IF SKI IS OK
7522  022406  010237  001174            MOV     R2,$TMP0        ;SAVE TEST PATTERN
7523  022412  104120                    ERROR   120             ;SKI SET BY WRONG BIT
7524  022414                        50$:
7525                                    :       ADVANCE TEST PATTERN IN R2
7526  022414  042702  000001            BIC     #DMD,R2         ;DONT SHIFT DMD BIT
7527  022420  001002                    BNE     60$
7528  022422  012702  000001            MOV     #DMD,R2         ;DONT TRUNCATE TEST
7529  022426  006302                60$:  ASL     R2              ;SHIFT TO NEXT BIT
7530  022430  001403                    BEQ     70$             ;EXIT IF DONE
7531  022432  052702  000001            BIS     #DMD,R2         ;KEEP DMD ON
7532  022436  000731                    BR      30$             ;CONTINUE TEST
7533
7534  022440                        70$:                        ;END OF TEST
7535
7536                                    ;;*****************************************************************
7537                                    ;$TEST 34       PIP TEST
7538
7539                                    ;;*****************************************************************
7540  022440  000004                $T34:  SCOPE
7541  022442  012737  000034  001226    MOV     #34,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7542
7543  022450  000240                    NOP
7544  022452  012737  000024  001120    MOV     #20.,$ICNT      ;20 ITERATIONS
7545  022460  112737  000001  001131    MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
7546  022466  012737  022502  001122    MOV     #T34,$LPADR  ;LOAD LOOP ON TEST ADDRESS
7547  022474  012737  022502  001124    MOV     #T34,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
7548  022502                        T34:
7549  022502  012706  001100            MOV     #STACK,SP       ;LOAD THE STACK POINTER
7550  022506  013700  001276            MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
7551  022512  013701  001456            MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
7552  022516  012760  000040  000010    MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7553  022524  111160  000010            MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7554  022530  005003                    CLR     R3              ;RESET ERROR FLAGS
7555  022532  010037  001136            MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7556  022536  062737  000012  001136    ADD     #RMDS,$BDADR
7557
7558                                ;SET MAINTENANCE ON CYLINDER "MOC" AND VERIFY THAT "PIP" CAN BE RESET.
7559
7560  022544  012760  000001  000024    MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7561
7562  022552  012760  000401  000024    MOV     #DMD!MOC,RMMR1(R0)      ;LOAD RMMR1
7563
7564  022560  016037  000012  001142    MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7565  022566  042737  157777  001142    BIC     #^CPIP,$BDDAT
7566  022574  001405                    BEQ     10$             ;BRANCH IF PIP IS RESET
7567  022576  005037  001140            CLR     $GDDAT
7568  022602  104121                    ERROR   121             ;CANT RESET PIP
7569  022604  052703  000001            BIS     #BIT0,R3        ;SET ERROR FLAG
7570  022610                        10$:
7571                                ;RESET MAINTENANCE ON CYLINDER AND VERIFY THAT "PIP" CAN BE SET
7572
```

```
7573  022610  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7574
7575  022616  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7576  022624  042737  157777  001142          BIC     #^CPIP,$BDDAT
7577  022632  001006                          BNE     20$             ;BRANCH IF PIP IS SET
7578  022634  012737  020000  001140          MOV     #PIP,$GDDAT
7579  022642  104122                          ERROR   122             ;CANT SET PIP
7580  022644  052703  000002                  BIS     #BIT1,R3        ;SET ERROR FLAG
7581  022650                          20$:
7582                                  ;IF NO PREVIOUS ERROR, TEST FOR ADJACENT BIT SETTING "MOC"
7583  022650  005703                          TST     R3
7584  022652  001046                          BNE     70$             ;BRANCH IF ANY PREVIOUS ERROR
7585  022654  012702  000001                  MOV     #1,R2           ;INITIALIZE TEST PATTERN
7586  022660                          30$:
7587                                  ;       WRITE THE TEST PATTERN, CHECK MOC USING PIP
7588
7589  022660  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7590
7591  022666  010260  000024                  MOV     R2,RMMR1(R0)    ;LOAD RMMR1
7592
7593  022672  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
7594  022700  042737  157777  001142          BIC     #^CPIP,$BDDAT   ;GET PIP STATUS
7595  022706  005037  001140                  CLR     $GDDAT          ;SETUP EXPECTED RESULT
7596  022712  032702  000400                  BIT     #MOC,R2
7597  022716  001003                          BNE     40$
7598  022720  052737  020000  001140          BIS     #PIP,$GDDAT     ;PIP SHOULD BE SET
7599  022726  023737  001140  001142  40$:    CMP     $GDDAT,$BDDAT
7600  022734  001403                          BEQ     50$             ;BRANCH IF PIP OK
7601  022736  010237  001174                  MOV     R2,$TMP0        ;SAVE TEST PATTERN
7602  022742  104123                          ERROR   123             ;MOC SET BY WRONG BIT
7603  022744                          50$:
7604                                  ;       ADVANCE THE TEST PATTERN
7605  022744  042702  000001                  BIC     #DMD,R2         ;DONT SHIFT DMD
7606  022750  001002                          BNE     60$
7607  022752  012702  000001                  MOV     #DMD,R2         ;DONT TRUNCATE TEST
7608  022756  006302                  60$:    ASL     R2              ;SHIFT BIT
7609  022760  001403                          BEQ     70$             ;EXIT IF DONE
7610  022762  052702  000001                  BIS     #DMD,R2         ;KEEP DMD ON
7611  022766  000734                          BR      30$             ;CONTINUE TEST
7612
7613  022770                          70$:                            ;END OF TEST
7614
7615                                  ;;**************************************************************
7616                                  ;*TEST 35        EBL TEST
7617
7618                                  ;;**************************************************************
7619  022770  000004                  T35:    SCOPE
7620  022772  012737  000035  001226          MOV     #35,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7621
7622  023000  000240                          NOP
7623  023002  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
7624  023010  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
7625  023016  012737  023032  001122          MOV     #T35,$LPADR     ;LOAD LOOP ON TEST ADDRESS
7626  023024  012737  023032  001124          MOV     #T35,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
7627  023032                          T35:
7628  023032  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
```

```
7629  023036  013700  001276            MOV     $BASE,R0          ;R0 = UNIBUS ADDRESS OF UUT
7630  023042  013701  001456            MOV     TSTQUE,R1         ;R1 = POINTER TO DEVICE
7631  023046  005003                     CLR     R3                ;RESET ERROR FLAGS
7632  023050  010037  001136            MOV     R0,$BDADR         ;SETUP REGISTER ADDRESS
7633  023054  062737  000024  001136    ADD     #RMMR1,$BDADR
7634  023062  005037  001140            CLR     $GDDAT            ;SETUP EXPECTED RESULT
7635                                ;CLEAR AND VERIFY THAT END OF BLOCK IS RESET
7636  023066  012760  000040  000010    MOV     #CLR,RMCS2(R0)    ;CLEAR THE MASSBUS
7637  023074  111160  000010            MOVB    (R1),RMCS2(R0)    ;SELECT UNIT
7638
7639  023100  016037  000024  001142    MOV     RMMR1(R0),$BDDAT          ;STORE RMMR1 AT $BDDAT
7640  023106  042737  157777  001142    BIC     #↑CEBL,$BDDAT
7641  023114  001403                     BEQ     10$               ;BRANCH IF EBL IS RESET
7642  023116  104124                     ERROR   124               ;CANT CLEAR EBL
7643  023120  052703  000001            BIS     #BIT0,R3          ;SET ERROR FLAG
7644  023124                          10$:
7645                                ;SET AND RESET DIAGNOSTIC END OF BLOCK, CHECK FOR EBL S-A-1.
7646
7647  023124  012760  000001  000024    MOV     #DMD,RMMR1(R0)    ;LOAD RMMR1
7648
7649  023132  012760  020001  000024    MOV     #DMD!DEBL,RMMR1(R0)       ;LOAD RMMR1
7650
7651  023140  012760  000001  000024    MOV     #DMD,RMMR1(R0)    ;LOAD RMMR1
7652
7653  023146  016037  000024  001142    MOV     RMMR1(R0),$BDDAT          ;STORE RMMR1 AT $BDDAT
7654  023154  042737  157777  001142    BIC     #↑CEBL,$BDDAT
7655  023162  001403                     BEQ     20$               ;BRANCH IF EBL IS RESET
7656  023164  104125                     ERROR   125               ;DEBL APPEARS S-A-1
7657  023166  052703  000001            BIS     #BIT0,R3          ;SET ERROR FLAG
7658  023172                          20$:
7659                                ;RESET AND SET DIAGNOSTIC END OF BLOCK, CHECK FOR EBL S-A-0
7660
7661  023172  012760  000001  000024    MOV     #DMD,RMMR1(R0)    ;LOAD RMMR1
7662
7663  023200  012760  020001  000024    MOV     #DMD!DEBL,RMMR1(R0)       ;LOAD RMMR1
7664
7665  023206  016037  000024  001142    MOV     RMMR1(R0),$BDDAT          ;STORE RMMR1 AT $BDDAT
7666  023214  042737  157777  001142    BIC     #↑CEBL,$BDDAT
7667  023222  001006                     BNE     30$               ;BRANCH IF EBL IS SET
7668  023224  012737  020000  001140    MOV     #EBL,$GDDAT
7669  023232  104126                     ERROR   126               ;CANT SET EBL
7670  023234  052703  000002            BIS     #BIT1,R3          ;SET ERROR FLAG
7671  023240                          30$:
7672                                ;IF NO PREVIOUS ERRORS, TEST FOR ADJACENT BIT INTERFERENCE ON "DEBL".
7673  023240  005703                     TST     R3
7674  023242  001042                     BNE     70$               ;BRANCH IF ANY ERROR
7675  023244  012702  000001            MOV     #1,R2             ;INITIALIZE TEST PATTERN
7676  023250                          40$:
7677                                ;       WRITE, READ AND VERIFY THE TEST PATTERN IN R2
7678
7679  023250  012760  000001  000024    MOV     #DMD,RMMR1(R0)    ;LOAD RMMR1
7680
7681  023256  010260  000024            MOV     R2,RMMR1(R0)      ;LOAD RMMR1
7682
7683  023262  016037  000024  001142    MOV     RMMR1(R0),$BDDAT          ;STORE RMMR1 AT $BDDAT
7684  023270  042737  157777  001142    BIC     #↑CEBL,$BDDAT
```

```
7685  023276  010203                        MOV     R2,R3           ;GENERATE EXPECTED RESULT
7686  023300  042703  157777                BIC     #^CEBL,R3
7687  023304  020337  001142                CMP     R3,$BDDAT
7688  023310  001405                        BEQ     50$             ;BRANCH IF EBL IS OK
7689  023312  010337  001140                MOV     R3,$GDDAT       ;SAVE EXPECTED RESULT
7690  023316  010237  001174                MOV     R2,$TMPD        ;SAVE TEST PATTERN
7691  023322  104127                        ERROR   127             ;DEBL SET(RESET) BY WRONG BIT
7692  023324                          50$:
7693                                  ;       SHIFT TO NEXT BIT POSITION
7694  023324  042702  000001                BIC     #DMD,R2         ;DONT SHIFT DMD
7695  023330  001002                        BNE     60$
7696  023332  012702  000001                MOV     #DMD,R2         ;DONT TRUNCATE DMD
7697  023336  006302                  60$:  ASL     R2              ;SHIFT TO NEXT BIT
7698  023340  001403                        BEQ     70$             ;EXIT IF DONE
7699  023342  052702  000001                BIS     #DMD,R2         ;KEEP DMD ON
7700  023346  000740                        BR      40$             ;CONTINUE TEST
7701
7702  023350                          70$:                            ;END OF TEST
7703
7704                                  ;;*****************************************************************
7705                                  ;*TEST 36       LAST SECTOR, LAST TRACK TEST
7706
7707                                  ;;*****************************************************************
7708  023350  000004                  T$T36:  SCOPE
7709  023352  012737  000036  001226          MOV     #36,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7710  023360  000240                          NOP
7711  023362  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
7712  023370  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
7713  023376  012737  023412  001122          MOV     #T36,$LPADR  ;LOAD LOOP ON TEST ADDRESS
7714  023404  012737  023412  001124          MOV     #T36,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
7715  023412                          T36:
7716  023412  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
7717  023416  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
7718  023422  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
7719  023426  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7720  023434  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7721  023440  005002                          CLR     R2              ;INITIALIZE TEST PATTERN
7722  023442  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
7723  023446  062737  000024  001136          ADD     #RMMR1,$BDADR
7724  023454  005037  001434                  CLR     RMOF0           ;START IN 18 BIT MODE
7725  023460                          10$:
7726                                  ;TRANSFER TEST PATTERN TO RMDA THEN VERIFY LAST SECTOR "LS" AND LAST
7727                                  ;SECTOR/TRACK "LST" FOR EACH TRANSFER. THE TABLE BELOW LISTS THE VALUE
7728                                  ;OF RMDA FOR WHICH LS AND LST ARE SET.
7729                                  ;
7730                                  ;       18 BIT MODE     16 BIT MODE
7731                                  ;LS=    XXX035          XXX037
7732                                  ;
7733                                  ;LST=   002035          002037
7734
7735
7736  023460  013760  001434  000032          MOV     RMOF0,RMOF(R0)  ;LOAD RMOF
7737
7738  023466  010260  000006                  MOV     R2,RMDA(R0)     ;LOAD RMDA
7739
7740  023472  016037  000024  001352          MOV     RMMR1(R0),RMMR11        ;STORE RMMR1 IN INPUT BUFFER
```

```
7741  023500  013737  001352  001142          MOV     RMMR1I,$BDDAT   ;VERIFY "LS"
7742  023506  042737  177773  001142          BIC     #↑CLS,$BDDAT
7743  023514  005037  001140                  CLR     $GDDAT          ;GENERATE EXPECTED "LS"
7744  023520  032737  010000  001434          BIT     #FMT16,RMOFO    ;16 BIT MODE??
7745  023526  001007                          BNE     20$             ;YES!!
7746  023530  122702  000035                  CMPB    #035,R2
7747  023534  001012                          BNE     30$
7748  023536  052737  000004  001140          BIS     #LS,$GDDAT      ;LS SHOULD BE ON-18 BIT MODE
7749  023544  000406                          BR      30$
7750  023546  122702  000037          20$:    CMPB    #037,R2
7751  023552  001003                          BNE     30$
7752  023554  052737  000004  001140          BIS     #LS,$GDDAT      ;LS SHOULD BE ON-16 BIT MODE
7753  023562  023737  001140  001142  30$:    CMP     $GDDAT,$BDDAT
7754  023570  001407                          BEQ     40$             ;BRANCH IF LS IS CORRECT
7755  023572  010237  001174                  MOV     R2,$TMP0        ;SAVE TEST PATTERN
7756  023576  013737  001434  001176          MOV     RMOFO,$TMP1     ;SAVE OFFSET REGISTER FOR ERROR
7757  023604  104130                          ERROR   130             ;LS NOT CORRECT FOR RMDA
7758  023606  000453                          BR      80$             ;SKIP TO NEXT
7759  023610  013737  001352  001142  40$:    MOV     RMMR1I,$BDDAT   ;VERIFY "LST"
7760  023616  042737  177775  001142          BIC     #↑CLST,$BDDAT
7761  023624  005037  001140                  CLR     $GDDAT          ;GENERATE EXPECTED "LST"
7762  023630  032737  010000  001434          BIT     #FMT16,RMOFO    ;16 BIT MODE??
7763  023636  001007                          BNE     50$             ;YES!!
7764  023640  022702  002035                  CMP     #002035,R2
7765  023644  001012                          BNE     60$
7766  023646  052737  000002  001140          BIS     #LST,$GDDAT     ;LST SHOULD BE ON-18 BIT MODE
7767  023654  000406                          BR      60$
7768  023656  022702  002037          50$:    CMP     #002037,R2
7769  023662  001003                          BNE     60$
7770  023664  052737  000002  001140          BIS     #LST,$GDDAT     ;LST SHOULD BE ON-16 BIT MODE
7771  023672  023737  001140  001142  60$:    CMP     $GDDAT,$BDDAT
7772  023700  001404                          BEQ     70$
7773  023702  010237  001174                  MOV     R2,$TMP0        ;SAVE TEST PATTERN
7774  023706  104131                          ERROR   131             ;LST NOT CORRECT FOR RMDA
7775  023710  000412                          BR      80$             ;SKIP TO NEXT
7776
7777  023712                          70$:
7778                                  ;       ADVANCE TO NEXT TEST PATTERN, CHANGE TO 16 BIT MODE IF ALL
7779                                  ;18 BIT TESTS DONE.
7780  023712  005202                          INC     R2              ;INCREMENT PATTERN
7781  023714  001261                          BNE     10$             ;CONTINUE IF NOT DONE
7782  023716  032737  010000  001434          BIT     #FMT16,RMOFO    ;DONE 16 BIT TOO??
7783  023724  001004                          BNE     80$             ;YES!!
7784  023726  012737  010000  001434          MOV     #FMT16,RMOFO    ;DO 16 BIT FORMAT TEST
7785  023734  000651                          BR      10$
7786
7787  023736                          80$:                            ;END OF TEST
7788
7789                                  ;;*****************************************************************
7790                                  ;*TEST 37       RMDA COUNT TEST
7791
7792                                  ;;*****************************************************************
7793  023736  000004                  ↑ST37:  SCOPE
7794  023740  012737  000037  001226          MOV     #37,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
7795
7796  023746  000240                          NOP
```

```
 7797  023750  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
 7798  023756  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
 7799  023764  012737  024000  001122          MOV     #T37,$LPADR  ;LOAD LOOP ON TEST ADDRESS
 7800  023772  012737  024000  001124          MOV     #T37,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
 7801  024000                              T37:
 7802  024000  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 7803  024004  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 7804  024010  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 7805  024014  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
 7806  024020  062737  000006  001136          ADD     #RMDA,$BDADR
 7807  024026  005037  001434                  CLR     RMOFO           ;START WITH 18 BIT FORMAT
 7808  024032  012737  000035  024454          MOV     #035,110$       ;SETUP LAST SECTOR FOR 18 BIT
 7809  024040  012737  000001  001140          MOV     #1,$GDDAT       ;SETUP FIRST COUNT
 7810                              ;;*************************************************************
```

```
7811                    ;INCREMENT SECTOR COUNT USING DIAGNOSTIC END OF BLOCK STARTING AT
7812                    ;SECTOR 0 AND CONTINUING UNTIL TRACK ADDRESS INCREMENTS
```

```
7813  024046                          10$:
7814                                  ;       .CLEAR THE MASSBUS
7815                                  ;       .SET FORMAT
7816                                  ;       .LOAD SECTOR AND TRACK ADDRESS
7817                                  ;       .ENABLE DEBUG CLOCK
7818                                  ;       .SET GO BIT
7819  024046  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7820  024054  111160  000010                 MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7821
7822  024060  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7823
7824  024066  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
7825
7826  024074  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
7827
7828  024102  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
7829
7830  024110  013760  001434  000032          MOV     RMOF0,RMOF(R0)  ;LOAD RMOF
7831  024116  013737  001434  001174          MOV     RMOF0,$TMP0     ;SAVE OFFSET FOR ERROR TYPE
7832
7833  024124  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
7834
7835  024132  012760  000001  000000          MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
```

```
7836  024140                                  25$:
7837
7838                                          ;       SET AND RESET EBL TO INCREMENT RMDA THEN VERIFY RMDA.
7839
7840  024140  012760  060001  000024                  MOV     #DMD!DBEN!DEBL,RMMR1(R0)        ;LOAD RMMR1
7841
7842  024146  012760  040001  000024                  MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
7843
7844  024154  016037  000006  001142                  MOV     RMDA(R0),$BDDAT ;STORE RMDA AT $BDDAT
7845  024162  023737  001142  001140                  CMP     $BDDAT,$GDDAT
7846  024170  001402                                  BEQ     30$             ;BRANCH IF RMDA OK
7847  024172  104132                                  ERROR   132             ;SECTOR COUNT NOT INCREMENTING
7848  024174  000416                                  BR      50$             ;OUT OF SYNC-SKIP TO NEXT
7849  024176                                  30$:
7850                                          ;       ADVANCE EXPECTED SECTOR COUNT AND CONTINUE IF ONE CYCLE NOT
7851                                          ;COMPLETE
7852  024176  005237  001140                          INC     $GDDAT          ;INCREMENT EXPECTED SECTOR
7853  024202  123737  001142  024454                  CMPB    $BDDAT,110$     ;WAS THE LAST SECTOR JUST COUNTED??
7854  024210  001004                                  BNE     40$             ;NO!!
7855  024212  105037  001140                          CLRB    $GDDAT          ;YES-NEXT SECTOR SHOULD BE ZERO
7856  024216  105237  001141                          INCB    $GDDAT+1        ;INCREMENT TRACK ADDRESS
7857  024222  105737  001142                  40$:    TSTB    $BDDAT          ;HAS A FULL CYCLE BEEN COUNTED??
7858  024226  001401                                  BEQ     50$             ;YES-DO NEXT
7859  024230  000743                                  BR      25$             ;CONTINUE SECTOR TEST
7860
7861  024232                                  50$:
7862                                          ;*****************************************************************
7863                                          ;INCREMENT TRACK COUNT USING DIAGNOSTIC END OF BLOCK.  START AT TRACK 0.
7864                                          ;LAST SECTOR AND COUNT ONE COMPLETE TRACK CYCLE.
7865  024232  013737  024454  001410                  MOV     110$,RMDA0      ;STARTING TRACK ADDRESS
7866  024240  012737  000400  001140                  MOV     #000400,$GDDAT  ;FIRST VALUE AFTER INCREMENT
7867
7868  024246                                  60$:
7869
7870                                          ;       .CLEAR THE MASSBUS
7871                                          ;       .SET FORMAT
7872                                          ;       .LOAD LAST SECTOR ADDRESS AND TEST TRACK ADDRESS
7873                                          ;       .ENABLE DEBUG CLOCK
7874                                          ;       .SET GO BIT
7875
7876  024246  012760  000040  000010                  MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
7877  024254  111160  000010                          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
7878
7879  024260  013760  001434  000032                  MOV     RMOF0,RMOF(R0)  ;LOAD RMOF
7880
7881  024266  013760  001410  000006                  MOV     RMDA0,RMDA(R0)  ;LOAD RMDA
7882
7883  024274  012760  000001  000024                  MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
7884
7885  024302  012760  040001  000024                  MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
7886
7887  024310  012760  000001  000000                  MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
7888                                          ;CLOCK RMDA USING DIAGNOSTIC END OF BLOCK
7889
7890  024316  012760  060001  000024                  MOV     #DMD!DBEN!DEBL,RMMR1(R0)        ;LOAD RMMR1
7891
```

```
7892  024324  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
7893                                    ;       VERIFY RMDA ACCORDING TO $GDDAT
7894
7895  024332  016037  000006  001142          MOV     RMDA(R0),$BDDAT ;STORE RMDA AT $BDDAT
7896  024340  023737  001140  001142          CMP     $GDDAT,$BDDAT
7897  024346  001402                          BEQ     70$
7898  024350  104133                          ERROR   133             ;TRACK COUNT NOT INCREMENTING
7899  024352  000420                          BR      90$             ;OUT OF SYNC-SKIP TO NEXT
7900  024354                          70$:
7901                                    ;       SETUP FOR NEXT INCREMENT OF RMDA TRACK ADDRESS
7902  024354  105237  001141                  INCB    $GDDAT+1        ;ADVANCE EXPECTED TRACK
7903  024360  123727  001143  000004          CMPB    $BDDAT+1,#4     ;WAS THE LAST TRACK JUST COUNTED??
7904  024366  001002                          BNE     80$             ;NO!!
7905  024370  005037  001140                  CLR     $GDDAT          ;YES-NEXT TRACK, SECTOR SHOULD BE ZERO
7906  024374  013737  001142  001410  80$:    MOV     $BDDAT,RMDA0    ;HAS A FULL CYCLE BEEN COUNTED??
7907  024402  001404                          BEQ     90$             ;YES!!
7908  024404  113737  024454  001410          MOVB    110$,RMDA0      ;INCREMENT FROM LAST SECTOR
7909  024412  000715                          BR      60$
7910  024414                          90$:
7911                                    ;;*****************************************************************
7912                                    ;REPEAT THE TEST IN 16 BIT FORAT
7913  024414  032737  010000  001434          BIT     #FMT16,RMOF0    ;DONE BOTH FORMATS??
7914  024422  001013                          BNE     100$            ;YES!!
7915  024424  012737  010000  001434          MOV     #FMT16,RMOF0    ;SET FORMAT BIT FOR 16
7916  024432  012737  000037  024454          MOV     #037,110$       ;SET LAST SECTOR FOR 16
7917  024440  012737  000001  001140          MOV     #1,$GDDAT       ;SET FIRST COUNT VALUE
7918  024446  000137  024046                  JMP     10$             ;REPEAT TEST
7919
7920  024452  000401                  100$:   BR      120$
7921
7922  024454  000000                  110$:   .WORD                   ;STORAGE FOR LAST SECTOR VALUE
7923
7924  024456                          120$:                           ;END OF TEST
```

```
                                        ;;*****************************************************************
                                        ;*TEST 40        RMDC COUNT TEST
                                        ;;*****************************************************************
024456  000004                  T$T40:  SCOPE
024460  012737  000040  001226          MOV     #40,$TESTN          ;;SET TEST NUMBER IN APT MAIL BOX
024466  000240                          NOP
024470  012737  000024  001120          MOV     #20.,$ICNT          ;20 ITERATIONS
024476  112737  000001  001131          MOVB    #1,$ERMAX           ;ONE ERROR ALLOWED
024504  012737  024520  001122          MOV     #T40,$LPADR  ;LOAD LOOP ON TEST ADDRESS
024512  012737  024520  001124          MOV     #T40,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
024520                          T40:
024520  012706  001100                  MOV     #STACK,SP           ;LOAD THE STACK POINTER
024524  013700  001276                  MOV     $BASE,R0            ;R0 = UNIBUS ADDRESS OF UUT
024530  013701  001456                  MOV     T$TQUE,R1           ;R1 = POINTER TO DEVICE
024534  012760  000040  000010          MOV     #CLR,RMCS2(R0)      ;CLEAR THE MASSBUS
024542  111160  000010                  MOVB    (R1),RMCS2(R0)      ;SELECT UNIT
                                        ;CLEAR RMDC, SET FORMAT AND SETUP PROGRAM PARAMETERS
024546  012037  001136                  MOV     R0,$BDAOR           ;SETUP REGISTER ADDRESS
024552  062737  000034  001136          ADD     #RMDC,$BDAOR
024560  005037  001434                  CLR     RMOF0               ;START WITH 18 BIT FORMAT
024564  012737  002035  001410          MOV     #002035,RMDA0       ;LOAD LAST SECTOR/TRACK VALUE
024572  012737  000001  001140  10$:     MOV     #1,$GDDAT           ;LOAD FIRST INCREMENTAL VALUE

024600  012760  000000  000034          MOV     #0,RMDC(R0)         ;LOAD RMDC

024606  013760  001434  000032          MOV     RMOF0,RMOF(R0)      ;LOAD RMOF
024614  013737  001434  001174          MOV     RMOF0,$TMP0         ;SAVE FOR ERROR MSG
024622                          20$:
                                        ;       .CLEAR THE MASSBUS
                                        ;       .SET OFFSET
                                        ;       .LOAD LAST SECTOR AND TRACK ADDRESS
                                        ;       .ENABLE DEBUG CLOCK
                                        ;       .SET GO BIT

024622  012760  000040  000010          MOV     #CLR,RMCS2(R0)      ;CLEAR THE MASSBUS
024630  111160  000010                  MOVB    (R1),RMCS2(R0)      ;SELECT UNIT

024634  013760  001434  000032          MOV     RMOF0,RMOF(R0)      ;LOAD RMOF

024642  013760  001410  000006          MOV     RMDA0,RMDA(R0)      ;LOAD RMDA

024650  012760  000001  000024          MOV     #DMD,RMMR1(R0)      ;LOAD RMMR1

024656  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1

024664  012760  000001  000000          MOV     #GO,RMCS1(R0)       ;LOAD RMCS1
                                ;CLOCK THE CYLINDER ADDRESS USING DEBL

024672  012760  060001  000024          MOV     #DMD!DBEN!DEBL,RMMR1(R0)        ;LOAD RMMR1

024700  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
```

```
7981
7982  024706  016037  000034  001142          MOV     RMDC(R0),$BDDAT ;STORE RMDC AT $BDDAT
7983  024714  023737  001140  001142          CMP     $GDDAT,$BDDAT
7984  024722  001402                          BEQ     30$             ;BRANCH IF RMDC=RMDC+1
7985  024724  104140                          ERROR   140             ;CANT INCREMENT RMDC
7986  024726  000427                          BR      60$             ;OUT OF SYNC-SKIP TO END
7987  024730                          30$:
7988                                  ;ADVANCE EXPECTED RESULT FOR NEXT INCREMENT
7989  024730  005237  001140                  INC     $GDDAT          ;ADVANCE NEXT RESULT
7990  024734  022737  002000  001140          CMP     #1777+1,$GDDAT  ;SHOULD NEXT VALUE BE ZERO??
7991  024742  001002                          BNE     40$             ;NO!!
7992  024744  005037  001140                  CLR     $GDDAT          ;YES-RMDC SHOULD OVERFLOW
7993  024750  005737  001142          40$:    TST     $BDDAT          ;IS ONE CYCLE COMPLETE??
7994  024754  001401                          BEQ     50$             ;YES!!
7995  024756  000721                          BR      20$             ;CONTINUE
7996  024760                          50$:
7997                                  ;REPEAT TEST IN 16 BIT MODE-ELSE DONE
7998  024760  032737  010000  001434          BIT     #FMT16,RMOF0    ;DONE BOTH MODES??
7999  024766  001007                          BNE     60$             ;YES!!
8000  024770  012737  010000  001434          MOV     #FMT16,RMOF0    ;SET 16 BIT FORMAT
8001  024776  012737  002037  001410          MOV     #002037,RMDA0   ;LOAD LAST SECTOR/TRACK VALUE
8002  025004  000672                          BR      10$             ;REPEAT TEST
8003
8004  025006                          60$:                            ;END OF TEST
8005
8006                                  ;;*****************************************************************
8007                                  ;*TEST 41        LBT TEST
8008
8009                                  ;;*****************************************************************
8010  025006  000004                  T$T41:  SCOPE
8011  025010  012737  000041  001226          MOV     #41,$TESTN      ;;SET TEST NUMBER IN AP- MAIL BOX
8012
8013  025016  000240                          NOP
8014  025020  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
8015  025026  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8016  025034  012737  025050  001122          MOV     #T41,$LPADR  ;LOAD LOOP ON TEST ADDRESS
8017  025042  012737  025050  001124          MOV     #T41,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
8018  025050                          T41:
8019  025050  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
8020  025054  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8021  025060  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8022  025064  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
8023  025070  062737  000012  001136          ADD     #RMOS,$BDADR
8024                                  ;       CLEAR THE MASSBUS
8025                                  ;       SET FORMAT
8026                                  ;       LOAD LAST TRACK AND SECTOR
8027                                  ;       LOAD LAST CYLINDER
8028
8029                                  ;       VERIFY THAT "LBT" IS RESET
8030  025076  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8031  025104  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8032
8033  025110  012760  000000  000032          MOV     #0,RMOF(R0)     ;LOAD RMOF
8034
8035  025116  012760  002035  000006          MOV     #002035,RMDA(R0)        ;LOAD RMDA
8036
```

```
8037  025124  012760  001466  000034          MOV     #822.,RMDC(R0)  ;LOAD RMDC
8038
8039  025132  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8040  025140  042737  175777  001142          BIC     #↑CLBT,$BDDAT
8041  025146  001403                          BEQ     10$             ;BRANCH IF LBT IS RESET
8042  025150  005037  001140                  CLR     $GDDAT          ;LBT SHOULD BE ZERO
8043  025154  104141                          ERROR   141             ;CANNOT RESET "LBT"
8044
8045  025156                          10$:
8046                                  ;       ENABLE DEBUG CLOCK
8047                                  ;       SET GO
8048                                  ;       FORCE EBL
8049
8050                                  ;       VERIFY THAT LBT IS SET
8051
8052  025156  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8053
8054  025164  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
8055
8056  025172  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
8057
8058  025200  012760  000001  000000          MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
8059
8060  025206  012760  060001  000024          MOV     #DMD!DBEN!DEBL,RMMR1(R0)        ;LOAD RMMR1
8061
8062  025214  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
8063
8064  025222  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8065  025230  042737  175777  001142          BIC     #↑CLBT,$BDDAT
8066  025236  001004                          BNE     20$             ;BRANCH IF LBT IS SET
8067  025240  012737  002000  001140          MOV     #LBT,$GDDAT
8068  025246  104142                          ERROR   142             ;CANT SET LBT
8069
8070  025250                          20$:                            ;END OF TEST
8071
8072                                  ;;**********************************************************************
8073                                  ;*TEST 42        COMPOSITE ERROR TEST
8074
8075                                  ;;**********************************************************************
8076  025250  000004                  T$T42:  SCOPE
8077  025252  012737  000042  001226          MOV     #42,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
8078
8079  025260  000240                          NOP
8080  025262  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
8081  025270  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8082  025276  012737  025312  001122          MOV     #T42,$LPADR     ;LOAD LOOP ON TEST ADDRESS
8083  025304  012737  025312  001124          MOV     #T42,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
8084  025312                          T42:
8085  025312  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
8086  025316  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8087  025322  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8088  025326  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8089  025334  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8090  025340  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
8091  025344  062737  000012  001136          ADD     #RMDS,$BDADR
8092                                  ;USING DIAGNOSTIC MODE, CLEAR ALL ERRORS AND VERIFY THAT COMPOSITE
```

```
8093                                        ;ERROR IS RESET.
8094
8095  025352  012760  000001  000024        MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8096
8097  025360  012760  000000  000014        MOV     #0,RMER1(R0)    ;LOAD RMER1
8098
8099  025366  012760  000000  000042        MOV     #0,RMER2(R0)    ;LOAD RMER2
8100
8101  025374  016037  000012  001142        MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8102  025402  042737  137777  001142        BIC     #^CERR,$BDDAT
8103  025410  001403                        BEQ     10$             ;BRANCH IF ERR IS RESET
8104  025412  005037  001140                CLR     $GDDAT
8105  025416  104143                        ERROR   143             ;CANT READ ZERO FROM ERR
8106  025420  012737  040000  001140  10$:  MOV     #ERR,$GDDAT
8107                                        ;SET BOTH ERROR REGISTERS AND VERIFY THAT COMPOSITE ERROR IS SET
8108
8109  025426  012760  177777  000014        MOV     #-1,RMER1(R0)   ;LOAD RMER1
8110
8111  025434  012760  177777  000042        MOV     #-1,RMER2(R0)   ;LOAD RMER2
8112
8113  025442  016037  000012  001142        MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8114  025450  042737  137777  001142        BIC     #^CERR,$BDDAT
8115  025456  001001                        BNE     20$             ;BRANCH IF ERR IS SET
8116  025460  104144                        ERROR   144             ;CANT SET ERR
8117  025462                              20$:
8118                                        ;VERIFY THAT COMPOSITE ERROR SETS FOR EACH BIT OF RMER1
8119  025462  012702  000001                MOV     #1,R2           ;INITIALIZE TEST PATTERN
8120  025466                              30$:
8121                                        ;       WRITE THE TEST PATTERN AND VERIFY THAT ERR IS SET
8122  025466  012760  000040  000010        MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8123  025474  111160  000010                MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8124
8125  025500  012760  000001  000024        MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8126
8127  025506  012760  000000  000014        MOV     #0,RMER1(R0)    ;LOAD RMER1
8128
8129  025514  012760  000000  000042        MOV     #0,RMER2(R0)    ;LOAD RMER2
8130
8131  025522  010260  000014                MOV     R2,RMER1(R0)    ;LOAD RMER1
8132
8133  025526  016037  000012  001142        MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8134  025534  042737  137777  001142        BIC     #^CERR,$BDDAT
8135  025542  001005                        BNE     40$             ;BRANCH IF COMPOSITE ERROR SET
8136  025544  010237  001174                MOV     R2,$TMP0        ;SAVE RMER1 TEST PATTERN
8137  025550  005037  001176                CLR     $TMP1           ;SAVE RMER2 TEST PATTERN
8138  025554  104145                        ERROR   145             ;ERR NOT SET BY RMER1 ERROR
8139  025556                              40$:
8140                                        ;       ADVANCE THE TEST PATTERN FOR RMER1
8141  025556  006302                        ASL     R2
8142  025560  001342                        BNE     30$             ;CONTINUE IF TEST NOT DONE
8143  025562                              50$:
8144                                        ;VERIFY THAT COMPOSITE ERROR SETS FOR EACH BIT OF RMER2
8145  025562  012702  000001                MOV     #1,R2           ;INITIALIZE TEST PATTERN
8146  025566                              60$:
8147                                        ;       WRITE THE TEST PATTERN AND VERIFY THAT ERR IS SET
8148  025566  012760  000040  000010        MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
```

```
8149  025574  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8150
8151  025600  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8152
8153  025606  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
8154
8155  025614  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
8156
8157  025622  010260  000042                  MOV     R2,RMER2(R0)    ;LOAD RMER2
8158
8159  025626  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8160  025634  042737  137777  001142          BIC     #^tCERR,$BDDAT
8161  025642  012737  040000  001140          MOV     #ERR,$GDDAT     ;SETUP EXPECTED VALUE FOR COMP ERROR
8162  025650  032702  001567                  BIT     #XNUER2,R2
8163  025654  001402                          BEQ     65$             ;BRANCH IF TEST BIT IS A USED BIT
8164  025656  005037  001140                  CLR     $GDDAT          ;TEST BIT IS NOT USED - ERR SHOULD BE 0
8165  025662  023737  001140  001142  65$:    CMP     $GDDAT,$BDDAT
8166  025670  001405                          BEQ     70$             ;BRANCH IF COMP ERROR IS OK
8167  025672  005037  001174                  CLR     $TMP0           ;SAVE RMER1 TEST PATTERN
8168  025676  010237  001176                  MOV     R2,$TMP1        ;SAVE RMER2 TEST PATTERN
8169  025702  104145                          ERROR   145             ;ERR NOT SET BY RMER2 ERROR
8170  025704                          70$:
8171                                  ;       ADVANCE THE TEST PATTERN FOR RMER2
8172  025704  006302                          ASL     R2
8173  025706  001327                          BNE     60$             ;CONTINUE IF TEST NOT DONE
8174
8175  025710                          80$:                            ;END OF TEST
8176
8177                                  ;;**************************************************************
8178                                  ;*TEST 43        WRITE GO TEST
8179
8180                                  ;;**************************************************************
8181  025710  000004                  T$T43:  SCOPE
8182  025712  012737  000043  001226          MOV     #43,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
8183
8184  025720  000240                          NOP
8185  025722  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
8186  025730  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8187  025736  012737  025752  001122          MOV     #T43,$LPADR     ;LOAD LOOP ON TEST ADDRESS
8188  025744  012737  025752  001124          MOV     #T43,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
8189  025752                          T43:
8190  025752  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
8191  025756  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8192  025762  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8193  025766  010037  001136                  MOV     R0,$BDADR       ;COPY RMCS1 ADDRESS
8194  025772  005002                          CLR     R2              ;INITIALIZE FUNCTION CODE
8195  025774                          10$:
8196
8197                                  ;CLEAR THE MASSBUS, SET DIAGNOSTIC MODE AND ENABLE DEBUG CLOCK
8198  025774  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8199  026002  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8200
8201  026006  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8202
8203  026014  012760  041001  000024          MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
8204
```

```
8205  026022  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
8206
8207  026030  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
8208
8209  026036  010203                  ;TRANSFER THE FUNCTION CODE AND GO BIT TO RMCS1, VERIFY GO IS SET
8210  026040  052703  000001                  MOV     R2,R3           ;SETUP FUNCTION CODE
8211                                          BIS     #GO,R3
8212  026044  010360  000000                  MOV     R3,RMCS1(R0)    ;LOAD RMCS1
8213
8214  026050  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
8215  026056  032737  000001  001142          BIT     #GO,$BDDAT
8216  026064  001007                          BNE     20$             ;BRANCH IF GO IS SET
8217                                  ;REPORT THE ERROR-CANT SET GO WITH THIS FUNCTION CODE
8218  026066  042737  177700  001142          BIC     #^CFNCMSK,$BDDAT
8219  026074  010337  001140                  MOV     R3,$GDDAT       ;SAVE FUNCTION CODE
8220  026100  104146                          ERROR   146             ;CANT SET GO
8221  026102  000405                          BR      30$
8222  026104                          20$:
8223                                  ;ADVANCE R2 TO THE NEXT FUNCTION CODE
8224  026104  062702  000002                  ADD     #2,R2
8225  026110  022702  000076                  CMP     #ILF76,R2
8226  026114  10332~                          BHIS    10$
8227
8228  026116                          30$:                            ;END OF TEST
8229
8230                                  ;;*******************************************************************
8231                                  ;*TEST 44        BRANCH MULTIPLEXOR TEST
8232
8233                                  ;;*******************************************************************
8234  026116  000004                  T$T44.  SCOPE
8235  026120  012737  000044  001226          MOV     #44,$TESTN      ;,SET TEST NUMBER IN APT MAIL BOX
8236
8237  026126  000240                          NOP
8238  026130  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
8239  026136  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8240  026144  012737  026160  001122          MOV     #T44,$LPADR  ,LOAD LOOP ON TEST ADDRESS
8241  026152  012737  026160  001124          MOV     #T44,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
8242  026160                          T44:
8243  026160  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
8244  026164  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8245  026170  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8246  026174  010037  001136                  MOV     R0,$BDADR       ;COPY REGISTER ADDRESS
8247  026200  062737  000040  001136          ADD     #RMMR2,$BDADR
8248  026206  012702  026440                  MOV     #100$,R2        ;INITIALIZE TABLE POINTER
8249                                  ;CLEAR THE MASSBUS AND SET DEBUG CLOCK ENABLE
8250  026212                          10$:
8251  026212  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8252  026220  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8253
8254  026224  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8255
8256  026232  012760  041001  000024          MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
8257
8258  026240  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
8259
8260  026246  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
```

```
8261                                    ;THE TEST BIT SHOULD BE ONE BECAUSE THE ADDRESS IS ALL ONES WHEN
8262                                    ;THE COMMAND SEQUENCER IS INITIALIZED.
8263
8264  026254  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
8265  026262  032737  010000  001142          BIT     #TST,$BDDAT
8266  026270  001010                          BNE     15$                     ;BRANCH IF TEST BIT IS ON
8267  026272  042737  167777  001142          BIC     #^CTST,$BDDAT           ;SETUP FOR ERROR TYPE
8268  026300  012737  010000  001140          MOV     #TST,$GDDAT
8269  026306  104147                          ERROR   147                     ;TEST BIT NOT SET
8270  026310  000452                          BR      40$                     ;SKIP REST OF TEST
8271  026312                          15$:
8272                                    ;GET THE FUNCTION CODE FROM THE TABLE AND TRANSFER IT TO THE DEVICE,
8273                                    ;THEN STEP THE COMMAND SEQUENCER ACCORDING TO THE TABLE.
8274
8275  026312  111203                          MOVB    (R2),R3
8276  026314  052703  000001                 BIS     #GO,R3
8277  026320  042703  177700                 BIC     #^CFNCMSK,R3            ;R3=FUNCTION CODE, GO BIT
8278
8279  026324  010360  000000                 MOV     R3,RMCS1(R0)            ;LOAD RMCS1
8280  026330  010337  001174                 MOV     R3,$TMP0                ;SAVE R3 FOR ERROR MSG
8281
8282  026334  116203  000001                 MOVB    1(R2),R3                ;GET CLOCK COUNT IN R3
8283  026340  042703  177400                 BIC     #^C377,R3
8284  026344                          20$:
8285
8286  026344  012760  141001  000024          MOV     #DMD!DBEN!MUR!DBCK,RMMR1(R0)    ;LOAD RMMR1
8287
8288  026352  012760  041001  000024          MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
8289  026360  005303                          DEC     R3                      ;DECREMENT CLOCK COUNT
8290  026362  001370                          BNE     20$                     ;ISSUE CLOCKS TILL ZERO
8291
8292                                    ;GET THE TEST BIT AND COMPARE IT WITH THE TABLE ENTRY
8293
8294  026364  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $DDDAT
8295  026372  042737  167777  001142          BIC     #^CTST,$BDDAT
8296  026400  016237  000002  001140          MOV     2(R2),$GDDAT
8297  026406  023737  001140  001142          CMP     $GDDAT,$BDDAT
8298  026414  001402                          BEQ     30$                     ;BRANCH IF TEST BIT OK
8299  026416  104150                          ERROR   150                     ;TEST BIT IS INCORRECT
8300  026420  000406                          BR      40$                     ;SKIP REST OF TEST
8301  026422                          30$:
8302                                    ;MOVE THE TABLE POINTER AND CONTINUE IF NEXT ENTRY POSITIVE
8303  026422  062702  000004                 ADD     #4,R2
8304  026426  105762  000001                 TSTB    1(R2)
8305  026432  100401                          BMI     40$                     ;BRANCH IF DONE TEST
8306  026434  000666                          BR      10$                     ;REPEAT TEST
8307  026436  000436                  40$:    BR      200$                    ;JUMP OVER TABLE
8308
8309  026440                          10U$:
8310
8311                                    ;TABLE OF FUNCTION CODES, CLOCK COUNTS, AND TEST BITS
9312
8313  026440     000                          .BYTE   NOP                     ;MUX ADDRESS=DATA COMMAND
8314  026441     001                          .BYTE   1
8315  026442  000000                          .WORD   0                       ;TEST BIT=0
8316
```

```
8317  026444     000                    .BYTE   NOP             ;MUX ADDRESS=UNIT READY
8318  026445     002                    .BYTE   2
8319  026446  000000                    .WORD   0               ;TEST BIT=0
8320
8321  026450     010                    .BYTE   DRVCLR          ;MUX ADDRESS=F4
8322  026451     001                    .BYTE   1
8323  026452  010000                    .WORD   TST             ;TEST BIT=1
8324
8325  026454     050                    .BYTE   WCD             ;MUX ADDRESS=F4
8326  026455     001                    .BYTE   1
8327  026456  000000                    .WORD   0               ;TEST BIT=0
8328
8329  026460     012                    .BYTE   RLEASE          ;MUX ADDRESS=F4
8330  026461     001                    .BYTE   1
8331  026462  010000                    .WORD   TST             ;TEST BIT=1
8332
8333  026464     052                    .BYTE   WCH             ;MUX ADDRESS=F4
8334  026465     001                    .BYTE   1
8335  026466  000000                    .WORD   0               ;TEST BIT=0
8336
8337  026470     020                    .BYTE   RIP             ;MUX ADDRESS=F4
8338  026471     001                    .BYTE   1
8339  026472  010000                    .WORD   TST             ;TEST BIT=1
8340
8341  026474     060                    .BYTE   WD              ;MUX ADDRESS=F4
8342  026475     001                    .BYTE   1
8343  026476  000000                    .WORD   0               ;TEST BIT=0
8344
8345  026500     022                    .BYTE   PAKACK          ;MUX ADDRESS=F4
8346  026501     001                    .BYTE   1
8347  026502  010000                    .WORD   TST             ;TEST BIT=1
8348
8349  026504     062                    .BYTE   WH              ;MUX ADDRESS=F4
8350  026505     001                    .BYTE   1
8351  026506  000000                    .WORD   0               ;TEST BIT=0
8352
8353  026510     030                    .BYTE   SEARCH          ;MUX ADDRESS=F4
8354  026511     001                    .BYTE   1
8355  026512  010000                    .WORD   TST             ;TEST BIT=1
8356
8357  026514     070                    .BYTE   RD              ;MUX ADDRESS=F4
8358  026515     001                    .BYTE   1
8359  026516  000000                    .WORD   0               ;TEST BIT=0
8360
8361  026520     032                    .BYTE   ILF32           ;MUX ADDRESS=F4
8362  026521     001                    .BYTE   1
8363  026522  010000                    .WORD   TST             ;TEST BIT=1
8364
8365  026524     072                    .BYTE   RH              ;MUX ADDRESS=F4
8366  026525     001                    .BYTE   1
8367  026526  000000                    .WORD   0               ;TEST BIT=0
8368
8369  026530     000                    .BYTE                   ;END OF TABLE
8370  026531     377                    .BYTE   .-1
8371  026532  000000                    .WORD
8372  026534                  200$:                             ;END OF TEST
```

```
8373
8374                                    ;;*****************************************************************
8375                                    ;*TEST 45        SET/RESET GO TEST
8376
8377                                    ;;*****************************************************************
8378  026534  000004                    TST45:  SCOPE
8379  026536  012737  000045  001226            MOV     #45,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
8380
8381  026544  000240                            NOP
8382  026546  012737  000024  001120            MOV     #20.,$ICNT      ;20 ITERATIONS
8383  026554  112737  000001  001131            MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8384  026562  012737  026576  001122            MOV     #T45,$LPADR  ;LOAD LOOP ON TEST ADDRESS
8385  026570  012737  026576  001124            MOV     #T45,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
8386  026576                            T45:
8387  026576  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
8388  026602  013700  001276                    MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8389  026606  013701  001456                    MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8390  026612  012702  027234                    MOV     #200$,R2        ;INITIALIZE FUNCTION CODE POINTER
8391                                    ;CLEAR, THEN SET DIAGNOSTIC MODE, CLEAR COMPOSITE ERROR, SET MEDIUM
8392                                    ;ON LINE AND ENABLE DEBUG CLOCK
8393  026616                            10$:
8394  026616  012760  000040  000010            MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8395  026624  111160  000010                    MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8396
8397  026630  012760  000001  000024            MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8398
8399  026636  012760  041001  000024            MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
8400
8401  026644  012760  000000  000014            MOV     #0,RMER1(R0)    ;LOAD RMER1
8402
8403  026652  012760  000000  000042            MOV     #0,RMER2(R0)    ;LOAD RMER2
8404                                    ;TRANSFER THE FUNCTION CODE AND GO BIT TO RMCS1 AND VERIFY GO IS SET
8405  026660  111203                            MOVB    (R2),R3         ;GET FUNCTION CODE
8406  026662  042703  177701                    BIC     #^CILF76,R3     ;CLEAR UNUSED BITS
8407  026666  052703  000001                    BIS     #GO,R3          ;SET GO
8408
8409  026672  010360  000000                    MOV     R3,RMCS1(R0)    ;LOAD RMCS1
8410
8411  026676  016037  000000  001142            MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
8412  026704  032737  000001  001142            BIT     #GO,$BDDAT
8413  026712  001011                            BNE     20$             ;BRANCH IF GO IS SET
8414  026714  042737  177700  001142            BIC     #^CFNCMSK,$BDDAT
8415  026722  010337  001140                    MOV     R3,$GDDAT       ;SAVE EXPECTED RESULT
8416  026726  010037  001136                    MOV     R0,$BDADR       ;COPY REGISTER ADDRESS
8417  026732  104151                            ERROR   151             ;CANT SET GO
8418  026734  000536                            BR      100$
8419
8420  026736                            20$:
8421                                    ;GET READY STATUS AND VERIFY THAT IT IS THE COMPLEMENT OF GO
8422  026736  005037  001140                    CLR     $GDDAT          ;EXPECT DRY TO BE OFF
8423  026742  032737  000001  001142            BIT     #GO,$BDDAT      ;WAS GO SET??
8424  026750  001003                            BNE     30$             ;YES!!
8425  026752  012737  000200  001140            MOV     #DRY,$GDDAT     ;GO WAS NOT SET, DRY SHOULD BE
8426  026760                            30$:
8427
8428  026760  016037  000012  001142            MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
```

```
8429  026766  042737  177577  001142          BIC     #↑CDRY,$BDDAT
8430  026774  023737  001140  001142          CMP     $GDDAT,$BDDAT
8431  027002  001406                          BEQ     40$             ;BRANCH IF DRY IS OK
8432  027004  010037  001136                  MOV     R0,$BDADR       ;COPY REGISTER ADDRESS
8433  027010  062737  000012  001136          ADD     #RMDS,$BDADR
8434  027016  104152                          ERROR   152             ;DRY NOT COMPLEMENT OF GO
8435  027020                          40$:
8436                                  ;STEP THE DEBUG CLOCK AND VERIFY THAT GO REMAINS SET
8437  027020  116204  000001                  MOVB    1(R2),R4        ;GET NUMBER OF CLOCK CYCLES
8438  027024  042704  177400                  BIC     #↑C377,R4
8439  027030                          50$:
8440
8441  027030  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
8442
8443  027036  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
8444
8445  027044  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
8446  027052  042737  177700  001142          BIC     #↑CFNCMSK,$BDDAT  ;CLEAR UNUSED BITS
8447  027060  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
8448  027064  010337  001140                  MOV     R3,$GDDAT       ;SAVE EXPECTED RESULT
8449                                  ;DECREMENT CLOCK COUNT AND EXIT LOOP IF ZERO
8450  027070  005304                          DEC     R4
8451  027072  001406                          BEQ     60$
8452  027074  032737  000001  001142          BIT     #GO,$BDDAT      ;IS GO STILL SET??
8453  027102  001352                          BNE     50$             ;YES!!
8454  027104  104153                          ERROR   153             ;GO RESET EARLY
8455  027106  000451                          BR      100$            ;OUT OF SYNC=SKIP TO NEXT
8456  027110                          60$:
8457                                  ;GO SHOULD NOW BE RESET AND DRY SHOULD BE SET
8458  027110  032737  000001  001142          BIT     #GO,$BDDAT      ;IS GO RESET??
8459  027116  001405                          BEQ     70$             ;YES!!
8460  027120  042737  000001  001140          BIC     #GO,$GDDAT      ;SETUP EXPECTED RESULT
8461  027126  104154                          ERROR   154             ;GO DID NOT RESET
8462  027130  000440                          BR      100$
8463  027132                          70$:
8464  027132  012737  000200  001140          MOV     #DRY,$GDDAT     ;EXPECT DRIVE READY TO BE SET
8465  027140  032737  000001  001142          BIT     #GO,$BDDAT      ;DID GO RESET??
8466  027146  001403                          BEQ     80$             ;YES!!
8467  027150  005037  001140                  CLR     $GDDAT          ;GO IS SET-
8468  027154                          80$:
8469
8470  027154  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8471  027162  042737  177577  001142          BIC     #↑CDRY,$BDDAT
8472  027170  010037  001136                  MOV     R0,$BDADR       ;COPY REGISTER ADDRESS
8473  027174  062737  000012  001136          ADD     #RMDS,$BDADR
8474  027202  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;IS DRIVE READY OK??
8475  027210  001401                          BEQ     90$             ;YES!!
8476  027212  104152                          ERROR   152             ;DRY NOT COMPLEMENT OF GO
8477  027214                          90$:
8478                                  ;ADVANCE TO THE NEXT FUNCTION CODE TO BE TESTED-EXIT IF DONE
8479  027214  062702  000002                  ADD     #2,R2           ;MOVE TABLE POINTER
8480  027220  105762  000001                  TSTB    1(R2)           ;END OF TABLE??
8481  027224  100402                          BMI     100$            ;YES!!
8482  027226  000137  026616                  JMP     10$             ;TEST THIS FUNCTION CODE
8483  027232  000423                  100$:   BR      300$            ;GO TO NEXT TEST
8484
```

```
8485  027234                          200$:
8486                                  ;;*****************************************************************
8487                                  ;TABLE OF FUNCTION CODES AND CLOCK COUNTS USED DURING TEST
8488  027234  002                             .BYTE   ILF02           ;ILLEGAL FUNCTION CODE #2
8489  027235  001                             .BYTE   1
8490
8491  027236  004                             .BYTE   SEEK            ;SEEK COMMAND
8492  027237  001                             .BYTE   1
8493
8494  027240  006                             .BYTE   RECAL           ;RECALIBRATE COMMAND
8495  027241  001                             .BYTE   1
8496
8497  027242  014                             .BYTE   OFFSET          ;OFFSET COMMAND
8498  027243  001                             .BYTE   1
8499
8500  027244  016                             .BYTE   RTC             ;RETURN TO CENTER LINE COMMAND
8501  027245  001                             .BYTE   1
8502
8503  027246  024                             .BYTE   ILF24           ;ILLEGAL FUNCTION CODE #24
8504  027247  001                             .BYTE   1
8505
8506  027250  026                             .BYTE   ILF26           ;ILLEGAL FUNCTION CODE #26
8507  027251  001                             .BYTE   1
8508
8509  027252  034                             .BYTE   ILF34           ;ILLEGAL FUNCTION CODE #34
8510  027253  001                             .BYTE   1
8511
8512  027254  036                             .BYTE   ILF36           ;ILLEGAL FUNCTION CODE #36
8513  027255  001                             .BYTE   1
8514
8515  027256  042                             .BYTE   ILF42           ;ILLEGAL FUNCTION CODE #42
8516  027257  001                             .BYTE   1
8517
8518  027260  044                             .BYTE   ILF44           ;ILLEGAL FUNCTION CODE #44
8519  027261  001                             .BYTE   1
8520
8521  027262  046                             .BYTE   ILF46           ;ILLEGAL FUNCTION CODE #46
8522  027263  001                             .BYTE   1
8523
8524  027264  054                             .BYTE   ILF54           ;ILLEGAL FUNCTION CODE #54
8525  027265  001                             .BYTE   1
8526
8527  027266  056                             .BYTE   ILF56           ,ILLEGAL FUNCTION CODE #56
8528  027267  001                             .BYTE   1
8529
8530  027270  064                             .BYTE   ILF64           ;ILLEGAL FUNCTION CODE #64
8531  027271  001                             .BYTE   1
8532
8533  027272  066                             .BYTE   ILF66           ;ILLEGAL FUNCTION CODE #66
8534  027273  001                             .BYTE   1
8535
8536  027274  074                             .BYTE   ILF74           ;ILLEGAL FUNCTION CODE #74
8537  027275  001                             .BYTE   1
8538
8539  027276  076                             .BYTE   ILF76           ;ILLEGAL FUNCTION CODE #76
8540  027277  001                             .BYTE   1
```

```
8541
8542  027300  000                       .BYTE                   ;END OF TABLE
8543  027301  377                       .BYTE   #-1
8544
8545  027302                    300$:                           ;END OF TEST
8546
8547                            ;;*****************************************************************
8548                            ;*TEST 46        END 1 RESET GO TEST
8549
8550                            ;;*****************************************************************
8551  027302  000004            T$T46:  SCOPE
8552  027304  012737  000046  001226    MOV     #46,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
8553
8554  027312  000240                    NOP
8555  027314  012737  000024  001120    MOV     #20.,$ICNT      ;20 ITERATIONS
8556  027322  112737  000001  001131    MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8557  027330  012737  027344  001122    MOV     #T46,$LPADR  ;LOAD LOOP ON TEST ADDRESS
8558  027336  012737  027344  001124    MOV     #T46,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
8559  027344                    T46:
8560  027344  012706  001100            MOV     #STACK,SP       ;LOAD THE STACK POINTER
8561  027350  013700  001276            MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8562  027354  013701  001456            MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8563  027360  012702  027624            MOV     #100$,R2        ;INITIALIZE TABLE POINTER
8564  027364  010037  001136            MOV     R0,$BDADR       ;COPY RMCS1 ADDRESS
8565
8566  027370                    10$:
8567                            ;CLEAR MASSBUS, THEN SET MEDIUM ON LINE AND ENABLE DEBUG CLOCK
8568  027370  012760  000040  000010        MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8569  027376  111160  000010                MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8570
8571  027402  012760  000001  000024        MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8572
8573  027410  012760  041001  000024        MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
8574
8575  027416  012760  000000  000014        MOV     #0,RMER1(R0)    ;LOAD RMER1
8576
8577  027424  012760  000000  000042        MOV     #0,RMER2(R0)    ;LOAD RMER2
8578                            ;TRANSFER THE FUNCTION CODE AND GO BIT TO RMCS1, VERIFY GO IS SET
8579  027432  111203                        MOVB    (R2),R3         ;GET FUNCTION CODE FROM
8580  027434  042703  177701                BIC     #^C<CF76>,R3    ;TABLE AND SET GO
8581  027440  052703  000001                BIS     #GO,R3
8582  027444  010337  001140                MOV     R3,$GDDAT       ;SAVE FUNCTION CODE FOR MSG
8583
8584  027450  010360  000000                MOV     R3,RMCS1(R0)    ;LOAD RMCS1
8585
8586  027454  016037  000000  001142        MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
8587  027462  032737  000001  001142        BIT     #GO,$BDDAT
8588  027470  001005                        BNE     20$             ;BRANCH IF GO IS SET
8589  027472  042737  177700  001142        BIC     #^CFNCMSK,$BDDAT
8590  027500  104151                        ERROR   151             ;GO DID NOT SET
8591  027502  000447                        BR      60$             ;OUT OF SYNC-SKIP
8592  027504                    20$:
8593                            ;GET THE NUMBER OF CLOCK CYCLES FROM THE TABLE, SAVE EXPECTED STATUS
8594  027504  116204  000001                MOVB    1(R2),R4        ;R4=CLOCK COUNT
8595  027510  042704  177400                BIC     #^C377,R4
8596  027514                    30$:
```

```
                                        ;STEP THE DEBUG CLOCK AND VERIFY GO STATUS ON UNTIL CLOCK COUNT EXPIRES.
                                        
027514  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0     ;LOAD RMMR1
                                        
027522  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
                                        
027530  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
027536  042737  177700  001142          BIC     #^CFNCMSK,$BDDAT
027544  005304                          DEC     R4
027546  001406                          BEQ     40$             ;BRANCH IF GO SHOULD BE OFF
027550  032737  000001  001142          BIT     #GO,$BDDAT
027556  001356                          BNE     30$             ;CONTINUE IF GO IS ON
027560  104153                          ERROR   153             ;GO RESET EARLY
027562  000417                          BR      60$             ;OUT OF SYNC-SKIP
027564                          40$:
                                        ;VERIFY THAT GO RESET AT END1
027564  032737  000001  001142          BIT     #GO,$BDDAT      ;DID GO RESET??
027572  001405                          BEQ     50$             ;YES!!
027574  042737  000001  001140          BIC     #GO,$GDDAT
027602  104154                          ERROR   154             ;GO NOT RESET AT END1
027604  000406                          BR      60$
027606                          50$:
                                        ;GET THE NEXT FUNCTION CODE FROM THE TABLE
027606  062702  000002                  ADD     #2,R2
027612  105762  000001                  TSTB    1(R2)
027616  100401                          BMI     60$             ;BRANCH IF END OF TABLE
027620  000663                          BR      10$             ;TEST THIS FUNCTION CODE
027622  000404                  60$:    BR      200$            ;JUMP OVER TABLE
                                        
027624                          100$:
                                        ;TABLE OF FUNCTION CODES AND CLOCK COUNTS USED DURING TEST
                                        
027624      012                         .BYTE   RLEASE          ;RELEASE COMMAND
027625      002                         .BYTE   2
                                        
027626      030                         .BYTE   SEARCH          ;SEARCH COMMAND
027627      002                         .BYTE   2
                                        
027630      032                         .BYTE   ILF32           ;ILLEGAL FUNCTON #32
027631      002                         .BYTE   2
                                        
027632      000                         .BYTE                   ;END OF TABLE
027633      377                         .BYTE   #-1
027634                          200$:                           ;END OF TEST
                                        
                                        ;;*****************************************************************
                                        ;*TEST 47        SET PULSE TEST
                                        
                                        ;;*****************************************************************
027634  000004                  TST47:  SCOPE
027636  012737  000047  001226          MOV     #47,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
                                        
027644  000240                          NOP
027646  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
027654  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
027662  012737  027676  001122          MOV     #T47,$LPADR  ;LOAD LOOP ON TEST ADDRESS
```

```
8653  027670  012737  027676  001124          MOV     #T47,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
8654  027676                          T47:
8655  027676  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
8656  027702  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8657  027706  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8658  027712  010037  001136                  MOV     R0,$BDADR       ;COPY REG ADDRESS FOR MSG
8659  027716  062737  000024  001136          ADD     #RMMR1,$BDADR
8660  027724  012702  030170                  MOV     #100$,R2        ;INITIALIZE TABLE POINTER
8661  027730                          10$:
8662                                  ;CLEAR THE MASS BUS, ENABLE DEBUG CLOCK, AND RESET ERROR REGISTERS
8663  027730  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8664  027736  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8665
8666  027742  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8667
8668  027750  012760  041001  000024          MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
8669
8670  027756  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
8671
8672  027764  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
8673                                  ;VERIFY THAT CONTINUE, "CONT" IS RESET AFTER CLEAR
8674
8675  027772  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
8676  030000  042737  177677  001142          BIC     #^CCONT,$BDDAT
8677  030006  001404                          BEQ     20$             ;BRANCH IF CONT WAS CLEARED
8678  030010  005037  001140                  CLR     $GDDAT          ;FOR ERROR MSG
8679  030014  104155                          ERROR   155             ;CANT CLEAR CONTINUE
8680  030016  000463                          BR      70$
8681  030020                          20$:
8682                                  ;GET THE FUNCTION CODE FROM THE TABLE AND TRANSFER IT TO RMCS1
8683  030020  111203                          MOVB    (R2),R3
8684  030022  052703  000001                  BIS     #GO,R3
8685  030026  042703  177700                  BIC     #^CFNCMSK,R3    ;R3=FUNCTION CODE AND GO
8686
8687  030032  010360  000000                  MOV     R3,RMCS1(R0)    ;LOAD RMCS1
8688  030036  010337  001174                  MOV     R3,$TMP0        ;SAVE FUNCTION CODE FOR MSG
8689                                  ;GET THE CLOCK COUNT FROM THE TABLE
8690  030042  116203  000001                  MOVB    1(R2),R3
8691  030046  042703  177400                  BIC     #^C377,R3
8692                                  ;GET THE BIT STREAM FOR CONTINUE FROM THE TABLE
8693  030052  016204  000002                  MOV     2(R2),R4
8694  030056                          30$:
8695                                  ;STEP THE COMMAND SEQUENCER AND VERIFY CONTINUE STATUS
8696
8697  030056  012760  141001  000024          MOV     #DMD!DBEN!MUR!DBCK,RMMR1(R0)    ;LOAD RMMR1
8698
8699  030064  012760  041001  000024          MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
8700
8701  030072  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
8702  030100  042737  177677  001142          BIC     #^CCONT,$BDDAT
8703  030106  005037  001140                  CLR     $GDDAT          ;GENERATE EXPECTED CONTINUE
8704  030112  032704  000001                  BIT     #BIT0,R4
8705  030116  001403                          BEQ     40$
8706  030120  012737  000100  001140          MOV     #CONT,$GDDAT
8707  030126  023737  001140  001142  40$:    CMP     $GDDAT,$BDDAT
8708  030134  001402                          BEQ     50$             ;BRANCH IF CONTINUE IS OK
```

```
8709  030136  104156                        ERROR   156             ;CONTINUE IS INCORRECT
8710  030140  000412                        BR      70$             ;SKIP
8711  030142                          50$:
8712                                  ;DECREMENT CLOCK COUNT AND SHIFT BIT STREAM
8713  030142  005303                        DEC     R3
8714  030144  001402                        BEQ     60$             ;BRANCH IF CLOCK COUNT EXPIRED
8715  030146  006204                        ASR     R4              ;SHIFT TO NEXT CONTINUE BIT
8716  030150  000742                        BR      30$             ;TEST NEXT CLOCK CYCLE
8717  030152                          60$:
8718                                  ;ADVANCE TABLE POINTER-EXIT IF DONE
8719  030152  062702  000004                ADD     #4,R2
8720  030156  105762  000001                TSTB    1(R2)
8721  030162  100401                        BMI     70$             ;EXIT IF CLOCK COUNT NEGATIVE
8722  030164  000661                        BR      10$             ;CONTINUE TEST
8723  030166  000442                  70$:  BR      200$            ;JUMP OVER TABLE
8724
8725  030170                          100$:
8726                                  ;TABLE OF FUNCTION CODES, CLOCK COUNTS AND CONTINUE BITS FOR TEST
8727
8728  030170      000                       .BYTE   NOP             ;NOP COMMAND
8729  030171      004                       .BYTE   4               ;4 CLOCKS
8730  030172  000000                        .WORD   ^B0000          ;CONTINUE=0000
8731
8732  030174      002                       .BYTE   ILF02           ;ILLEGAL FUNCTION 2
8733  030175      002                       .BYTE   2
8734  030176  000000                        .WORD   ^B00
8735
8736  030200      004                       .BYTE   SEEK            ;SEEK COMMAND
8737  030201      002                       .BYTE   2
8738  030202  000000                        .WORD   ^B00
8739
8740  030204      006                       .BYTE   RECAL           ;RECALIBRATE COMMAND
8741  030205      002                       .BYTE   2
8742  030206  000000                        .WORD   ^B00
8743
8744  030210      010                       .BYTE   DRVCLR          ;DRIVE CLEAR COMMAND
8745  030211      002                       .BYTE   2
8746  030212  000001                        .WORD   ^B01
8747
8748  030214      012                       .BYTE   RLEASE          ;RELEASE COMMAND
8749  030215      003                       .BYTE   3
8750  030216  000000                        .WORD   ^B000
8751
8752  030220      014                       .BYTE   OFFSET          ;OFFSET COMMAND
8753  030221      002                       .BYTE   2
8754  030222  000000                        .WORD   ^B00
8755
8756  030224      016                       .BYTE   RTC             ;RETURN TO CENTER COMMAND
8757  030225      002                       .BYTE   2
8758  030226  000000                        .WORD   ^B00
8759
8760  030230      020                       .BYTE   RIP             ;READ IN PRESET COMMAND
8761  030231      004                       .BYTE   4
8762  030232  000016                        .WORD   ^B1110
8763
8764  030234      022                       .BYTE   PAKACK          ;PACK ACKNOWLEDGE
```

```
8765  030235  004                          .BYTE   4
8766  030236  000016                       .WORD   ^B1110
8767
8768  030240  024                          .BYTE   ILF24          ;ILLEGAL FUNCTION 24
8769  030241  002                          .BYTE   2
8770  030242  000000                       .WORD   ^B00
8771
8772  030244  026                          .BYTE   ILF26          ;ILLEGAL FUNCTION 26
8773  030245  002                          .BYTE   2
8774  030246  000000                       .WORD   ^B00
8775
8776  030250  030                          .BYTE   SEARCH         ;SEARCH COMMAND
8777  030251  003                          .BYTE   3
8778  030252  000000                       .WORD   ^B000
8779
8780  030254  032                          .BYTE   ILF32          ;ILLEGAL FUNCTION 32
8781  030255  003                          .BYTE   3
8782  030256  000000                       .WORD   ^B000
8783
8784  030260  034                          .BYTE   ILF34          ;ILLEGAL FUNCTION 34
8785  030261  002                          .BYTE   2
8786  030262  000000                       .WORD   ^B00
8787
8788  030264  036                          .BYTE   ILF36          ;ILLEGAL FUNCTION 36
8789  030265  002                          .BYTE   2
8790  030266  000000                       .WORD   ^B00
8791
8792  030270  000                          .BYTE                  ;END OF TABLE
8793  030271  377                          .BYTE   -1
8794  030272  000000                       .WORD
8795
8796  030274                       200$:                          ;END OF TEST
8797
8798                               ;;*****************************************************************
8799                               ;*TEST 50       SET/RESET IVC TEST
8800                               ;;*****************************************************************
8801
8802  030274  000004               T$T50:  SCOPE
8803  030276  012737  000050  001226       MOV     #50,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
8804
8805  030304  000240                       NOP
8806  030306  012737  000024  001120       MOV     #20.,$ICNT     ;20 ITERATIONS
8807  030314  112737  000001  001131       MOVB    #1,$ERMAX      ;ONE ERROR ALLOWED
8808  030322  012737  030336  001122       MOV     #T50,$LPADR  ;LOAD LOOP ON TEST ADDRESS
8809  030330  012737  030336  001124       MOV     #T50,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
8810  030336                       T50:
8811  030336  012706  001100              MOV     #STACK,SP      ;LOAD THE STACK POINTER
8812  030342  013700  001276              MOV     $BASE,R0       ;R0 = UNIBUS ADDRESS OF UUT
8813  030346  013701  001456              MOV     TSTQUE,R1      ;R1 = POINTER TO DEVICE
8814  030352  010037  001136              MOV     R0,$BDADR      ;SETUP REG ADDRESS
8815  030356  062737  000042  001136       ADD     #RMER2,$BDADR
8816  030364  005002                       CLR     R2             ;R2=FUNCTION CODE
8817  030366                       10$:
8818                               ;INITIALIZE AND VERIFY THAT IVC STATUS IS ZERO.
8819  030366  012760  000040  000010       MOV     #CLR,RMCS2(R0) ;CLEAR THE MASSBUS
8820  030374  111160  000010              MOVB    (R1),RMCS2(R0) ;SELECT UNIT
```

```
8821
8822  030400  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8823
8824  030406  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
8825
8826  030414  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
8827
8828  030422  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
8829
8830  030430  016037  000042  001142          MOV     RMER2(R0),$BDDAT        ;STORE RMER2 AT $BDDAT
8831  030436  042737  167777  001142          BIC     #^CIVC,$BDDAT
8832  030444  001404                          BEQ     20$             ;BRANCH IF IVC IS ZERO
8833  030446  005037  001140                  CLR     $GDDAT
8834  030452  104157                          ERROR   157             ;CANT CLEAR IVC
8835  030454  000444                          BR      40$             ;SKIP REST OF TEST
8836  030456                          20$:
8837                                  ;LOAD THE FUNCTION CODE WITH GO BIT, STEP THE COMMAND SEQUENCER OFF
8838                                  ;ADDRESS 0 AND VERIFY IVC STATUS.
8839  030456  010203                          MOV     R2,R3           ;SETUP FUNCTION CODE
8840  030460  052703  000001                  BIS     #GO,R3
8841
8842  030464  010360  000000                  MOV     R3,RMCS1(R0)    ;LOAD RMCS1
8843
8844  030470  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
8845
8846  030476  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
8847
8848  030504  016037  000042  001142          MOV     RMER2(R0),$BDDAT        ;STORE RMER2 AT $BDDAT
8849  030512  042737  167777  001142          BIC     #^CIVC,$BDDAT   ;SET ACTUAL STATUS
8850  030520  016237  066142  001140          MOV     FNCDTB(R2),$GDDAT  ;SETUP EXPECTED STATUS FROM
8851  030526  042737  167777  001140          BIC     #^CIVC,$GDDAT   ;FUNCTION CODE TABLE
8852  030534  023737  001140  001142          CMP     $GDDAT,$BDDAT
8853  030542  001403                          BEQ     30$             ;BRANCH IF IVC IS OK
8854  030544  010237  001174                  MOV     R2,$TMP0        ;SAVE FUNCTION CODE FOR MSG
8855  030550  104160                          ERROR   160             ;IVC IS INCORRECT
8856  030552                          30$:
8857                                  ;ADVANCE FUNCTION CODE AND REPEAT TEST IF NOT DONE
8858  030552  062702  000002                  ADD     #2,R2
8859  030556  022702  000076                  CMP     #ILF76,R2
8860  030562  103401                          BLO     40$             ;BRANCH IF DONE TEST
8861  030564  000700                          BR      10$
8862
8863  030566                          40$:                            ;END OF TEST
8864
8865                                  ;;*****************************************************************
8866                                  ;*TEST 51        SET LSC TEST
8867
8868                                  ;;*****************************************************************
8869  030566  000004                  TST51:  SCOPE
8870  030570  012737  000051  001226          MOV     #51,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
8871
8872  030576  000240                          NOP
8873  030600  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
8874  030606  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8875  030614  012737  030630  001122          MOV     #T51,$LPADR  ;LOAD LOOP ON TEST ADDRESS
8876  030622  012737  030630  001124          MOV     #T51,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
```

```
8877  030630                                  TS1:
8878  030630  012706  001100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
8879  030634  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
8880  030640  013701  001456                          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
8881  030644  010037  001136                          MOV     R0,$BDADR
8882  030650  062737  000042  001136                  ADD     #RMER2,$BDADR
8883
8884                                          ;INITIALIZE AND VERIFY THAT LOSS OF SYSTEM CLOCK, "LSC", IS RESET
8885  030656  012760  000040  000010                  MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
8886  030664  111160  000010                          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
8887
8888  030670  012760  000001  000024                  MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8889
8890  030676  012760  040001  000024                  MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
8891
8892  030704  012760  000000  000014                  MOV     #0,RMER1(R0)    ;LOAD RMER1
8893
8894  030712  012760  000000  000042                  MOV     #0,RMER2(R0)    ;LOAD RMER2
8895
8896  030720  016037  000042  001142                  MOV     RMER2(R0),$BDDAT        ;STORE RMER2 AT $BDDAT
8897  030726  042737  173777  001142                  BIC     #^tCLSC,$BDDAT
8898  030734  001403                                  BEQ     10$             ;BRANCH IF LSC IS ZERO
8899  030736  005037  001140                          CLR     $GDDAT
8900  030742  104161                                  ERROR   161             ;CANT CLEAR LSC
8901                                          ;WITH DEBUG CLOCK ENABLED, SET GO AND WAIT FOR ONE SHOT TO SET
8902  030744                                  10$:
8903
8904  030744  012760  000001  000000                  MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
8905  030752  012737  000001  001524                  MOV     #1,WATCH        ;SET WATCHDOG TIMER VALUE
8906  030760  004777  150542                          JSR     PC,@CLOCK       ;START THE CLOCK
8907  030764  005737  001524                  20$:    TST     WATCH
8908  030770  001375                                  BNE     20$             ;WAIT FOR WATCH ZERO
8909  030772  004777  150532                          JSR     PC,@STOP        ;STOP THE CLOCK
8910                                          ;ONE SHOT SHOULD BE SET-DISABLE DIAGNOSTIC CLOCK AND LSC SHOULD SET.
8911
8912  030776  012760  000001  000024                  MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
8913
8914  031004  016037  000042  001142                  MOV     RMER2(R0),$BDDAT        ;STORE RMER2 AT $BDDAT
8915  031012  042737  173777  001142                  BIC     #^tCLSC,$BDDAT
8916  031020  001004                                  BNE     30$             ;BRANCH IF LSC SET
8917  031022  012737  004000  001140                  MOV     #LSC,$GDDAT
8918  031030  104162                                  ERROR   162             ;CANT SET LSC
8919
8920  031032                                  30$:                            ;END OF TEST
8921
8922                                          ;;*****************************************************************
8923                                          ;*TEST 52        DECODE TEST
8924
8925                                          ;;*****************************************************************
8926  031032  000004                          ^tST52: SCOPE
8927  031034  012737  000052  001226                  MOV     #52,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
8928
8929  031042  000240                                  NOP
8930  031044  012737  000024  001120                  MOV     #20.,$ICNT      ;20 ITERATIONS
8931  031052  112737  000001  001131                  MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
8932  031060  012737  031074  001122                  MOV     #TS2,$LPADR  ;LOAD LOOP ON TEST ADDRESS
```

```
8933  031066  012737  031074  001124          MOV     #T52,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
8934  031074                          T52:
8935  031074  012706  001100                  MOV     #STACK,SP        ;LOAD THE STACK POINTER
8936  031100  013700  001276                  MOV     $BASE,R0         ;R0 = UNIBUS ADDRESS OF UUT
8937  031104  013701  001456                  MOV     TSTQUE,R1        ;R1 = POINTER TO DEVICE
8938  031110  005037  001416                  CLR     RMER10           ;NO ERROR FIRST TEST
8939  031114                          5$:
8940  031114  004737  031474                  JSR     PC,100$          ;INITIALIZE
8941
8942                                  ;EXECUTE A PACK ACKNOWLEDGE AND CHECK VOLUME VALID
8943
8944  031120  013760  001416  000014          MOV     RMER10,RMER1(R0)         ;LOAD RMER1
8945
8946  031126  012760  000023  000000          MOV     #PACACK!GO,RMCS1(R0)     ;LOAD RMCS1
8947  031134  012703  000003                  MOV     #3,R3
8948  031140                          10$:
8949
8950  031140  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)     ;LOAD RMMR1
8951
8952  031146  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
8953  031154  005303                          DEC     R3
8954  031156  001370                          BNE     10$              ;ISSUE NEXT CLOCK IF COUNT NOT 0
8955
8956  031160  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8957  031166  042737  177677  001142          BIC     #^CVV,$BDDAT
8958  031174  001414                          BEQ     20$              ;BRANCH IF VV IS ZERO
8959  031176  005737  001416                  TST     RMER10
8960  031202  001527                          BEQ     70$              ;BRANCH IF VV SHOULD BE SET
8961  031204  005037  001140                  CLR     $GDDAT           ;SETUP ERROR MESSAGE
8962  031210  010037  001136                  MOV     R0,$BDADR
8963  031214  062737  000012  001136          ADD     #RMDS,$BDADR
8964  031222  104163                          ERROR   163              ;DECODE SET WITH COMP ERROR ACTIVE
8965  031224  000522                          BR      80$              ;SKIP
8966  031226                          20$:
8967  031226  004737  031474                  JSR     PC,100$          ;INITIALIZE AND SET DIAGNOSTIC MODE
8968
8969                                  ;EXECUTE A READ IN PRESET AND CHECK VOLUME VALID
8970
8971  031232  013760  001416  000014          MOV     RMER10,RMER1(R0)         ;LOAD RMER1
8972
8973  031240  012760  000021  000000          MOV     #RIP!GO,RMCS1(R0)        ;LOAD RMCS1
8974  031246  012703  000003                  MOV     #3,R3            ;R3=CLOCK COUNT
8975  031252                          30$:
8976
8977  031252  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)     ;LOAD RMMR1
8978
8979  031260  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
8980  031266  005303                          DEC     R3
8981  031270  001370                          BNE     30$              ;ISSUE NEXT CLOCK IF COUNT NOT ZERO
8982
8983  031272  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
8984  031300  042737  177677  001142          BIC     #^CVV,$BDDAT
8985  031306  001414                          BEQ     40$              ;BRANCH IF VOLUME VALID NOT SET
8986  031310  005737  001416                  TST     RMER10
8987  031314  001465                          BEQ     70$              ;BRANCH IF VOLUME VALID SHOULD BE SET
8988  031316  005037  001140                  CLR     $GDDAT           ;SETUP ERROR MESSAGE
```

```
031322 010037 001136                    MOV     R0,$BDADR
031326 062737 000012 001136             ADD     #RMDS,$BDADR
031334 104163                           ERROR   163             ;DECODE SET WITH COMP ERROR ACTIVE
031336 000455                           BR      80$             ;SKIP
031340                          40$:
031340 004737 031474                    JSR     PC,100$         ;INITIALIZE AND SET DIAGNOSTIC MODE

                                ;EXECUTE A WRITE CHECK DATA AND CHECK OCCUPIED

031344 013760 001416 000014             MOV     RMER10,RMER1(R0)        ;LOAD RMER1

031352 012760 000051 000000             MOV     #WCD!GO,RMCS1(R0)       ;LOAD RMCS1
031360 012703 000002                    MOV     #2,R3           ;R3=CLOCK COUNT
031364                          50$:

031364 012760 141001 000024             MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1

031372 012760 041001 000024             MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
031400 005303                           DEC     R3
031402 001370                           BNE     50$             ;ISSUE NEXT CLOCK IF COUNT NOT ZERO

031404 016037 000024 001142             MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
031412 042737 077777 001142             BIC     #^COCC,$BDDAT
031420 001414                           BEQ     60$             ;BRANCH IF OCCUPIED IS RESET
031422 005737 001416                    TST     RMER10
031426 001415                           BEQ     70$             ;BRANCH IF OCCUPIED SHOULD BE SET
031430 005037 001140                    CLR     $GDDAT          ;SETUP ERROR MESSAGE
031434 010037 001136                    MOV     R0,$BDADR
031440 062737 000024 001136             ADD     #RMMR1,$BDADR
031446 104164                           ERROR   164             ;DECODE SET WITH COMP ERROR ACTIVE
031450 000410                           BR      80$
031452                          60$:
                                ;VOLUME VALID AND OCCUPIED DID NOT SET-SEE IF COMP ERROR WAS ACTIVE
031452 005737 001416                    TST     RMER10
031456 001005                           BNE     80$             ;BRANCH IF COMP ERROR WAS SET
                                ;COULD NOT SET VV OR OCCUPIED-SUSPECT DECODE FLOP NOT SETTING
031460 104165                           ERROR   165             ;DECODE DOES NOT SET

031462                          70$:

                                ;REPEAT TEST WITH COMPOSITE ERROR ACTIVE-VERIFY THAT DECODE FLOP
                                ;DOES NOT SET, AS INDICATED BY VOLUME VALID AND OCCUPIED.
031462 012737 040000 001416             MOV     #UNS,RMER10     ;USE UNSAFE TO SET COMP ERROR
031470 000611                           BR      5$

031472 000513                   80$:    BR      200$            ;END OF TEST

031474                          100$:

                                ;SUBROUTINE USED DURING TEST

                                ;USING DIAGNOSTIC MODE, RESET VOLUME VALID AND COMPOSITE ERROR.
                                ;VERIFY THAT VV, ERR, AND OCC ARE ZERO.
031474 012760 000040 000010             MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
031502 111160 000010                    MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
```

```
 9045  031506  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
 9046
 9047  031514  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9048
 9049  031522  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
 9050
 9051  031530  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
 9052  031536  005037  001140                  CLR     $GDDAT          ;SETUP FOR ERROR MSG
 9053  031542  010037  001136                  MOV     R0,$BDADR
 9054  031546  062737  000012  001136          ADD     #RMDS,$BDADR
 9055
 9056  031554  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
 9057  031562  042737  137777  001142          BIC     #^CERR,$BDDAT
 9058  031570  001402                          BEQ     110$            ;BRANCH IF COMP ERROR ZERO
 9059  031572  104143                          ERROR   143             ;CANT CLEAR COMP ERROR
 9060  031574  000447                          BR      140$            ;SKIP TEST
 9061  031576                          110$:
 9062
 9063  031576  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
 9064  031604  042737  177677  001142          BIC     #^CVV,$BDDAT
 9065  031612  001402                          BEQ     120$            ;BRANCH IF VOLUME VALID ZERO
 9066  031614  104135                          ERROR   135             ;CANT RESET VOLUME VALID
 9067  031616  000436                          BR      140$            ;SKIP TEST
 9068  031620                          120$:
 9069
 9070  031620  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
 9071  031626  042737  077777  001142          BIC     #^COCC,$BDDAT
 9072  031634  001407                          BEQ     130$            ;BRANCH IF OCCUPIED ZERO
 9073  031636  010037  001136                  MOV     R0,$BDADR       ;SETUP ERROR MESSAGE
 9074  031642  062737  000024  001136          ADD     #RMMR1,$BDADR
 9075  031650  104166                          ERROR   166             ;CANT CLEAR OCCUPIED
 9076  031652  000420                          BR      140$            ;SKIP TEST
 9077  031654                          130$:
 9078                                  ;TO VERIFY THAT THE DECODE FLOP IS RESET, LOAD AN ILLEGAL FUNCTION
 9079                                  ;IN RMCS1 AND VERIFY THAT ILF DOES NOT SET.
 9080
 9081  031654  012760  000024  000000          MOV     #ILF24,RMCS1(R0         ;LOAD RMCS1
 9082
 9083  031662  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
 9084  031670  042737  177776  001142          BIC     #^CILF,$BDDAT
 9085  031676  001410                          BEQ     150$            ;BRANCH IF ILF IS ZERO
 9086  031700  010037  001136                  MOV     R0,$BDADR       ;SETUP ERROR MESSAGE
 9087  031704  062737  000014  001136          ADD     #RMER1,$BDADR
 9088  031712  104167                          ERROR   167             ;DECODE FLOP APPEARS ON
 9089  031714  012716  031722          140$:   MOV     #200$,(SP)      ;DONT GO BACK TO TEST
 9090
 9091  031720  000207                  150$:   RTS     PC              ;RETURN TO TEST OR EXIT TEST
 9092
 9093  031722                          200$:
 9094
 9095                                  ;;*****************************************************************
 9096                                  ;*TEST 53        SET/RESET VOLUME VALID TEST
 9097
 9098                                  ;;*****************************************************************
 9099  031722  000004                  TST53:  SCOPE
 9100  031724  012737  000053  001226          MOV     #53,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
```

```
9101
9102  031732  000240                          NOP
9103  031734  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
9104  031742  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
9105  031750  012737  031764  001122          MOV     #T53,$LPADR  ;LOAD LOOP ON TEST ADDRESS
9106  031756  012737  031764  001124          MOV     #T53,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
9107  031764                              T53:
9108  031764  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
9109  031770  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
9110  031774  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
9111  032000  010037  001136                  MOV     R0,$BDADR       ;SETUP REGISTER ADDRESS
9112  032004  062737  000012  001136          ADD     #RMDS,$BDADR
9113  032012  012702  032224                  MOV     #100$,R2        ;R2=TABLE POINTER
9114  032016                              10$:
9115                                    ;INITIALIZE AND USE DIAGNOSTIC MODE TO RESET VOLUME VALID
9116  032016  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
9117  032024  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
9118
9119  032030  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
9120
9121  032036  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9122
9123  032044  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
9124
9125  032052  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
9126
9127  032060  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
9128  032066  042737  177677  001142          BIC     #^CVV,$BDDAT
9129  032074  001403                          BEQ     20$             ;BRANCH IF VOLUME VALID ZERO
9130  032076  005037  001140                  CLR     $GDDAT
9131  032102  104135                          ERROR   135             ;CANT RESET VV
9132  032104                              20$:
9133                                    ;EXECUTE THE FUNCTION CODE IN THE TABLE
9134  032104  111203                          MOVB    (R2),R3         ;GET FUNCTION CODE
9135  032106  042703  177701                  BIC     #^CIE176,R3
9136  032112  052703  000001                  BIS     #GO,R3
9137
9138  032116  010360  000000                  MOV     R3,RMCS1(R0)    ;LOAD RMCS1
9139  032122  116204  000001                  MOVB    1(R2),R4        ;GET CLOCK COUNT
9140  032126  042704  177400                  BIC     #^C377,R4
9141  032132                              30$:
9142
9143  032132  012760  141001  000024          MOV     #DMD!DBEN!MUR!DBCK,RMMR1(R0)    ;LOAD RMMR1
9144
9145  032140  012760  041001  000024          MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
9146  032146  005304                          DEC     R4
9147  032150  001370                          BNE     30$             ;ISSUE COCKS TIL R4 ZERO
9148
9149  032152  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
9150  032160  042737  177677  001142          BIC     #^CVV,$BDDAT
9151  032166  001007                          BNE     40$             ;BRANCH IF VOLUME VALID SET
9152  032170  010337  001174                  MOV     R3,$TMP0        ;SAVE FUNCTION CODE FOR MSG
9153  032174  012737  000100  001140          MOV     #VV,$GDDAT
9154  032202  104170                          ERROR   170             ;CANT SET VOLUME VALID
9155  032204  000406                          BR      50$
9156  032206                              40$:
```

```
 9157
 9158  032206  062702  000002          ;ADVANCE THE TABLE POINTER, EXIT IF DONE
 9159  032212  105762  000001                  ADD     #2,R2
 9160  032216  100401                          TSTB    1(R2)
 9161  032220  000676                          BMI     50$             ;EXIT IF COUNT IS NEGATIVE
 9162  032222  000403                          BR      10$
 9163                                  50$:    BR      200$            ;JUMP OVER TABLE
 9164  032224                          100$:
 9165                                  ;TABLE OF FUNCTION CODES AND CLOCK COUNTS
 9166  032224      020                         .BYTE   RIP             ;READ IN PRESET COMMAND
 9167  032225      003                         .BYTE   3
 9168
 9169  032226      022                         .BYTE   PAKACK          ;PACK ACKNOWLEDGE COMMAND
 9170  032227      003                         .BYTE   3
 9171
 9172  032230      000                         .BYTE                   ;END OF TABLE
 9173  032231      377                         .BYTE   -1
 9174
 9175  032232                          200$:                           ;END OF TEST
 9176
 9177                                  ;;*****************************************************************
 9178                                  ;*TEST 54        ILLEGAL FUNCTION TEST
 9179
 9180                                  ;;*****************************************************************
 9181  032232  000004                  T54:    SCOPE
 9182  032234  012737  000054  001226          MOV     #54,$TESTN      ;;SET TEST NUMBER IN AP* MAIL BOX
 9183
 9184  032242  000240                          NOP
 9185  032244  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
 9186  032252  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
 9187  032260  012737  032274  001122          MOV     #T54,$LPADR  ;LOAD LOOP ON TEST ADDRESS
 9188  032266  012737  032274  001124          MOV     #T54,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
 9189  032274                          T54:
 9190  032274  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 9191  032300  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 9192  032304  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 9193  032310  005002                          CLR     R2              ;INITIALIZE FUNCTION CODE VALUE
 9194  032312                          10$:
 9195                                  ;SET VOLUME VALID USING SUBROUTINE
 9196  032312  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
 9197  032316  000402                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
 9198  032320  104000                          ERROR                   ;RETURN HERE IF ERROR
 9199  032322  000460                          BR      50$             ;SKIP TEST IF ERROR
 9200  032324  012704  000002          20$:    MOV     #2,R4           ;R4=CLOCK COUNT
 9201                                  ;EXECUTE THE TEST FUNCTION CODE AND VERIFY ILF
 9202
 9203  032330  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9204  032336  010203                          MOV     R2,R3           ;SETUP FUNCTION CODE IN R3
 9205  032340  052703  000001                  BIS     #GO,R3
 9206
 9207  032344  010360  000000                  MOV     R3,RMCS1(R0)    ;LOAD RMCS1
 9208  032350                          30$:
 9209
 9210  032350  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
 9211
 9212  032356  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1 R0) ;LOAD RMMR1
```

```
 9213  032364  005304                          DEC     R4
 9214  032366  001370                          BNE     30$
 9215
 9216  032370  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
 9217  032376  042737  177776  001142          BIC     #^CILF,$BDDAT   ;SETUP ACTUAL ILF STATUS
 9218  032404  016237  066142  001140          MOV     FNCDTB(R2),$GDDAT  ;GET EXPECTED ILF STATUS
 9219  032412  042737  177776  001140          BIC     #^CILF,$GDDAT
 9220  032420  023737  001140  001142          CMP     $GDDAT,$BDDAT
 9221  032426  001410                          BEQ     40$             ;BRANCH IF ILF IS OK
 9222  032430  010037  001136                  MOV     R0,$BDADR       ;SETUP FOR ERROR MSG
 9223  032434  062737  000014  001136          ADD     #RMER1,$BDADR
 9224  032442  010237  001174                  MOV     R2,$TMP0
 9225  032446  104171                          ERROR   171             ;ILF IS NOT CORRECT
 9226  032450                          40$:
 9227                                  ;ADVANCE TO THE NEXT FUNCTION CODE AND REPEAT TEST
 9228  032450  062702  000002                  ADD     #2,R2
 9229  032454  022702  000076                  CMP     #ILF76,R2
 9230  032460  103401                          BLO     50$
 9231  032462  000713                          BR      10$
 9232  032464                          50$:                            ;END OF TEST
 9233
 9234                                  ;;*****************************************************************
 9235                                  ;*TEST 55        OCCUPIED TEST
 9236
 9237                                  ;;*****************************************************************
 9238  032464  000004                  TST55:  SCOPE
 9239  032466  012737  000055  001226          MOV     #55,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
 9240
 9241  032474  000240                          NOP
 9242  032476  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
 9243  032504  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
 9244  032512  012737  032526  001122          MOV     #T55,$LPADR  ;LOAD LOOP ON TEST ADDRESS
 9245  032520  012737  032526  001124          MOV     #T55,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
 9246  032526                          T55:
 9247  032526  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 9248  032532  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 9249  032536  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 9250  032542  005002                          CLR     R2                      ;INITIALIZE FUNCTION CODE
 9251
 9252  032544                          10$:
 9253                                  ;GET THE DEVICE READY
 9254                                  ;SET VOLUME VALID USING SUBROUTINE
 9255  032544  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
 9256  032550  000402                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
 9257  032552  104000                          ERROR                   ;RETURN HERE IF ERROR
 9258  032554  000464                          BR      50$
 9259  032556                          20$:
 9260                                  ;ENABLE DEBUG CLOCK AND LOAD THE FUNCTION CODE
 9261
 9262  032556  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9263  032564  010203                          MOV     R2,R3                   ;ASSEMBLE FUNCTION CODE AND
 9264  032566  052703  000001                  BIS     #GO,R3                  ;GO BIT IN R3
 9265
 9266  032572  010360  000000                  MOV     R3,RMCS1(R0)    ;LOAD RMCS1
 9267  032576  012704  000002                  MOV     #2,R4                   ;R4=CLOCK COUNT
 9268                                  ;STEP THE DEBUG CLOCK UNTIL SET PULSE IS ACTIVE
```

```
9269  032502                          30$:
9270
9271  032602  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
9272
9273  032610  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR!
9274  032616  005304                          DEC     R4
9275  032620  001370                          BNE     30$                     ;ISSUE NEXT CLOCK TIL R4 ZERO
9276                                  ;VERIFY OCCUPIED STATUS
9277
9278  032622  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
9279  032630  042737  077777  001142          BIC     #^COCC,$BDDAT
9280  032636  005037  001140                  CLR     $GDDAT          ;GENERATE OCC FROM AOE
9281  032642  032762  001000  066142          BIT     #AOE,FNCDTB(R2)
9282  032650  001403                          BEQ     35$
```

```
 9283  032652  012737  100000  001140          MOV     #OCC,$GDDAT
 9284  032660  023737  001140  001142  35$:    CMP     $GDDAT,$BDDAT
 9285  032666  001411                          BEQ     40$                     ;BRANCH IF OCC IS OK
 9286  032670  010237  001174                  MOV     R2,$TMP0                ;SAVE FUNCTION CODE
 9287  032674  010037  001136                  MOV     R0,$BDADR               ;SETUP REGISTER ADDRESS
 9288  032700  062737  000024  001136          ADD     #RMMR1,$BDADR
 9289  032706  104173                          ERROR   173                     ;OCCUPIED IS INCORRECT
 9290  032710  000406                          BR      50$
 9291  032712                              40$:
 9292                                      ;ADVANCE TO NEXT FUNCTIONCODE, EXIT IF DONE
 9293  032712  062702  000002                      ADD     #2 R2
 9294  032716  022702  000076                      CMP     #ILF76,R2
 9295  032722  103401                          BLO     50$                     ;EXIT IF DONE
 9296  032724  000707                          BR      10$
 9297
 9298  032726                              50$:                                ;END OF TEST
 9299
 9300                                      ;;*****************************************************************
 9301                                      ;*TEST 56        READ IN PRESET TEST
 9302
 9303                                      ;;*****************************************************************
 9304  032726  000004                      TST56:  SCOPE
 9305  032730  012737  000056  001226              MOV     #56,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
 9306
 9307  032736  000240                              NOP
 9308  032740  012737  000024  001120              MOV     #20.,$ICNT      ;20 ITERATIONS
 9309  032746  112737  000001  001131              MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
 9310  032754  012737  032770  001122              MOV     #T56,$LPADR  ;LOAD LOOP ON TEST ADDRESS
 9311  032762  012737  032770  001124              MOV     #T56,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
 9312  032770                              T56:
 9313  032770  012706  001100                      MOV     #STACK,SP       ;LOAD THE STACK POINTER
 9314  032774  013700  001276                      MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 9315  033000  013701  001456                      MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 9316                                      ;CLEAR AND ENABLE DEBUG CLOCK - LEAVE VOLUME VALID RESET
 9317  033004  012760  000040  000010              MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
 9318  033012  111160  000010                      MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
 9319
 9320  033016  012760  000001  000024              MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
 9321
 9322  033024  012760  041001  000024              MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9323
 9324  033032  012760  000000  000014              MOV     #0,RMER1(R0)    ;LOAD RMER1
 9325
 9326  033040  012760  000000  000042              MOV     #0,RMER2(R0)    ;LOAD RMER2
 9327                                      ;LOAD ALL ONES IN RMDA, RMDC AND RMOF
 9328
 9329  033046  012760  177777  000006              MOV     #-1,RMDA(R0)    ;LOAD RMDA
 9330
 9331  033054  012760  177777  000034              MOV     #-1,RMDC(R0)    ;LOAD RMDC
 9332
 9333  033062  012760  177777  000032              MOV     #-1,RMOF(R0)    ;LOAD RMOF
 9334                                      ;LOAD READ IN PRESET COMMAND AND STEP THE CLOCK TILL SET PULSE
 9335
 9336  033070  012760  000021  000000              MOV     #RIP!GO,RMCS1(R0)       ;LOAD RMCS1
 9337  033076  012702  000003                      MOV     #3,R2                   ;R2=CLOCK COUNT
 9338  033102                              10$:
```

```
9339
9340  033102  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
9341
9342  033110  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9343  033116  005302                          DEC     R2
9344  033120  001370                          BNE     10$                     ;ISSUE 3 CLOCKS
9345                                  ;SEE IF RMDA OR RMDC OR RMOF IS ZERO
9346
9347  033122  016002  000006                  MOV     RMDA(R0),R2     ;STORE RMDA AT R2
9348  033126  005702                          TST     R2
9349  033130  001413                          BEQ     20$                     ;BRANCH IF RMDA IS ZERO
9350
9351  033132  016002  000034                  MOV     RMDC(R0),R2     ;STORE RMDC AT R2
9352  033136  042702  176000                  BIC     #XNUDC,R2               ;CLEAR UNUSED BITS
9353  033142  001406                          BEQ     20$                     ;BRANCH IF RMDC IS ZERO
9354
9355  033144  016002  000032                  MOV     RMOF(R0),R2     ;STORE RMOF AT R2
9356  033150  042702  161577                  BIC     #XNUOF,R2               ;CLEAR UNUSED BITS
9357  033154  001401                          BEQ     20$                     ;BRANCH IF RMOF IS ZERO
9358                                  ;READ IN PRESET COMMAND DIDNT CLEAR ANY OF THE 3 REGISTERS
9359  033156  104174                          ERROR   174                     ;READ IN PRESET FAILED
9360
9361  033160                          20$:                                    ;END OF TEST
9362
9363                                  ;;*****************************************************************
9364                                  ;*TEST 57        RIP/RMOF TEST
9365
9366                                  ;;*****************************************************************
9367  033160  000004                  TST57:  SCOPE
9368  033162  012737  000057  001226          MOV     #57,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
9369
9370  033170  000240                          NOP
9371  033172  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
9372  033200  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
9373  033206  012737  033222  001122          MOV     #T57,$LPADR  ;LOAD LOOP ON TEST ADDRESS
9374  033214  012737  033222  001124          MOV     #T57,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
9375  033222                          T57:
9376  033222  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
9377  033226  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
9378  033232  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
9379  033236  010037  001136                  MOV     R0,$BDADR               ;SETUP REGISTER ADDRESS AND
9380  033242  062737  000032  001136          ADD     #RMOF,$BDADR
9381  033250  005037  001140                  CLR     $GDDAT                  ;EXPECTED RMOF
9382
9383                                  ;INITIALIZE AND SET BITS IN RMOF
9384  033254  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
9385  033262  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
9386
9387  033266  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
9388
9389  033274  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9390
9391  033302  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
9392
9393  033310  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
9394
```

```
9395  033316  012760  177777  000032          MOV     #-1,RMOF(R0)    ;LOAD RMOF
9396                                  :EXECUTE A READ IN PRESET IN DIAGNOSTIC MODE TILL SET PULSE
9397
9398  033324  012760  000021  000000          MOV     #RIP!GO,RMCS1(R0)       ;LOAD RMCS1
9399  033332  012702  000003                  MOV     #3,R2                   ;R2=CLOCK COUNT
9400  033336                                  10$:
9401
9402  033336  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
9403
9404  033344  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9405  033352  005302                          DEC     R2
9406  033354  001370                          BNE     10$                     ;ISSUE 3 CLOCKS
9407                                  :VERIFY THAT RMOF IS ZERO
9408
9409  033356  016037  000032  001142          MOV     RMOF(R0),$BDDAT ;STORE RMOF AT $BDDAT
9410  033364  042737  161577  001142          BIC     #XNUOF,$BDDAT
9411  033372  001401                          BEQ     20$                     ;BRANCH IF RMOF IS ZERO
9412  033374  104175                          ERROR   175                     ;CANT CLEAR RMOF WITH RIP
9413
9414  033376                                  20$:                            ;END OF TEST
9415
9416                                  ;;*****************************************************************
9417                                  ;*TEST 60        RMDA/RMDC/RIP TEST
9418
9419                                  ;;*****************************************************************
9420  033376  000004                  TST60:  SCOPE
9421  033400  012737  000060  001226          MOV     #60,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
9422
9423  033406  000240                          NOP
9424  033410  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
9425  033416  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
9426  033424  012737  033440  001122          MOV     #T60,$LPADR  ;LOAD LOOP ON TEST ADDRESS
9427  033432  012737  033440  001124          MOV     #T60,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
9428  033440                                  T60:
9429  033440  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
9430  033444  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
9431  033450  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
9432  033454  005037  001140                  CLR     $GDDAT
9433
9434                                  ;CLEAR, ENABLE DEBUG CLOCK, THEN PRESET RMDA AND RMDC
9435  033460  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
9436  033466  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
9437
9438  033472  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
9439
9440  033500  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9441
9442  033506  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
9443
9444  033514  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
9445
9446  033522  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
9447
9448  033530  012760  177777  000034          MOV     #-1,RMDC(R0)    ;LOAD RMDC
9449                                  ;EXECLTE READ IN PRESET TILL SET PULSE
9450
```

```
 9451  033536  012760  000021  000000          MOV     #R.P!GO,RMCS1(R0)       ;LOAD RMCS1
 9452  033544  012702  000003                  MOV     #3,R2
 9453  033550                              10$:
 9454
 9455  033550  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
 9456
 9457  033556  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9458  033564  005302                          DEC     R2
 9459  033566  001370                          BNE     10$                     ;ISSUE 3 CLOCKS
 9460                              ;VERIFY RMDA IS ZERO
 9461
 9462  033570  016037  000006  001142          MOV     RMDA(R0),$BDDAT ;STORE RMDA AT $BDDAT
 9463  033576  005737  001142                  TST     $BDDAT
 9464  033602  001406                          BEQ     20$                     ;BRANCH IF RMDA RESET
 9465  033604  010037  001136                  MOV     R0,$BDADR
 9466  033610  062737  000006  001136          ADD     #RMDA,$BDADR
 9467  033616  104176                          ERROR   176                     ;RMDA NOT RESET BY RIP
 9468  033620                              20$:
 9469                              ;VERIFY RMDC IS ZERO
 9470
 9471  033620  016037  000034  001142          MOV     RMDC(R0),$BDDAT ;STORE RMDC AT $BDDAT
 9472  033626  042737  176000  001142          BIC     #XNUDC,$BDDAT
 9473  033634  001406                          BEQ     30$                     ;BRANCH IF RMDC RESET
 9474  033636  010037  001136                  MOV     R0,$BDADR
 9475  033642  062737  000034  001136          ADD     #RMDC,$BDADR
 9476  033650  104177                          ERROR   177                     ;RMDC NOT RESET BY RIP
 9477
 9478  033652                              30$:                                ;END OF TEST
 9479
 9480                              ;;*******************************************************************
 9481                              ;*TEST 61        OFFSET COMMAND TEST
 9482
 9483                              ;;*******************************************************************
 9484  033652  000004              T$T61:  SCOPE
 9485  033654  012737  000061  001226          MOV     #61,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
 9486
 9487  033662  000240                          NOP
 9488  033664  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
 9489  033672  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
 9490  033700  012737  033714  001122          MOV     #T61,$LPADR     ;LOAD LOOP ON TEST ADDRESS
 9491  033706  012737  033714  001124          MOV     #T61,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
 9492  033714                              T61:
 9493  033714  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
 9494  033720  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 9495  033724  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 9496  033730  010037  001136                  MOV     R0,$BDADR
 9497  033734  062737  000012  001136          ADD     #RMDS,$BDADR
 9498  033742  012737  000001  001140          MOV     #OM,$CODPT
 9499
 9500                              ;SET VOLUME VALID USING SUBROUTINE
 9501  033750  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
 9502  033754  000402                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
 9503  033756  104000                          ERROR                   ;RETURN HERE IF ERROR
 9504  033760  000433                          BR      40$
 9505  033762                              10$:
 9506
```

```
                        T61     OFFSET COMMAND TEST

9507  033762  012760  000000  000034            MOV     #0,RMDC(R0)     ;LOAD RMDC
9508                          ;ENABLE DEBUG CLOCK AND EXECUTE OFFSET COMMAND
9509
9510  033770  012760  041001  000024            MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9511
9512  033776  012760  000015  000000            MOV     #OFFSET!GO,RMCS1(R0)    ;LOAD RMCS1
9513  034004  012702  000002                    MOV     #2,R2                   ;R2=CLOCK COUNT
9514  034010                        20$:
9515
9516  034010  012760  141001  000024            MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
9517
9518  034016  012760  041001  000024            MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9519  034024  005302                            DEC     R2
9520  034026  001370                            BNE     20$                     ;ISSUE 2 CLOCKS
9521                          ;VERIFY THAT OFFSET MODE IS SET
9522
9523  034030  016037  000012  001142            MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
9524  034036  042737  177776  001142            BIC     #^COM,$BDDAT
9525  034044  001001                            BNE     40$                     ;BRANCH IF OM IS SET
9526  034046  104200                            ERROR   200                     ;CANT SET ON BY COMMAND
9527  034050                        40$:                                      ;END OF TEST
9528
9529                          ;;*****************************************************************
9530                          ;*TEST 62        RETURN TO CENTER TEST
9531
9532                          ;;*****************************************************************
9533  034050  000004                    ^ST62:  SCOPE
9534  034052  012737  000062  001226            MOV     #62,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
9535
9536  034060  000240                            NOP
9537  034062  012737  000024  001120            MOV     #20.,$ICNT      ;20 ITERATIONS
9538  034070  112737  000001  001131            MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
9539  034076  012737  034112  001122            MOV     #T62,$LPADR  ;LOAD LOOP ON TEST ADDRESS
9540  034104  012737  034112  001124            MOV     #T62,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
9541  034112                        T62:
9542  034112  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
9543  034116  013700  001276                    MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
9544  034122  013701  001456                    MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
9545  034126  010037  001136                    MOV     R0,$BDADR
9546  034132  062737  000012  001136            ADD     #RMDS,$BDADR
9547                          ;SET OFFSET DIRECTION AND OFFSET MODE
9548                          ;SET VOLUME VALID USING SUBROUTINE
9549  034140  004737  060654                    JSR     PC,SETVV        ;GO SET VOLUME VALID
9550  034144  000402                            BR      10$             ;BRANCH TO 10$ IF NO ERROR
9551  034146  104000                            ERROR                   ;RETURN HERE IF ERROR
9552  034150  000465                            BR      60$
9553  034152                        10$:
9554
9555  034152  012760  000200  000032            MOV     #OFD,RMOF(R0)   ;LOAD RMOF
9556                          ;SET OFFSET MODE USING SUBROUTINE
9557  034160  004737  061004                    JSR     PC,SETOM        ;GO SET OFFSET MODE
9558  034164  000401                            BR      20$             ;BRANCH TO 20$ IF NO ERROR
9559  034166  104000                            ERROR                   ;RETURN HERE IF ERROR
9560  034170                        20$:
9561                          ;ENABLE DEBUG CLOCK AND EXECUTE RETURN TOCENTER COMMAND
9562                          ;SET VOLUME VALID USING SUBROUTINE
```

```
9563  034170  004737  060654          JSR     PC,SETVV        ;GO SET VOLUME VALID
9564  034174  000402                  BR      30$             ;BRANCH TO 30$ IF NO ERROR
9565  034176  104000                  ERROR                   ;RETURN HERE IF ERROR
9566  034200  000451                  BR      60$
9567  034202                  30$:
9568
9569  034202  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9570
9571  034210  012760  000017  000000          MOV     #RTC!GO,RMCS1(R0)       ;LOAD RMCS1
9572  034216  012702  000002                  MOV     #2,R2
9573  034222                  40$:
9574
9575  034222  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
9576
9577  034230  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9578  034236  005302                  DEC     R2
9579  034240  001370                  BNE     40$                     ;ISSUE 2 CLOCKS
9580                          ;VERIFY THAT OFFSET MODE IS RESET
9581
9582  034242  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
9583  034250  042737  177776  001142          BIC     #^COM,$BDDAT
9584  034256  001403                  BEQ     50$                     ;BRANCH IF OFFSET MODE RESET
9585  034260  005037  001140                  CLR     $GDDAT
9586  034264  104201                  ERROR   201                     ;CANT RESET OFFSETMODE BY RTC
9587  034266                  50$:
9588                          ;VERIFY THAT OFFSET DIRECTION IS RESET
9589
9590  034266  016037  000032  001142          MOV     RMOF(R0),$BDDAT ;STORE RMOF AT $BDDAT
9591  034274  042737  177577  001142          BIC     #^COFD,$BDDAT
9592  034302  001410                  BEQ     60$                     ;BRANCH IF OFD IS RESET
9593  034304  005037  001140                  CLR     $GDDAT
9594  034310  010037  001136                  MOV     R0,$BDADR
9595  034314  062737  000032  001136          ADD     #RMOF,$BDADR
9596  034322  104202                  ERROR   202                     ;CANT RESET OFD BY RTC
9597  034324                  60$:                                    ;END OF TEST
9598
9599                          ;;*****************************************************************
9600                          ;*TEST 63       RMDC CLEAR OFFSET TEST
9601
9602                          ;;*****************************************************************
9603  034324  000004          T$T63:  SCOPE
9604  034326  012737  000063  001226          MOV     #63,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
9605
9606  034334  000240                  NOP
9607  034336  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
9608  034344  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
9609  034352  012737  034366  001122          MOV     #T63,$LPADR  ;LOAD LOOP ON TEST ADDRESS
9610  034360  012737  034366  001124          MOV     #T63,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
9611  034366                  T63:
9612  034366  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
9613  034372  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
9614  034376  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
9615  034402  010037  001136                  MOV     R0,$BDADR
9616  034406  062737  000012  001136          ADD     #RMDS,$BDADR
9617                          ;SET VOLUME VALID USING SUBROUTINE
9618  034414  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
```

```
                                T63     RMDC CLEAR OFFSET TEST

 9619  034420  000402                           BR      10$             ;BRANCH TO 10$ IF NO ERROR
 9620  034422  104000                           ERROR                   ;RETURN HERE IF ERROR
 9621  034424  000421                           BR      40$                     ;SKIP REST OF TEST
 9622  034426                        10$:
 9623                                ;SET OFFSET MODE USING SUBROUTINE
 9624  034426  004737  061004                   JSR     PC,SETOM        ;GO SET OFFSET MODE
 9625  034432  000401                           BR      20$             ;BRANCH TO 20$ IF NO ERROR
 9626  034434  104000                           ERROR                   ;RETURN HERE IF ERROR
 9627  034436                        20$:
 9628                                ;WRITE THE DESIRED CYLINDER REGISTER AND VERIFY THAT OFFSET IS ZERO
 9629
 9630  034436  012760  000000  000034           MOV     #0,RMDC(R0)     ;LOAD RMDC
 9631
 9632  034444  016037  000012  001142           MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
 9633  034452  042737  177776  001142           BIC     #^C<OFFLINE>,$BDDAT
 9634  034460  001403                           BEQ     40$
 9635  034462  005037  001140                   CLR     $GDDAT
 9636  034466  104203                           ERROR   203                     ;CANT RESET OFFSET BY RMDC
 9637
 9638  034470                        40$:                                    ;END OF TEST
 9639
 9640                                ;;******************************************************************
 9641                                ;*TEST 64        EBL CLEAR OFFSET TEST
 9642
 9643                                ;;******************************************************************
 9644  034470  000004                TST64:  SCOPE
 9645  034472  012737  000064  001226           MOV     #64,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
 9646
 9647  034500  000240                           NOP
 9648  034502  012737  000024  001120           MOV     #20.,$ICNT      ;20 ITERATIONS
 9649  034510  112737  000001  001131           MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
 9650  034516  012737  034532  001122           MOV     #T64,$LPADR  ;LOAD LOOP ON TEST ADDRESS
 9651  034524  012737  034532  001124           MOV     #T64,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
 9652  034532                        T64:
 9653  034532  012706  001100                   MOV     #STACK,SP       ;LOAD THE STACK POINTER
 9654  034536  013700  001276                   MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
 9655  034542  013701  001456                   MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
 9656  034546  010037  001136                   MOV     R0,$BDADR               ;SETUP REGISTER FOR ERROR MSG
 9657  034552  062737  000012  001136           ADD     #RMDS,$BDADR
 9658                                ;SET VOLUME VALID USING SUBROUTINE
 9659  034560  004737  060654                   JSR     PC,SETVV        ;GO SET VOLUME VALID
 9660  034564  000402                           BR      10$             ;BRANCH TO 10$ IF NO ERROR
 9661  034566  104000                           ERROR                   ;RETURN HERE IF ERROR
 9662  034570  000440                           BR      30$                     ;SKIP REST OF TEST IF ERROR
 9663  034572                        10$:
 9664                                ;SET OFFSET MODE USING SUBROUTINE
 9665  034572  004737  061004                   JSR     PC,SETOM        ;GO SET OFFSET MODE
 9666  034576  000401                           BR      20$             ;BRANCH TO 20$ IF NO ERROR
 9667  034600  104000                           ERROR                   ;RETURN HERE IF ERROR
 9668  034602                        20$:
 9669                                ;SET 16 BIT FORMAT AND LOAD LAST SECTOR/TRACK ADDRESS
 9670
 9671  034602  012760  010000  000032           MOV     #FMT16,RMOF(R0) ;LOAD RMOF
 9672
 9673  034610  012760  002037  000006           MOV     #002037,RMDA(R0)        ;LOAD RMDA
 9674                                ;FORCE END OF BLOCK AND VERIFY THAT OFFSET MODE IS CLEARED
```

```
                                                MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
                                                MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
                                                MOV     #DMD!MUR!DBEN!DEBL,RMMR1(R0)    ;LOAD RMMR1
                                                MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
                                                MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
                                                BIC     #^COM,$BDDAT
                                                BEQ     30$                     ;BRANCH IF OFFSET IS ZERO
                                                CLR     $GDDAT
                                                ERROR   204                     ;OFFSET NO CLEARED BY EBL
                                        30$:                                    ;END OF TEST

                                        ;;*****************************************************************
                                        ;*TEST 65        RUN AND GO TEST

                                        ;;*****************************************************************
                                        T65:    SCOPE
                                                MOV     #65,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
                                                NOP
                                                MOV     #20.,$ICNT      ;20 ITERATIONS
                                                MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
                                                MOV     #T65,$LPADR  ;LOAD LOOP ON TEST ADDRESS
                                                MOV     #T65,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
                                        T65:
                                                MOV     #STACK,SP       ;LOAD THE STACK POINTER
                                                MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
                                                MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
                                                CLR     $GDDAT                  ;INITIALIZE EXPECTED RESULT
                                                CLR     R2                      ;INTIALIZE FUNCTION CODE
                                                MOV     R0,$BDADR
                                                ADD     #RMMR1,$BDADR
                                        10$:
                                        ;CLEAR THE MASSBUS AND ENABLE DEBUG CLOCK
                                                MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
                                                MOVB    (R1),RMCS2(R0)  ;SELECT UNIT

                                                MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1

                                                MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1

                                                MOV     #0,RMER1(R0)    ;LOAD RMER1

                                                MOV     #0,RMER2(R0)    ;LOAD RMER2
                                        ;LOAD THE FUNCTION CODE AND VERIFY RUN AND GO FLOP

                                                MOV     R2,R3                   ;ASSEMBLE FUNCTION CODE AND GO
                                                BIS     #GO,R3
                                                MOV     #200,WATCH      ;SET WATCHDOG TIMER VALUE
                                                JSR     PC,@CLOCK       ;START THE CLOCK

                                                MOV     R3,RMCS1(R0)    ;LOAD RMCS1
                                        15$:
```

```
9731
9732  035056  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
9733  035064  042737  137777  001142          BIC     #^CRG,$BDDAT
9734  035072  023737  001140  001142          CMP     $GDDAT,$BDDAT
9735  035100  001411                          BEQ     20$                     ;BRANCH IF RUN AND GO FLOP OK
9736  035102  005737  001524                  TST     WATCH           ;TAKE ANOTHER SAMPLE IF CLOCK NOT ZERO
9737  035106  001363                          BNE     15$
9738  035110  004777  144414                  JSR     PC,@STOP        ;STOP THE CLOCK
9739  035114  010237  001174                  MOV     R2,$TMP0                ;SAVE FUNCTION CODE FOR MSG
9740  035120  104205                          ERROR   20$                     ;RUN AND GO INCORRECT
9741  035122  000416                          BR      40$                     ;SKIP REST OF
9742  035124                          20$:
9743  035124  004777  144400                  JSR     PC,@STOP        ;STOP THE CLOCK
9744                                  ;ADVNACE TO NEXT FUNCTION CODE - EXIT IF DONE
9745  035130  062702  000002                  ADD     #2,R2
9746  035134  022702  000076                  CMP     #ILF76,R2
9747  035140  103407                          BLO     40$                     ;EXIT IF DONE
9748  035142  020227  000050                  CMP     R2,#WCD                 ;CHANGE EXPECTED RESJLTI IF
9749  035146  103403                          BLO     30$                     ;DATA COMMAND
9750  035150  012737  040000  001140          MOV     #RG,$GDDAT
9751  035156  000704                  30$:    BR      10$                     ;REPEAT TEST
9752
9753  035160                          40$:                                    ;END OF TEST
9754                                  ;;*****************************************************************
9755                                  ;*TEST 66        SET IAE TEST
9756
9757                                  ;;*****************************************************************
9758  035160  000004                  T$T66:  SCOPE
9759  035162  012737  000066  001226          MOV     #66,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
9760
9761  035170  000240                          NOP
9762  035172  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
9763  035200  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
9764  035206  012737  035222  001122          MOV     #T66,$LPADR  ;LOAD LOOP ON TEST ADDRESS
9765  035214  012737  035222  001124          MOV     #T66,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
9766  035222
9767  035222  012706  001100          T66:    MOV     #STACK,SP       ;LOAD THE STACK POINTER
9768  035226  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
9769  035232  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
9770  035236  012702  035404                  MOV     #100$,R2                ;R2=TABLE POINTER
9771  035242                          10$:
9772                                  ;SET VOLUME VALID USING SUBROUTINE
9773  035242  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
9774  035246  000402                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
9775  035250  104000                          ERROR                   ;RETURN HERE IF ERROR
9776  035252  000453                          BR      50$                     ;SKIP REST OF TEST
9777  035254                          20$:
9778                                  ;LOAD INVALID TRACK, SECTOR AND CYLINDER ADDRESS AND SET FORMAT TO 18
9779
9780  035254  012760  177777  000006          MOV     #-1,RMDA(R0)    ;LOAD RMDA
9781
9782  035262  012760  177777  000034          MOV     #-1,RMDC(R0)    ;LOAD RMDC
9783
9784  035270  012760  000000  000032          MOV     #0,RMOF(R0)     ;LOAD RMOF
9785                                  ;ENABLE DEBUG CLOCK AND LOAD FUNCTION CODE IN RMCSI WITH GO ON
9786
```

```
 9787  035276  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9788  035304  111203                          MOVB    (R2),R3
 9789  035306  042703  177701                  BIC     #↑CILF76,R3
 9790  035312  052703  000001                  BIS     #GO,R3
 9791
 9792  035316  010360  000000                  MOV     R3,RMCS1(R0)    ;LOAD RMCS1
 9793  035322  116204  000001                  MOVB    1(R2),R4                ;GET CLOCK COUNT
 9794  035326  042704  177400                  BIC     #↑C377,R4
 9795  035332                          30$:
 9796                                  ;CLOCK THE COMMAND SEQUENCER
 9797
 9798  035332  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
 9799
 9800  035340  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9801  035346  005304                          DEC     R4
 9802  035350  001370                          BNE     30$
 9803                                  ;SEE IF IAE HAS SET
 9804
 9805  035352  016004  000014                  MOV     RMER1(R0),R4    ;STORE RMER1 AT R4
 9806  035356  042704  175777                  BIC     #↑CIAE,R4
 9807  035362  001007                          BNE     50$                     ;BRANCH IF IAE SET
 9808                                  ;IAE DID NOT SET - TRY ANOTHER FUNCTION CODE
 9809  035364  062702  000002                  ADD     #2,R2
 9810  035370  105762  000001                  TSTB    1(R2)
 9811  035374  100401                          BMI     40$                     ;BRANCH IF ALL CODES TRIED
 9812  035376  000721                          BR      10$
 9813  035400                          40$:
 9814                                  ;CANNOT SET IAE WITH ANY COMBINATION OF ADDRESS AND FUNCTION CODE
 9815  035400  104206                          ERROR   206
 9816  035402                          50$:
 9817  035402  000411                          BR      200$                    ,JUMP OVER TABLE
 9818
 9819  035404                          100$:
 9820                                  ;TABLE OF FUNCTION CODES AND CLOCK COUNTS FOR TEST
 9821
 9822  035404  030             .BYTE   SEARCH          ;SEARCH COMMAND
 9823  035405  002             .BYTE   2
 9824
 9825  035406  004             .BYTE   SEEK            ;SEEK COMMAND
 9826  035407  002             .BYTE   2
 9827
 9828  035410  062             .BYTE   WH              ;WRITE HEADER COMMAND
 9829  035411  002             .BYTE   2
 9830
 9831  035412  052             .BYTE   WCH             ;WRITE CHECK HEADER COMMAND
 9832  035413  002             .BYTE   2
 9833
 9834  035414  072             .BYTE   RH              ;READ HEADER COMMAND
 9835  035415  002             .BYTE   2
 9836
 9837  035416  060             .BYTE   WD              ;WRITE DATA COMMAND
 9838  035417  002             .BYTE   2
 9839
 9840  035420  050             .BYTE   WCD             ;WRITE CHECK DATA COMMAND
 9841  035421  002             .BYTE   2
 9842
```

```
9843  035422  070                                    .BYTE   RD                      ;READ DATA COMMAND
9844  035423  002                                    .BYTE   2
9845
9846  035424  000                                    .BYTE                           ;END OF TABLE
9847  035425  377                                    .BYTE   -1
9848
9849  035426                                 200$:                                   ;END OF TEST
9850
9851                                         ;;*****************************************************************
9852                                         ;*TEST 67        SEARCH, SEEK, READ WRITE TEST
9853
9854                                         ;;*****************************************************************
9855  035426  000004                         T67:    SCOPE
9856  035430  012737  000067  001226                 MOV     #67,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX
9857
9858  035436  000240                                 NOP
9859  035440  012737  000024  001120                 MOV     #20.,$ICNT              ;20 ITERATIONS
9860  035446  112737  000001  001131                 MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
9861  035454  012737  035470  001122                 MOV     #T67,$LPADR     ;LOAD LOOP ON TEST ADDRESS
9862  035462  012737  035470  001124                 MOV     #T67,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
9863  035470                                 T67:
9864  035470  012706  001100                         MOV     #STACK,SP               ;LOAD THE STACK POINTER
9865  035474  013700  001276                         MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
9866  035500  013701  001456                         MOV     TSTQUE,R1               ;R1 = POINTER TO DEVICE
9867  035504  005002                                 CLR     R2                              ;INITIALIZE FUNCTION CODE
9868  035506                                 10$:
9869                                         ;SET VOLUME VALID USING SUBROUTINE
9870  035506  004737  060654                         JSR     PC,SETVV                ;GO SET VOLUME VALID
9871  035512  000402                                 BR      20$                     ;BRANCH TO 20$ IF NO ERROR
9872  035514  104000                                 ERROR                           ;RETURN HERE IF ERROR
9873  035516  000472                                 BR      50$
9874  035520                                 20$:
9875                                         ;LOAD INVALID TRACK, SECTOR AND CYLINDER ADDRESS AND SET FORMAT
9876                                         ;TO 18 BIT MODE
9877
9878  035520  012760  177777  000006                 MOV     #-1,RMDA(R0)    ;LOAD RMDA
9879
9880  035526  012760  177777  000034                 MOV     #-1,RMDC(R0)    ;LOAD RMDC
9881
9882  035534  012760  000000  000032                 MOV     #0,RMOF(R0)     ;LOAD RMOF
9883                                         ;ENABLE DEBUG CLOCK AND LOAD FUNCTION CODE IN RMCS1 WITH GO ON
9884
9885  035542  012760  041001  000024                 MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9886  035550  010203                                 MOV     R2,R3                   ;ASSEMBLE CODE AND GO
9887  035552  052703  000001                         BIS     #GO,R3
9888
9889  035556  010360  000000                         MOV     R3,RMCS1(R0)    ;LOAD RMCS1
9890                                         ;CLOCK THE COMMAND SEQUENCER TO SET PULSE
9891  035562  012704  000002                         MOV     #2,R4
9892  035566                                 30$:
9893
9894  035566  012760  141001  000024                 MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
9895
9896  035574  012760  041001  000024                 MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
9897  035602  005304                                 DEC     R4
9898  035604  001370                                 BNE     30$
```

```
                                        ;VERIFY IAE ACCORDING TO FUNCTION CODE TABLE
                                                MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
035614  042737  175777  001142                BIC     #^C<IAE>,$BDDAT
035622  016237  066142  001140                MOV     FNCDTB(R2),$GDDAT       ;ASSEMBLE EXPECTED IAE
035630  042737  175777  001140                BIC     #^C<IAE>,$GDDAT
035636  023737  001140  001142                CMP     $GDDAT,$BDDAT
035644  001411                                BEQ     40$                     ;BRANCH IF IAE OK
035646  010037  001136                        MOV     R0,$BDADR               ;SET UP ERROR MSG
035652  062737  000014  001136                ADD     #RMER1,$BDADR
035660  010237  001174                        MOV     R2,$TMP0
035664  104207                                ERROR   207                     ;IAE IS INCORRECT
035666  000406                                BR      50$                     ;SKIP REST OF TEST
035670                                  40$:
                                        ;ADVANCE TO NEXT FUNCTIONCODE - EXIT IF DONE
035670  062702  000002                        ADD     #2,R2
035674  023702  000076                        CMP     ILF75,R2
035700  103401                                BLO     50$
035702  000701                                BR      10$
035704                                  50$:                                    ;END OF TEST

                                        ;;*****************************************************************
                                        ;*TEST 70        INVALID SECTOR/TRACK TEST

                                        ;;*****************************************************************
035704  000004                        T$T70:  SCOPE
035706  012737  000070  001226                MOV     #70,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX

035714  000240                                NOP
035716  012737  000024  001120                MOV     #20.,$ICNT              ;20 ITERATIONS
035724  112737  000001  001131                MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
035732  012737  035746  001122                MOV     #T70,$LPADR     ;LOAD LOOP ON TEST ADDRESS
035740  012737  035746  001124                MOV     #T70,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
035746                                  T70:
035746  012706  001100                        MOV     #STACK,SP               ;LOAD THE STACK POINTER
035752  013700  001276                        MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
035756  013701  001456                        MOV     TSTQUE,R1               ;R1 = POINTER TO DEVICE
035762  012702  036142                        MOV     #100$,R2                        ;INITIALIZE TABLE POINTER

035766                                  10$:
                                        ;SET VOLUME VALID USING SUBROUTINE
035766  004737  060654                        JSR     PC,SETVV                ;GO SET VOLUME VALID
035772  000402                                BR      20$                     ;BRANCH TO 20$ IF NO ERROR
035774  104000                                ERROR                           ;RETURN HERE IF ERROR
035776  000460                                BR      50$                             ;SKIP REST OF TEST
036000                                  20$:
                                        ;CLEAR DESIRED CYLINDER, LOAD SECTOR/TRACK ADDRESS FROM TABLE, AND SET
                                        ;18 BIT FORMAT

036000  012760  000000  000034                MOV     #0,RMDC(R0)             ;LOAD RMDC

036006  012760  000000  000032                MOV     #0,RMOF(R0)             ;LOAD RMOF

036014  011260  000006                        MOV     (R2),RMDA(R0)   ;LOAD RMDA
                                        ;EXECUTE A SEARCH COMMAND TO WHERE "SET PULSE" IS ACTIVE

```

```
 9955  036020  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9956
 9957  036026  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
 9958  036034  012703  000002                  MOV     #2,R3
 9959  036040                              30$:
 9960
 9961  036040  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
 9962
 9963  036046  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
 9964  036054  005303                          DEC     R3
 9965  036056  001370                          BNE     30$                     ;ISSUE 2 CLOCKS
 9966                                      ;VERIFY IAE IS SET
 9967
 9968  036060  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
 9969  036066  042737  175777  001142          BIC     #^C<IAE>,$BDDAT
 9970  036074  001014                          BNE     40$                     ;BRANCH IF IAE IS ON
 9971  036076  012737  002000  001140          MOV     #IAE,$GDDAT             ;SETUP ERROR MESSAGE
 9972  036104  010037  001136                  MOV     R0,$BDADR
 9973  036110  062737  000014  001136          ADD     #RMER1,$BDADR
 9974  036116  011237  001174                  MOV     (R2),$TMP0
 9975  036122  104210                          ERROR   210                     ;IAE NOT SET BY RMDA ADDRESS
 9976  036124  000405                          BR      50$
 9977  036126                              40$:
 9978                                      ;ADVANCE TO NEXT ENTRY IN TABLE - EXIT IF DONE
 9979  036126  062702  000002                  ADD     #2,R2
 9980  036132  005712                          TST     (R2)
 9981  036134  001401                          BEQ     50$                     ;EXIT IF END OF TABLE
 9982  036136  000713                          BR      10$                     ;REPEAT TEST
 9983  036140  000414                  50$:    BR      200$                    ;JUMP OVER TABLE
 9984
 9985  036142                              100$:
 9986
 9987                                      ;TABLE OF SECTOR AND TRACK ADDRESSES FOR TEST
 9988  036142  000                             .BYTE   0                       ;SECTOR ADDRESS = 0
 9989  036143  005                             .BYTE   ^B00000101              ;TRACK ADDRESS = 5
 9990
 9991  036144  000                             .BYTE   0                       ;SECTOR = 0
 9992  036145  006                             .BYTE   ^B00000110              ;TRACK  = 6
 9993
 9994  036146  000                             .BYTE   0                       ;SECTOR = 0
 9995  036147  010                             .BYTE   ^B00001000              ;TRACK = 8
 9996
 9997  036150  000                             .BYTE   0                       ;SECTOR = 0
 9998  036151  020                             .BYTE   ^B00010000              ;TRACK = 16
 9999
10000  036152  000                             .BYTE   0                       ;SECTOR = 0
10001  036153  040                             .BYTE   ^B00100000              ;TRACK = 32
10002
10003  036154  000                             .BYTE   0                       ;SECTOR = 0
10004  036155  100                             .BYTE   ^B01000000              ;TRACK = 64
10005
10006  036156  000                             .BYTE   0                       ;SECTOR = 0
10007  036157  200                             .BYTE   ^B10000000              ;TRACK = 128
10008
10009  036160  036                             .BYTE   ^B00011110              ;SECTOR = 31
.001C  036161  000                             .BYTE   0                       ;TRACK = 0
```

```
10011
10012  036162  040                             .BYTE   ↑B00100000             ;SECTOR = 32
10013  036163  000                             .BYTE   0                       ;TRACK = 0
10014
10015  036164  100                             .BYTE   ↑B01000000             ;SECTOR = 64
10016  036165  000                             .BYTE   0                       ;TRACK = 0
10017
10018  036166  200                             .BYTE   ↑B10000000             ;SECTOR = 128
10019  036167  000                             .BYTE   0                       ;TRACK = 0
10020
10021  036170  000                             .BYTE   0                       ;END OF TABLE
10022  036171  000                             .BYTE   0
10023
10024  036172                          200$:                                   ;END OF TEST
10025
10026                                  ;;*******************************************************************
10027                                  ;*TEST 71        INVALID CYLINDER TEST
10028
10029                                  ;;*******************************************************************
10030  036172  000004                 T71:    SCOPE
10031  036174  012737  000071  001226          MOV     #71,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX
10032
10033  036202  000240                          NOP
10034  036204  012737  000024  001120          MOV     #20.,$ICNT              ;20 ITERATIONS
10035  036212  112737  000001  001131          MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
10036  036220  012737  036234  001122          MOV     #T71,$LPADR     ;LOAD LOOP ON TEST ADDRESS
10037  036226  012737  036234  001124          MOV     #T71,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
10038  036234                          T71:
10039  036234  012706  001100                  MOV     #STACK,SP               ;LOAD THE STACK POINTER
10040  036240  013700  001276                  MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
10041  036244  013701  001456                  MOV     TSTQUE,R1               ;R1 = POINTER TO DEVICE
10042  036250  012702  036422                  MOV     #100$,R2                        ;INITIALIZE TABLE POINTER
10043  036254                          10$:
10044                                  ;SET VOLUME VALID USING SUBROUTINE
10045  036254  004737  060654                  JSR     PC,SETVV                ;GO SET VOLUME VALID
10046  036260  000402                          BR      20$                     ;BRANCH TO 20$ IF NO ERROR
10047  036262  104000                          ERROR                           ;RETURN HERE IF ERROR
10048  036264  000455                          BR      50$                             ;SKIP IF ERROR
10049  036266                          20$:
10050                                  ;CLEAR RMDA, LOAD RMDC FROM TABLE
10051
10052  036266  012760  000000  000006          MOV     #0,RMDA(R0)             ;LOAD RMDA
10053
10054  036274  011260  000034                  MOV     (R2),RMDC(R0)   ;LOAD RMDC
10055                                  ;ENABLE DEBUG CLOCK AND EXECUTE SEARCH COMMAND
10056
10057  036300  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10058
10059  036306  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
10060  036314  012703  000002                  MOV     #2,R3
10061  036320                          30$:
10062
10063  036320  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
10064
10065  036326  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10066  036334  005303                          DEC     R3
```

```
10067  036336  001370                          BNE     30$                     ;ISSUE 2 CLOCKS
10068                                  ;VERIFY IAE IS SET
10069
10070  036340  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
10071  036346  042737  175777  001142          BIC     #^C<IAE>,$BDDAT
10072  036354  001014                          BNE     40$                     ;BRANCH IF IAE IS SET
10073  036356  012737  002000  001140          MOV     #IAE,$GDDAT             ;SETUP ERROR MESSAGE
10074  036364  010037  001136                  MOV     R0,$BDADR
10075  036370  062737  000014  001136          ADD     #RMER1,$BDADR
10076  036376  011237  001174                  MOV     (R2),$TMP0
10077  036402  104211                          ERROR   211                     ;IAE NOT SET BY RMDC
10078  036404  000405                          BR      50$
10079  036406                         40$:
10080                                  ;ADVANCE TABBLE POINTER - EXIT IF DONE
10081  036406  062702  000002                  ADD     #2,R2
10082  036412  005712                          TST     (R2)
10083  036414  001401                          BEQ     50$
10084  036416  000716                          BR      10$
10085  036420  000405                  50$:    BR      200$                    ;JUMP OVER TABLE
10086
10087  036422                         100$:
10088
10089                                  ;TABLE OF CYLINER ADDRESSES USED DURING TEST
10090
10091  036422  001467                          .WORD   ^B1100110111            ;CYLINDER 823
10092
10093  036424  001470                          .WORD   ^B1100111000            ;CYLINDER 824
10094
10095  036426  001500                          .WORD   ^B1101000000            ;CYLINDER 832
10096
10097  036430  001600                          .WORD   ^B1110000000            ;CYLINDER 896
10098
10099  036432  000000                          .WORD   0                       ;END OF TABLE
10100
10101  036434                         200$:                                    ;END OF TEST
10102
10103                                  ;;*****************************************************************
10104                                  ;*TEST 72        SET AOE TEST
10105
10106                                  ;;*****************************************************************
10107  036434  000004                 ^ST72:  SCOPE
10108  036436  012737  000072  001226          MOV     #72,$TESTN              ;;SET TEST NUMBER IN APT MAIL BOX
10109
10110  036444  000240                          NOP
10111  036446  012737  000024  001120          MOV     #20.,$ICNT              ;20 ITERATIONS
10112  036454  112737  000001  001131          MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
10113  036462  012737  036476  001122          MOV     #T72,$LPADR     ;LOAD LOOP ON TEST ADDRESS
10114  036470  012737  036476  001124          MOV     #T72,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
10115  036476                         T72:
10116  036476  012706  001100                  MOV     #STACK,SP               ;LOAD THE STACK POINTER
10117  036502  013700  001276                  MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
10118  036506  013701  001456                  MOV     TSTQUE,R1               ;R1 = POINTER TO DEVICE
10119                                  ;SET VOLUME VALID USING SUBROUTINE
10120  036512  004737  060654                  JSR     PC,SETVV                ;GO SET VOLUME VALID
10121  036516  000402                          BR      10$                     ;BRANCH TO 10$ IF NO ERROR
10122  036520  104000                          ERROR                           ;RETURN HERE IF ERROR
```

```
10123  036522  000465                          T72     SET AOE TEST
10124  036524                                          BR      30$                     ;SKIP TEST IF ERROR
10125                                          10$:
10126                                          ;ENABLE DEBUG CLOCK AND LOAD LAST SECTOR ADDRESS, MEMORY ADDRESS AND
10127                                          ;WORD COUNT, THEN LOAD WRITE DATA COMMAND WITH GO SET
10128  036524  012760  041001  000024                MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10129
10130  036532  012760  000000  000032                MOV     #0,RMOF(R0)     ;LOAD RMOF
10131
10132  036540  012760  002035  000006                MOV     #002035,RMDA(R0)        ;LOAD RMDA
10133
10134  036546  012760  001466  000034                MOV     #001466,RMDC(R0)        ;LOAD RMDC
10135
10136  036554  012760  107030  000004                MOV     #BUFFER,RMBA(R0)        ;LOAD RMBA
10137
10138  036562  012760  177244  000002                MOV     #^C<2*256>+1,RMWC(R0)   ;LOAD RMWC
10139
10140  036570  012760  000061  000000                MOV     #WD!GO,RMCS1(R0)        ;LOAD RMCS1
10141  036576  012702  000014                        MOV     #14,R2                  ;R2 = CLOCK COUNT
10142                                                                                 ;CLOCK COUNT 2-05 3-04 14-60...
10143                                          ;CLOCK THE COMMAND SEQUENCER TO GENERATE SET PULSE
10144  036602                                  20$:
10145
10146  036602  012760  141001  000024                MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
10147
10148  036610  012760  041001  000024                MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10149  036616  005302                                DEC     R2
10150  036620  001370                                BNE     20$                     ;ISSUE 2 CLOCKS
10151                                          ;FORCE EBL TO GET TO OVERFLOW ADDRESS
10152
10153  036622  012760  061001  000024                MOV     #DMD!MUR!DBEN!DEBL,RMMR1(R0)    ;LOAD RMMR1
10154
10155  036630  012760  041001  000024                MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10156                                          ;VERIFY THAT ADDRESS OVERFLOW ERROR IS SET
10157
10158  036636  016037  000014  001142                MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
10159  036644  042737  176777  001142                BIC     #^CAOE,$BDDAT
10160  036652  001011                                BNE     30$                     ;BRANCH IF AOE IS SET
10161  036654  010037  001136                        MOV     R0,$BDADR               ;SETUP ERROR MESSAGE
10162  036660  062737  000014  001136                ADD     #RMER1,$BDADR
10163  036666  012737  001000  001140                MOV     #AOE,$GDDAT
10164  036674  104212                                ERROR   212                     ;CANT SET AOE
10165  036676                                  30$:                                   ;END OF TEST
10166
10167                                          ;;*****************************************************************
10168                                          ;*TEST 73        SET RMR TEST
10169
10170                                          ;;*****************************************************************
10171  036676  000004                          T$T73:  SCOPE
10172  036700  012737  000073  001226                MOV     #73,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
10173
10174  036706  000240                                NOP
10175  036710  012737  000024  001120                MOV     #20.,$ICNT      ;20 ITERATIONS
10176  036716  112737  000001  001131                MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10177  036724  012737  036740  001122                MOV     #T73,$LPADR     ;LOAD LOOP ON TEST ADDRESS
10178  036732  012737  036740  001124                MOV     #T73,$LPERR     ;LOAD LOOP ON ERROR ADDRESS
```

```
10179  036740                                  T73:
10180  036740  012706  001100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
10181  036744  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10182  036750  013701  001456                          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10183  036754  010037  001136                          MOV     R0,$BDADR               ;SETUP REGISTER ADDRESS FOR MSG
10184  036760  062737  000014  001136                  ADD     #RMER1,$BDADR
10185  036766  012702  037142                          MOV     #100$,R2                ;INITIALIZE TABLE POINTER
10186  036772                                  10$:
10187                                          ;CLEAR THE DEVICE AND ENABLE DEBUG CLOCK
10188  036772  012760  000040  000010                  MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10189  037000  111160  000010                          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10190
10191  037004  012760  000001  000024                  MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
10192
10193  037012  012760  041001  000024                  MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10194
10195  037020  012760  000000  000014                  MOV     #0,RMER1(R0)    ;LOAD RMER1
10196
10197  037026  012760  000000  00^042                  MOV     #0,RMER2(R0)    ;LOAD RMER2
10198                                          ;SET GO THEN WRITE THE REGISTER SPECIFIED BY THE TABLE
10199
10200  037034  012760  000001  000000                  MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
10201  037042  011203                                  MOV     (R2),R3                 ;GENERATE REGISTER ADDRESS
10202  037044  060003                                  ADD     R0,R3
10203  037046  012713  041001                          MOV     #DMD!MUR!DBEN,(R3)      ;WRITE THE REGISTER
10204                                          ;VERIFY RMR ACCORDING TO TABLE
10205
10206  037052  016037  000014  001142                  MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
10207  037060  042737  177773  001142                  BIC     #^CRMR,$BDDAT
10208  037066  016237  000002  001140                  MOV     2(R2),$GDDAT            ;GET EXPECTED RESULT FROM TABLE
10209  037074  023737  001140  001142                  CMP     $GDDAT,$BDDAT
10210  037102  001411                                  BEQ     30$                     ;BRANCH IF RMR IS OK
10211  037104  011237  001174                          MOV     (R2),$TMP0              ;SAVE TEST REGISTER
10212  037110  032762  000004  000002                  BIT     #RMR,2(R2)
10213  037116  001002                                  BNE     20$                     ;BRANCH IF ERROR SHOULD BE ONE
10214  037120  104213                                  ERROR   213                     ;RMR SET WHEN WRITING REGISTER
10215  037122  000401                                  BR      30$
10216  037124  104214                          20$:    ERROR   214                     ;RMR DID NOT SET
10217
10218  037126                                  30$:
10219                                          ;ADVANCE TABLE POINTER, EXIT IF DONE
10220  037126  062702  000004                          ADD     #4,R2
10221  037132  005712                                  TST     (R2)
10222  037134  100401                                  BMI     40$                     ;EXIT IF ENTRY NEGATIVE
10223  037136  000715                                  BR      10$
10224  037140  000410                          40$:    BR      200$                    ;JUMP OVER TABLE
10225
10226  037142                                  100$:
10227
10228                                          ;TABLE OF REGISTER ADDRESSES AND RMR VALUES
10229
10230  037142  000016                                  .WORD   #RMAS                   ;ATTENTION SUMMARY REG
10231  037144  000000                                  .WORD                           ;RMR = 0
10232
10233  037146  000024                                  .WORD   #RMMR1                  ;MAINTENANCE REG
10234  037150  000000                                  .WORD                           ;RMR = 0
```

```
10235
10236  037152  000006                          .WORD   #RMDA                   ;DISK ADDRESS REG
10237  037154  000004                          .WORD   RMR                     ;RMR = 1
10238
10239  037156  177777                          .WORD   #-1                     ;END OF TABLE
10240  037160  000000                          .WORD
10241
10242  037162                          200$:                                   ;END OF TEST
10243
10244                                  ;;**********************************************************************
10245                                  ;*TEST 74        PGM STATUS CHECK
10246
10247                                  ;;**********************************************************************
10248  037162  000004                  ↑ST74:  SCOPE
10249  037164  012737  000074  001226          MOV     #74,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
10250
10251  037172  000240                          NOP
10252  037174  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
10253  037202  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10254  037210  012737  037224  001122          MOV     #T74,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10255  037216  012737  037224  001124          MOV     #T74,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10256  037224                          T74:
10257  037224  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
10258  037230  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10259  037234  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10260                                  ;CLEAR AND READ DRIVE TYPE AND DRIVE STATUS
10261  037240  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10262  037246  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10263
10264  037252  016037  000026  001174          MOV     RMDT(R0),$TMP0  ;STORE RMDT AT $TMP0
10265
10266  037260  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10267                                  ;OMIT TEST IF DRQ IS ON - ELSE VERIFY THAT PGM IS OFF
10268  037266  032737  004000  001174          BIT     #DRQ,$TMP0
10269  037274  001014                          BNE     10$                     ;BRANCH IF DRQ IS ON
10270  037276  042737  176777  001142          BIC     #↑CPGM,$BDDAT
10271  037304  001410                          BEQ     10$                     ;BRANCH IF PGM IS OFF
10272  037306  005037  001140                  CLR     $GDDAT
10273  037312  010037  001136                  MOV     R0,$BDADR
10274  037316  062737  000012  001134          ADD     #RMDS,$GDADR
10275  037324  104215                          ERROR   215                     ;DRQ IS OFF BUT PGM IS ON
10276  037326                          10$:                                    ;END OF TEST
10277
10278                                  ;;**********************************************************************
10279                                  ;*TEST 75        DPR STATUS CHECK
10280
10281                                  ;;**********************************************************************
10282  037326  000004                  ↑ST75:  SCOPE
10283  037330  012737  000075  001226          MOV     #75,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
10284
10285  037336  000240                          NOP
10286  037340  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
10287  037346  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10288  037354  012737  037370  001122          MOV     #T75,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10289  037362  012737  037370  001124          MOV     #T75,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10290  037370                          T75:
```

```
10291  037370  012706  001100          MOV     #STACK,SP       ;LOAD THE STACK POINTER
10292  037374  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10293  037400  013701  001456          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10294                                  ;CLEAR AND VERIFY THAT DVA IS SET
10295  037404  012760  000040  000010  MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10296  037412  111160  000010          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10297
10298  037416  016037  000000  001142  MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
10299  037424  042737  173777  001142  BIC     #^CDVA,$BDDAT
10300  037432  001006                  BNE     10$                     ;BRANCH IF DVA IS ON
10301  037434  012737  004000  001140  MOV     #DVA,$GDDAT
10302  037442  010037  001136          MOV     R0,$BDADR
10303  037446  104216                  ERROR   216                     ;DVA NOT SET
10304  037450                          10$:
10305                                  ;VERIFY THAT DPR IS SET
10306
10307  037450  016037  000012  001142  MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10308  037456  042737  177377  001142  BIC     #^CDPR,$BDDAT
10309  037464  001011                  BNE     20$
10310  037466  012737  000400  001140  MOV     #DPR,$GDDAT
10311  037474  010037  001136          MOV     R0,$BDADR
10312  037500  062737  000012  001136  ADD     #RMDS,$BDADR
10313  037506  104217                  ERROR   217                     ;DPR NOT SET
10314
10315  037510                          20$:                            ;END OF TEST
10316
10317                                  ;;*******************************************************************
10318                                  ;*TEST 76        PORT REQUEST TEST, PART 1
10319
10320                                  ;;*******************************************************************
10321  037510  000004                  T$T76:  SCOPE
10322  037512  012737  000076  001226  MOV     #76,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
10323
10324  037520  000240                  NOP
10325  037522  012737  000024  001120  MOV     #20.,$ICNT      ;20 ITERATIONS
10326  037530  112737  000001  001131  MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10327  037536  012737  037552  001122  MOV     #T76,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10328  037544  012737  037552  001124  MOV     #T76,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10329  037552                          T76:
10330  037552  012706  001100          MOV     #STACK,SP       ;LOAD THE STACK POINTER
10331  037556  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10332  037562  013701  001456          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10333                                  ;SET VOLUME VALID USING SUBROUTINE
10334  037566  004737  060654          JSR     PC,SETVV        ;GO SET VOLUME VALID
10335  037572  000402                  BR      10$             ;BRANCH TO 10$ IF NO ERROR
10336  037574  104000                  ERROR                   ;RETURN HERE IF ERROR
10337  037576  000434                  BR      20$
10338  037600                          10$:
10339                                  ;EXECUTE A RELEASE TO RESET REQUEST FLOP
10340
10341  037600  012760  000013  000000  MOV     #RLEASE!GO,RMCS1(R0)    ;LOAD RMCS1
10342                                  ;READ RMMR2 AND SKIP TEST IF REQUEST FLOPS AREN'T RESET
10343
10344  037606  016002  000040          MOV     RMMR2(R0),R2    ;STORE RMMR2 AT R2
10345  037612  042702  037777          BIC     #^C<RQA!RQB>,R2
10346  037616  001024                  BNE     20$
```

```
10347                                   ;READ RMCS1 TO SET REQUEST FLOP
10348
10349  037620  016002  000000                   MOV     RMCS1(R0),R2    ;STORE RMCS1 AT R2
10350                                   ;VERIFY THAT REQUEST FLOP IS SET IF PGM IS SET
10351
10352  037624  016005  000012                   MOV     RMDS(R0),R5     ;STORE RMDS AT R5
10353  037630  032705  001000                   BIT     #PGM,R5         ;SEE IF PGM IS SET
10354  037634  001415                           BEQ     20$             ;DONT TEST REQUEST IF PGM IS ZERO
10355
10356  037636  016037  000040  001142         MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
10357  037644  042737  037777  001142         BIC     #^C<RQA!RQB>,$BDDAT
10358  037652  001006                         BNE     20$                     ;BRANCH IF REQUEST IS SET
10359  037654  010037  001136                 MOV     R0,$BDADR
10360  037660  062737  000040  001136         ADD     #RMMR2,$BDADR
10361  037666  104220                         ERROR   220                     ;CANT SET REQUEST BY RMCS1
10362  037670                          20$:
10363
10364                                   ;;**********************************************************************
10365                                   ;*TEST 77        PORT REQUEST TEST, PART 2
10366
10367                                   ;;**********************************************************************
10368  037670  000004                   T$T77:  SCOPE
10369  037672  012737  000077  001226           MOV     #77,$TESTN      ;;SET TEST NUMBER IN APT MAIL BOX
10370
10371  037700  000240                           NOP
10372  037702  012737  000024  001120           MOV     #20.,$ICNT      ;20 ITERATIONS
10373  037710  112737  000001  001131           MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10374  037716  012737  037732  001122           MOV     #T77,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10375  037724  012737  037732  001124           MOV     #T77,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10376  037732                          T77:
10377  037732  012706  001100                   MOV     #STACK,SP       ;LOAD THE STACK POINTER
10378  037736  013700  001276                   MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10379  037742  013701  001456                   MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10380                                   ;SET VOLUME VALID USING SUBROUTINE
10381  037746  004737  060654                   JSR     PC,SETVV        ;GO SET VOLUME VALID
10382  037752  000402                           BR      10$             ;BRANCH TO 10$ IF NO ERROR
10383  037754  104000                           ERROR                   ;RETURN HERE IF ERROR
10384  037756  000435                           BR      20$
10385  037760                          10$:
10386                                   ;EXECUTE A RELEASE TO RESET REQUEST FLOP
10387
10388  037760  012760  000013  000000           MOV     #RLEASE!GO,RMCS1(R0)    ;LOAD RMCS1
10389                                   ;READ RMMR2 AND SKIP TEST IF REQUEST FLOPS ARENT RESET
10390
10391  037766  016002  000040                   MOV     RMMR2(R0),R2    ;STORE RMMR2 AT R2
10392  037772  042702  037777                   BIC     #^C<RQA!RQB>,R2
10393  037776  001025                           BNE     20$
10394                                   ;WRITE THE ATTENTION SUMMARY REGISTER TO SET REQUEST FLOP
10395
10396  040000  012760  177777  000016           MOV     #-1,RMAS(R0)    ;LOAD RMAS
10397                                   ;VERIFY THAT REQUEST FLOP IS SET IF PGM IS SET
10398
10399  040006  016005  000012                   MOV     RMDS(R0),R5     ;STORE RMDS AT R5
10400  040012  032705  001000                   BIT     #PGM,R5         ;SEE IF PGM IS SET
10401  040016  001415                           BEQ     20$             ;DONT TEST REQUEST IF PGM IS ZERO
10402
```

```
10403  040020  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
10404  040026  042737  037777  001142          BIC     #^C<RQA!RQB>,$BDDAT
10405  040034  001006                          BNE     20$
10406  040036  010037  001136                  MOV     R0,$BDADR
10407  040042  062737  000040  001136          ADD     #RMMR2,$BDADR
10408  040050  104221                          ERROR   221                     ;CANT SEE REQUEST BY RMAS
10409  040052                          20$:
10410
10411                                  ;;*****************************************************************
10412                                  ;*TEST 100       PORT REQUEST TEST, PART 3
10413
10414                                  ;;*****************************************************************
10415  040052  000001                  T100:   SCOPE
10416  040054  012737  000100  001226          MOV     #100,$TESTN             ;;SET TEST NUMBER IN APT MAIL BOX
10417
10418  040062  000240                          NOP
10419  040064  012737  000024  001120          MOV     #20.,$ICNT              ;20 ITERATIONS
10420  040072  112737  000001  001131          MOVB    #1,$ERMAX               ;ONE ERROR ALLOWED
10421  040100  012737  040114  001122          MOV     #T100,$LPADR    ;LOAD LOOP ON TEST ADDRESS
10422  040106  012737  040114  001124          MOV     #T100,$LPERR    ;LOAD LOOP ON ERROR ADDRESS
10423  040114                          T100:
10424  040114  012706  001100                  MOV     #STACK,SP               ;LOAD THE STACK POINTER
10425  040120  013700  001276                  MOV     $BASE,R0                ;R0 = UNIBUS ADDRESS OF UUT
10426  040124  013701  001456                  MOV     TSTQUE,R1               ;R1 = POINTER TO DEVICE
10427                                  ;SET VOLUME VALID USING SUBROUTINE
10428  040130  004737  060654                  JSR     PC,SETVV                ;GO SET VOLUME VALID
10429  040134  000402                          BR      10$                     ;BRANCH TO 10$ IF NO ERROR
10430  040136  104000                          ERROR                           ;RETURN HERE IF ERROR
10431  040140  000435                          BR      20$
10432  040142                          10$:
10433                                  ;EXECUTE A RELEASE COMMAND TO RESET REQUEST FLOP
10434
10435  040142  012760  000013  000000          MOV     #RLEASE!GO,RMCS1(R0)    ;LOAD RMCS1
10436                                  ;READ RMMR2 AND SKIP TEST IF REQUEST FLOPS ARENT RESET
10437
10438  040150  016002  000040                  MOV     RMMR2(R0),R2    ;STORE RMMR2 AT R2
10439  040154  042702  037777                  BIC     #^C<RQA!RQB>,R2
10440  040160  001025                          BNE     20$
10441                                  ;WRITE RMDA TO SET REQUEST FLOP
10442
10443  040162  012760  000000  000006          MOV     #0,RMDA(R0)             ;LOAD RMDA
10444                                  ;VERIFY THAT REQUEST FLOP IS SET IF PGM IS SET
10445
10446  040170  016005  000012                  MOV     RMDS(R0),R5             ;STORE RMDS AT R5
10447  040174  032705  001000                  BIT     #PGM,R5                 ;SEE IF PGM IS SET
10448  040200  001415                          BEQ     20$                     ;DONT TEST REQUEST IF PGM IS ZERO
10449
10450  040202  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
10451  040210  042737  037777  001142          BIC     #^C<RQA!RQB>,$BDDAT
10452  040216  001006                          BNE     20$
10453  040220  010037  001136                  MOV     R0,$BDADR
10454  040224  062737  000040  001136          ADD     #RMMR2,$BDADR
10455  040232  104222                          ERROR   222                     ;CANT SET REQUEST BY RMDA
10456
10457  040234                          20$:
10458
```

```
10459                                   ;;*****************************************************************
10460                                   ;*TEST 101       RELEASE TEST
10461                                   ;;*****************************************************************
10462
10463  040234  000004                   TST101: SCOPE
10464  040236  012737  000101  001226           MOV     #101,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10465
10466  040244  000240                           NOP
10467  040246  012737  000024  001120           MOV     #20.,$ICNT      ;20 ITERATIONS
10468  040254  112737  000001  001131           MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10469  040262  012737  040276  001122           MOV     #T101,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10470  040270  012737  040276  001124           MOV     #T101,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10471  040276                           T101:
10472  040276  012706  001100                   MOV     #STACK,SP       ;LOAD THE STACK POINTER
10473  040302  013700  001276                   MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10474  040306  013701  001456                   MOV     TSTGUE,R1       ;R1 = POINTER TO DEVICE
10475                                   ;REQUEST FLOP SHOULD SET WHEN WRITING RMCS1
10476                                   ;SET VOLUME VALID USING SUBROUTINE
10477  040312  004737  060654                   JSR     PC,SETVV        ;GO SET VOLUME VALID
10478  040316  000402                           BR      10$             ;BRANCH TO 10$ IF NO ERROR
10479  040320  104000                           ERROR                   ;RETURN HERE IF ERROR
10480  040322  000454                           BR      40$
10481  040324                           10$:
10482                                   ;EXECUTE A RELEASE COMMAND
10483
10484  040324  012760  041001  000024           MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
10485
10486  040332  012760  000013  000000           MOV     #RLEASE!GO,RMCS1(R0)    ;LOAD RMCS1
10487  040340  012702  000002                   MOV     #2,R2
10488  040344                           20$:
10489
10490  040344  012760  141001  000024           MOV     #DMD!DBEN!MUR!DBCK,RMMR1(R0)    ;LOAD RMMR1
10491
10492  040352  012760  041001  000024           MOV     #DMD!DBEN!MUR,RMMR1(R0) ;LOAD RMMR1
10493  040360  005302                           DEC     R2
10494  040362  001370                           BNE     20$                     ;ISSUE 2 CLOCKS
10495                                   ;VERIFY REQUEST FLOPS ARE RESET
10496
10497  040364  016037  000026  001174           MOV     RMDT(R0),$TMP0  ;STORE RMDT AT $TMP0
10498
10499  040372  016037  000040  001142           MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
10500  040400  042737  037777  001142           BIC     #^C<RQA!RQB>,$BDDAT
10501  040406  001422                           BEQ     40$                     ;BRANCH IF REQUESTS ARE RESET
10502  040410  032737  004000  001174           BIT     #DRQ,$TMP0
10503  040416  001410                           BEQ     30$                     ;BRANCH IF SINGLE PORT DEVICE
10504  040420  032737  100000  001142           BIT     #RQA,$BDDAT
10505  040426  001412                           BEQ     40$                     ;BRANCH IF RQA IS RESET
10506  040430  032737  040000  001142           BIT     #RQB,$BDDAT
10507  040436  001406                           BEQ     40$                     ;BRANCH IF RQB IS RESET
10508  040440                           30$:
10509                                   ;DRQ IS ZERO AND A REQUEST FLOP IS ON, OR, DRQ IS ONE AND
10510                                   ;BOTH REQUEST FLOPS ARE ON
10511  040440  010037  001136                   MOV     R0,$BDADR
10512  040444  062737  000040  001136           ADD     #RMMR2,$BDADR
10513  040452  104223                           ERROR   223                     ;REQUEST FLOP NOT RESET
10514  040454                           40$:                                    ;END OF TEST
```

```
10515
10516                                   ;;**********************************************************************
10517                                   ;*TEST 102       WRITE ATA TEST
10518
10519                                   ;;**********************************************************************
10520  040454  000004                   TST102: SCOPE
10521  040456  012737  000102  001226           MOV     #102,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10522
10523  040464  000240                           NOP
10524  040466  012737  000024  001120           MOV     #20.,$ICNT      ;20 ITERATIONS
10525  040474  112737  000001  001131           MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10526  040502  012737  040516  001122           MOV     #T102,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10527  040510  012737  040516  001124           MOV     #T102,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10528  040516                           T102:
10529  040516  012706  001100                   MOV     #STACK,SP       ;LOAD THE STACK POINTER
10530  040522  013700  001276                   MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10531  040526  013701  001456                   MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10532                                   ;CLEAR THE DEVICE, SET DIAGNOSTIC MODE THEN SET UNIT READY
10533  040532  012760  000040  000010           MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10534  040540  111160  000010                   MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10535
10536  040544  012760  000001  000024           MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
10537
10538  040552  012760  000000  000014           MOV     #0,RMER1(R0)    ;LOAD RMER1
10539
10540  040560  012760  000000  000042           MOV     #0,RMER2(R0)    ;LOAD RMER2
10541
10542  040566  012760  001001  000024           MOV     #DMD!MUR,RMMR1(R0)      ;LOAD RMMR1
10543                                   ;WRITE THE ATTENTION SUMMARY REGISTER
10544  040574  111102                           MOVB    (R1),R2                 ;ASSEMBLE THE ATA BIT IN R3
10545  040576  042702  177770                   BIC     #^CUNTMSK,R2
10546  040602  116203  066242                   MOVB    ATNTBL(R2),R3
10547  040606  042703  177400                   BIC     #^CATNMSK,R3
10548
10549  040612  010360  000016                   MOV     R3,RMAS(R0)     ;LOAD RMAS
10550                                   ;READ RMDS AND VERIFY THAT ATA IS RESET
10551
10552  040616  016037  000012  001142           MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10553  040624  042737  077777  001142           BIC     #^CATA,$BDDAT
10554  040632  001411                           BEQ     10$                     ;BRANCH IF ATA IS RESET
10555  040634  010037  001136                   MOV     R0,$BDADR
10556  040640  062737  000012  001136           ADD     #RMDS,$BDADR
10557  040646  005037  001140                   CLR     $GDDAT
10558  040652  104224                           ERROR   224                     ;CANT CLEAR ATA
10559  040654  000417                           BR      20$
10560  040656                           10$:
10561                                   ;READ RMAS AND VERIFY ATA IS RESET
10562
10563  040656  016037  000016  001142           MOV     RMAS(R0),$BDDAT ;STORE RMAS AT $BDDAT
10564  040664  005103                           COM     R3
10565  040666  040337  001142                   BIC     R3,$BDDAT
10566  040672  001410                           BEQ     20$                     ;BRANCH IF ATA IS RESET
10567  040674  005037  001140                   CLR     $GDDAT
10568  040700  010037  001136                   MOV     R0,$BDADR
10569  040704  062737  000016  001136           ADD     #RMAS,$BDADR
10570  040712  104225                           ERROR   225                     ;RMAS ATA NOT ZERO
```

```
10571  040714                          20$:                                    ;END OF TEST
10572
10573                                  ;;*****************************************************************
10574                                  ;*TEST 103       RESET ATA BY GO TEST
10575
10576                                  ;;*****************************************************************
10577  040714  000004                  TST103: SCOPE
10578  040716  012737  000103  001226          MOV     #103,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10579
10580  040724  000240                          NOP
10581  040726  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
10582  040734  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10583  040742  012737  040756  001122          MOV     #T103,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10584  040750  012737  040756  001124          MOV     #T103,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10585  040756                          T103:
10586  040756  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
10587  040762  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10588  040766  013701  001456                  MOV     TSTOUE,R1       ;R1 = POINTER TO DEVICE
10589  040772  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10590  041000  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10591
10592  041004  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
10593
10594  041012  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
10595
10596  041020  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
10597
10598  041026  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10599                                  ;WITH DEBUG CLOCK ENABLED, SET GO AND VERIFY THAT ATA IS RESET
10600
10601  041034  012760  000001  000000          MOV     #GO,RMCS1(R0)   ;LOAD RMCS1
10602
10603  041042  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10604  041050  042737  077777  001142          BIC     #^CATA,$BDDAT
10605  041056  001410                          BEQ     10$             ;BRANCH IF ATA IS RESET
10606  041060  005037  001140                  CLR     $GDDAT
10607  041064  010037  001136                  MOV     R0,$BDADR
10608  041070  062737  000012  001136          ADD     #RMDS,$BDADR
10609  041076  104226                          ERROR   226             ;CANT RESET ATA WITH GO
10610
10611  041100                          10$:                            ;END OF TEST
10612
10613                                  ;;*****************************************************************
10614                                  ;*TEST 104       UNIT READY ATA TEST
10615
10616                                  ;;*****************************************************************
10617  041100  000004                  TST104: SCOPE
10618  041102  012737  000104  001226          MOV     #104,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10619
10620  041110  000240                          NOP
10621  041112  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
10622  041120  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10623  041126  012737  041142  001122          MOV     #T104,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10624  041134  012737  041142  001124          MOV     #T104,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10625  041142                          T104:
10626  041142  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
```

```
10627  041146  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10628  041152  013701  001456          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10629                                ;SET DIAGNOSTIC MODE AND CLEAR ATA
10630  041156  012760  000040  000010  MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10631  041164  111160  000010          MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10632
10633  041170  012760  000001  000024  MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
10634
10635  041176  012760  000000  000014  MOV     #0,RMER1(R0)    ;LOAD RMER1
10636
10637  041204  012760  000000  000042  MOV     #0,RMER2(R0)    ;LOAD RMER2
10638
10639  041212  012760  177777  000016  MOV     #-1,RMAS(R0)    ;LOAD RMAS
10640                                ;SET UNIT READY AND VERIFY ATA IS SET
10641
10642  041220  012760  001001  000024  MOV     #DMD!MUR,RMMR1(R0)      ;LOAD RMMR1
10643
10644  041226  016037  000012  001142  MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10645  041234  042737  077777  001142  BIC     #^CATA,$BDDAT
10646  041242  001011                  BNE     10$
10647  041244  010037  001136          MOV     R0,$BDADR               ;BRANCH IF ATA IS SET
10648  041250  062737  000012  001136  ADD     #RMDS,$BDADR
10649  041256  012737  100000  001140  MOV     #ATA,$GDDAT
10650  041264  104227                  ERROR   227                     ;ATA NOT SET BY DI READY
10651  041266                        10$:
10652                                ;CLEAR ATA, RESET UNIT READY, AND VERIFY ATA IS SET
10653
10654  041266  012760  177777  000016  MOV     #-1,RMAS(R0)    ;LOAD RMAS
10655
10656  041274  012760  000001  000024  MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
10657
10658  041302  016037  000012  001142  MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10659  041310  042737  077777  001142  BIC     #^CATA,$BDDAT
10660  041316  001011                  BNE     20$
10661  041320  010037  001136          MOV     R0,$BDADR
10662  041324  062737  000012  001136  ADD     #RMDS,$BDADR
10663  041332  012737  100000  001140  MOV     #ATA,$GDDAT
10664  041340  104230                  ERROR   230                     ;ATA NOT SET BY 10 READY
10665
10666  041342                        20$:                            ;END OF TEST
10667
10668
10669                                ;;*****************************************************************
10670                                ;*TEST 105       ERROR ATA TEST
10671
10672  041342  000004                ;;*****************************************************************
10673  041344  012737  000105  001226  TST105: SCOPE
10674                                MOV     #105,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10675  041352  000240                NOP
10676  041354  012737  000024  001120  MOV     #20.,$ICNT      ;20 ITERATIONS
10677  041362  112737  000001  001131  MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10678  041370  012737  041404  001122  MOV     #T105,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10679  041376  012737  041404  001124  MOV     #T105,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10680  041404                          05:
10681  041404  012706  001100          MOV     #STACK,SP       ;LOAD THE STACK POINTER
10682  041410  013700  001276          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
```

```
10683  041414  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10684                                  ;CLEAR THE DEVICE AND RESET ATTENTION
10685  041420  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10686  041426  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10687
10688  041432  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
10689
10690  041440  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
10691
10692  041446  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
10693
10694  041454  012760  177777  000016          MOV     #-1,RMAS(R0)    ;LOAD RMAS
10695                                 ;WRITE ONES IN ERROR REGISTER 1 AND VERIFY ATA IS SET
10696
10697  041462  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
10698
10699  041470  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10700  041476  042737  077777  001142          BIC     #^CATA,$BDDAT
10701  041504  001011                          BNE     10$
10702  041506  012737  100000  001140          MOV     #ATA,$GDDAT
10703  041514  010037  001136                  MOV     R0,$BDADR
10704  041520  062737  000012  001136          ADD     #RMDS,$BCADR
10705  041526  104231                          ERROR   231                     ;ATA NOT SET BY COMP ERROR
10706
10707  041530                                 10$:                            ;END OF TEST
10708
10709                                  ;;*****************************************************************
10710                                  ;*TEST 106       REGISTER TRANSFER ATA TEST
10711
10712                                  ;;*****************************************************************
10713  041530  000004                  T$T106: SCOPE
10714  041532  012737  000106  001226          MOV     #106,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10715  041540  000240                          NOP
10716  041542  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
10717  041550  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10718  041556  012737  041572  001122          MOV     #T106,$LPADR    ;LOAD LOOP ON TEST ADDRESS
10719  041564  012737  041572  001124          MOV     #T106,$LPERR    ;LOAD LOOP ON ERROR ADDRESS
10720  041572                          T106:
10721  041572  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
10722  041576  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10723  041602  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10724  041606  012702  041742                  MOV     #100$,R2                ;INITIALIZE TABLE ADDRESS
10725                                 ;FORCE COMPOSITE ERROR AND RESET ATA
10726  041612                          5$:
10727  041612  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10728  041620  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10729
10730  041624  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
10731
10732  041632  012760  177777  000014          MOV     #-1,RMER1(R0)   ;LOAD RMER1
10733
10734  041640  012760  177777  000016          MOV     #-1,RMAS(R0)    ;LOAD RMAS
10735                                 ;WRITE THE TEST REGISTER AND VERIFY ATA
10736  041646  011203                          MOV     (R2),R3                 ;GENERATE REGISTER ADDRESS
10737  041650  060003                          ADD     R0,R3
10738  041652  005013                          CLR     (R3)
```

```
10739
10740  041654  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10741  041662  042737  077777  001142          BIC     #^CATA,$BDDAT
10742  041670  016237  000002  001140          MOV     2(R2),$GDDAT
10743  041676  023737  001140  001142          CMP     $GDDAT,$BDDAT
10744  041704  001410                          BEQ     10$                     ;BRANCH IF ATA IS OK
10745  041706  010337  001174                  MOV     R3,$TMP0
10746  041712  010037  001136                  MOV     R0,$BDADR
10747  041716  062737  000012  001136          ADD     #RMDS,$BDADR
10748  041724  104232                          ERROR   232                     ;ATA INCORRECT FOR REG WRITTEN
10749  041726                          10$:
10750                                  ;MOVE TABLE POINTER - EXIT IF DONE
10751  041726  062702  000004                  ADD     #4,R2
10752  041732  005712                          TST     (R2)
10753  041734  100401                          BMI     20$                     ;EXIT IF ENTRY MINUS
10754  041736  000725                          BR      5$
10755  041740  000410                  20$:    BR      200$                    ;JUMP OVER TABLE
10756
10757  041742                          100$:
10758                                  ;TABLE OF REGISTER ADDRESSES AND ATA BITS
10759  041742  000016                          .WORD   RMAS
10760  041744  000000                          .WORD
10761
10762  041746  000006                          .WORD   RMDS
10763  041750  100000                          .WORD   ATA
10764
10765  041752  000000                          .WORD   RMCS1
10766  041754  000000                          .WORD
10767
10768  041756  177777                          .WORD   -1                      ;END OF TABLE
10769  041760  000000                          .WORD
10770
10771  041762                          200$:                                   ;END OF TEST
10772
10773
10774                                  ;;*****************************************************************
10775                                  ;*TEST 107      P SET ATA TEST
10776
10777                                  ;;*****************************************************************
10778  041762  000004                  TST107: SCOPE
10779  041764  012737  000107  001226          MOV     #107,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10780
10781  041772  000240                          NOP
10782  041774  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
10783  042002  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10784  042010  012737  042024  001122          MOV     #T107,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10785  042016  012737  042024  001124          MOV     #T107,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10786  042024                          T107:
10787  042024  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
10788  042030  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10789  042034  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10790  042040  012702  042202                  MOV     #100$,R2        ;INITIALIZE TABLE POINTER
10791
10792  042044                          10$:
10793                                  ;SET VOLUME VALID USING SUBROUTINE
10794  042044  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
```

```
10795  042050  000402                        BR      20$             ;BRANCH TO 20$ IF NO ERROR
10796  042052  104000                        ERROR                   ;RETURN HERE IF ERROR
10797  042054  000451                        BR      50$
10798  042056                          20$:
10799                                  ;EXECUTE THE COMMAND FROM THE TABLE
10800
10801  042056  012760  041001  000024        MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10802  042064  011203                        MOV     (R2),R3         ;GET FUNCTION CODE
10803  042066  052703  000001                BIS     #GO,R3
10804
10805  042072  010360  000000                MOV     R3,RMCS1(R0)    ;LOAD RMCS1
10806  042076  012703  000003                MOV     #3,R3
10807  042102                          30$:
10808
10809  042102  012760  141001  000024        MOV     #DMD!MUR!DBEN!DECK,RMMR1(R0)    ;LOAD RMMR1
10810
10811  042110  012760  041001  000024        MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10812  042116  005303                        DEC     R3
10813  042120  001370                        BNE     30$
10814                                  ;VERIFY THAT ATA IS SET
10815
10816  042122  016037  000012  001142        MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
10817  042130  042737  077777  001142        BIC     #^CATA,$BDDAT
10818  042136  001013                        BNE     40$
10819  042140  010037  001136                MOV     R0,$BDADR
10820  042144  062737  000012  001136        ADD     #RMDS,$BDADR
10821  042152  012737  100000  001140        MOV     #ATA,$GDDAT
10822  042160  011237  001174                MOV     (R2),$TMP0
10823  042164  104233                        ERROR   233             ;ATA NOT SET BY SEQUENCER
10824  042166                          40$:
10825                                  ;ADVANCE TABLE POINTER-EXIT IF DONE
10826  042166  062702  000002                ADD     #2,R2
10827  042172  005712                        TST     (R2)
10828  042174  100401                        BMI     50$
10829  042176  000722                        BR      10$
10830  042200  000403                50$:    BR      200$            ;JUMP OVER TABLE
10831
10832  042202                          100$:
10833                                  ;TABLE OF FUNCTION CODES
10834
10835  042202  000014                        .WORD   OFFSET
10836
10837  042204  000016                        .WORD   RTC
10838
10839  042206  177777                        .WORD   -1              ;END OF TABLE
10840  042210                          200$:
10841
10842                                  ;;*****************************************************************
10843                                  ;*TEST 110       SET WLE TEST
10844
10845                                  ;;*****************************************************************
10846  042210  000004                  TST110: SCOPE
10847  042212  012737  000110  001226        MOV     #110,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10848
10849  042220  000240                        NOP
10850  042222  012737  000024  001120        MOV     #20.,$ICNT      ;20 ITERATIONS
```

```
10851  042230  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10852  042236  012737  042252  001122          MOV     #T110,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10853  042244  012737  042252  001124          MOV     #T110,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10854  042252                              T110:
10855  042252  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
10856  042256  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10857  042262  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10858  042266  012702  042462                  MOV     #100$,R2        ;INITIALIZE TABLE POINTER
10859  042272                              10$:
10860                                      ;SET VOLUME VALID USING SUBROUTINE
10861  042272  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
10862  042276  000402                          BR      20$             ;BRANCH TO 20$ IF NO ERROR
10863  042300  104000                          ERROR                   ;RETURN HERE IF ERROR
10864  042302  000466                          BR      50$
10865  042304                              20$:
10866                                      ;ENABLE DEBUG CLOCK AND SET WRITE PROTECT ACCORDING TO TABLE
10867  042304  016203  000002                  MOV     2(R2),R3        ;GET WRITE PROTECT FROM TABLE
10868  042310  052703  041001                  BIS     #DMD!MUR!DBEN,R3        ;SET OTHER MAINT BITS
10869
10870  042314  010360  000024                  MOV     R3,RMMR1(R0)    ;LOAD RMMR1
10871                                      ;LOAD AND EXECUTE THE COMMAND FROM THE TABLE
10872  042320  011204                          MOV     (R2),R4         ;GET FUNCTION CODE FROM TABLE
10873  042322  052704  000001                  BIS     #GO,R4          ;SET GO
10874
10875  042326  010460  000000                  MOV     R4,RMCS1(R0)    ;LOAD RMCS1
10876  042332  012705  000002                  MOV     #2,R5           ;R5=CLOCK COUNT
10877  042336  052703  100000              30$:BIS     #DBCK,R3        ;SET CLOCK
10878
10879  042342  010360  000024                  MOV     R3,RMMR1(R0)    ;LOAD RMMR1
10880  042346  042703  100000                  BIC     #DBCK,R3        ;RESET CLOCK
10881
10882  042352  010360  000024                  MOV     R3,RMMR1(R0)    ;LOAD RMMR1
10883  042356  005305                          DEC     R5
10884  042360  001366                          BNE     30$             ;ISSUE 2 CLOCKS
10885                                  ;VERIFY THAT WRITE LOCK ERROR IS ACCORDING TO TABLE
10886
10887  042362  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
10888  042370  042737  173777  001142          BIC     #^CWLE,$BDDAT
10889  042376  026237  000004  001142          CMP     4(R2),$BDDAT
10890  042404  001417                          BEQ     40$             ;BRANCH IF WLE IS OK
10891  042406  016237  000004  001140          MOV     4(R2),$GDDAT    ;SAVE DATA FOR ERROR MSG
10892  042414  010037  001136                  MOV     R0,$BDADR
10893  042420  062737  000014  001136          ADD     #RMER1,$BDADR
```

```
10894  042426  011237  001174              MOV     (R2),$TMP0      ;$TMP0=FUNCTION CODE
10895  042432  016237  000002  001176      MOV     2(R2),$TMP1     ;$TMP1=WRITE PROTECT
10896  042440  104234                      ERROR   234             ;WLE INCORRECT
10897  042442  000406                      BR      50$
10898  042444                          40$:
10899                                  ;ADVANCE TABLE POINTER TO NEXT FUNCTION CODE-EXIT IF DONE
10900  042444  062702  000006              ADD     #6,R2
10901  042450  005762  000002              TST     2(R2)
10902  042454  100401                      BMI     50$
10903  042456  000705                      BR      10$             ;REPEAT TEST
10904
10905  042460  000416                  50$:    BR      200$            ;JUMP OVEP TABLE
10906
10907  042462                          100$:
10908
10909                                  ;TABLE OF FUNCTION CODES, WRITE PROTECT AND WRITE LOCK ERRORS
10910
10911  042462  000060                      .WORD   WD              ;WRITE DATA COMMAND
10912  042464  000010                      .WORD   MWP             ;WRITE PROTECT ON
10913  042466  004000                      .WORD   WLE             ;WRITE LOCK ERROR ONE
10914
10915  042470  000060                      .WORD   WD              ;WRITE DATA COMMAND
10916  042472  000000                       WORD                   ;MWP OFF
10917  042474  000000                      .WORD                   ;WLE OFF
10918
10919  042476  000070                      .WORD   RD              ;READ DATA COMMAND
10920  042500  000010                      .WORD   MWP             ;MWP ON
10921  042502  000000                      .WORD                   ;WLE OFF
10922
10923  042504  000020                      .WORD   RIP             ;READ IN PRESET COMMAND
10924  042506  000010                      .WORD   MWP             ;MWP ON
10925  042510  000000                      .WORD                   ;WLE OFF
10926
10927  042512  000000                      .WORD                   ;END OF TABLE
10928  042514  177777                      .WORD   -1
10929
10930  042516                          200$:                       ;END OF TEST
10931
10932                                  ;;*****************************************************************
10933                                  ;*TEST 111      EXCEPTION TEST
10934
10935                                  ;;*****************************************************************
10936  042516  000004                  ST111:  SCOPE
10937  042520  012737  000111  001226          MOV     #111,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
10938
10939                                  ;WITH OCCUPIED SET, EACH OF THE FOLLOWING ERRORS SHOULD CAUSE AN
10940                                  ;EXCEPTION:
10941                                  ;
10942                                  ;       PAR, IF RUN AND GO IS SET
10943                                  ;       RMR, IF RUN AND GO IS SET
10944                                  ;       ILR, IF RUN AND GO IS SET
10945                                  ;       DCK
10946                                  ;       HCE
10947                                  ;       HCRC
10948                                  ;       FER
10949                                  ;       OPI
```

```
10950
10951  042526  000240                          NOP
10952  042530  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
10953  042536  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
10954  042544  012737  042560  001122          MOV     #T111,$LPADR  ;LOAD LOOP ON TEST ADDRESS
10955  042552  012737  042560  001124          MOV     #T111,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
10956  042560                          T111:
10957  042560  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
10958  042564  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
10959  042570  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
10960  042574  012702  043054                  MOV     #100$,R2        ;INITIALIZE TABLE POINTER
10961  042600                          10$:
10962                                  ;INITIALIZE AND VERIFY THAT EXCEPTION IS RESET
10963  042600  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
10964  042606  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
10965
10966  042612  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
10967  042620  042737  167777  001142          BIC     #^CREX,$BDDAT
10968  042626  001410                          BEQ     20$             ;BRANCH IF EXCEPTION IS 0
10969  042630  010037  001136                  MOV     R0,$BDADR
10970  042634  062737  000024  001136          ADD     #RMMR1,$BDADR
10971  042642  005037  001140                  CLR     $GDDAT
10972  042646  104235                          ERROR   235             ;CANT CLEAR EXCEPTION
10973  042650                          20$:
10974                                  ;SET VOLUME VALID USING SUBROUTINE
10975  042650  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
10976  042654  000402                          BR      30$             ;BRANCH TO 30$ IF NO ERROR
10977  042656  104000                          ERROR                   ;RETURN HERE IF ERROR
10978  042660  000474                          BR      60$
10979  042662                          30$:
10980                                  ;EXECUTE A WRITE DATA COMMAND TO SET OCCUPIED, RUN AND GO
10981
10982  042662  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
10983
10984  042670  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
10985
10986  042676  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10987
10988  042704  012760  000061  000000          MOV     #WD!GO,RMCS1(R0)        ;LOAD RMCS1
10989  042712  012703  000002                  MOV     #2,R3
10990  042716                          40$:
10991
10992  042716  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
10993
10994  042724  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
10995  042732  005303                          DEC     R3
10996  042734  001370                          BNE     40$             ;ISSUE 2 CLOCKS
10997                                  ;LOAD ERROR REGISTER WITH ENTRY FROM TABLE AND VERIFY THAT EXCEPTION IS SET
10998
10999  042736  011260  000014                  MOV     (R2),RMER1(R0)  ;LOAD RMER1
11000  042742  012737  000200  001524          MOV     #200,WATCH      ;SET WATCHDOG TIMER VALUE
11001  042750  004777  136552                  JSR     PC,@CLOCK       ;START THE CLOCK
11002  042754                          45$:
11003
11004  042754  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
11005  042762  042737  167777  001142          BIC     #^CREX,$BDDAT
```

```
11006  042770  001021                          BNE     50$
11007  042772  005737  001524                  TST     WATCH           ;HAS CLOCK EXPIRED ??
11008  042776  001366                          BNE     45$             ;NO - TAKE ANOTHER SAMPLE
11009  043000  004777  136524                  JSR     PC,@STOP        ;STOP THE CLOCK
11010  043004  012737  010000  001140          MOV     #REX,$GDDAT
11011  043012  010037  001136                  MOV     R0,$BDADR
11012  043016  062737  000024  001136          ADD     #RMMR1,$BDADR
11013  043024  011237  001174                  MOV     (R2),$TMP0
11014  043030  104236                          ERROR   236             ;CANT SET EXCEPTION
11015  043032  000407                          BR      60$
11016  043034                          50$:
11017                                   ;ADVANCE TABLE POINTER-EXIT IF DONE
11018  043034  004777  136470                  JSR     PC,@STOP        ;STOP THE CLOCK
11019  043040  062702  000002                  ADD     #2,R2
11020  043044  005712                          TST     (R2)
11021  043046  001401                          BEQ     60$
11022  043050  000653                          BR      10$
11023  043052  000402                  60$:    BR      200$            ;JUMP OVER TABLE
11024
11025  043054                          100$:
11026                                   ;PRESENTLY, THE TABLE HAS ONLY ONE ENTRY, THE TEST USING RMR.  THE
11027                                   ;TABLE SHOULD BE EXPANDED TO TEST ALL THE CONDITIONS LISTED ABOVE IF
11028                                   ;A HARDWARE CHANGE IS MADE SUCH THAT IT IS POSSIBLE TO WRITE ERROR
11029                                   ;REGISTER 1 WITH GO SET.
11030
11031  043054  000004                          .WORD   RMR             ;RMR IS CAUSED BY HARDWARE
11032
11033  043056  000000                          .WORD                   ;END OF TABLE
11034  043060                          200$:                           ;END OF TEST
11035
11036                                   ;;*****************************************************************
11037                                   ;*TEST 112       SET OPI TEST
11038                                   ;;*****************************************************************
11039
11040  043060  000004                  ↑ST112: SCOPE
11041  043062  012737  000112  001226          MOV     #112,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
11042
11043  043070  000240                          NOP
11044  043072  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
11045  043100  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
11046  043106  012737  043122  001122          MOV     #↑T112,$LOOPADR ;LOAD LOOP ON TEST ADDRESS
11047  043114  012737  043122  001124          MOV     #T112,$LPERR    ;LOAD LOOP ON ERROR ADDRESS
11048  043122
11049  043122  012706  001100          T112:   MOV     #STACK,SP       ;LOAD THE STACK POINTER
11050  043126  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
11051  043132  013701  001456                  MOV     ISTQUE,R1       ;R1 = POINTER TO DEVICE
11052  043136  005002                          CLR     R2              ;INITIALIZE FUNCTION CODE
11053  043140  010037  001136                  MOV     R0,$BDADR       ;SETUP ERROR MSG
11054  043144  062737  000014  001136          ADD     #RMER1,$BDADR
11055  043152                          10$:
11056                                   ;CLEAR AND VERIFY OPI IS RESET
11057  043152  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
11058  043160  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
11059
11060  043164  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
11061  043172  042737  157777  001142          BIC     #↑COPI,$BDDAT
```

```
11062  043200  001403                        BEQ     20$                 ;BRANCH IF OPI IS ZERO
11063  043202  005037  001140                CLR     $GDDAT
11064  043206  104237                        ERROR   237                 ;CANT CLEAR OPI
11065  043210                          20$:
11066                                  ;EXECUTE THE FUNCTION CODE AND VERIFY OPI IS SET
11067
11068  043210  012760  000001  000024        MOV     #DMD,RMMR1(R0)      ;LOAD RMMR1
11069
11070  043216  012760  040001  000024        MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11071  043224  010203                        MOV     R2,R3               ;SET GO
11072  043226  052703  000001                BIS     #GO,R3
11073
11074  043232  010360  000000                MOV     R3,RMCS1(R0)        ;LOAD RMCS1
11075  043236  012704  000004                MOV     #4,R4               ;R4=CLOCK COUNT
11076  043242                          30$:
11077
11078  043242  012760  140001  000024        MOV     #DMD!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
11079
11080  043250  012760  040001  000024        MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11081  043256  005304                        DEC     R4
11082  043260  001370                        BNE     30$                 ;ISSUE 4 CLOCKS
11083
11084  043262  016037  000014  001142        MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
11085  043270  042737  157777  001142        BIC     #^CDPI,$BDDAT
11086  043276  001007                        BNE     40$
11087  043300  012737  020000  001140        MOV     #DPI,$GDDAT
11088  043306  010237  001174                MOV     R2,$TMP0
11089  043312  104240                        ERROR   240                 ;CANT SET OPI
11090  043314  000406                        BR      50$
11091  043316                          40$:
11092                                  ;ADVANCE FUNCTION CODE-EXIT IF DONE
11093  043316  062702  000002                ADD     #2,R2
11094  043322  022702  000076                CMP     #ILF76,R2
11095  043326  103401                        BLO     50$
11096  043330  000710                        BR      10$                 ;REPEAT FOR NEXT CODE
11097
11098  043332                          50$:                            ;END OF TEST
11099
11100                                  ;;**********************************************************
11101                                  ;*TEST 113      RECALIBRATE TEST
11102
11103                                  ;;**********************************************************
11104  043332  000004                  ^ST113: SCOPE
11105  043334  012737  000113  001226        MOV     #113,$TESTN         ;;SET TEST NUMBER IN APT MAIL BOX
11106
11107  043342  000240                        NOP
11108  043344  012737  000024  001120        MOV     #20.,$ICNT          ;20 ITERATIONS
11109  043352  112737  000001  001131        MOVB    #1,$ERMAX           ;ONE ERROR ALLOWED
11110  043360  012737  043374  001122        MOV     #T113,$LPADR    ;LOAD LOOP ON TEST ADDRESS
11111  043366  012737  043374  001124        MOV     #T113,$LPERR    ;LOAD LOOP ON ERROR ADDRESS
11112  043374                          T113:
11113  043374  012706  001100                MOV     #STACK,SP           ;LOAD THE STACK POINTER
11114  043400  013700  001276                MOV     $BASE,R0            ;R0 = UNIBUS ADDRESS OF UUT
11115  043404  013701  001456                MOV     TSTQUE,R1           ;R1 = POINTER TO DEVICE
11116
11117                                  ;;**********************************************************
```

```
11118                                   ;VERIFY THAT OPI SETS IF UNIT READY DROPS AFTER DECODE
11119
11120                                   ;SET VOLUME VALID USING SUBROUTINE
11121  043410  004737  060654                    JSR     PC,SETVV        ;GO SET VOLUME VALID
11122  043414  000403                            BR      10$             ;BRANCH TO 10$ IF NO ERROR
11123  043416  104000                            ERROR                   ;RETURN HERE IF ERROR
11124  043420  000137  044716                    JMP     330$
11125  043424                                  10$:
11126                                   ;       ENABLE DEBUG CLOCK AND LOAD RECALIBRATE COMMAND
11127
11128  043424  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11129
11130  043432  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11131
11132  043440  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11133
11134  043446  012760  000007  000000          MOV     #RECAL!GO,RMCS1(R0)     ;LOAD RMCS1
11135                                   ;       STEP COMMAND SEQUENCER TO RECAL COM (2 CLOCKS)
11136  043454  012702  000002                    MOV     #2,R2
11137  043460                                  20$:
11138
11139  043460  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11140
11141  043466  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11142  043474  005302                            DEC     R2
11143  043476  001370                            BNE     20$
11144                                   ;       DROP UNIT READY AND STEP COMMAND SEQUENCER (2 CLOCKS)
11145
11146  043500  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11147  043506  012702  000002                    MOV     #2,R2
11148  043512                                  30$:
11149
11150  043512  012760  140001  000024          MOV     #DMD!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
11151
11152  043520  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11153  043526  005302                            DEC     R2
11154  043530  001370                            BNE     30$
11155                                   ;       VERIFY THAT OPI IS SET
11156
11157  043532  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
11158  043540  042737  157777  001142          BIC     #^COPI,$BDDAT
11159  043546  001011                            BNE     40$
11160  043550  012737  020000  001140          MOV     #OPI,$GDDAT
11161  043556  010037  001136                  MOV     R0,$BDADR
11162  043562  062737  000014  001136          ADD     #RMER1,$BDADR
11163  043570  104241                            ERROR   241             ;OPI NOT SET DURING RECAL
11164
11165  043572  012737  043600  001124  40$:     MOV     #50$,$LPERR     ;CHANGE LOOP ON ERROR ADDRESS
11166
11167                                   ;;*****************************************************************
11168                                   ;VERIFY THAT RECALIBRATE ABORTS DURING EXECUTION
11169
11170  043600                                  50$:
11171                                   ;SET VOLUME VALID USING SUBROUTINE
11172  043600  004737  060654                    JSR     PC,SETVV        ;GO SET VOLUME VALID
11173  043604  000403                            BR      60$             ;BRANCH TO 60$ IF NO ERROR
```

```
11174  043606  104000                        ERROR                   ;RETURN HERE IF ERROR
11175  043610  000137  044716                JMP     330$
11176
11177  043614                        60$:
11178                                ;       ENABLE DEBUG CLOCK AND LOAD RECALIBRATE COMMAND
11179
11180  043614  012760  041001  000024        MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11181
11182  043622  012760  000000  000014        MOV     #0,RMER1(R0)    ;LOAD RMER1
11183
11184  043630  012760  000000  000042        MOV     #0,RMER2(R0)    ;LOAD RMER2
11185
11186  043636  012760  000007  000000        MOV     #RECAL!GO,RMCS1(R0)     ;LOAD RMCS1
11187                                ;       STEP THE COMMAND SEQUENCER TO FIRST TEST FOR ABORT (3 CLOCKS)
11188  043644  012702  000003                MOV     #3,R2
11189  043650                        70$:
11190
11191  043650  012760  141001  000024        MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11192
11193  043656  012760  041001  000024        MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11194  043664  005302                        DEC     R2
11195  043666  001370                        BNE     70$
11196                                ;       SET DRIVE FAULT TO CAUSE ABORT CONDITION
11197
11198  043670  012760  041101  000024        MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
11199                                ;       STEP 2 CLOCKS AND VERIFY GO IS RESET
11200  043676  012702  000002                MOV     #2,R2
11201  043702                        80$:
11202
11203  043702  012760  141101  000024        MOV     #DMD!MUR!DBEN!MDF!DBCK,RMMR1(R0)        ;LOAD RMMR1
11204
11205  043710  012760  041101  000024        MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
11206  043716  005302                        DEC     R2
11207  043720  001370                        BNE     80$
11208
11209  043722  016037  000000  001142        MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
11210  043730  042737  177776  001142        BIC     #^CGO,$BDDAT
11211  043736  001405                        BEQ     90$
11212  043740  010037  001136                MOV     R0,$BDADR
11213  043744  005037  001140                CLR     $GDDAT
11214  043750  104242                        ERROR   242             ;GO NOT RESET DUE TO ABORT
11215
11216  043752  012737  043760  001124  90$:  MOV     #100$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
11217
11218                                ;;*****************************************************************
11219                                ;VERIFY OPI SETS IF ON CYLINDER LATCH DOESNT CLEAR
11220
11221  043760                        100$:
11222                                ;SET VOLUME VALID USING SUBROUTINE
11223  043760  004737  060654                JSR     PC,SETVV        ;GO SET VOLUME VALID
11224  043764  000403                        BR      110$            ;BRANCH TO 110$ IF NO ERROR
11225  043766  104000                        ERROR                   ;RETURN HERE IF ERROR
11226  043770  000137  044716                JMP     330$
11227  043774                        110$:
11228                                ;       ENABLE DEBUG CLOCK AND LOAD RECALIBRATE COMMAND
11229
```

```
11230  043774  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11231
11232  044002  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11233
11234  044010  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11235
11236  044016  012760  000007  000000          MOV     #RECAL!GO,RMCS1(R0)     ;LOAD RMCS1
11237                          ;       STEP THE COMMAND SEQUENCER
11238  044024  012702  000017                  MOV     #15.,R2
11239  044030                  120$:
11240
11241  044030  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11242
11243  044036  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11244  044044  005302                          DEC     R2
11245  044046  001370                          BNE     120$
11246                          ;       VERIFY THAT OPI IS SET
11247
11248  044050  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
11249  044056  042737  157777  001142          BIC     #^COPI,$BDDAT
11250  044064  001011                          BNE     130$
11251  044066  010037  001136                  MOV     R0,$BDADR
11252  044072  062737  000014  001136          ADD     #RMER1,$BDADR
11253  044100  012737  020000  001140          MOV     #OPI,$GDDAT
11254  044106  104243                          ERROR   243             ;OPI NOT SET DUE TO ON LATCH
11255
11256  044110  012737  044116  001124  130$:   MOV     #150$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
11257
11258                          ;;*****************************************************************
11259                          ;VERIFY ATA SETS IF DRIVE COMPLETES RECALIBRATE (ON CYLINDER SETS)
11260
11261  044116                  150$:
11262                          ;SET VOLUME VALID USING SUBROUTINE
11263  044116  004737  060654          JSR     PC,SETVV        ;GO SET VOLUME VALID
11264  044122  000403                  BR      160$            ;BRANCH TO 160$ IF NO ERROR
11265  044124  104000                  ERROR                   ;RETURN HERE IF ERROR
11266  044126  000137  044716          JMP     330$
11267  044132                  160$:
11268                          ;       ENABLE DEBUG CLOCK AND LOAD RECALIBRATE COMMAND
11269
11270  044132  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11271
11272  044140  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11273
11274  044146  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11275
11276  044154  012760  000007  000000          MOV     #RECAL!GO,RMCS1(R0)     ;LOAD RMCS1
11277                          ;       STEP COMMAND SEQUENCER TO FIRST ON LATCH TEST (13 CLOCKS)
11278  044162  012702  000015                  MOV     #13.,R2
11279  044166                  170$:
11280
11281  044166  012760  141401  000024          MOV     #DMD!MUR!DBEN!DBCK!MOC,RMMR1(R0)        ;LOAD RMMR1
11282
11283  044174  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11284  044202  005302                          DEC     R2
11285  044204  001370                          BNE     170$
```

```
11286                                          ;       DROP ON CYLINDER TO RESET LATCH, THEN SET ON CYLINDER
11287
11288  044206  012760  041001  000024                  MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11289
11290  044214  012760  041401  000024                  MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11291                                          ;       STEP COMMAND SEQUENCER TO SET ATTENTION (3 CLOCKS)
11292  044222  012702  000003                          MOV     #3,R2
11293  044226                                  180$:
11294
11295  044226  012760  141401  000024                  MOV     #DMD!MUR!DBEN!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
11296
11297  044234  012760  041401  000024                  MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11298  044242  005302                                  DEC     R2
11299  044244  001370                                  BNE     180$
11300                                          ;       VERIFY ATA IS SET
11301
11302  044246  016037  000012  001142                  MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
11303  044254  042737  077777  001142                  BIC     #^CATA,$BDDAT
11304  044262  001011                                  BNE     190$
11305  044264  012737  100000  001140                  MOV     #ATA,$GDDAT
11306  044272  010037  001136                          MOV     R0,$BDADR
11307  044276  062737  000012  001136                  ADD     #RMDS,$BDADR
11308  044304  104244                                  ERROR   244             ;ATA NOT SET BY RECAL
11309
11310  044306  012737  044314  001124  190$:   MOV     #200$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
11311
11312                                          ;;*****************************************************************
11313                                          ;VERIFY THAT RECALIBRATE ABORTS AFTER EXECUTION DURING WAIT LOOP
11314
11315  044314                                  200$:
11316                                          ;SET VOLUME VALID USING SUBROUTINE
11317  044314  004737  060654                          JSR     PC,SETVV        ;GO SET VOLUME VALID
11318  044320  000402                                  BR      210$            ;BRANCH TO 210$ IF NO ERROR
11319  044322  104000                                  ERROR                   ;RETURN HERE IF ERROR
11320  044324  000574                                  BR      330$
11321  044326                                  210$:
11322                                          ;       ENABLE DEBUG CLOCK AND LOAD RECALIBRATE COMMAND
11323
11324  044326  012760  041401  000024                  MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11325
11326  044334  012760  000000  000014                  MOV     #0,RMER1(R0)    ;LOAD RMER1
11327
11328  044342  012760  000000  000042                  MOV     #0,RMER2(R0)    ;LOAD RMER2
11329
11330  044350  012760  000007  000000                  MOV     #RECAL!GO,RMCS1(R0)     ;LOAD RMCS1
11331                                          ;       STEP COMMAND SEQUENCER TO FIRST ON LATCH TEST (13 CLOCKS)
11332  044356  012702  000015                          MOV     #13.,R2
11333  044362                                  220$:
11334
11335  044362  012760  141401  000024                  MOV     #DMD!MUR!DBEN!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
11336
11337  044370  012760  041401  000024                  MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11338  044376  005302                                  DEC     R2
11339  044400  001370                                  BNE     220$
11340                                          ;       DROP ON CYLINDER TO RESET LATCH, LEAVE ON CYLINDER 0
11341
```

```
11342  044402  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11343                           ;       STEP COMMAND SEQUENCER THROUGH WAIT LOOP (7 CLOCKS)
11344  044410  012702  000007          MOV     #7,R2
11345  044414                  230$:
11346
11347  044414  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11348
11349  044422  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ,LOAD RMMR1
11350  044430  005302                          DEC     R2
11351  044432  001370                          BNE     230$
11352                           ;       VERIFY THAT GO IS STILL SET
11353
11354  044434  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
11355  044442  042737  177776  001142          BIC     #^CGO,$BDDAT
11356  044450  001006                          BNE     240$
11357  044452  012737  000001  001140          MOV     #GO,$GDDAT
11358  044460  010037  001136                  MOV     R0,$BDADR
11359  044464  104245                          ERROR   245             ;GO RESET EARLY DURING RECAL
11360                           ;       SET SEEK INCOMPLETE ERROR
11361  044466                  240$:
11362
11363  0444.   012760  041201  000024          MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
11364                           ;       STEP COMMAND SEQUENCER AND VERIFY GO RESETS (3 CLOCKS)
11365  044474  012702  000003          MOV     #3,R2
11366  044500                  250$:
11367
11368  044500  012760  141201  000024          MOV     #DMD!MUR!DBEN!MSER!DBCK,RMMR1(R0)       ;LOAD RMMR1
11369
11370  044506  012760  041201  000024          MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
11371  044514  005302                          DEC     R2
11372  044516  001370                          BNE     250$
11373
11374  044520  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
11375  044526  042737  177776  001142          BIC     #^CGO,$BDDAT
11376  044534  001405                          BEQ     260$
11377  044536  010037  001136                  MOV     R0,$BDADR
11378  044542  005037  001140                  CLR     $GDDAT
11379  044546  104246                          ERROR   246             ;GO NOT RESET DUR TO WAIT ABORT
11380
1138.  044550  012737  044556  001124  260$:   MOV     #300$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
113
11383                           ;;*************************************************************
11384                           ;VERIFY THE TAG BUS DURING RECALIBRATE
11385
11386  044556                  300$:
11387                           ;SET VOLUME VALID USING SUBROUTINE
11388  044556  004737  060654          JSR     PC,SETVV        ;GO SET VOLUME VALID
11389  044562  000402                  BR      310$            ;BRANCH TO 310$ IF NO ERROR
11390  044564  104000                  ERROR                   ;RETURN HERE IF ERROR
11391  044566  000453                  BR      330$
11392  044570                  310$:
11393                           ;       ENABLE DEBUG CLOCK AND LOAD RECALIBRATE COMMAND
11394
11395  044570  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11396
11397  044576  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
```

```
11398
11399  044604  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11400
11401  044612  012760  000007  000000          MOV     #RECAL!GO,RMCS1(R0)     ;LOAD RMCS1
11402  044620  012702  044720                  MOV     #400$,R2        ;INITIALIZE TABLE POINTER
11403                                          ;       VERIFY TAG BUS ACCORDING TO TABLE
11404  044624                                  315$:
11405
11406  044624  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
11407  044632  042737  150000  001142          BIC     #RQA!RQB!TST,$BDDAT
11408  044640  021237  001142                  CMP     (R2),$BDDAT
11409  044644  001411                          BEQ     320$
11410  044646  011237  001140                  MOV     (R2),$GDDAT
11411  044652  010037  001136                  MOV     R0,$BDADR
11412  044656  062737  000040  001136          ADD     #RMMR2,$BDADR
11413  044664  104247                          ERROR   247             ;INCORRECT TAG BUS DURING RECAL
11414  044666  000413                          BR      330$
11415  044670                                  320$:
11416                                          ;       ADVANCE TO NEXT ENTRY IN TABLE-EXIT IF DONE
11417  044670  062702  000002                  ADD     #2,R2
11418  044674  005712                          TST     (R2)
11419  044676  100407                          BMI     330$            ;EXIT IF ENTRY NEGATIVE
11420                                          ;       STEP THE COMMAND SEQUENCER AND REPEAT VERIFICATION
11421
11422  044700  012760  151001  000024          MOV     #DMD!DBEN!MUR!MOV!DBCK,RMMR1(R0)        ;LOAD RMMR1
11423
11424  044706  012760  041401  000024          MOV     #DMD!DBEN!MUR!MOC,RMMR1(R0)     ;LOAD RMMR1
11425  044714  000743                          BR      315$
11426  044716  000416                  330$:   BR      500$            ;JUMP OVER TABLE
11427
11428  044720                                  400$:
11429
11430                                          ;TABLE OF TAG BUS CONTROL AND BIT VALUES
11431
11432  044720  001777                          .WORD   1777            ;BUS BITS AT HIGH IMPEDANCE STATE
11433  044722  001777                          .WORD   1777
11434  044724  006100                          .WORD   CC!CH!BBO6      ;CONTROL BITS ENABLED, BIT 6 ON
11435  044726  006100                          .WORD   CC!CH!BBO6
11436  044730  026100                          .WORD   TAG!CC!CH!BBO6  ;TAG COMES ON
11437  044732  026100                          .WORD   TAG!CC!CH!BBO6
11438  044734  026100                          .WORD   TAG!CC!CH!BBO6
11439  044736  026100                          .WORD   TAG!CC!CH!BBO6
11440  044740  026100                          .WORD   TAG!CC!CH!BBO6
11441  044742  026100                          .WORD   TAG!CC!CH!BBO6
11442  044744  006100                          .WORD   CC!CH!BBO6      ;TAG GOES OFF
11443  044746  006100                          .WORD   CC!CH!BBO6
11444  044750  001777                          .WORD   1777            ;CONTROL BITS DISABLED
11445
11446  044752  177777                          .WORD   -1              ;END OF TABLE
11447
11448  044754                          500$:                           ;END OF TEST
11449
11450                                  ;;**************************************************************
11451                                  ;*TEST 114       SEEK TEST
11452
11453                                  ;;**************************************************************
```

```
11454  044754  000004                    TST114: SCOPE
11455  044756  012737  000114  001226            MOV     #114,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
11456
11457  044764  000240                            NOP
11458  044766  012737  000024  001120            MOV     #20.,$ICNT      ;20 ITERATIONS
11459  044774  112737  000001  001131            MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
11460  045002  012737  045016  001122            MOV     #T114,$LPADR  ;LOAD LOOP ON TEST ADDRESS
11461  045010  012737  045016  001124            MOV     #T114,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
11462  045016                            T114:
11463  045016  012706  001100                    MOV     #STACK,SP       ;LOAD THE STACK POINTER
11464  045022  013700  001276                    MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
11465  045026  013701  001456                    MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
11466
11467                                    ;;**************************************************************
11468                                    ;VERIFY THAT OPI SETS IF UNIT READY DROPS DURING COMMAND EXECUTION
11469
11470                                    ;SET VOLUME VALID USING SUBROUTINE
11471  045032  004737  060654                    JSR     PC,SETVV        ;GO SET VOLUME VALID
11472  045036  000403                            BR      10$             ;BRANCH TO 10$ IF NO ERROR
11473  045040  104000                            ERROR                   ;RETURN HERE IF ERROR
11474  045042  000137  046462                    JMP     330$
11475  045046                            10$:
11476                                    ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11477                                    ;       ADDRESS,  AND LOAD SEEK COMMAND
11478
11479  045046  012760  041001  000024            MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11480
11481  045054  012760  000000  000006            MOV     #0,RMDA(R0)     ;LOAD RMDA
11482
11483  045062  012760  000000  000034            MOV     #0,RMDC(R0)     ;LOAD RMDC
11484
11485  045070  012760  000000  000014            MOV     #0,RMER1(R0)    ;LOAD RMER1
11486
11487  045076  012760  000000  000042            MOV     #0,RMER2(R0)    ;LOAD RMER2
11488
11489  045104  012760  000005  000000            MOV     #SEEK!GO,RMCS1(R0)      ;LOAD RMCS1
11490                                    ;       STEP COMMAND SEQUENCER TO SEEK COM (2 CLOCKS)
11491  045112  012702  000002                    MOV     #2,R2
11492  045116                            20$:
11493
11494  045116  012760  141001  000024            MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11495
11496  045124  012760  041001  000024            MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11497  045132  005302                            DEC     R2
11498  045134  001370                            BNE     20$
11499                                    ;       DROP UNIT READY AND STEP COMMAND SEQUENCER (2 CLOCKS)
11500
11501  045136  012760  040001  000024            MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11502  045144  012702  000002                    MOV     #2,R2
11503  045150                            30$:
11504
11505  045150  012760  140001  000024            MOV     #DMD!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
11506
11507  045156  012760  040001  000024            MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11508  045164  005302                            DEC     R2
11509  045166  001370                            BNE     30$
```

```
11510                                   ;       VERIFY THAT OPI IS SET
11511
11512  045170  016037  000014  001142           MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
11513  045176  042737  157777  001142           BIC     #^C<OPI>,$BDDAT
11514  045204  001011                           BNE     40$
11515  045206  012737  020000  001140           MOV     #OPI,$GDDAT
11516  045214  010037  001136                   MOV     R0,$BDADR
11517  045220  062737  000014  001136           ADD     #RMER1,$BDADR
11518  045226  104250                           ERROR   250             ;OPI NOT SET DURING SEEK
11519
11520  045230  012737  045236  001124  40$:     MOV     #50$,$LPERR     ;CHANGE LOOP ON ERROR ADDRESS
11521
11522                                   ;;*****************************************************************
11523                                   ;VERIFY THAT SEEK ABORTS DURING EXECUTION
11524
11525  045236                           50$:
11526                                   ;SET VOLUME VALID USING SUBROUTINE
11527  045236  004737  060654                   JSR     PC,SETVV        ;GO SET VOLUME VALID
11528  045242  000403                           BR      60$             ;BRANCH TO 60$ IF NO ERROR
11529  045244  104000                           ERROR                   ;RETURN HERE IF ERROR
11530  045246  000137  046462                   JMP     330$
11531
11532  045252                           60$:
11533                                   ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11534                                   ;       ADDRESS,  AND LOAD SEEK COMMAND
11535
11536  045252  012760  041001  000024           MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11537
11538  045260  01276C  000000  000006           MOV     #0,RMDA(R0)     ;LOAD RMDA
11539
11540  045266  012760  000000  000034           MOV     #0,RMDC(R0)     ;LOAD RMDC
11541
11542  045274  012760  000000  000014           MOV     #0,RMER1(R0)    ;LOAD RMER1
11543
11544  045302  012760  000000  000042           MOV     #0,RMER2(R0)    ;LOAD RMER2
11545
11546  045310  012760  000005  000000           MOV     #SEEK!GO,RMCS1(R0)      ;LOAD RMCS1
11547                                   ;       STEP THE COMMAND SEQUENCER TO FIRST TEST FOR ABORT (3 CLOCKS)
11548  045316  012702  000003                   MOV     #3,R2
11549  045322                           70$:
11550
11551  045322  012760  141001  000024           MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11552
11553  045330  012760  041001  000024           MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11554  045336  005302                           DEC     R2
11555  045340  001370                           BNE     70$
11556                                   ;       SET DRIVE FAULT TO CAUSE ABORT CONDITION
11557
11558  045342  012760  041101  000024           MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
11559                                   ;       STEP 2 CLOCKS AND VERIFY GO IS RESET
11560  045350  012702  000002                   MOV     #2,R2
11561  045354                           80$:
11562
11563  045354  012760  141101  000024           MOV     #DMD!MUR!DBEN!MDF!DBCK,RMMR1(R0)        ;LOAD RMMR1
11564
11565  045362  012760  041101  000024           MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
```

```
11566  045370  005302                          DEC     R2
11567  045372  001370                          BNE     80$
11568
11569  045374  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
11570  045402  042737  177776  001142          BIC     #^CGO,$BDDAT
11571  045410  001405                          BEQ     90$
11572  045412  010037  001136                  MOV     R0,$BDADR
11573  045416  005037  001140                  CLR     $GDDAT
11574  045422  104251                          ERROR   251             ;GO NOT RESET DUE TO ABORT
11575
11576  045424  012737  045432  001124  90$:    MOV     #100$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
11577
11578                                  ;;*****************************************************************
11579                                  ;VERIFY OPI SETS IF ON CYLINDER LATCH DOESNT CLEAR
11580
11581  045432                          100$:
11582                                  ;SET VOLUME VALID USING SUBROUTINE
11583  045432  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
11584  045436  000403                          BR      110$            ;BRANCH TO 110$ IF NO ERROR
11585  045440  104000                          ERROR                   ;RETURN HERE IF ERROR
11586  045442  000137  046462                  JMP     330$
11587  045446                          110$:
11588                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11589                                  ;       ADDRESS,  AND LOAD SEEK COMMAND
11590
11591  045446  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11592
11593  045454  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
11594
11595  045462  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
11596
11597  045470  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11598
11599  045476  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11600
11601  045504  012760  000005  000000          MOV     #SEEK!GO,RMCS1(R0)      ;LOAD RMCS1
11602                                  ;       STEP THE COMMAND SEQUENCER
11603  045512  012702  000017                  MOV     #15.,R2
11604  045516                          120$:
11605
11606  045516  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11607
11608  045524  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11609  045532  005302                          DEC     R2
11610  045534  001370                          BNE     120$
11611                                  ;       VERIFY THAT OPI IS SET
11612
11613  045536  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
11614  045544  042737  157777  001142          BIC     #^COPI,$BDDAT
11615  045552  001011                          BNE     130$
11616  045554  010037  001136                  MOV     R0,$BDADR
11617  045560  062737  000014  001136          ADD     #RMER1,$BDADR
11618  045566  012737  020000  001140          MOV     #OPI,$GDDAT
11619  045574  104252                          ERROR   252             ;OPI NOT SET DUE TO ON LATCH
11620
11621  045576  012737  045604  001124  130$:    MOV     #150$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
```

```
11622
11623                                   ;;*****************************************************************
11624                                   ;VERIFY ATA SETS IF DRIVE COMPLETES SEEK (ON CYLINDER SETS)
11625
11626  045604                           150$:
11627                                   ;SET VOLUME VALID USING SUBROUTINE
11628  045604  004737  060654                   JSR     PC,SETVV        ;GO SET VOLUME VALID
11629  045610  000403                           BR      160$            ;BRANCH TO 160$ IF NO ERROR
11630  045612  104000                           ERROR                   ;RETURN HERE IF ERROR
11631  045614  000137  046462                   JMP     330$
11632  045620                           160$:
11633                                   ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11634                                   ;       ADDRESS,  AND LOAD SEEK COMMAND
11635
11636  045620  012760  041401  000024         MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11637
11638  045626  012760  000000  000006         MOV     #0,RMDA(R0)     ;LOAD RMDA
11639
11640  045634  012760  000000  000034         MOV     #0,RMDC(R0)     ;LOAD RMDC
11641
11642  045642  012760  000000  000014         MOV     #0,RMER1(R0)    ;LOAD RMER1
11643
11644  045650  012760  000000  000042         MOV     #0,RMER2(R0)    ;LOAD RMER2
11645
11646  045656  012760  000005  000000         MOV     #SEEK!GO,RMCS1(R0)      ;LOAD RMCS1
11647                                   ;       STEP COMMAND SEQUENCER TO FIRST ON LATCH TEST (13 CLOCKS)
11648  045664  012702  000015                 MOV     #13.,R2
11649  045670                           170$:
11650
11651  045670  012760  141401  000024         MOV     #DMD!MUR!DBEN!DBCK!MOC,RMMR1(R0)        ;LOAD RMMR1
11652
11653  045676  012760  041401  000024         MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11654  045704  005302                         DEC     R2
11655  045706  001370                         BNE     170$
11656                                   ;       DROP ON CYLINDER TO RESET LATCH, THEN SET ON CYLINDER
11657
11658  045710  012760  041001  000024         MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11659
11660  045716  012760  041401  000024         MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11661                                   ;       STEP COMMAND SEQUENCER TO SET ATTENTION (3 CLOCKS)
11662  045724  012702  000003                 MOV     #3,R2
11663  045730                           180$:
11664
11665  045730  012760  141401  000024         MOV     #DMD!MUR!DBEN!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
11666
11667  045736  012760  041401  000024         MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11668  045744  005302                         DEC     R2
11669  045746  001370                         BNE     180$
11670                                   ;       VERIFY ATA IS SET
11671
11672  045750  016037  000012  001142         MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
11673  045756  042737  077777  001142         BIC     #^CATA,$BDDAT
11674  045764  001011                         BNE     190$
11675  045766  012737  100000  001140         MOV     #ATA,$GDDAT
11676  045774  010037  001136                 MOV     R0,$BDADR
11677  046000  062737  000012  001136         ADD     #RMDS,$BDADR
```

```
11678  046006  104253                          ERROR   253             ;ATA NOT SET BY SEEK
11679
11680  046010  012737  046016  001124  190$:   MOV     #200$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
11681
11682                                          ;;*****************************************************************
11683                                          ;VERIFY THAT SEEK ABORTS AFTER EXECUTION DURING WAIT LOOP
11684
11685  046016                                  200$:
11686                                          ;SET VOLUME VALID USING SUBROUTINE
11687  046016  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
11688  046022  000403                          BR      210$            ;BRANCH TO 210$ IF NO ERROR
11689  046024  104000                          ERROR                   ;RETURN HERE IF ERROR
11690  046026  000137  046462                  JMP     330$
11691  046032                                  210$:
11692                                          ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11693                                          ;       ADDRESS  AND LOAD SEEK COMMAND
11694
11695  046032  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11696
11697  046040  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
11698
11699  046046  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
11700
11701  046054  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11702
11703  046062  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11704
11705  046070  012760  000005  000000          MOV     #SEEK!GO,RMCS1(R0)      ;LOAD RMCS1
11706                                          ;       STEP COMMAND SEQUENCER TO FIRST ON LATCH TEST (13 CLOCKS)
11707  046076  012702  000015                  MOV     #13.,R2
11708  046102                                  220$:
11709
11710  046102  012760  141401  000024          MOV     #DMD!MUR!DBEN!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
11711
11712  046110  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11713  046116  005302                          DEC     R2
11714  046120  001370                          BNE     220$
11715                                          ;       DROP ON CYLINDER TO RESET LATCH, LEAVE ON CYLINDER 0
11716
11717  046122  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11718                                          ;       STEP COMMAND SEQUENCER THROUGH WAIT LOOP (7 CLOCKS)
11719  046130  012702  000007                  MOV     #7,R2
11720  046134                                  230$:
11721
11722  046134  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11723
11724  046142  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11725  046150  005302                          DEC     R2
11726  046152  001370                          BNE     230$
11727                                          ;       VERIFY THAT GO IS STILL SET
11728
11729  046154  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
11730  046162  042737  177776  001142          BIC     #^CGO,$BDDAT
11731  046170  001006                          BNE     240$
11732  046172  012737  000001  001140          MOV     #GO,$GDDAT
11733  046200  010037  001136                  MOV     R0,$BDADR
```

```
11734  046204  104254                          ERROR   254             ;GO RESET EARLY DURING SEEK
11735                                          ;SET SEEK INCOMPLETE ERROR
11736  046206                          240$:
11737
11738  046206  012760  041201  000024          MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
11739                                          ;STEP COMMAND SEQUENCER AND VERIFY GO RESETS (3 CLOCKS)
11740  046214  012702  000003                  MOV     #3,R2
11741  046220                          250$:
11742
11743  046220  012760  141201  000024          MOV     #DMD!MUR!DBEN!MSER!DBCK,RMMR1(R0)       ;LOAD RMMR1
11744
11745  046226  012760  041201  000024          MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
11746  046234  005302                          DEC     R2
11747  046236  001370                          BNE     250$
11748
11749  046240  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
11750  046246  042737  177776  001142          BIC     #^CGO,$BDDAT
11751  046254  001405                          BEQ     260$
11752  046256  010037  001136                  MOV     R0,$BDADR
11753  046262  005037  001140                  CLR     $GDDAT
11754  046266  104255                          ERROR   255             ;GO NOT RESET DUE TO WAIT ABORT
11755
11756  046270  012737  046302  001124  260$:  MOV     #300$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
11757  046276  012703  000001                  MOV     #1,R3           ;INITIALIZE CYLINDER ADDRESS
11758
11759                                  ;;**************************************************************
11760                                  ;VERIFY THE TAG BUS DURING SEEK
11761
11762  046302                          300$:
11763                                  ;SET VOLUME VALID USING SUBROUTINE
11764  046302  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
11765  046306  000402                          BR      310$            ;BRANCH TO 310$ IF NO ERROR
11766  046310  104000                          ERROR                   ;RETURN HERE IF ERROR
11767  046312  000463                          BR      330$
11768  046314                          310$:
11769                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11770                                  ;       ADDRESS  AND LOAD SEEK COMMAND
11771
11772  046314  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
11773
11774  046322  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
11775
11776  046330  010360  000034                  MOV     R3,RMDC(R0)     ;LOAD RMDC
11777
11778  046334  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11779
11780  046342  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11781
11782  046350  012760  000005  000000          MOV     #SEEK!GO,RMCS1(R0)      ;LOAD RMCS1
11783  046356  012702  046476                  MOV     #400$,R2        ;INITIALIZE TABLE POINTER
11784                                  ;       VERIFY TAG BUS ACCORDING TO TABLE AND CYLINDER IN R3
11785  046362                          315$:
11786
11787  046362  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
11788  046370  042737  150000  001142          BIC     #RQA!RQB!TST,$BDDAT
11789  046376  011237  001140                  MOV     (R2),$GDDAT
```

```
11790  046402  050337  001140            BIS     R3,$GDDAT       ;OR CYLINDER ADDRESS IN
11791  046406  023737  001140  001142    CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED AND RECEIVED
11792  046414  001407                    BEQ     320$            ;BRANCH IF TAG BUS OK
11793  046416  010037  001136            MOV     R0,$BDADR
11794  046422  062737  000040  001136    ADD     #RMMR2,$BDADR
11795  046430  104256                    ERROR   256             ;INCORRECT TAG BUS DURING SEEK
11796  046432  000413                    BR      330$
11797  046434                    320$:
11798                            ;       ADVANCE TO NEXT ENTRY IN TABLE-EXIT IF DONE
11799  046434  062702  000002            ADD     #2,R2
11800  046440  005712                    TST     (R2)
11801  046442  100407                    BMI     330$            ;EXIT IF ENTRY NEGATIVE
11802                            ;       STEP THE COMMAND SEQUENCER AND REPEAT VERIFICATION
11803
11804  046444  012760  151001  000024    MOV     #DMD!DBEN!MUR!MOV!DBCK,RMMR1(R0)        ;LOAD RMMR1
11805
11806  046452  012760  041401  000024    MOV     #DMD!DBEN!MUR!MOC,RMMR1(R0)     ;LOAD RMMR1
11807  046460  000740                    BR      315$
11808  046462                    330$:
11809                            ;REPEAT TAG BUS TEST FOR EACH PRIME CYLINDER, I.E.. 1,2,4,...
11810
11811  046462  006303                    ASL     R3              ;SHIFT TO NEXT CYLINDER
11812  046464  020327  000512            CMP     R3,#512
11813  046470  101001                    BHI     340$            ;EXIT IF 512 WAS DONE
11814  046472  000703                    BR      300$            ;TEST NEXT CYLINDER
11815  046474  000416            340$:   BR      500$            ;JUMP OVER TABLE
11816
11817  046476                    400$:
11818
11819                            ;TABLE OF TAG BUS CONTROL AND BIT VALUES
11820
11821  046476  001777                    .WORD   1777            ;BUS BITS AT HIGH IMPEDANCE STATE
11822  046500  001777                    .WORD   1777
11823  046502  004000                    .WORD   CC      ;CONTROL BITS ENABLED, BIT 6 ON
11824  046504  004000                    .WORD   CC
11825  046506  024000                    .WORD   TAG!CC  ;TAG COMES ON
11826  046510  024000                    .WORD   TAG!CC
11827  046512  024000                    .WORD   TAG!CC
11828  046514  024000                    .WORD   TAG!CC
11829  046516  024000                    .WORD   TAG!CC
11830  046520  024000                    .WORD   TAG!CC
11831  046522  004000                    .WORD   CC      ;TAG GOES OFF
11832  046524  004000                    .WORD   CC
11833  046526  001777                    .WORD   1777            ;CONTROL BITS DISABLED
11834
11835  046530  177777                    .WORD   -1              ;END OF TABLE
11836
11837  046532                    500$:                           ;END OF TEST
11838
11839                            ;;*****************************************************************
11840                            ;*TEST 115      SEARCH TEST
11841
11842                            ;;*****************************************************************
11843  046532  000004            TST115: SCOPE
11844  046534  012737  000115  001226    MOV     #115,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
11845
```

```
11846  046542  000240                          NOP
11847  046544  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
11848  046552  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
11849  046560  012737  046574  001122          MOV     #T115,$LPADR  ;LOAD LOOP ON TEST ADDRESS
11850  046566  012737  046574  001124          MOV     #T115,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
11851  046574                          T115:
11852  046574  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
11853  046600  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
11854  046604  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
11855
11856                                  ;;*****************************************************************
11857                                  ;VERIFY THAT OPI SETS IF UNIT READY DROPS DURING COMMAND EXECUTION
11858
11859                                  ;SET VOLUME VALID USING SUBROUTINE
11860  046610  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
11861  046614  000403                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
11862  046616  104000                          ERROR                   ;RETURN HERE IF ERROR
11863  046620  000137  050632                  JMP     330$
11864  046624                          10$:
11865                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11866                                  ;       ADDRESS,  AND LOAD SEARCH COMMAND
11867
11868  046624  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11869
11870  046632  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
11871
11872  046640  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
11873
11874  046646  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11875
11876  046654  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11877
11878  046662  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
11879                                  ;       STEP COMMAND SEQUENCER TO SEARCH COM (2 CLOCKS)
11880  046670  012702  000002                  MOV     #2,R2
11881  046674                          20$:
11882
11883  046674  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11884
11885  046702  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11886  046710  005302                          DEC     R2
11887  046712  001370                          BNE     20$
11888                                  ;       DROP UNIT READY AND STEP COMMAND SEQUENCER (2 CLOCKS)
11889
11890  046714  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11891  046722  012702  000002                  MOV     #2,R2
11892  046726                          30$:
11893
11894  046726  012760  140001  000024          MOV     #DMD!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
11895
11896  046734  012760  040001  000024          MOV     #DMD!DBEN,RMMR1(R0)     ;LOAD RMMR1
11897  046742  005302                          DEC     R2
11898  046744  001370                          BNE     30$
11899                                  ;       VERIFY THAT OPI IS SET
11900
11901  046746  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
```

```
11902  046754  042737  157777  001142          BIC     #^COPI,$BDDAT
11903  046762  001011                          BNE     40$
11904  046764  012737  020000  001140          MOV     #OPI,$GDDAT
11905  046772  010037  001136                  MOV     R0,$BDADR
11906  046776  062737  000014  001136          ADD     #RMER1,$BDADR
11907  047004  104257                          ERROR   257             ;OPI NOT SET DURING SEARCH
11908
11909  047006  012737  047014  001124  40$:    MOV     #50$,$LPERR     ;CHANGE LOOP ON ERROR ADDRESS
11910
11911                                  ;;*****************************************************************
11912                                  ;VERIFY THAT SEARCH ABORTS DURING EXECUTION
11913
11914  047014                          50$:
11915                                  ;SET VOLUME VALID USING SUBROUTINE
11916  047014  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
11917  047020  000403                          BR      60$             ;BRANCH TO 60$ IF NO ERROR
11918  047022  104000                          ERROR                   ;RETURN HERE IF ERROR
11919  047024  000137  050632                  JMP     330$
11920
11921  047030                          60$:
11922                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11923                                  ;       ADDRESS,  AND LOAD SEARCH COMMAND
11924
11925  047030  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11926
11927  047036  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
11928
11929  047044  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
11930
11931  047052  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11932
11933  047060  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11934
11935  047066  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
11936                                  ;       STEP THE COMMAND SEQUENCER TO FIRST TEST FOR ABORT (3 CLOCKS)
11937  047074  012702  000003                  MOV     #3,R2
11938  047100                          70$:
11939
11940  047100  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11941
11942  047106  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11943  047114  005302                          DEC     R2
11944  047116  001370                          BNE     70$
11945                                  ;       SET DRIVE FAULT TO CAUSE ABORT CONDITION
11946
11947  047120  012760  041101  000024          MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
11948                                  ;       STEP 2 CLOCKS AND VERIFY GO IS RESET
11949  047126  012702  000002                  MOV     #2,R2
11950  047132                          80$:
11951
11952  047132  012760  141101  000024          MOV     #DMD!MUR!DBEN!MDF!DBCK,RMMR1(R0)        ;LOAD RMMR1
11953
11954  047140  012760  041101  000024          MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
11955  047146  005302                          DEC     R2
11956  047150  001370                          BNE     80$
11957
```

```
11958  047152  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
11959  047160  042737  177776  001142          BIC     #↑CGO,$BDDAT
11960  047166  001405                          BEQ     90$
11961  047170  010C37  001136                  MOV     R0,$BDADR
11962  047174  005037  001140                  CLR     $GDDAT
11963  047200  104260                          ERROR   260             ;GO NOT RESET DUE TO ABORT
11964
11965                                  ;(THE OTHER TWO ABORT TESTS IN THE COMMAND SEQUENCER ARE TESTED
11966                                  ;DURING DATA COMMAND TESTS)
11967
11968  047202  012737  047210  001124  90$:     MOV     #100$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
11969
11970                                  ;;*****************************************************************
11971                                  ;VERIFY OPI SETS IF ON CYLINDER LATCH DOESNT CLEAR
11972
11973  047210                          100$:
11974                                  ;SET VOLUME VALID USING SUBROUTINE
11975  047210  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
11976  047214  000403                          BR      110$            ;BRANCH TO 110$ IF NO ERROR
11977  047216  104000                          ERROR                   ;RETURN HERE IF ERROR
11978  047220  000137  050632                  JMP     330$
11979  047224                          110$:
11980                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
11981                                  ;       ADDRESS,  AND LOAD SEARCH COMMAND
11982
11983  047224  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
11984
11985  047232  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
11986
11987  047240  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
11988
11989  047246  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
11990
11991  047254  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
11992
11993  047262  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
11994                                  ;       STEP THE COMMAND SEQUENCER
11995  047270  012702  000023                  MOV     #19.,R2
11996  047274                          120$:
11997
11998  047274  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
11999
12000  047302  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
12001  047310  005302                          DEC     R2
12002  047312  001370                          BNE     120$
12003                                  ;       VERIFY THAT OPI IS SET
12004
12005  047314  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
12006  047322  042737  157777  001142          BIC     #↑COPI,$BDDAT
12007  047330  001011                          BNE     130$
12008  047332  010037  001136                  MOV     R0,$BDADR
12009  047336  062737  000014  001136          ADD     #RMER1,$BDADR
12010  047344  012737  020000  001140          MOV     #OPI,$GDDAT
12011  047352  104261                          ERROR   261             ;OPI NOT SET DUE TO ON LATCH
12012
12013  047354  012737  047362  001124  130$:   MOV     #150$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
```

```
12014
12015                                   ;;*****************************************************************
12016                                   ;VERIFY ATA SETS IF DRIVE COMPLETES SEARCH (ON CYLINDER AND
12017                                   ;SECTOR COMPARE SETS)
12018
12019  047362                           150$:
12020                                   ;SET VOLUME VALID USING SUBROUTINE
12021  047362  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
12022  047366  000403                          BR      160$            ;BRANCH TO 160$ IF NO ERROR
12023  047370  104000                          ERROR                   ;RETURN HERE IF ERROR
12024  047372  000137  050632                  JMP     330$
12025  047376                           160$:
12026                                   ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRP < AND SECTOR
12027                                   ;       ADDRESS,  AND LOAD SEARCH COMMAND
12028
12029  047376  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12030
12031  047404  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
12032
12033  047412  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
12034
12035  047420  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
12036
12037  047426  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
12038
12039  047434  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
12040                                   ;       STEP COMMAND SEQUENCER TO FIRST ON LATCH TEST (17 CLOCKS)
12041  047442  012702  000021                  MOV     #17.,R2
12042  047446                           170$:
12043
12044  047446  012760  141401  000024          MOV     #DMD!MUR!DBEN!DBCK!MOC,RMMR1(R0)        ;LOAD RMMR1
12045
12046  047454  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12047  047462  005302                          DEC     R2
12048  047464  001370                          BNE     170$
12049                                   ;       DROP ON CYLINDER TO RESET LATCH,AND RAISE INDEX PULSE
12050                                   ;TO SET FORMAT CHANGE FLOP
12051
12052
12053  047466  012760  041005  000024          MOV     #DMD!MUR!DBEN!MI,RMMR1(R0)      ;LOAD RMMR1
12054                                   ;       RAISE ON CYLINDER AND INHIBIT SEARCH TIMEOUT
12055
12056  047474  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!DTO,RMMR1(R0) ;LOAD RMMR1
12057                                   ;       STEP COMMAND SEQUENCER TO SEARCH ENABLE (2 CLOCKS)
12058  047502  012702  000002                  MOV     #2,R2
12059  047506                           180$:
12060
12061  047506  012760  151401  000024          MOV     #DMD!MUR!DBEN!MOC!DTO!DBCK,RMMR1(R0)    ;LOAD RMMR1
12062
12063  047514  012760  051401  000024          MOV     #DMD!MUR!DBEN!MOC!DTO,RMMR1(R0) ;LOAD RMMR1
12064  047522  005302                          DEC     R2
12065  047524  001370                          BNE     180$
12066                                   ;FORCE SECTOR COMPARE BY CLOCKING SECTOR PULSE WITH SECTOR COMPARE
12067                                   ;ACTIVE
12068
12069  047526  012760  051403  000024          MOV     #DMD!MUR!MOC!DBEN!DTO!MSC,RMMR1(R0)     ;LOAD RMMR1
```

```
12070
12071  047534  012760  051443  000024          MOV     #DMD!MUR!MOC!DBEN!DTO!MSC!MS,RMMR1(R0)  ;LOAD RMMR1
12072
12073  047542  012760  051403  000024          MOV     #DMD!MUR!MOC!DBEN!DTO!MSC,RMMR1(R0)     ;LOAD RMMR1
12074                                  ;CLOCK SEQUENCER TO SET ATA (3 CLOCKS)
12075  047550  012702  000003                  MOV     #3,R2                   ;R2 = CLOCK COUNT
12076  047554                          185$:
12077
12078  047554  012760  151401  000024          MOV     #DMD!MUR!MOC!DBEN!DTO!DBCK,RMMR1(R0)    ;LOAD RMMR1
12079
12080  047562  012760  051401  000024          MOV     #DMD!MUR!MOC!DBEN!DTO,RMMR1(R0) ;LOAD RMMR1
12081  047570  005302                          DEC     R2
12082  047572  001370                          BNE     185$
12083                                  ;       VERIFY ATA IS SET
12084
12085  047574  016037  000012  001142          MOV     RM0S(R0),$BDDAT ;STORE RM0S AT $BDDAT
12086  047602  042737  077777  001142          BIC     #^CATA,$BDDAT
12087  047610  001011                          BNE     190$
12088  047612  012737  100000  001140          MOV     #ATA,$GDDAT
12089  047620  010037  001136                  MOV     R0,$BDADR
12090  047624  062737  000012  001136          ADD     #RM0S,$BDADR
12091  047632  104262                          ERROR   262                     ;ATA NOT SET BY SEARCH
12092
12093  047634  012737  047642  001124  190$:   MOV     #200$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
12094
12095                                  ;;*****************************************************************
12096                                  ;VERIFY THAT SEARCH ABORTS AFTER EXECUTION DURING SEARCH SEEK LOOP
12097
12098  047642                          200$:
12099                                  ;SET VOLUME VALID USING SUBROUTINE
12100  047642  004737  060654                  JSR     PC,SETVV                ;GO SET VOLUME VALID
12101  047646  000403                          BR      210$                    ;BRANCH TO 210$ IF NO ERROR
12102  047650  104000                          ERROR                           ;RETURN HERE IF ERROR
12103  047652  000137  050632                  JMP     330$
12104  047656                          210$:
12105                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
12106                                  ;       ADDRESS  AND LOAD SEARCH COMMAND
12107
12108  047656  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12109
12110  047664  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
12111
12112  047672  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
12113
12114  04770.  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
12115
12116  047706  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
12117
12118  047714  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
12119                                  .       STEP COMMAND SEQUENCER TO FIRST ON LATCH TEST (17 CLOCKS)
12120  047722  012702  000021                  MOV     #17.,R2
12121  047726                          220$:
12122
12123  047726  012760  141401  000024          MOV     #DMD!MUR!DBEN!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
12124
12125  047734  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
```

```
12126  047742  005302                          DEC     R2
12127  047744  001370                          BNE     220$
12128                                  ;       DROP ON CYLINDER TO RESET LATCH, LEAVE ON CYLINDER 0
12129
12130  047746  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
12131                                  ;       STEP COMMAND SEQUENCER THROUGH WAIT LOOP (7 CLOCKS)
12132  047754  012702  000007                  MOV     #7,R2
12133  047760                          230$:
12134
12135  047760  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
12136
12137  047766  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
12138  047774  005302                          DEC     R2
12139  047776  001370                          BNE     230$
12140                                  ;       VERIFY THAT GO IS STILL SET
12141
12142  050000  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
12143  050006  042737  177776  001142          BIC     #^CGO,$BDDAT
12144  050014  001006                          BNE     240$
12145  050016  012737  000001  001140          MOV     #GO,$GDDAT
12146  050024  010037  001136                  MOV     R0,$BDADR
12147  050030  104263                          ERROR   263             ;GO RESET EARLY DURING SEARCH
12148                                  ;       SET SEEK INCOMPLETE ERROR
12149  050032                          240$:
12150
12151  050032  012760  041201  000024          MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
12152                                  ;       STEP COMMAND SEQUENCER AND VERIFY GO RESETS (3 CLOCKS)
12153  050040  012702  000003                  MOV     #3,R2
12154  050044                          250$:
12155
12156  050044  012760  141201  000024          MOV     #DMD!MUR!DBEN!MSER!DBCK,RMMR1(R0)       ;LOAD RMMR1
12157
12158  050052  012760  041201  000024          MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
12159  050060  005302                          DEC     R2
12160  050062  001370                          BNE     250$
12161
12162  050064  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
12163  050072  042737  177776  001142          BIC     #^CGO,$BDDAT
12164  050100  001405                          BEQ     260$
12165  050102  010037  001136                  MOV     R0,$BDADR
12166  050106  005037  001140                  CLR     $GDDAT
12167  050112  104264                          ERROR   264             ;GO NOT RESET DUE TO WAIT ABORT
12168
12169  050114  012737  050122  001124  260$:   MOV     #265$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
12170
12171                                  ;;*****************************************************************
12172                                  ;VERIFY THAT SEARCH ABORTS DURING SECTOR COMPARE LOOP
12173
12174  050122                          265$:
12175                                  ;SET VOLUME VALID USING SUBROUTINE
12176  050122  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
12177  050126  000403                          BR      270$            ;BRANCH TO 270$ IF NO ERROR
12178  050130  104000                          ERROR                   ;RETURN HERE IF ERROR
12179  050132  000137  050632                  JMP     330$
12180  050136                          270$:
12181                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
```

```
12182                                          ;       ADDRESS,  AND LOAD SEARCH COMMAND
12183
12184  050136  012760  041401  000024                  MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12185
12186  050144  012760  000000  000006                  MOV     #0,RMDA(R0)     ;LOAD RMDA
12187
12188  050152  012760  000000  000034                  MOV     #0,RMDC(R0)     ;LOAD RMDC
12189
12190  050160  012760  000000  000014                  MOV     #0,RMER1(R0)    ;LOAD RMER1
12191
12192  050166  012760  000000  000042                  MOV     #0,RMER2(R0)    ;LOAD RMER2
12193
12194  050174  012760  000031  000000                  MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
12195                                          ;       STEP COMMAND SEQUENCER TO FIRST ON LATCH TEST (17 CLOCKS)
12196  050202  012702  000021                          MOV     #17.,R2
12197  050206                                  275$:
12198
12199  050206  012760  141401  000024                  MOV     #DMD!MUR!DBEN!DBCK!MOC,RMMR1(R0)        ;LOAD RMMR1
12200
12201  050214  012760  041401  000024                  MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12202  050222  005302                                  DEC     R2
12203  050224  001370                                  BNE     275$
12204                                          ;       DROP ON CYLINDER TO RESET LATCH, AND RAISE INDEX PULSE
12205                                          ;TO SET FORMAT CHANGE FLOP
12206
12207
12208  050226  012760  041005  000024                  MOV     #DMD!MUR!DBEN!MI,RMMR1(R0)      ;LOAD RMMR1
12209                                          ;       RAISE ON CYLINDER AND INHIBIT SEARCH TIMEOUT
12210
12211  050234  012760  051401  000024                  MOV     #DMD!MUR!DBEN!MOC!DTO,RMMR1(R0) ;LOAD RMMR1
12212                                          ;       STEP COMMAND SEQUENCER TO SEARCH ENABLE (2 CLOCKS)
12213  050242  012702  000002                          MOV     #2,R2
12214  050246                                  280$:
12215
12216  050246  012760  151401  000024                  MOV     #DMD!MUR!DBEN!MOC!DTO!DBCK,RMMR1(R0)    ;LOAD RMMR1
12217
12218  050254  012760  051401  000024                  MOV     #DMD!MUR!DBEN!MOC!DTO,RMMR1(R0) ;LOAD RMMR1
12219  050262  005302                                  DEC     R2
12220  050264  001370                                  BNE     280$
12221                                          ;       VERIFY THAT SEARCH ENABLE IS ON DURING SECTOR COMPARE LOOP
12222  050266  012702  000004                  ;       MOV     #4,R2           ;R2 = CLOCK COUNT
12223  050272                                  281$:
12224
12225  050272  016037  000024  001142                  MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
12226  050300  042737  173777  001142                  BIC     #^C<ESRC>,$BDDAT
12227  050306  001411                                  BEQ     282$            ;BRANCH IF SEARCH NOT ENABLED
12228
12229  050310  012760  151401  000024                  MOV     #DMD!MUR!MOC!DBEN!DTO!DBCK,RMMR1(R0)    ;LOAD RMMR1
12230
12231  050316  012760  051401  000024                  MOV     #DMD!MUR!MOC!DBEN!DTO,RMMR1(R0) ;LOAD RMMR1
12232  050324  005302                                  DEC     R2
12233  050326  001361                                  BNE     281$
12234  050330  000411                                  BR      283$
12235  050332  012737  004000  001140  282$:           MOV     #ESRC,$GDDAT
12236  050340  010037  001136                          MOV     R0,$BDADR
12237  050344  062737  000024  001136                  ADD     #RMMR1,$BDADR
```

```
12238  050352  104265                          ERROR   265             ;SEARCH NOT ENABLED
12239  050354                          283$:
12240                                  ;       SET DRIVE FAULT TO CAUSE ABORT CONDITION
12241
12242  050354  012760  051501  000024          MOV     #DMD!MUR!DBEN!MOC!DTO!MDF,RMMR1(R0)     ;LOAD RMMR1
12243                                  ;       STEP 2 CLOCKS AND VERIFY GO IS RESET
12244  050362  012702  000002                  MOV     #2,R2           ;R2 = CLOCK COUNT
12245  050366                          285$:
12246
12247  050366  012760  151501  000024          MOV     #DMD!MUR!DBEN!MOC!DTO!MDF!DBCK,RMMR1(R0)        ;LOAD RMMR1
12248
12249  050374  012760  051501  000024          MOV     #DMD!MUR!DBEN!MOC!DTO!MDF,RMMR1(R0)     ;LOAD RMMR1
12250  050402  005302                          DEC     R2
12251  050404  001370                          BNE     285$
12252
12253  050406  016037  000000  001142          MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
12254  050414  042737  177776  001142          BIC     #^CGO,$BDDAT
12255  050422  001406                          BEQ     290$
12256  050424  012737  000000  001140          MOV     #0,$GDDAT
12257  050432  010037  001136                  MOV     R0,$BDADR
12258  050436  104260                          ERROR   260             ;GO NOT RESET DURING SECTOR COMPARE
12259
12260  050440  012737  050452  001124  290$:   MOV     #300$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
12261  050446  012703  000001                  MOV     #1,R3           ;INITIALIZE CYLINDER ADDRESS
12262
12263                                  ;;**************************************************************
12264                                  ;VERIFY THE TAG BUS DURING SEARCH
12265
12266  050452                          300$:
12267                                  ;SET VOLUME VALID USING SUBROUTINE
12268  050452  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
12269  050456  000402                          BR      310$            ;BRANCH TO 310$ IF NO ERROR
12270  050460  104000                          ERROR                   ;RETURN HERE IF ERROR
12271  050462  000463                          BR      330$
12272  050464                          310$:
12273                                  ;       ENABLE DEBUG CLOCK, LOAD CYLINDER, TRACK AND SECTOR
12274                                  ;       ADDRESS  AND LOAD SEARCH COMMAND
12275
12276  050464  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12277
12278  050472  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
12279
12280  050500  010360  000034                  MOV     R3,RMDC(R0)     ;LOAD RMDC
```

```
12281
12282  050504  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
12283
12284  050512  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
12285
12286  050520  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
12287  050526  012702  050646                  MOV     #400$,R2        ;INITIALIZE TABLE POINTER
12288                                          ;       VERIFY TAG BUS ACCORDING TO TABLE AND CYLINDER IN R3
12289  050532                                  315$:
12290
12291  050532  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
12292  050540  042737  150000  001142          BIC     #RQA!RQB!TST,$BDDAT
12293  050546  011237  001140                  MOV     (R2),$GDDAT
12294  050552  050337  001140                  BIS     R3,$GDDAT       ;OR CYLINDER ADDRESS IN
12295  050556  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;COMPARE EXPECTED AND RECEIVED
12296  050564  001407                          BEQ     320$            ;BRANCH IF TAG BUS OK
12297  050566  010037  001136                  MOV     R0,$BDADR
12298  050572  062737  000040  001136          ADD     #RMMR2,$BDADR
12299  050600  104266                          ERROR   266             ;INCORRECT TAG BUS DURING SEARCH
12300  050602  000420                          BR      340$
12301  050604                                  320$:
12302                                          ;       ADVANCE TO NEXT ENTRY IN TABLE-EXIT IF DONE
12303  050604  062702  000002                  ADD     #2,R2
12304  050610  005712                          TST     (R2)
12305  050612  100407                          BMI     330$            ;EXIT IF ENTRY NEGATIVE
12306                                          ;       STEP THE COMMAND SEQUENCER AND REPEAT VERIFICATION
12307
12308  050614  012760  141401  000024          MOV     #DMD!DBEN!MUR!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
12309
12310  050622  012760  041401  000024          MOV     #DMD!DBEN!MUR!MOC,RMMR1(R0)     ;LOAD RMMR1
12311  050630  000740                          BR      315$
12312  050632                                  330$:
12313                                          ;REPEAT TAG BUS TEST FOR EACH PRIME CYLINDER, I.E., 1,2,4,...
12314
12315  050632  006303                          ASL     R3              ;SHIFT TO NEXT CYLINDER
12316  050634  020327  000512                  CMP     R3,#512
12317  050640  101001                          BHI     340$            ;EXIT IF 512 WAS DONE
12318  050642  000703                          BR      300$            ;TEST NEXT CYLINDER
12319  050644  000424          340$:   BR      500$            ;JUMP OVER TABLE
12320
12321  050646                                  400$:
12322
12323                                          ;TABLE OF TAG BUS CONTROL AND BIT VALUES
12324
12325  050646  001777                          .WORD   1777            ;BUS BITS AT HIGH IMPEDANCE STATE
12326  050650  001777                          .WORD   1777
12327  050652  001777                          .WORD   1777
12328  050654  001777                          .WORD   1777
12329  050656  001777                          .WORD   1777
12330  050660  004000                          .WORD   CC      ;CONTROL BITS ENABLED, BIT 6 ON
12331  050662  004000                          .WORD   CC
12332  050664  024000                          .WORD   TAG!CC  ;TAG COMES ON
12333  050666  024000                          .WORD   TAG!CC
12334  050670  024000                          .WORD   TAG!CC
12335  050672  024000                          .WORD   TAG!CC
12336  050674  024000                          .WORD   TAG!CC
```

```
12337  050676  024000                          .WORD   TAG!CC
12338  050700  004000                          .WORD   CC      ;TAG GOES OFF
12339  050702  004000                          .WORD   CC
12340  050704  001777                          .WORD   1777            ;CONTROL BITS DISABLED
12341  050706  001777                          .WORD   1777
12342  050710  001777                          .WORD   1777
12343  050712  001777                          .WORD   1777
12344
12345  050714  177777                          .WORD   -1              ;END OF TABLE
12346
12347  050716                          500$:                           ;END OF TEST
12348
12349                                  ;;*****************************************************************
12350                                  ;*TEST 116       SEARCH TIMEOUT TEST
12351
12352                                  ;;*****************************************************************
12353  050716  000004                  TST116: SCOPE
12354  050720  012737  000116  001226          MOV     #116,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
12355
12356  050726  000240                          NOP
12357  050730  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
12358  050736  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
12359  050744  012737  050760  001122          MOV     #T116,$LPADR  ;LOAD LOOP ON TEST ADDRESS
12360  050752  012737  050760  001124          MOV     #T116,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
12361  050760                          T116:
12362  050760  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
12363  050764  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
12364  050770  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
12365                                  ;SET VOLUME VALID USING SUBROUTINE
12366  050774  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
12367  051000  000402                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
12368  051002  104000                          ERROR                   ;RETURN HERE IF ERROR
12369  051004  000550                          BR      90$
12370  051006                          10$:
12371                                  ;ENABLE DEBUG CLOCK AND LOAD SEARCH COMMAND
12372
12373  051006  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12374
12375  051014  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
12376
12377  051022  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
12378
12379  051030  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
12380
12381  051036  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
12382
12383  051044  012760  000031  000000          MOV     #SEARCH!GO,RMCS1(R0)    ;LOAD RMCS1
12384                                  ;EXECUTE SEARCH TO TEST FOR ON LATCH RESET (17 CLOCKS)
12385  051052  012702  000021                  MOV     #17.,R2
12386  051056                          20$:
12387
12388  051056  012760  141401  000024          MOV     #DMD!MUR!DBEN!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
12389
12390  051064  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12391  051072  005302                          DEC     R2
12392  051074  001370                          BNE     20$
```

```
12393                                   ;DROP ON CYLINDER TO RESET LATCH, RAISE ON CYLINDER
12394
12395  051076  012760  041001  000024           MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
12396
12397  051104  012760  041401  000024           MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
12398                                   ;STEP COMMAND SEQUENCER TO SECTOR COMPARE LOOP (2 CLOCKS)
12399  051112  012702  000002                   MOV     #2,R2
12400  051116                          30$:
12401
12402  051116  012760  151401  000024           MOV     #DMD!DBEN!MUR!MOC!DBCK!DTO,RMMR1(R0)    ;LOAD RMMR1
12403
12404  051124  012760  051401  000024           MOV     #DMD!DBEN!MUR!MOC!DTO,RMMR1(R0) ;LOAD RMMR1
12405  051132  005302                           DEC     R2
12406  051134  001370                           BNE     30$
12407                                   ;THE COMMAND SEQUENCER IS NOW IN THE SECTOR COMPARE LOOP.  STEP
12408                                   ;THROUGH THE LOOP AND VERIFY SEARCH IS ENABLED.
12409  051136  012702  000005                   MOV     #5,R2
12410  051142                          40$:
12411
12412  051142  012760  151401  000024           MOV     #DMD!DBEN!MUR!MOC!DBCK!DTO,RMMR1(R0)    ;LOAD RMMR1
12413
12414  051150  012760  051401  000024           MOV     #DMD!DBEN!MUR!MOC!DTO,RMMR1(R0) ;LOAD RMMR1
12415
12416  051156  016037  000024  001142           MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
12417  051164  042737  173777  001142           BIC     #^CESRC,$BDDAT
12418  051172  001403                           BEQ     50$             ;BRANCH IF SEARCH NOT ENABLED
12419  051174  005302                           DEC     R2
12420  051176  001361                           BNE     40$
12421  051200  000412                           BR      60$
12422  051202  012737  004000  001140  50$:     MOV     #ESRC,$GDDAT    ;SETUP ERROR MSG
12423  051210  010037  001136                   MOV     R0,$BDADR
12424  051214  062737  000024  001136           ADD     #RMMR1,$BDADR
12425  051222  104265                           ERROR   265             ;SEARCH NOT ENABLED
12426  051224  000440                           BR      90$
12427  051226                          60$:
12428                                   ;DROP DTO TO ENABLE SEARCH TIMEOUT AND WAIT FOR OPI TO SET.
12429
12430  051226  012760  041401  000024           MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12431  051234  012737  000400  001524           MOV     #400,WATCH      ;SET WATCHDOG TIMER VALUE
12432  051242  004777  130260                   JSR     PC,@CLOCK       ;START THE CLOCK
12433  051246                          70$:
12434
12435  051246  016037  000014  001142           MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
12436  051254  042737  157777  001142           BIC     #^COPI,$BDDAT
12437  051262  001017                           BNE     80$
12438  051264  005737  001524                   TST     WATCH
12439  051270  001366                           BNE     70$
12440  051272  004777  130232                   JSR     PC,@STOP        ;STOP THE CLOCK
12441  051276  012737  020000  001140           MOV     #OPI,$GDDAT     ;SETUP ERROR MSG
12442  051304  010037  001136                   MOV     R0,$BDADR
12443  051310  062737  000014  001136           ADD     #RMER1,$BDADR
12444  051316  104267                           ERROR   267             ;OPI NOT SET BY SEARCH TIMEOUT
12445  051320  000402                           BR      90$
12446  051322                          80$:
12447  051322  004777  130202                   JSR     PC,@STOP        ;STOP THE CLOCK
12448
```

```
12449  051326                                  90$:                                    ;END OF TEST
12450
12451                                          ;;*****************************************************************
12452                                          ;*TEST 117      DATA COMMAND TESTS (1)
12453
12454                                          ;;*****************************************************************
12455  051326  000004                          TST117: SCOPE
12456  051330  012737  000117  001226                  MOV     #117,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
12457
12458  051336  000240                                  NOP
12459  051340  012737  000024  001120                  MOV     #20.,$ICNT      ;20 ITERATIONS
12460  051346  112737  000001  001131                  MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
12461  051354  012737  051370  001122                  MOV     #T117,$LPADR    ;LOAD LOOP ON TEST ADDRESS
12462  051362  012737  051370  001124                  MOV     #T117,$LPERR    ;LOAD LOOP ON ERROR ADDRESS
12463  051370                                  T117:
12464  051370  012706  C01100                          MOV     #STACK,SP       ;LOAD THE STACK POINTER
12465  051374  013700  001276                          MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
12466  051400  013701  001456                          MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
12467                                          ;;*****************************************************************
12468                                          ;VERIFY DATA COMMAND SETS OPI IF DRIVE NOT READY
12469                                          ;SET VOLUME VALID USING SUBROUTINE
12470  051404  004737  060654                          JSR     PC,SETVV        ;GO SET VOLUME VALID
12471  051410  000402                                  BR      10$             ;BRANCH TO 10$ IF NO ERROR
12472  051412  104000                                  ERROR                   ;RETURN HERE IF ERROR
12473  051414  000471                                  BR      40$
12474  051416                                  10$:
12475                                          ;       ENABLE DEBUG CLOCK AND LOAD READ COMMAND
12476
12477  051416  012760  041401  000024                  MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12478
12479  051424  012760  000000  000014                  MOV     #0,RMER1(R0)    ,LOAD RMER1
12480
12481  051432  012760  000000  000042                  MOV     #0,RMER2(R0)    ;LOAD RMER2
12482
12483  051440  012760  000000  000006                  MOV     #0,RMDA(R0)     ;LOAD RMDA
12484
12485  051446  012760  000000  000034                  MOV     #0,RMDC(R0)     ;LOAD RMDC
12486
12487  051454  012760  000071  000000                  MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
12488                                          ;       STEP COMMAND SEQUENCER TO UNIT READY TEST (3 CLOCKS)
12489  051462  012702  000003                          MOV     #3,R2
12490  051466                                  20$:
12491
12492  051466  012760  141401  000024                  MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12493
12494  051474  012760  041401  000024                  MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12495  051502  005302                                  DEC     R2
12496  051504  001370                                  BNE     20$
12497                                          ;       DROP UNIT READY
12498
12499  051506  012760  040401  000024                  MOV     #DMD!MOC!DBEN,RMMR1(R0) ;LOAD RMMR1
12500                                          ;       STEP SEQUENCER AND VERIFY OPI SETS (2 CLOCKS)
12501  051514  012702  000002                          MOV     #2,R2
12502  051520                                  30$:
12503
12504  051520  012760  140401  000024                  MOV     #DMD!MOC!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
```

```
12505
12506  051526  012760  040401  000024          MOV     #DMD!MOC!DBEN,RMMR1(R0) ;LOAD RMMR1
12507  051534  005302                          DEC     R2
12508  051536  001370                          BNE     30$
12509
12510  051540  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
12511  051546  042737  157777  001142          BIC     #^COPI,$BDDAT
12512  051554  001011                          BNE     40$
12513  051556  012737  020000  001140          MOV     #OPI,$GDDAT
12514  051564  010037  001136                  MOV     R0,$BDADR
12515  051570  062737  000014  001136          ADD     #RMER1,$BDADR
12516  051576  104270                          ERROR   270             ;OPI NOT SET DURING DATA
12517
12518  051600  012737  051606  001124  40$:    MOV     #50$,$LPERR     ;CHANGE LOOP ON ERROR TEST
12519
12520                                  ;;*****************************************************************
12521                                  ;VERIFY DATA COMMAND ABORTS AT LOCATION 129
12522
12523  051606                          50$:
12524                                  ;SET VOLUME VALID USING SUBROUTINE
12525  051606  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
12526  051612  000402                          BR      60$             ;BRANCH TO 60$ IF NO ERROR
12527  051614  104000                          ERROR                   ;RETURN HERE IF ERROR
12528  051616  000576                          BR      150$
12529  051620                          60$:
12530                                  ;ENABLE DEBUG CLOCK AND LOAD READ COMMAND
12531
12532  051620  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12533
12534  051626  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
12535
12536  051634  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
12537
12538  051642  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
12539
12540  051650  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
12541
12542  051656  012760  000071  000000          MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
12543                                  ;STEP COMMAND SEQUENCER TO ABORT TEST AT LOCATION 129 (4 CLOCKS)
12544  051664  012702  000004                  MOV     #4,R2
12545  051670                          70$:
12546
12547  051670  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12548
12549  051676  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12550  051704  005302                          DEC     R2
12551  051706  001370                          BNE     70$
12552                                  ;SET DEVICE FAULT TO CAUSE ABORT CONDITION
12553
12554  051710  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12555                                  ;STEP THE SEQUENCER THROUGH THE TEST FOR ABORT (1 CLOCK)
12556  051716  012702  000001                  MOV     #1,R2
12557  051722                          80$:
12558
12559  051722  012760  141501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!DBCK,RMMR1(R0)    ;LOAD RMMR1
12560
```

```
12561  051730  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12562  051736  005302                          DEC     R2
12563  051740  001370                          BNE     80$
12564
12565                                  ;ABORT EBL SHOULD NOW BE ACTIVE - USE THE MAINTENANCE REGISTER TO
12566                                  ;FORCE BIT CLOCKS AND VERIFY THAT EBL SETS WITHIN 16 BIT CLOCKS
12567  051742  012702  000020                  MOV     #16.,R2          ;MAXIMUM NUMBER OF BIT CLOCKS
12568  051746                          85$:
12569
12570  051746  012760  045501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!MCLK,RMMR1(R0)    ;LOAD RMMR1
12571
12572  051754  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12573
12574  051762  016037  000024  001142          MOV     RMMR1(R0),$BDDAT         ;STORE RMMR1 AT $BDDAT
12575  051770  042737  157777  001142          BIC     #^CEBL,$BDDAT
12576  051776  001014                          BNE     90$              ;BRANCH IF EBL IS SET
12577
12578  052000  005302                          DEC     R2
12579  052002  001361                          BNE     85$              ;CONTINUE BIT CLOCKS IF COUNT NOT 0
12580  052004  012737  020000  001140          MOV     #EBL,$GDDAT
12581  052012  010037  001136                  MOV     R0,$BDADR
12582  052016  062737  000024  001136          ADD     #RMMR1,$BDADR
12583  052024  104271                          ERROR   271              ;EBL NOT SET AT DATA ABORT
12584  052026  000472                          BR      150$
12585  052030                          90$:
12586                                  ;STEP THE SEQUENCER THROUGH ITS TEST FOR EBL (2 CLOCKS)
12587  052030  012702  000002                  MOV     #2,R2
12588  052034                          100$:
12589
12590  052034  012760  141501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!DBCK,RMMR1(R0)     ;LOAD RMMR1
12591
12592  052042  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12593  052050  005302                          DEC     R2
12594  052052  001370                          BNE     100$
12595
12596                                  ;ABORT EBL SHOULD NOW BE INACTIVE - FORCE BIT CLOCK USING THE
12597                                  ;MAINTENANCE REGISTER TO RESET EBL (16 BIT CLOCKS)
12598  052054  012702  000020                  MOV     #16.,R2          ;MAXIMUM NUMBER OF BIT CLOCKS
12599  052060                          110$:
12600
12601  052060  012760  045501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!MCLK,RMMR1(R0)     ;LOAD RMMR1
12602
12603  052066  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12604  052074  005302                          DEC     R2
12605  052076  001370                          BNE     110$             ;ISSUE 16 BIT CLOCKS THEN TEST
12606  052100                          120$:
12607                                  ;VERIFY EBL IS NOW RESET
12608
12609  052100  016037  000024  001142          MOV     RMMR1(R0),$BDDAT         ;STORE RMMR1 AT $BDDAT
12610  052106  042737  157777  001142          BIC     #^CEBL,$BDDAT
12611  052114  001411                          BEQ     130$             ;BRANCH IF EBL IS RESET
12612  052116  005037  001140                  CLR     $GDDAT
12613  052122  010037  001136                  MOV     R0,$BDADR
12614  052126  062737  000024  001136          ADD     #RMMR1,$BDADR
12615  052134  104273                          ERROR   273              ;EBL DIDNT RESET ON TIME
12616  052136  000426                          BR      150$
```

```
12617  052140                                  130$:
12618                                          ;VERIFY GO RESETS WITHIN 4 CLOCK CYCLES
12619  052140  012702  000004                          MOV     #4,R2
12620  052144                                  140$:
12621
12622  052144  012760  141501  000024                  MOV     #DMD!MUR!MOC!DBEN!MDF!DBCK,RMMR1(R0)    ;LOAD RMMR1
12623
12624  052152  012760  041501  000024                  MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12625  052160  005302                                  DEC     R2
12626  052162  001370                                  BNE     140$
12627
12628  052164  016037  000000  001142                  MOV     RMCS1(R0),$BDDAT        ;STORE RMCS1 AT $BDDAT
12629  052172  042737  177776  001142                  BIC     #^CGO,$BDDAT
12630  052200  001405                                  BEQ     150$
12631  052202  005037  001140                          CLR     $GDDAT
12632  052206  010037  001136                          MOV     R0,$BDADR
12633  052212  104274                                  ERROR   274             ;GO NOT RESET DURING DATA ABORT
12634
12635  052214  012737  052222  001124  150$:   MOV     #200$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
12636
12637                                          ;;*****************************************************************
12638                                          ;VERIFY SEQUENCER BRANCHES TO SEEK WHEN RUN AND GO FLOP SETS
12639
12640  052222                                  200$:
12641                                          ;SET VOLUME VALID USING SUBROUTINE
12642  052222  004737  060654                          JSR     PC,SETVV        ;GO SET VOLUME VALID
12643  052226  000402                                  BR      210$            ;BRANCH TO 210$ IF NO ERROR
12644  052230  104000                                  ERROR                   ;RETURN HERE IF ERROR
12645  052232  000512                                  BR      250$
12646  052234                                  210$:
12647                                          ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
12648
12649  052234  012760  041401  000024                  MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12650
12651  052242  012760  000000  000014                  MOV     #0,RMER1(R0)    ;LOAD RMER1
12652
12653  052250  012760  000000  000042                  MOV     #0,RMER2(R0)    ;LOAD RMER2
12654
12655  052256  012760  000000  000006                  MOV     #0,RMDA(R0)     ;LOAD RMDA
12656
12657  052264  012760  000000  000034                  MOV     #0,RMDC(R0)     ;LOAD RMDC
12658
12659  052272  012760  000071  000000                  MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
12660                                          ;MOVE SEQUENCER TO TEST FOR RUN AND GO AT LOCATION 130 (5 CLOCKS)
12661  052300  012702  000005                          MOV     #5,R2
12662  052304                                  220$:
12663
12664  052304  012760  141401  000024                  MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12665
12666  052312  012760  041401  000024                  MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12667  052320  005302                                  DEC     R2
12668  052322  001370                                  BNE     220$
12669                                          ;VERIFY RUN AND GO IS SET
12670
12671  052324  016037  000024  001142                  MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
12672  052332  042737  137777  001142                  BIC     #^CRG,$BDDAT
```

```
12673  052340  001012                          BNE     230$
12674  052342  012737  040000  001140          MOV     #RG,$GDDAT
12675  052350  010037  001136                  MOV     R0,$BDADR
12676  052354  062737  000024  001136          ADD     #RMMR1,$BDADR
12677  052362  104275                          ERROR   275             ;RUN AND GO NOT SET
12678  052364  000435                          BR      250$
12679  052366                          230$:
12680                                  ;VERIFY THAT CYLINDER TAG COMES UP IN ONE CLOCK CYCLE
12681  052366  012702  000001                  MOV     #1,R2
12682  052372                          240$:
12683
12684  052372  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12685
12686  052400  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12687  052406  005302                          DEC     R2
12688  052410  001370                          BNE     240$
12689
12690  052412  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
12691  052420  042737  160000  001142          BIC     #RQA!RQB!TAG,$BDDAT
12692  052426  012737  004000  001140          MOV     #CC,$GDDAT
12693  052434  023737  001140  001142          CMP     $GDDAT,$BDDAT
12694  052442  001406                          BEQ     250$
12695  052444  010037  001136                  MOV     R0,$BDADR
12696  052450  062737  000040  001136          ADD     #RMMR2,$BDADR
12697  052456  104276                          ERROR   276             ;CYLINDER TAG NOT SET DURING DATA
12698
12699  052460  012737  052472  001124  250$:   MOV     #260$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
12700
12701                                  ;;*****************************************************************
12702                                  ;VERIFY DATA COMMAND ABORTS AT COMMAND SEQUENCER LOCATIONS 144, 145
12703  052466  012702  000144                  MOV     #144,R2         ;INITIALIZE TEST LOCATION
12704  052472                          260$:
12705                                  ;SET VOLUME VALID USING SUBROUTINE
12706  052472  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
12707  052476  000402                          BR      270$            ;BRANCH TO 270$ IF NO ERROR
12708  052500  104000                          ERROR                   ;RETURN HERE IF ERROR
12709  052502  000553                          BR      320$
12710  052504                          270$:
12711                                  ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
12712
12713  052504  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12714
12715  052512  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
12716
12717  052520  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
12718
12719  052526  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
12720
12721  052534  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
12722
12723  052542  012760  000071  000000          MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
12724                                  ;WAIT FOR RUN AND GO TO SET
12725  052550  012737  000310  001524          MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
12726  052556  004777  126744                  JSR     PC,@CLOCK       ;START THE CLOCK
12727  052562                          280$:
12728
```

```
12729  052562  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
12730  052570  042737  137777  001142          BIC     #1CRG,$BDDAT
12731  052576  001017                          BNE     290$
12732  052600  005737  001524                  TST     WATCH
12733  052604  001366                          BNE     280$
12734  052606  004777  126716                  JSR     PC,@STOP        ;STOP THE CLOCK
12735  052612  012737  040000  001140          MOV     #RG,$GDDAT
12736  052620  010037  001136                  MOV     R0,$BDADR
12737  052624  062737  000024  001136          ADD     #RMMR1,$BDADR
12738  052632  104275                          ERROR   275             ;RUN AND GO NOT SET
12739  052634  000476                          BR      320$
12740  052636                          290$:
12741  052636  004777  126666                  JSR     PC,@STOP        ;STOP THE CLOCK
12742                  ;MOVE COMMAND SEQUENCER TO ABORT TEST (LOCATION 144 OR 145)
12743  052642  012703  000006                  MOV     #6,R3           ;SETUP CLOCK COUNT
12744  052646  022702  000144                  CMP     #144,R2
12745  052652  001402                          BEQ     300$
12746  052654  012703  000007                  MOV     #7,R3
12747  052660                          300$:
12748
12749  052660  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12750
12751  052666  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12752  052674  005303                          DEC     R3
12753  052676  001370                          BNE     300$
12754                  ;SET DRIVE FAULT TO FORCE ABORT CONDITION
12755
12756  052700  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12757                  ;CLOCK SEQUENCER THROUGH ITS TEST FOR ABORT (1 CLOCK)
12758  052706  012703  000001                  MOV     #1,R3
12759  052712                          305$:
12760
12761  052712  012760  141501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!DBCK,RMMR1(R0)    ;LOAD RMMR1
12762
12763  052720  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12764  052726  005303                          DEC     R3
12765  052730  001370                          BNE     305$            ;ISSUE 2 CLOCKS
12766
12767                  ;ABORT EBL SHOULD NOW BE ACTIVE - USE THE MAINTENANCE REGISTER TO
12768                  ;FORCE BIT CLOCKS AND VERIFY THAT EBL SETS WITHIN 16 BIT CLOCKS
12769  052732  012702  000020                  MOV     #16.,R2         ;MAXIMUM NUMBER OF BIT CLOCKS
12770  052736                          306$:
12771
12772  052736  012760  045501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!MCLK,RMMR1(R0)     ;LOAD RMMR1
12773
12774  052744  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
12775
12776  052752  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
12777  052760  042737  157777  001142          BIC     #^CEBL,$BDDAT
12778  052766  001013                          BNE     310$            ;BRANCH IF EBL IS SET
12779
12780  052770  005302                          DEC     R2
12781  052772  001361                          BNE     306$            ;CONTINUE BIT CLOCKS IF COUNT NOT 0
12782  052774  012737  020000  001140          MOV     #EBL,$GDDAT
12783  053002  010037  001136                  MOV     R0,$BDADR
12784  053006  062737  000024  001136          ADD     #RMMR1,$BDADR
```

```
12785  053014  104271                        ERROR   271             ;SEQ DID NOT ABORT AT DATA SEEK
12786  053016  022702  000144        310$:   CMP     #144,R2
12787  053022  001003                        BNE     320$
12788  053024  012702  000145                MOV     #145,R2
12789  053030  000620                        BR      260$
12790
12791  053032  012737  053044  001124  320$:   MOV     #330$,$LPERR            ;CHANGE LOOP ON ERROR ADDRESS
12792
12793                                  ;;*****************************************************************
12794                                  ;VERIFY HEAD TAG DURING DATA COMMAND
12795  053040  012702  000400                MOV     #400,R2         ;INITIALIZE TRACK ADDRESS
12796  053044                          330$:
12797                                  ;SET VOLUME VALID USING SUBROUTINE
12798  053044  004737  060654                JSR     PC,SETVV        ;GO SET VOLUME VALID
12799  053050  000402                        BR      340$            ;BRANCH TO 340$ IF NO ERROR
12800  053052  104000                        ERROR                   ;RETURN HERE IF ERROR
12801  053054  000550                        BR      400$
12802  053056                          340$:
12803                                  ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
12804
12805  053056  012760  041401  000024        MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12806
12807  053064  012760  000000  000014        MOV     #0,RMER1(R0)    ;LOAD RMER1
12808
12809  053072  012760  000000  000042        MOV     #0,RMER2(R0)    ;LOAD RMER2
12810
12811  053100  010260  000006                MOV     R2,RMDA(R0)     ;LOAD RMDA
12812
12813  053104  012760  000000  000034        MOV     #0,RMDC(R0)     ;LOAD RMDC
12814
12815  053112  012760  000071  000000        MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
12816                                  ;WAIT FOR RUN AND GO TO SET
12817  053120  012737  000310  001524        MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
12818  053126  004777  126374                JSR     PC,@CLOCK       ;START THE CLOCK
12819  053132                          350$:
12820
12821  053132  016037  000024  001142        MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
12822  053140  042737  137777  001142        BIC     #^CRG,$BDDAT
12823  053146  001017                        BNE     360$
12824  053150  005737  001524                TST     WATCH
12825  053154  001366                        BNE     350$
12826  053156  004777  126346                JSR     PC,@STOP        ;STOP THE CLOCK
12827  053162  012737  040000  001140        MOV     #RG,$GDDAT
12828  053170  010037  001136                MOV     R0,$BDADR
12829  053174  062737  000024  001136        ADD     #RMMR1,$BDADR
12830  053202  104275                        ERROR   275             ;RUN AND GO NOT SET
12831  053204  000474                        BR      400$
12832  053206                          360$:
12833  053206  004777  126316                JSR     PC,@STOP        ;STOP THE CLOCK
12834                                  ;STEP COMMAND SEQUENCER TO HEAD SEQUENCE, LOCATION 156 (17 CLOCKS)
12835  053212  012703  000021                MOV     #17.,R3
12836  053216                          370$:
12837
12838  053216  012760  141401  000024        MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12839
12840  053224  012760  041401  000024        MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
```

```
12841  053232  005303                          DEC     R3
12842  053234  001370                          BNE     370$
12843                                  ;DROP AND RAISE ON CYLINDER TO RESET ON LATCH
12844
12845  053236  012760  041011  000024          MOV     #DMD!MUR!C3EN,RMMR1(R0) ;LOAD RMMR1
12846
12847  053244  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12848  053252  012703  053400                  MOV     #450$,R3        ;INITIALIZE TABLE POINTER
12849                                  ;VERIFY TAG BUS ACCORDING TO TABLE AND TRACK ADDRESS IN R2
12850  053256                          375$:
12851
12852  053256  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
12853  053264  042737  150000  001142          BIC     #RQA!RQB!TST,$BDDAT
12854  053272  011337  001140                  MOV     (R3),$GDDAT
12855  053276  010204                          MOV     R2,R4           ;GENERATE EXPECTED TAG BUS
12856  053300  000304                          SWAB    R4
12857  053302  042704  177770                  BIC     #^C7,R4
12858  053306  050437  001140                  BIS     R4,$GDDAT
12859  053312  023737  001140  001142          CMP     $GDDAT,$BDDAT
12860  053320  001020                          BNE     390$
12861
12862  053322  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12863
12864  053330  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12865                                  ;ADVANCE TO NEXT TABLE ENTRY
12866  053336  062703  000002                  ADD     #2,R3
12867  053342  005713                          TST     (R3)
12868  053344  100401                          BMI     380$
12869  053346  000743                          BR      375$
12870  053350                          380$:
12871                                  ;SHIFT TO NEXT TRACK ADDRESS-EXIT LOOP IF DONE
12872  053350  006302                          ASL     R2
12873  053352  020227  002000                  CMP     R2,#2000
12874  053356  101007                          BHI     400$
12875  053360  000631                          BR      330$
12876  053362                          390$:
12877                                  ;ERROR ON TAG BUS DURING HEAD SEQUENCE
12878  053362  010037  001136                  MOV     R0,$BDADR
12879  053366  062737  000040  001136          ADD     #RMMR2,$BDADR
12880  053374  104276                          ERROR   276             ;INCORRECT TAG BUS
12881
12882  053376  000440                  400$:   BR      500$            ;JUMP OVER TABLE
12883
12884  053400                          450$:
12885                                  ;TABLE OF TAG BUS DURING HEAD SEQUENCE
12886  053400  002000                          .WORD   CH
12887  053402  002000                          .WORD   CH
12888  053404  022000                          .WORD   CH!TAG
12889  053406  022000                          .WORD   CH!TAG
12890  053410  022000                          .WORD   CH!TAG
12891  053412  022000                          .WORD   CH!TAG
12892  053414  022000                          .WORD   CH!TAG
12893  053416  022000                          .WORD   CH!TAG
12894  053420  002000                          .WORD   CH
12895  053422  002000                          .WORD   CH
12896  053424  001777                          .WORD   1777
```

```
12897  053426  001777                          .WORD   1777
12898  053430  001777                          .WORD   1777
12899  053432  001777                          .WORD   1777
12900  053434  001777                          .WORD   1777
12901  053436  001777                          .WORD   1777
12902  053440  001777                          .WORD   1777
12903  053442  001777                          .WORD   1777
12904  053444  001777                          .WORD   1777
12905  053446  001777                          .WORD   1777
12906  053450  001777                          .WORD   1777
12907  053452  001777                          .WORD   1777
12908  053454  001777                          .WORD   1777
12909  053456  001777                          .WORD   1777
12910  053460  001777                          .WORD   1777
12911  053462  001777                          .WORD   1777
12912  053464  001777                          .WORD   1777
12913  053466  001777                          .WORD   1777
12914  053470  001777                          .WORD   1777
12915  053472  001777                          .WORD   1777
12916  053474  001777                          .WORD   1777
12917
12918  053476  177777                          .WORD   -1              ;END OF TABLE
12919
12920  053500                          500$:                           ;END OF TEST
12921
12922                                  ;;*****************************************************************
12923                                  ;*TEST 120       DATA COMMAND TESTS (2)
12924
12925                                  ;;*****************************************************************
12926  053500  000004                  TST120: SCOPE
12927  053502  012737  000120  001226          MOV     #120,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
12928
12929  053510  000240                          NOP
12930  053512  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
12931  053520  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
12932  053526  012737  053542  001122          MOV     #T120,$LPADR    ;LOAD LOOP ON TEST ADDRESS
12933  053534  012737  053542  001124          MOV     #T120,$LPERR    ;LOAD LOOP ON ERROR ADDRESS
12934  053542                          T120:
12935  053542  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
12936  053546  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
12937  053552  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
12938                                  ;;*****************************************************************
12939                                  ;VERIFY OPI SETS IF ON CYLINDER LATCH DOESNT RESET
12940                                  ;SET VOLUME VALID USING SUBROUTINE
12941  053556  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
12942  053562  000402                          BR      10$             ;BRANCH TO 10$ IF NO ERROR
12943  053564  104000                          ERROR                   ;RETURN HERE IF ERROR
12944  053566  000514                          BR      60$
12945  053570                          10$:
12946                                  ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND DURING CYLINDER SEQUENCE
12947
12948  053570  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12949
12950  053576  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
12951
12952  053604  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
```

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12953
12954  053612  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
12955
12956  053620  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
12957
12958  053626  012760  000071  000000          MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
12959                          ;WAIT FOR RUN AND GO TO SET
12960  053634  012737  000310  001524          MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
12961  053642  004777  125660                  JSR     PC,@CLOCK       ;START THE CLOCK
12962  053646                          20$:
12963
12964  053646  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
12965  053654  042737  137777  001142          BIC     #^CRG,$BDDAT
12966  053662  001017                          BNE     30$
12967  053664  005737  001524                  TST     WATCH
12968  053670  001366                          BNE     20$
12969  053672  004777  125632                  JSR     PC,@STOP        ;STOP THE CLOCK
12970  053676  012737  040000  001140          MOV     #RG,$GDDAT
12971  053704  010037  001136                  MOV     R0,$BDADR
12972  053710  062737  000024  001136          ADD     #RMMR1,$BDADR
12973  053716  104275                          ERROR   275             ;RUN AND GO DIDNT SET
12974  053720  000437                          BR      60$
12975  053722                          30$:
12976  053722  004777  125602                  JSR     PC,@STOP        ;STOP THE CLOCK
12977                          ;STEP COMMAND SEQUENCER AND VERIFY OPI SETS (19 CLOCKS)
12978  053726  012702  000023                  MOV     #19.,R2
12979  053732                          40$:
12980
12981  053732  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
12982
12983  053740  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
12984  053746  005302                          DEC     R2
12985  053750  001370                          BNE     40$
12986
12987  053752  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
12988  053760  042737  157777  001142          BIC     ^C!OPI,$BDDAT
12989  053766  001011                          BNE     50$             ;BRANCH IF OPI SET
12990  053770  012737  020000  001140          MOV     #OPE,$GDDAT
12991  053776  010037  001136                  MOV     R0,$BDADR
12992  054002  062737  000014  001136          ADD     #RMER1,$BDADR
12993  054010  104277                          ERROR   277             ;OPI NOT SET BY ON LATCH SET
12994  054012  012737  054020  001124  50$:     MOV     #60$,$LPERR     ;CHANGE LOOP ON ERROR ADDRESS
12995                          ;;*****************************************************************
12996                          ;VERIFY DATA COMMAND ABORTS DURING SEEK WAIT LOOP
12997  054020                  60$:
12998                          ;SET VOLUME VALID USING SUBROUTINE
12999  054020  004737  0E0654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
13000  054024  000402                          BR      70$             ;BRANCH TO 70$ IF NO ERROR
13001  054026  104000                          ERROR                   ;RETURN HERE IF ERROR
13002  054030  000567                          BR      140$
13003  054032                          70$:
13004                          ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
13005
13006  054032  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13007
13008  054040  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
```

```
13009
13010  054046  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
13011
13012  054054  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
13013
13014  054062  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
13015
13016  054070  012760  000071  000000          MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
13017                                  ;WAIT FOR RUN & GO TO SET
13018  054076  012737  000310  001524          MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
13019  054104  004777  125416                  JSR     PC,@CLOCK       ;START THE CLOCK
13020  054110                          80$:
13021
13022  054110  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13023  054116  042737  137777  001142          BIC     #^CRG,$BDDAT
13024  054124  001017                          BNE     90$
13025  054126  005737  001524                  TST     WATCH
13026  054132  001366                          BNE     80$
13027  054134  004777  125370                  JSR     PC,@STOP        ;STOP THE CLOCK
13028  054140  012737  040000  001140          MOV     #RG,$GDDAT
13029  054146  010037  001136                  MOV     R0,$BDADR
13030  054152  062737  000024  001136          ADD     #RMMR1,$BDADR
13031  054160  104275                          ERROR   275             ;RUN AND GO DIDNT SET
13032  054162  000512                          BR      140$
13033  054164                          90$:
13034  054164  004777  125340                  JSR     PC,@STOP        ;STOP THE CLOCK
13035                                  ;STEP COMMAND SEQUENCER TO ON LATCH TEST AT LOCATION 156 (17 CLOCKS)
13036  054170  012702  000021                  MOV     #17.,R2
13037  054174                          100$:
13038
13039  054174  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13040
13041  054202  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13042  054210  005302                          DEC     R2
13043  054212  001370                          BNE     100$
13044                                  ;DROP ON CYLINDER TO RESET LATCH
13045
13046  054214  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13047                                  ;MOVE COMMAND SEQUENCER TO SEEK WAIT LOOP (31 CLOCKS)
13048  054222  012702  000037                  MOV     #31.,R2
13049  054226                          110$:
13050
13051  054226  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
13052
13053  054234  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13054  054242  005302                          DEC     R2
13055  054244  001370                          BNE     110$
13056                                  ;STEP THROUGH SEEK WAIT LOOP (6 CLOCKS) 2 TIMES
13057  054246  012702  000006                  MOV     #6.,R2
13058  054252                          120$:
13059
13060  054252  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
13061
13062  054260  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13063  054266  005302                          DEC     R2
13064  054270  001370                          BNE     120$
```

```
13065                                   ;SET SEEK INCOMPLETE ERROR TO CAUSE ABORT
13066
13067  054272  012760  041201  000024           MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
13068                                   ;CLOCK THE SEQUENCER THROUGH ITS TEST FOR ABORT (2 CLOCKS)
13069  054300  012702  000002           MOV     #2,R2
13070  054304                          130$:
13071
13072  054304  012760  141201  000024           MOV     #DMD!MUR!DBEN!MSER!DBCK,RMMR1(R0)       ;LOAD RMMR1
13073
13074  054312  012760  041201  000024           MOV     #DMD!MUR!DBEN!MSER,RMMR1(R0)    ;LOAD RMMR1
13075  054320  005302                   DEC     R2
13076  054322  001370                   BNE     130$
13077
13078                                   ;ABORT EBL SHOULD NOW BE ACTIVE - USE THE MAINTENANCE REGISTER TO
13079                                   ;FORCE BIT CLOCKS AND VERIFY THAT EBL SETS WITHIN 16 BIT CLOCKS
13080  054324  012702  000020           MOV     #16.,R2         ;MAXIMUM NUMBER OF BIT CLOCKS
13081  054330                          135$:
13082
13083  054330  012760  045501  000024           MOV     #DMD!MUR!MOC!DBEN!MDF!MCLK,RMMR1(R0)    ;LOAD RMMR1
13084
13085  054336  012760  041501  000024           MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
13086
13087  054344  016037  000024  001142           MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13088  054352  042737  157777  001142           BIC     #^CEBL,$BDDAT
13089  054360  001013                   BNE     140$
13090
13091  054362  005302                   DEC     R2
13092  054364  001361                   BNE     135$            ;CONTINUE BIT CLOCKS IF COUNT NOT 0
13093  054366  012737  020000  001140           MOV     #EBL,$GDDAT
13094  054374  010037  001136           MOV     R0,$BDADR
13095  054400  062737  000024  001136           ADD     #RMMR1,$BDADR
13096  054406  104300                   ERROR   300             ;EBL NOT SET DUE TO ABORT
13097  054410  012737  054416  001124  140$:    MOV     #150$,$LPERR            ;CHANGE LOOP ON ERROR ADDRESS
13098
13099                                   ;;*****************************************************************
13100                                   ;VERIFY DATA COMMAND ABORTS DURING OFFSET IF ON CYLINDER LATCH
13101                                   ;DOESNT RESET
13102  054416                          150$:
13103                                   ;SET VOLUME VALID USING SUBROUTINE
13104  054416  004737  060654                   JSR     PC,SETVV        ;GO SET VOLUME VALID
13105  054422  000402                   BR      160$            ;BRANCH TO 160$ IF NO ERROR
13106  054424  104000                   ERROR                   ;RETURN HERE IF ERROR
13107  054426  000536                   BR      220$
13108  054430                          160$:
13109                                   ;LOAD TRACK,SETCOR,CYLINDER ADDRESS
13110
13111  054430  012760  000000  000006           MOV     #0,RMDA(R0)     ;LOAD RMDA
13112
13113  054436  012760  000000  000034           MOV     #0,RMDC(R0)     ;LOAD RMDC
13114                                   ;SET OFFSET MODE USING SUBROUTINE
13115  054444  004737  061004                   JSR     PC,SETOM        ;GO SET OFFSET MODE
13116  054450  000402                   BR      170$            ;BRANCH TO 170$ IF NO ERROR
13117  054452  104000                   ERROR                   ;RETURN HERE IF ERROR
13118  054454  000523                   BR      220$
13119  054456                          170$:
13120                                   ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
```

```
13121
13122  054456  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13123
13124  054464  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
13125
13126  054472  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
13127
13128  054500  012760  000071  000000          MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
13129                                  ;WAIT FOR RUN AND GO TO SET
13130  054506  012737  000310  001524          MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
13131  054514  004777  125006                  JSR     PC,@CLOCK       ;START THE CLOCK
13132  054520                          180$:
13133
13134  054520  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13135  054526  042737  137777  001142          BIC     #^CRG,$BDDAT
13136  054534  001017                          BNE     190$
13137  054536  005737  001524                  TST     WATCH
13138  054542  001366                          BNE     180$
13139  054544  004777  124760                  JSR     PC,@STOP        ;STOP THE CLOCK
13140  054550  012737  040000  001140          MOV     #RG,$GDDAT
13141  054556  010037  001140                  MOV     R0,$GDDAT
13142  054562  062737  000024  001136          ADD     #RMMR1,$BDADR
13143  054570  104275                          ERROR   275             ;RUN AND GO NOT SET
13144  054572  000454                          BR      220$
13145  054574                          190$:
13146  054574  004777  124730                  JSR     PC,@STOP        ;STOP THE CLOCK
13147                                  ;STEP COMMAND SEQUENCER TO ON LATCH TEST AT LOCATION 156 (17 CLOCKS)
13148  054600  012702  000021                  MOV     #17.,R2
13149  054604                          200$:
13150
13151  054604  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13152
13153  054612  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13154  054620  005302                          DEC     R2
13155  054622  001370                          BNE     200$
13156                                  ;DROP ON CYLINDER TO RESET LATCH, SET ON CYLINDER TO PASS TEST
13157                                  ;AT LOCATION 166
13158
13159  054624  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13160
13161  054632  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
13162                                  ;MOVE SEQUENCER TO SET OPI AND EBL (39 CLOCKS)
13163  054640  012702  000047                  MOV     #39.,R2
13164  054644                          210$:
13165
13166  054644  012760  141401  000024          MOV     #DMD!MUR!DBEN!MOC!DBCK,RMMR1(R0)        ;LOAD RMMR1
13167
13168  054652  012760  041401  000024          MOV     #DMD!MUR!DBEN!MOC,RMMR1(R0)     ;LOAD RMMR1
13169  054660  005302                          DEC     R2
13170  054662  001370                          BNE     210$
13171                                  ;VERIFY OPI IS SET
13172
13173  054664  016037  000014  001142          MOV     RMER1(R0),$BDDAT        ;STORE RMER1 AT $BDDAT
13174  054672  042737  157777  001142          BIC     #^COPI,$BDDAT
13175  054700  001011                          BNE     220$
13176  054702  012737  020000  001140          MOV     #OPI,$GDDAT
```

```
13177  054710  010037  001136                MOV     R0,$BDADR
13178  054714  062737  000014  001136        ADD     #RMER1,$BDADR
13179  054722  104277                        ERROR   277             ;OPI NOT SET DURING OFFSET
13180  054724  012737  054732  001124  220$: MOV     #230$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
13181
13182                                  ;;*****************************************************************
13183                                  ;VERIFY DATA COMMAND ABORTS DURING OFFSET WAIT LOOP
13184
13185  054732                          230$:
13186                                  ;SET VOLUME VALID USING SUBROUTINE
13187  054732  004737  060654                JSR     PC,SETVV        ;GO SET VOLUME VALID
13188  054736  000403                        BR      240$            ;BRANCH TO 240$ IF NO ERROR
13189  054740  104000                        ERROR                   ;RETURN HERE IF ERROR
13190  054742  000137  055352                JMP     310$
13191  054746                          240$:
13192                                  ;LOAD SECTOR,TRACK AND CYLINDER ADDRESS
13193
13194  054746  012760  000000  000006        MOV     #0,RMDA(R0)     ;LOAD RMDA
13195
13196  054754  012760  000000  000034        MOV     #0,RMDC(R0)     ;LOAD RMDC
13197                                  ;SET OFFSET MODE USING SUBROUTINE
13198  054762  004737  061004                JSR     PC,SETOM        ;GO SET OFFSET MODE
13199  054766  000402                        BR      245$            ;BRANCH TO 245$ IF NO ERROR
13200  054770  10400C                        ERROR                   ;RETURN HERE IF ERROR
13201  054772  000567                        BR      310$
13202                                  ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
13203  054774                          245$:
13204
13205  054774  012760  041401  000024        MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13206
13207  055002  012760  000000  000014        MOV     #0,RMER1(R0)    ;LOAD RMER1
13208
13209  055010  012760  000000  000042        MOV     #0,RMER2(R0)    ;LOAD RMER2
13210
13211  055016  012760  000071  000000        MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
13212                                  ;WAIT FOR RUN AND GO TO SET
13213  055024  012737  000310  001524        MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
13214  055032  004777  124470                JSR     PC,@CLOCK       ;START THE CLOCK
13215  055036                          250$:
13216
13217  055036  016037  000024  001142        MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13218  055044  042737  137777  001142        BIC     #^CRG,$BDDAT
13219  055052  001017                        BNE     260$
13220  055054  005737  001524                TST     WATCH
13221  055060  001366                        BNE     250$
13222  055062  004777  124442                JSR     PC,@STOP        ;STOP THE CLOCK
13223  055066  012737  040000  001140        MOV     #RG,$GODAT
13224  055074  010037  001136                MOV     R0,$BDADR
13225  055100  062737  000024  001136        ADD     #RMMR1,$BDADR
13226  055106  104275                        ERROR   275             ;RUN AND GO NOT SET
13227  055110  000520                        BR      310$
13228  055112                          260$:
13229  055112  004777  124412                JSR     PC,@STOP        ;STOP THE CLOCK
13230                                  ;STEP SEQUENCER TO LOCATION 156 (17 CLOCKS)
13231  055116  012702  000021                MOV     #17.,R2
13232  055122                          270$:
```

```
13233
13234  055122  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13235
13236  055130  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13237  055136  005302                          DEC     R2
13238  055140  001370                          BNE     270$
13239                                  ;DROP ON CYLINDER TO RESET LATCH, SET ON CYLINDER TO PASS TEST
13240                                  ;AT LOCATION 166
13241
13242  055142  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13243
13244  055150  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13245                                  ;MOVE SEQUENCER TO LOCATION  174 (37 CLOCKS)
13246  055156  012702  000045                  MOV     #37.,R2
13247  055162                          280$:
13248
13249  055162  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13250
13251  055170  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13252  055176  005302                          DEC     R2
13253  055200  001370                          BNE     280$
13254                                  ;DROP ON CYLINDER TO RESET LATCH, LEAVE ON CYLINDER RESET
13255
13256  055202  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13257                                  ;STEP SEQUENCER THROUGH OFFSET WAIT LOOP TWICE (7 CLOCKS)
13258  055210  012702  000007                  MOV     #7.,R2
13259  055214                          290$:
13260
13261  055214  012760  141001  000024          MOV     #DMD!MUR!DBEN!DBCK,RMMR1(R0)    ;LOAD RMMR1
13262
13263  055222  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13264  055230  005302                          DEC     R2
13265  055232  001370                          BNE     290$
13266                                  ;SET DRIVE FAULT TO CAUSE ABORT CONDITION
13267
13268  055234  012760  041101  000024          MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
13269                                  ;STEP SEQUENCER THROUGH ITS TEST FOR ABORT (2 CLOCKS)
13270  055242  012702  000002                  MOV     #2,R2
13271  055246                          300$:
13272
13273  055246  012760  141101  000024          MOV     #DMD!MUR!DBEN!MDF!DBCK,RMMR1(R0)        ;LOAD RMMR1
13274
13275  055254  012760  041101  000024          MOV     #DMD!MUR!DBEN!MDF,RMMR1(R0)     ;LOAD RMMR1
13276  055262  005302                          DEC     R2
13277  055264  001370                          BNE     300$
13278
13279                                  ;ABORT EBL SHOULD NOW BE ACTIVE - USE THE MAINTENANCE REGISTER TO
13280                                  ;FORCE BIT CLOCKS AND VERIFY THAT EBL SETS WITHIN 16 BIT CLOCKS
13281  055266  012702  000020                  MOV     #16.,R2         ;MAXIMUM NUMBER OF BIT CLOCKS
13282  055272                          305$:
13283
13284  055272  012760  045501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!MCLK,RMMR1(R0)    ;LOAD RMMR1
13285
13286  055300  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
13287
13288  055306  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
```

```
13289  055314  042737  157777  001142          BIC     #^CEBL,$BDDAT
13290  055322  001013                          BNE     310$
13291
13292  055324  005302                          DEC     R2
13293  055326  001361                          BNE     305$            ;CONTINUE BIT CLOCKS IF COUNT NOT 0
13294  055330  012737  020000  001140          MOV     #EBL,$GDDAT
13295  055336  010037  001136                  MOV     R0,$BDADR
13296  055342  062737  000024  001136          ADD     #RMMR1,$BDADR
13297  055350  104271                          ERROR   271             ;EBL NOT SET DUE TO OFFSET WAIT ABORT
13298
13299  055352  012737  055360  001124  310$:   MOV     #320$,$LPERR    ;CHANGE LOOP ON ERROR ADDRESS
13300
13301                                  ;;*****************************************************************
13302                                  ;VERIFY THAT DATA COMMAND ABORTS DURING SECTOR WAIT LOOP AT LOCATION 179
13303
13304  055360                          320$:
13305                                  ;SET VOLUME VALID USING SUBROUTINE
13306  055360  004737  060654                  JSR     PC,SETVV        ;GO SET VOLUME VALID
13307  055364  000403                          BR      330$            ;BRANCH TO 330$ IF NO ERROR
13308  055366  104000                          ERROR                   ;RETURN HERE IF ERROR
13309  055370  000137  056016                  JMP     420$
13310  055374                          330$:
13311                                  ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
13312
13313  055374  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13314
13315  055402  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
13316
13317  055410  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
13318
13319  055416  012760  000000  000006          MOV     #0,RMDA(R0)     ;LOAD RMDA
13320
13321  055424  012760  000000  000034          MOV     #0,RMDC(R0)     ;LOAD RMDC
13322
13323  055432  012760  000071  000000          MOV     #RD!GO,RMCS1(R0)        ;LOAD RMCS1
13324                                  ;WAIT FOR RUN AND GO TO SET
13325  055440  012737  000310  001524          MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
13326  055446  004777  124054                  JSR     PC,@CLOCK       ;START THE CLOCK
13327  055452                          340$:
13328
13329  055452  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13330  055460  042737  137777  001142          BIC     #^CRG,$BDDAT
13331  055466  001017                          BNE     350$
13332  055470  005737  001524                  TST     WATCH
13333  055474  001366                          BNE     340$
13334  055476  004777  124026                  JSR     PC,@STOP        ;STOP THE CLOCK
13335  055502  012737  040000  001140          MOV     #RG,$GDDAT
13336  055510  010037  001136                  MOV     R0,$BDADR
13337  055514  062737  000024  001136          ADD     #RMMR1,$BDADR
13338  055522  104275                          ERROR   275             ;RUN AND GO NOT SET
13339  055524  000534                          BR      420$
13340  055526                          350$:
13341  055526  004777  123776                  JSR     PC,@STOP        ;STOP THE CLOCK
13342                                  ;STEP SEQUENCER TO LOCATION 156 (17 CLOCKS)
13343  055532  012702  000021                  MOV     #17.,R2
13344  055536                          360$:
```

```
13345
13346  055536  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13347
13348  055544  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13349  055552  005302                          DEC     R2
13350  055554  001370                          BNE     360$
13351                                  ;DROP ON CYLINDER TO RESET LATCH, SET ON CYLINDER TO PASS TEST
13352                                  ;AT LOCATION 166
13353
13354  055556  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13355                                  ;MOVE SEQUENCER TO SECTOR WAIT (34 CLOCKS)
13356  055564  012702  000042                  MOV     #34.,R2
13357  055570                          370$:
13358
13359  055570  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13360
13361  055576  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13362  055604  005302                          DEC     R2
13363  055606  001370                          BNE     370$
13364                                  ;STEP THROUGH SECTOR WAIT LOOP TWICE AND VERIFY SEARCH IS ENABLED
13365                                  ;DURING THE LOOP (6 CLOCKS)
13366  055610  012702  000006                  MOV     #6.,R2
13367  055614                          380$:
13368
13369  055614  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13370
13371  055622  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13372
13373  055630  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13374  055636  042737  173777  001142          BIC     #^CESRC,$BDDAT
13375  055644  001403                          BEQ     390$
13376  055646  005302                          DEC     R2
13377  055650  001361                          BNE     380$
13378  055652  000412                          BR      400$
13379  055654  012737  004000  001140  390$:   MOV     #ESRC,$GDDAT
13380  055662  010037  001136                  MOV     R0,$BDADR
13381  055666  062737  000024  001136          ADD     #RMMR1,$BDADR
13382  055674  104301                          ERROR   301             ;SEARCH NOT ENABLED DURING DATA
13383  055676  000447                          BR      420$
13384  055700                          400$:
13385                                  ;SET DRIVE FAULT TO CAUSE ABORT CONDITION
13386
13387  055700  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
13388                                  ;STEP SEQUENCER THROUGH ITS TEST FOR ABORT (2 CLOCKS)
13389  055706  012702  000002                  MOV     #2,R2
13390  055712                          410$:
13391
13392  055712  012760  141501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!DBCK,RMMR1(R0)     ;LOAD RMMR1
13393
13394  055720  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
13395  055726  005302                          DEC     R2
13396  055730  001370                          BNE     410$
13397
13398                                  ;ABORT EBL SHOULD NOW BE ACTIVE - USE THE MAINTENANCE REGISTER TO
13399                                  ;FORCE BIT CLOCKS AND VERIFY THAT EBL SETS WITHIN 16 BIT CLOCKS
13400  055732  012702  000020                  MOV     #16.,R2         ;MAXIMUM NUMBER OF BIT CLOCKS
```

```
13401  055736                                  415$:
13402
13403  055736  012760  045501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF!MCLK,RMMR1(R0)    ;LOAD RMMR1
13404
13405  055744  012760  041501  000024          MOV     #DMD!MUR!MOC!DBEN!MDF,RMMR1(R0) ;LOAD RMMR1
13406                                  ;VERIFY EBL IS SET
13407
13408  055752  016037  000024  001142          MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13409  055760  042737  157777  001142          BIC     #^CEBL,$BDDAT
13410  055766  001013                          BNE     420$
13411
13412  055770  005302                          DEC     R2
13413  055772  001361                          BNE     415$                    ;CONTINUE BIT CLOCKS IF COUNT NOT 0
13414  055774  012737  020000  001140          MOV     #EBL,$GDDAT
13415  056002  010037  001136                  MOV     R0,$BDADR
13416  056006  062737  000024  001136          ADD     #RMMR1,$BDADR
13417  056014  104271                          ERROR   271                     ;NO ABORT AT SECTOR WAIT
13418
13419  056016                                  420$:                           ;END OF TEST
13420
13421                                  ;;*****************************************************************
13422                                  ;*TEST 121       DATA COMMAND TESTS(3)
13423
13424                                  ;;*****************************************************************
13425  056016  000004                  TST121: SCOPE
13426  056020  012737  000121  001226          MOV     #121,$TESTN     ;;SET TEST NUMBER IN APT MAIL BOX
13427
13428  056026  000240                          NOP
13429  056030  012737  000024  001120          MOV     #20.,$ICNT      ;20 ITERATIONS
13430  056036  112737  000001  001131          MOVB    #1,$ERMAX       ;ONE ERROR ALLOWED
13431  056044  012737  056060  001122          MOV     #T121,$LPADR  ;LOAD LOOP ON TEST ADDRESS
13432  056052  012737  056060  001124          MOV     #T121,$LPERR  ;LOAD LOOP ON ERROR ADDRESS
13433  056060                          T121:
13434  056060  012706  001100                  MOV     #STACK,SP       ;LOAD THE STACK POINTER
13435  056064  013700  001276                  MOV     $BASE,R0        ;R0 = UNIBUS ADDRESS OF UUT
13436  056070  013701  001456                  MOV     TSTQUE,R1       ;R1 = POINTER TO DEVICE
13437                                  ;;*****************************************************************
13438                                  ;VERIFY THE TAG BUS DURING DATA COMMAND
13439
13440                                  ;;*****************************************************************
13441                                  ;FIRST PART USES OFFSET FORWARD
13442
13443                                  ;LOAD TEST PARAMETERS IN REGISTER OUTPUT BUFFER
13444  056074  112737  000035  001410          MOVB    #29.,RMDA0      ;SECTOR 29
13445  056102  112737  000004  001411          MOVB    #4,RMDA0+1      ;TRACK 4
13446  056110  012737  001466  001436          MOV     #822.,RMDC0     ;CYLINDER 822
13447  056116  012737  000200  001434          MOV     #OFD,RMOF0      ;FORWARD OFFSET
13448  056124  012737  000071  001402          MOV     #RD!GO,RMCS10   ;READ DATA
13449  056132  012737  177400  001404          MOV     #^C256.+1,RMWC0 ;WORD COUNT
13450  056140  012737  107030  001406          MOV     #BUFFER,RMBA0   ;BUFFER ADDRESS
13451
13452                                  ;EXECUTE COMMAND AND VERIFY TAG BUS USING SUBROUTINE
13453  056146  004737  056170                  JSR     PC,10$
13454
13455                                  ;;*****************************************************************
13456                                  ;SECOND PART USES OFFSET REVERSE
```

```
13457                                   ;LOAD TEST PARAMETERS IN REGISTER OUTPUT BUFFER
13458  056152  112737  000000  001434           MOVB    #0,RMOFO        ;REVERSE OFFSET
13459
13460                                   ;EXECUTE COMMAND AND VERIFY TAG BUS USING SUBROUTINE
13461  056160  004737  056170                   JSR     PC,10$
13462
13463  056164  000137  057176                   JMP     300$
13464
13465                                   ;;*****************************************************************
13466                                   ;SUBROUTINE USED DURING TEST
13467
13468  056170                           10$:
13469                                   ;SET VOLUME VALID USING SUBROUTINE
13470  056170  004737  060654                   JSR     PC,SETVV        ;GO SET VOLUME VALID
13471  056174  000403                           BR      20$             ;BRANCH TO 20$ IF NO ERROR
13472  056176  104000                           ERROR                   ;RETURN HERE IF ERROR
13473  056200  000137  057014                   JMP     160$
13474  056204                           20$:
13475                                   ;LOAD TRACK, SECTOR AND CYLINDER ADDRESS, LOAD OFFSET
13476
13477  056204  013760  001410  000006           MOV     RMDA0,RMDA(R0)  ;LOAD RMDA
13478
13479  056212  013760  001436  000034           MOV     RMDC0,RMDC(R0)  ;LOAD RMDC
13480
13481  056220  013760  001434  000032           MOV     RMOF0,RMOF(R0)  ;LOAD RMOF
13482                                   ;SET OFFSET MODE USING SUBROUTINE
13483  056226  004737  061004                   JSR     PC,SETOM        ;GO SET OFFSET MODE
13484  056232  000403                           BR      30$             ;BRANCH TO 30$ IF NO ERROR
13485  056234  104000                           ERROR                   ;RETURN HERE IF ERROR
13486  056236  000137  057014                   JMP     160$
13487  056242                           30$:
13488                                   ;LOAD BUFFER ADDRESS AND WORD COUNT
13489
13490  056242  013760  001404  000002           MOV     RMWC0,RMWC(R0)  ;LOAD RMWC
13491
13492  056250  013760  001406  000004           MOV     RMBA0,RMBA(R0)  ;LOAD RMBA
13493                                   ;ENABLE DEBUG CLOCK AND LOAD DATA COMMAND
13494
13495  056256  012760  041401  000024           MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13496
13497  056264  012760  000000  000014           MOV     #0,RMER1(R0)    ;LOAD RMER1
13498
13499  056272  012760  000000  000042           MOV     #0,RMER2(R0)    ;LOAD RMER2
13500
13501  056300  013760  001''02  000000           MOV     RMCS10,RMCS1(R0)        ;LOAD RMCS1
13502                                   ;WAIT FOR RUN AND GO TO SET
13503  056306  012737  000310  001524           MOV     #200.,WATCH     ;SET WATCHDOG TIMER VALUE
13504  056314  004777  123206                   JSR     PC,@CLOCK       ;START THE CLOCK
13505  056320                           40$:
13506
13507  056320  016037  000024  001142           MOV     RMMR1(R0),$BDDAT        ;STORE RMMR1 AT $BDDAT
13508  056326  042737  137777  001142           BIC     #!CRG,$BDDAT
13509  056334  001020                           BNE     50$
13510  056336  005737  001524                   TST     WATCH
13511  056342  001366                           BNE     40$
13512  056344  004777  123160                   JSR     PC,@STOP        ;STOP THE CLOCK
```

```
13513  056350  012737  040000  001140          MOV     #RG,$GDDAT
13514  056356  010037  001136                  MOV     R0,$BDADR
13515  056362  062737  000024  001136          ADD     #RMMR1,$BDADR
13516  056370  104275                          ERROR   275                     ;RUN AND GO NOT SET
13517  056372  000137  057014                  JMP     160$
13518  056376                          50$:
13519  056376  004777  123126                  JSR     PC,@STOP                ;STOP THE CLOCK
13520  056402  012704  057016                  MOV     #200$,R4                ;R4 = TABLE POINTER
13521
13522                                  ;STEP SEQUENCER TO HEAD SEQUENCE AT LOCATION 156 (17 CLOCKS)
13523  056406  012705  000021                  MOV     #17.,R5                 ;R5 = CLOCK COUNT
13524  056412                          60$:
13525
13526  056412  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
13527  056420  042737  150000  001142          BIC     #RQA!RQB!TST,$BDDAT
13528  056426  012437  001140                  MOV     (R4)+,$GDDAT
13529  056432  053737  001436  001140          BIS     RMOC0,$GDDAT            ;OR CYLINDER ADDRESS
13530  056440  023737  001140  001142          CMP     $GDDAT,$BDDAT
13531  056446  001011                          BNE     70$                     ;BRANCH IF TAG BUS WRONG
13532
13533  056450  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13534
13535  056456  012760  041401  000024          MOV     #DMJ!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13536  056464  005305                          DEC     R5
13537  056466  001351                          BNE     60$
13538  056470  000407                          BR      80$
13539  056472  010037  001136          70$:    MOV     R0,$BDADR
13540  056476  062737  000040  001136          ADD     #RMMR2,$BDADR
13541  056504  104276                          ERROR   276                     ;INCORRECT TAG BUS DURING DATA
13542  056506  000542                          BR      160$
13543  056510                          80$:
13544                                  ;DROP ON CYLINDER TO RESET LATCH, SET ON CYLINDER TO PASS TEST AT
13545                                  ;LOCATION 166
13546
13547  056510  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13548
13549  056516  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13550                                  ;STEP SEQUENCER TO END OF OFFSET AT LOCATION 174 (37 CLOCKS)
13551  056524  012705  000045                  MOV     #37.,R5                 ;RELOAD CLOCK COUNT
13552  056530                          90$:
13553
13554  056530  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
13555  056536  042737  150000  001142          BIC     #RQA!RQB!TST,$BDDAT
13556  056544  011437  001140                  MOV     (R4),$GDDAT
13557  056550  032714  002000                  BIT     #CH,(R4)
13558  056554  001430                          BEQ     110$                    ;BRANCH IF CONTROL/HEADER NOT ON
13559  056556  032714  004000                  BIT     #CC,(R4)
13560  056562  001416                          BEQ     100$                    ;BRANCH IF HEADER TAG
13561                                  ;CONTROL TAG SHOULD BE ON-SETUP EXPECTED OFFSET
13562  056564  052737  000010  001140          BIS     #BBO3,$GDDAT            ;ASSUME OFD IS NOT SET
13563  056572  032737  000200  001434          BIT     #OFD,RMOFO
13564  056600  001406                          BEQ     95$
13565  056602  042737  000010  001140          BIC     #BBO3,$GDDAT            ;RESET BUS BIT 3 - DIRECTION IS REV
13566  056610  052737  000004  001140          BIS     #BBO2,$GDDAT
13567  056616  000407                  95$:    BR      110$
13568
```

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13569  056620                                  100$:
13570                                          ;HEADER TAG SHOULD BE ON - SETUP EXPECTED TRACK ADDRESS
13571  056620  013703  001410                  MOV     RMDA0,R3        ;GET TRACK
13572  056624  000303                          SWAB    R3
13573  056626  042703  177770                  BIC     #^C7,R3
13574  056632  050337  001140                  BIS     R3,$GDDAT
13575  056636                                  110$:
13576                                          ;COMPARE EXPECTED AND RECEIVED TAG BUS DATA
13577  056636  023737  001140  001142          CMP     $GDDAT,$BDDAT
13578  056644  001013                          BNE     120$
13579
13580  056646  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13581
13582  056654  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13583  056662  062704  000002                  ADD     #2,R4           ;MOVE TABLE POINTER
13584  056666  005305                          DEC     R5              ;DECREMENT CLOCK COUNT
13585  056670  001317                          BNE     90$
13586  056672  000407                          BR      130$
13587  056674  010037  001136                  120$:   MOV     R0,$BDADR
13588  056700  062737  000040  001136          ADD     #RMMR2,$BDADR
13589  056706  104276                          ERROR   276             ;INCORRECT TAG BUS DURING DATA
13590  056710  000441                          BR      160$
13591  056712                                  130$:
13592                                          ;DROP ON CYLINDER TO RESET LATCH, RAISE ON CYLINDER TO PASS TEST AT
13593                                          ;SEQUENCER LOCATION 175
13594
13595  056712  012760  041001  000024          MOV     #DMD!MUR!DBEN,RMMR1(R0) ;LOAD RMMR1
13596
13597  056720  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13598                                          ;STEP SEQUENCER TO SECTOR WAIT LOOP (8 CLOCKS)
13599  056726  012705  000010                  MOV     #8.,R5
13600  056732                                  140$:
13601
13602  056732  016037  000040  001142          MOV     RMMR2(R0),$BDDAT        ;STORE RMMR2 AT $BDDAT
13603  056740  042737  150000  001142          BIC     #RQA!RQB!TST,$BDDAT
13604  056746  023737  001140  001142          CMP     $GDDAT,$BDDAT   ;GOOD DATA SAME AS LAST CMP
13605  056754  001011                          BNE     150$            ;BRANCH IF ERROR
13606
13607  056756  012760  141401  000024          MOV     #DMD!MUR!MOC!DBEN!DBCK,RMMR1(R0)        ;LOAD RMMR1
13608
13609  056764  012760  041401  000024          MOV     #DMD!MUR!MOC!DBEN,RMMR1(R0)     ;LOAD RMMR1
13610  056772  005305                          DEC     R5
13611  056774  001356                          BNE     140$
13612  056776  000406                          BR      160$
13613  057000  010037  001136                  150$:   MOV     R0,$BDADR
13614  057004  062737  000040  001136          ACD     #RMMR2,$BDADR
13615  057012  104276                          ERROR   276             ;INCORRECT TAG BUS DURING DATA
13616
13617  057014  000207                  160$:   RTS     PC
13618
13619  057016                                  200$:
13620                                          ;TABLE OF TAG BUS CONTROL AND DATA VALUES
13621  057016  001777                          .WORD   1777            ;LOCATION 0
13622  057020  001777                          .WORD   1777            ;LOCATION 25
13623  057022  001777                          .WORD   1777            ;LOCATION 26
13624  057024  001777                          .WORD   1777            ;LOCATION 128
```

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13625  057026  001777                .WORD   1777            ;LOCATION 129
13626  057030  001777                .WORD   1777            ;LOCATION 130
13627  057032  004700                .WORD   CC              ;LOCATION 144
13628  057034  004000                .WORD   CC              ;LOCATION 145
13629  057036  024000                .WORD   CC!TAG          ;LOCATION 146
13630  057040  024000                .WORD   CC!TAG          ;LOCATION 147
13631  057042  024000                .WORD   CC!TAG          ;LOCATION 148
13632  057044  024000                .WORD   CC!TAG          ;LOCATION 149
13633  057046  024000                .WORD   CC!TAG          ;LOCATION 150
13634  057050  024000                .WORD   CC!TAG          ;LOCATION 151
13635  057052  004000                .WORD   CC              ;LOCATION 152
13636  057054  004000                .WORD   CC              ;LOCATION 153
13637  057056  001777                .WORD   1777            ;LOCATION 154
13638  057060  002000                .WORD   CH              ;LOCATION 156
13639  057062  002000                .WORD   CH              ;LOCATION 157
13640  057064  022000                .WORD   CH!TAG          ;LOCATION 158
13641  057066  022000                .WORD   CH!TAG          ;LOCATION 159
13642  057070  022000                .WORD   CH!TAG          ;LOCATION 160
13643  057072  022000                .WORD   CH!TAG          ;LOCATION 161
13644  057074  022000                .WORD   CH!TAG          ;LOCATION 162
13645  057076  022000                .WORD   CH!TAG          ;LOCATION 163
13646  057100  002000                .WORD   CH              ;LOCATION 164
13647  057102  002000                .WORD   CH              ;LOCATION 165
13648  057104  001777                .WORD   1777            ;LOCATION 232
13649  057106  001777                .WORD   1777            ;LOCATION 233
13650  057110  001777                .WORD   1777            ;LOCATION 234
13651  057112  001777                .WORD   1777            ;LOCATION 235
13652  057114  001777                .WORD   1777            ;LOCATION 236
13653  057116  001777                .WORD   1777            ;LOCATION 237
13654  057120  001777                .WORD   1777            ;LOCATION 238
13655  057122  001777                .WORD   1777            ;LOCATION 239
13656  057124  001777                .WORD   1777            ;LOCATION 240
13657  057126  001777                .WORD   1777            ;LOCATION 241
13658  057130  001777                .WORD   1777            ;LOCATION 242
13659  057132  001777                .WORD   1777            ;LOCATION 243
13660  057134  001777                .WORD   1777            ;LOCATION 244
13661  057136  001777                .WORD   1777            ;LOCATION 245
13662  057140  001777                .WORD   1777            ;LOCATION 246
13663  057142  001777                .WORD   1777            ;LOCATION 247
13664  057144  001777                .WORD   1777            ;LOCATION 248
13665  057146  001777                .WORD   1777            ;LOCATION 249
13666  057150  001777                .WORD   1777            ;LOCATION 250
13667  057152  001777                .WORD   1777            ;LOCATION 251
13668  057154  001777                .WORD   1777            ;LOCATION 252
13669  057156  001777                .WORD   1777            ;LOCATION 166
13670  057160  006000                .WORD   CC!CH           ;LOCATION 169
13671  057162  006000                .WORD   CC!CH           ;LOCATION 170
13672  057164  026000                .WORD   CC!CH!TAG       ;LOCATION 171
13673  057166  026000                .WORD   CC!CH!TAG       ;LOCATION 172
13674  057170  026000                .WORD   CC!CH!TAG       ;LOCATION 173
13675  057172  026000                .WORD   CC!CH!TAG       ;LOCATION 174
13676  057174  026000                .WORD   CC!CH!TAG       ;LOCATION 175,ETC
13677
13678  057176                300$:                           ;END OF TEST
```

```
 3679  057176                          $EOSP:
13680  057176  000240                          NOP
13681  057200  013700  001456                  MOV     TSTQUE,R0
13682  057204  062700  000002                  ADD     #2,R0
13683  057210  010037  001456                  MOV     R0,TSTQUE
13684  057214  005710                          TST     (R0)
13685  057216  001402                          BEQ     1$
13686  057220  000137  006322                  JMP     READY
13687  057224  012737  001460  001456  1$:     MOV     #TSTQUE+2,TSTQUE
13688                                  .SBTTL  END OF PASS ROUTINE
13689
13690                                  ;;*****************************************************************
13691                                  ;*INCREMENT THE PASS NUMBER ($PASS)
13692                                  ;*TYPE "END PASS #XXXXX TOTAL NUMBER OF ERRORS SINCE LAST REPORT YYYYY"
13693                                  ;*WHERE XXXXX AND YYYYY ARE DECIMAL NUMBERS
13694                                  ;*IF THERES A MONITOR GO TO IT
13695                                  ;*IF THERE ISN'T JUMP TO READY
13696
13697  057232                          $EOP:
13698  057232  000240                          NOP
13699  057234  005037  001116                  CLR     $TSTNM          ;;ZERO THE TEST NUMBER
13700  057240  005037  001206                  CLR     $TIMES          ;;ZERO THE NUMBER OF ITERATIONS
13701  057244  005237  001230                  INC     $PASS           ;;INCREMENT THE PASS NUMBER
13702  057250  042737  100000  001230          BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
13703  057256  005327                          DEC     (PC)+           ;;LOOP?
13704  057260  000001          $EOPCT: .WORD   1
13705  057262  003063                          BGT     $DOAGN          ;;YES
13706  057264  012737                          MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
13707  057266  000001          $ENDCT: .WORD   1
13708  057270  057260                          $EOPCT
13709  057272  104401  057300                  TYPE    ,65$            ;;TYPE ASCIZ STRING
13710  057276  000407                          BR      64$             ;;GET OVER THE ASCIZ
13711                          ;;65$:  .ASCIZ  <12><15>/END PASS #/
13712  057316                  64$:
13713  057316  013746  001230                  MOV     $PASS,-(SP)     ;;SAVE $PASS FOR TYPEOUT
13714                                                                  ;;TYPE PASS NUMBER
13715  057322  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
13716  057324  104401  057332                  TYPE    ,67$            ;;TYPE ASCIZ STRING
13717  057330  000421                          BR      66$             ;;GET OVER THE ASCIZ
13718                          ;;67$:  .ASCIZ  /  TOTAL ERRORS SINCE LAST REPORT /
13719  057374                  66$:
13720  057374  013746  001126                  MOV     $ERTTL,-(SP)    ;;SAVE $ERTTL FOR TYPEOUT
13721                                                                  ;;TOTAL NUMBER OF ERRORS
13722  057400  104405                          TYPDS                   ;;GO TYPE--DECIMAL ASCII WITH SIGN
13723  057402  104401  001217                  TYPE    ,$CRLF          ;;TYPE CARRIAGE RETURN, LINE FEED
13724  057406  005037  001126                  CLR     $ERTTL          ;;CLEAR ERROR TOTAL
13725  057412  013700  000042  $GET42: MOV     @#42,R0         ;;GET MONITOR ADDRESS
13726  057416  001405                          BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
13727  057420  000005                          RESET                   ;;CLEAR THE WORLD
13728  057422  004710          $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
13729  057424  000240                          NOP                     ;;SAVE ROOM
13730  057426  000240                          NOP                     ;;FOR
13731  057430  000240                          NOP                     ;;ACT11
13732  057432                  $DOAGN:
13733  057432  000137                          JMP     @(PC)+          ;;RETURN
13734  057434  006322          $PTNAD: .WORD   READY
```

```
13735  057436      377      377      000  $ENULL: .BYTE   -1,-1,0          ;;NULL CHARACTER STRING
13736                                              .EVEN
                   057442
```

```
13737                                   .SBTTL  SUBROUTINES
13738
13739                                   ;;*****************************************************************
13740                                   .SBTTL  ERROR TYPEOUT ROUTINE
13741
13742                                   ;*THE ERROR TYPEOUT ROUTINE ASSEMBLES AND PRINTS INFORMATION
13743                                   ;*REGARDING THE DETECTION OF AN ERROR AS FOLLOWS:
13744                                   ;*
13745                                   ;*       .UNIT NUMBER, TEST NUMBER, ERROR NUMBER AND PROGRAM COUNTER ARE
13746                                   ;*PRINTED ON THE FIRST LINE;
13747                                   ;*       .ERROR MESSAGE IS ASSEMBLED, FORMATTED AND PRINTED ON
13748                                   ;*ONE OR MORE SUCCEEDING LINES;
13749                                   ;*       .PAIRED LINES OF ERROR HEADERS AND ERROR DATA
13750                                   ;*ARE PRINTED AFTER THE ERROR MESSAGE.
13751
13752  057442                           ERRTYP:
13753  057442  104414                           SAVREG
13754  057444  032777  020000  121502           BIT     #SW13,@SWR      ;INHIBIT TYPEOUTS??
13755  057452  001402                           BEQ     1$              ;NO!!
13756  057454  000137  060172                   JMP     21$             ;YES!!
13757                                  ;TYPE UNIT NUMBER, TEST NUMBER, ERROR NUMBER, AND PROGRAM COUNTER
13758  057460  104401  001217           1$:     TYPE    ,$CRLF
13759  057464  104401  060206                   TYPE    ,ERTY00         ;TYPE "UNT#"
13760  057470  013746  001234                   MOV     $UNIT,-(SP)     ;;SAVE $UNIT FOR TYPEOUT
13761                                                                   ;;TYPE UNIT NUMBER
13762  057474  104403                           TYPOS                   ;;GO TYPE--OCTAL ASCII
13763  057476     003                           .BYTE   3               ;;TYPE 3 DIGIT(S)
13764  057477     000                           .BYTE   0               ;;SUPPRESS LEADING ZEROS
13765  057500  005037  060176                   CLR     TSTNMB          ;LOAD TEST NUMBER FOR
13766  057504  013737  001226  060176           MOV     $TESTN,TSTNMB
13767  057512  104401  060214                   TYPE    ,ERTY01         ;TYPE "TST#"
13768  057516  013746  060176                   MOV     TSTNMB,-(SP)    ;;SAVE TSTNMB FOR TYPEOUT
13769                                                                   ;;TYPE TEST NUMBER
13770  057522  104403                           TYPOS                   ;;GO TYPE--OCTAL ASCII
13771  057524     003                           .BYTE   3               ;;TYPE 3 DIGIT(S)
13772  057525     000                           .BYTE   0               ;;SUPPRESS LEADING ZEROS
13773  057526  005037  060200                   CLR     ERRNMB          ;LOAD ERROR NUMBER FOR
13774  057532  113737  001130  060200           MOVB    $ITEMB,ERRNMB   ;TYPEOUT
13775  057540  001406                           BEQ     2$              ;SKIP IF NO ERROR CALLED
13776  057542  104401  060224                   TYPE    ,ERTY02         ;TYPE "ERR#"
13777  057546  013746  060200                   MOV     ERRNMB,-(SP)    ;;SAVE ERRNMB FOR TYPEOUT
13778                                                                   ;;TYPE ERROR NUMBER
13779  057552  104403                           TYPOS                   ;;GO TYPE--OCTAL ASCII
13780  057554     003                           .BYTE   3               ;;TYPE 3 DIGIT(S)
13781  057555     000                           .BYTE   0               ;;SUPPRESS LEADING ZEROS
13782  057556  104401  060233           2$:     TYPE    ,ERTY03         ;TYPE "PC="
13783  057562  013746  001132                   MOV     $ERRPC,-(SP)    ;;SAVE $ERRPC FOR TYPEOUT
13784                                                                   ;;TYPE PROGRAM COUNTER
13785  057566  104403                           TYPOS                   ;;GO TYPE--OCTAL ASCII
13786  057570     006                           .BYTE   6               ;;TYPE 6 DIGIT(S)
13787  057571     001                           .BYTE   1               ;;TYPE LEADING ZEROS
13788                                  ;GENERATE POINTER TO ERROR TABLE UNLESS ERROR NUMBER IS 0
13789  057572  005737  060200           3$:     TST     ERRNMB          ;WAS AN ERROR CALLED?
13790  057576  001575                           BEQ     21$             ;NO!!
13791  057600  104401  001217                   TYPE    ,$CRLF          ;YES-TYPE CRLF
13792  057604  105037  060204                   CLRB    BOTFLG          ;CLEAR BOT FLAG
```

```
13793  057610  105037  060205                  CLRB    CHRCNT          ;CLEAR CHARACTER COUNTER
13794  057614  013700  060200                  MOV     ERRNMB,R0       ;R0 POINTS TO FIRST OF
13795  057620  006300                          ASL     R0              ;FOUR ENTRIES IN ERROR
13796  057622  006300                          ASL     R0              ;TABLE
13797  057624  006300                          ASL     R0
13798  057626  062700  001522                  ADD     #$ERRTB-8.,R0
13799  057632  011001                          MOV     (R0),R1         ;R1 POINTS TO ERROR MESSAGE
13800                                                                  ;TABLE
13801  057634  001507                          BEQ     12$             ;BRANCH IF NO ERROR MESSAGE
13802                                  ;TYPE THE ERROR MESSAGE
13803  057636  012102                  4$:     MOV     (R1)+,R2        ;R2=ADDRESS OF MESSAGE STRING
13804  057640  001505                          BEQ     12$             ;BRANCH IF END OF MESSAGE
13805  057642  010237  060010                  MOV     R2,11$          ;LOAD ADDRESS OF STRING
13806  057646  005037  060202                  CLR     BOTADR          ;CLEAR BOT ADDRESS
13807  057652  112203                  5$:     MOVB    (R2)+,R3        ;END OF STRING??
13808  057654  001454                          BEQ     10$             ;YES!!
13809  057656  122703  000015                  CMPB    #CR,R3          ;CARRIAGE RETURN??
13810  057662  001003                          BNE     6$              ;NO!!
13811  057664  105037  060205                  CLRB    CHRCNT          ;YES-CLEAR CHAR COUNT
13812  057670  000770                          BR      5$              ;GET NEXT CHARACTER
13813  057672  122703  000012          6$:     CMPB    #LF,R3          ;LINE FEED??
13814  057676  001765                          BEQ     5$              ;YES-GET NEXT CHARACTER
13815  057700  122703  000011                  CMPB    #HT,R3          ;HORIZONTAL TAB??
13816  057704  001007                          BNE     8$              ;NO!!
13817  057706  105237  060205          7$:     INCB    CHRCNT          ;ADJUST CHARACTER COUNT
13818  057712  132737  000007  060205          BITB    #7,CHRCNT
13819  057720  001372                          BNE     7$
13820  057722  000407                          BR      9$
13821  057724  105237  060205          8$:     INCB    CHRCNT          ;INCREMENT CHARACTER COUNT
13822  057730  122703  000040                  CMPB    #' ,R3          ;SPACE??
13823  057734  001002                          BNE     9$              ;NO!!
13824  057736  010237  060202                  MOV     R2,BOTADR       ;SAVE ADDRESS OF SPACE
13825  057742  122737  000100  060205  9$:     CMPB    #64.,CHRCNT     ;END OF LINE??
13826  057750  103340                          BHIS    5$              ;NO!!
13827  057752  013704  060202                  MOV     BOTADR,R4       ;GET ADDRESS OF LAST SPACE
13828  057756  001007                          BNE     90$             ;BRANCH IF SPACE DETECTED
13829  057760  104401  001217                  TYPE    ,$CRLF          ;TYPE CRLF
13830  057764  105037  060205                  CLRB    CHRCNT          ;CLEAR CHARACTER COUNT
13831  057770  013702  060010                  MOV     11$,R2          ;SET UP R2 FOR TESTING
13832  057774  000726                          BR      5$
13833  057776  105044                  90$:    CLRB    -(R4)           ;REPLACE SPACE
13834  060000  112737  177777  060204          MOVB    #-1,BOTFLG      ;SET BOT FLAG
13835  060006  104401                  10$:    TYPE                    ;TYPE ERROR MESSAGE STRING
13836  060010  000000                  11$:    .WORD                   ;STRING ADDRESS GOES HERE
13837  060012  105737  060204                  TSTB    BOTFLG          ;WAS STRING TRUNCATED??
13838  060016  001707                          BEQ     4$              ;NO!!
13839  060020  104401  001217                  TYPE    ,$CRLF          ;YES-TYPE CRLF
13840  060024  105037  060204                  CLRB    BOTFLG          ;CLEAR BOT FLAG
13841  060030  105037  060205                  CLRB    CHRCNT          ;CLEAR CHARACTER COUNT
13842  060034  013702  060202                  MOV     BOTADR,R2       ;SETUP R2 FOR TESTING
13843  060040  010237  060010                  MOV     R2,11$          ;SETUP 11$ FOR TYPING
13844  060044  112742  000040                  MOVB    #' ,-(R2)       ;RESTORE SPACE
13845  060050  105722                          TSTB    (R2)+           ;RESTORE R2
13846  060052  000677                          BR      5$              ;TYPE REST OF STRING
13847  060054                          12$:
13848                                  ;TYPE ERROR HEADER AND ERROR DATA
```

```
13849  060054                          13$:
13850  060054  016001  000002                  MOV     2(R0),R1        ;R1 POINTS TO ERROR HEADER TABLE
13851  060060  001444                          BEQ     21$             ;BRANCH IF NO HEADER
13852  060062  104401  001217                  TYPE    ,$CRLF          ;(ASSUME NO DATA)
13853  060066  016002  000004                  MOV     4(R0),R2        ;R2 POINTS TO DATA ADDRESS TABLE
13854  060072  016003  000006                  MOV     6(R0),R3        ;R3 POINTS TO FORMAT TABLE
13855  060076  012137  060106          14$:    MOV     (R1)+,15$       ;PUT HEADER ADDRESS FOR TYPE
13856  060102  001433                          BEQ     21$             ;BRANCH IF END OF HEADERS
13857                                                                  ;(ASSUME END OF DATA)
13858  060104  104401                          TYPE
13859  060106  000000          15$:    .WORD   0                       ;HEADER ADDRESS GOES HERE
13860  060110  104401  001217                  TYPE    ,$CRLF
13861  060114  005702                          TST     R2              ;DATA WITH HEADER??
13862  060116  001767                          BEQ     14$             ;NO!!
13863  060120  012204                          MOV     (R2)+,R4        ;R4 POINTS TO DATA ADDRESS
13864  060122  012305                          MOV     (R3)+,R5        ;R5 POINTS TO FORMAT
13865  060124  105725          16$:    TSTB    (R5)+                   ;WHAT KIND OF DATA??
13866  060126  100407                          BMI     18$             ;BINARY
13867  060130  001403                          BEQ     17$             ;OCTAL
13868  060132  013446                          MOV     @(R4)+,-(SP)    ;DECIMAL
13869  060134  104405                          TYPDS
13870  060136  000405                          BR      19$
13871  060140  013446          17$:    MOV     @(R4)+,-(SP)
13872  060142  104402                          TYPOC
13873  060144  000402                          BR      19$
13874  060146  013446          18$:    MOV     @(R4)+,-(SP)
13875  060150  104406                          TYPBN
13876  060152  005714          19$:    TST     (R4)                    ;MORE DATA??
13877  060154  001403                          BEQ     20$             ;NO!!
13878  060156  104401  060241                  TYPE    ,ERTY04         ;YES-TYPE 2 SPACES
13879  060162  000760                          BR      16$             ;AND CONTINUE
13880  060164  104401  001217          20$:    TYPE    ,$CRLF          ;TYPE ONE BLANK LINE
13881  060170  000742                          BR      14$             ;BEFORE NEXT HEADER
13882  060172  104415          21$:    RESREG
13883  060174  000207                          RTS     PC
13884

13885  060176  000000          TSTNMB: .WORD   0               ;TEST NUMBER
13886  060200  000000          ERRNMB: .WORD   0               ;ERROR NUMBER
13887  060202  000000          BOTADR: .WORD   0               ;BEGINNING OF TEXT ADDRESS
13888  060204     000          BOTFLG: .BYTE   0               ;BOT FLAG
13889  060205     000          CHRCNT: .BYTE   0               ;CHARACTER COUNT
13890
13891  060206  047125  052111  000043  ERTY00: .ASCIZ  @UNIT#@
13892  060214  020054  042524  052123  ERTY01: .ASCIZ  @, TEST#@
13893  060222  000043
13894  060224  020054  051105  021522  ERTY02: .ASCIZ  @, ERR#@
13895  060232     000
13896  060233     054  050040  036503  ERTY03: .ASCIZ  @, PC=@
13897  060240     000
13898  060241     040  000040          ERTY04: .ASCIZ  @  @
13899                                  .EVEN
13900
```

```
13901                                           .SBTTL  CLOCK SUBROUTINES
13902
13903                                           ;ROUTINE TO SIZE FOR CLOCKS (KW11-L OR KW11-P)
13904                                           ;;*****************************************************************
13905  060244  000240                          SIZCLK: NOP
13906  060246  013746  000004                          MOV     ERRVEC,-(SP)    ;;PUSH ERRVEC ON STACK
13907  060252  013746  000006                          MOV     ERRVEC+2,-(SP)          ;;PUSH ERRVEC+2 ON STACK
13908  060256  012737  060342  000004                  MOV     #10$,ERRVEC     ;LOAD 04 TRAP VECTORS
13909  060264  012737  000300  000006                  MOV     #PR6,ERRVEC+2
13910
13911                                           ;SEE IF A KW11-P CLOCK IS PRESENT - GO TO 10$ IF NOT PRESENT
13912  060272  005777  121204                          TST     @$LPCSR         ;TEST FOR P CLOCK
13913  060276  012737  060504  001526                  MOV     #PCLOCK,CLOCK   ;LOAD SUBROUTINE ADDRESS
13914  060304  012737  060626  001530                  MOV     #PSTOP,STOP     ;LOAD STOP ADDRESS
13915  060312  012777  060572  121166                  MOV     #PCOUNT,@$LPVEC ;LOAD P CLOCK INTERRUPT VECTOR
13916  060320  012777  000300  121162                  MOV     #PR6,@$LPVEC+2
13917  060326  013777  001516  121160                  MOV     $LLVEC+2,@$LLVEC;CLEAR L CLOCK INTERRUPT VECTOR
13918  060334  005077  121156                          CLR     @$LLVEC+2
13919  060340  000454                                  BR      30$
13920  060342  012716  060350                  10$:    MOV     #15$,(SP)       ;DUMMY RTI ADDRESS
13921  060346  000002                                  RTI                     ;RESTORE PRIORITY
13922  060350                                  15$:
13923                                           ;NO P CLOCK-SEE IF L CLOCK IS PRESENT-GO TO 20$ IF NOT PRESET
13924  060350  012737  060426  000004                  MOV     #20$,ERRVEC     ;CHANGE 04 TRAP VECTOR
13925  060356  005777  121130                          TST     @$LLCSR         ;TEST FOR L CLOCK
13926  060362  012737  060522  001526                  MOV     #LCLOCK,CLOCK   ;LOAD SUBROUTINE ADDRESS
13927  060370  012737  060634  001530                  MOV     #LSTOP,STOP     ;LOAD STOP ADDRESS
13928  060376  012777  060572  121110                  MOV     #LCOUNT,@$LLVEC ;LOAD L CLOCK INTERRUPT VECTOR
13929  060404  012777  000300  121104                  MOV     #PR6,@$LLVEC+2
13930  060412  013777  001510  121066                  MOV     $LPVEC+2,@$LPVEC;CLEAR P CLOCK INTERRUPT VECTOR
13931  060420  005077  121064                          CLR     @$LPVEC+2
13932  060424  000422                                  BR      30$
13933  060426  012716  060434                  20$:    MOV     #25$,(SP)       ;DUMMY RTI ADDRESS
13934  060432  000002                                  RTI                     ;RESTORE PRIORITY
13935  060434                                  25$:
13936                                           ;NO CLOCK AVAILABLE - AUGMENT RETURN ADDRESS
13937  060434  005037  001526                          CLR     CLOCK           ;CLEAR SUBROUTINE ADDRESS
13938  060440  012737  001510  001506                  MOV     #$LPVEC+2,$LPVEC;CLEAR P CLOCK INTERRUPT VECTOR
13939  060446  005037  001510                          CLR     $LPVEC+2
13940  060452  012737  001516  001514                  MOV     #$LLVEC+2,$LLVEC;CLEAR L CLOCK INTERRUPT VECTOR
13941  060460  005037  001516                          CLR     $LLVEC+2
13942  060464  062766  000002  000004                  ADD     #2,4(SP)        ;CHANGE RETURN ADDRESS
13943
13944  060472                                  30$:
13945  060472  012637  000006                          MOV     (SP)+,ERRVEC+2          ;;POP STACK INTO ERRVEC+2
13946  060476  012637  000004                          MOV     (SP)+,ERRVEC    ;;POP STACK INTO ERRVEC
13947  060502  000207                                  RTS     PC
13948                                           ;ROUTINES TO START THE CLOCK (KW11-L OR KW11-P)
13949                                           ;;*****************************************************************
13950
13951  060504  012777  177777  120772  PCLOCK: MOV     #-1,@$LPCSB     ;LOAD COUNT SET BUFFER
13952  060512  012777  000135  120762          MOV     #135,@$LPCSR    ;LOAD CONTROL REGISTER
13953  060520  000403                          BR      PLCLK           ;GO TO COMMON CODE
13954
13955  060522  012777  000100  120762  LCLOCK: MOV     #100,@$LLCSR    ;LOAD CONTROL REGISTER
13956
```

```
13957  060530  005037  001522          PLCLK:  CLR     TIME            ;CLEAR TIMER COUNT
13958  060534  104400                          TRAP                    ;;PUSH OLD PSW AND PC ON STACK
13959  060536  012605                          MOV     (SP)+,R5        ;;SAVE THE PSW IN R5
13960  060540  010537  001520                  MOV     R5,$PSW         ;SAVE PRIORITY
13961  060544  042705  177437                  BIC     #^CPR7,R5       ;MASK X
13962  060550  022705  000300                  CMP     #PR6,R5         ;IS PRIORITY TOO HIGH??
13963  060554  101005                          BHI     40$             ;NO!!
13964  060556  012746  000240                  MOV     #PR5,-(SP)      ;;PUT NEW PS ON STACK
13965  060562  012746  060570                  MOV     #30$,-(SP)      ;;PUT NEW PC ON  STACK
13966  060566  000002                          RTI                     ;;POP NEW PC AND PS
13967  060570                          30$:
13968  060570  000207                  40$:    RTS     PC
13969
13970                                  ;ROUTINES TO HANDLE CLOCK INTERRUPTS (KW11-L OR KW11-P)
13971
13972  060572                          PCOUNT:
13973  060572                          LCOUNT:
13974  060572  062737  000021  001522          ADD     #17.,TIME       ;ADD 17MS TO ELAPSED TIME
13975  060600  103003                          BCC     10$             ;BRANCH IF NO OVERFLOW
13976  060602  012737  177777  001522          MOV     #-1,TIME        ;RESTORE MAXIMUM COUNT
13977  060610  162737  000021  001524  10$:    SUB     #17.,WATCH      ;DECREMENT REMAINING TIME
13978  060616  100002                          BPL     20$             ;BRANCH IF POSITIVE
13979  060620  005037  001524                  CLR     WATCH           ;CLEAR REMAINING TIME
13980  060624  000002                  20$:    RTI                     ;RETURN TO USER
13981
13982                                  ;ROUTINES TO STOP THE CLOCK (KW11-L OR KW11-P)
13983
13984  060626  005077  120650          PSTOP:  CLR     @$LPCSR         ;STOP P CLOCK
13985  060632  000402                          BR      PLSTP           ;GO TO COMMON STOP CODE
13986
13987  060634  005077  120652          LSTOP:  CLR     @$LLCSR         ;STOP L CLOCK
13988
13989  060640                          PLSTP:
13990  060640  013746  001520                  MOV     $PSW,-(SP)      ;;PUT NEW PS ON STACK
13991  060644  012746  060652                  MOV     #10$,-(SP)      ;;PUT NEW PC ON  STACK
13992  060650  000002                          RTI                     ;;POP NEW PC AND PS
13993  060652                          10$:
13994  060652  000207                          RTS     PC
13995
13996                                  .SBTTL  SET VOLUME VALID SUBROUTINE
13997
13998                                  ;THIS SUBROUTINE INITIALIZES THE SUBSYSTEM AND SETS VOLUME VALID,
13999                                  ;RETURNING WITH THE DRIVE STILL IN DIAGNOSTIC MODE.  THE SUBROUTINE
14000                                  ;RETURNS TO THE WORD FOLLOWING THE CALL, EXCEPT WHEN AN ERROR IS
14001                                  ;DETECTED, IN WHICH CASE IT RETURNS TO THE SECOND WORD FOLLOWING THE
14002                                  ;CALL.
14003                                  ;
14004                                  ;CALL:  JSR     PC,SETVV        JUMP TO SUBROUTINE
14005                                  ;       BR      ??              RETURN HERE IF NO ERROR
14006                                  ;       ERROR                   RETURN HERE IF ERROR
14007
14008  060654                          SETVV:
14009  060654  012760  000040  000010          MOV     #CLR,RMCS2(R0)  ;CLEAR THE MASSBUS
14010  060662  111160  000010                  MOVB    (R1),RMCS2(R0)  ;SELECT UNIT
14011
14012  060666  012760  000001  000024          MOV     #DMD,RMMR1(R0)  ;LOAD RMMR1
```

```
14013
14014  060674  012760  001001  000024          MOV     #DMD!MUR,RMMR1(R0)      ;LOAD RMMR1
14015
14016  060702  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
14017
14018  060710  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
14019
14020  060716  012760  000023  000000          MOV     #PACACK!GO,RMCS1(R0)    ;LOAD RMCS1
14021
14022  060724  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
14023  060732  042737  177677  001142          BIC     #^CVV,$BDDAT
14024  060740  001020                          BNE     10$             ;BRANCH IF VOLUME VALID SET
14025  060742  010037  001136                  MOV     R0,$BDADR       ;SETUP FOR ERROR MSG
14026  060746  062737  000012  001136          ADD     #RMDS,$BDADR
14027  060754  012737  000100  001140          MOV     #VV,$GDDAT
14028  060762  062716  000002                  ADD     #2,(SP)         ;MOVE RETURN ADDRESS TO ERROR
14029  060766  112776  000170  000000          MOVB    #170,@(SP)      ;WRITE ERROR NUMBER
14030  060774  012737  000022  001174          MOV     #PACACK,$TMP0
14031  061002  000207                  10$:    RTS     PC              ;RETURN
14032
14033                                  .SBTTL  SET OFFSET MODE SUBROUTINE
14034
14035                                  ;THIS SUBROUTINE EXECUTES AN OFFSET COMMAND AND VERIFIES THAT OFFSET
14036                                  ;MODE SETS.  THE DRIVE SHOULD BE IN DIAGNOSTIC MODE WHEN CALLING THE
14037                                  ;SUBROUTINE, WHICH WILL LEAVE DMD ON.  THE SUBROUTINE RETURNS TO THE
14038                                  ;WORD FOLLOWING THE CALL UNLESS THERE IS AN ERROR, IN WHICH CASE IT
14039                                  ;RETURNS TO THE SECOND WORD FOLLOWING THE CALL
14040                                  ;
14041                                  ;CALL:  JSR     PC,SETOM        JUMP TO SUBROUTINE
14042                                  ;       BR      ??              RETURN HERE IF NO ERROR
14043                                  ;       ERROR                   RETURN HERE IF ERROR
14044
14045  061004                  SETOM:
14046
14047  061004  012760  001001  000024          MOV     #DMD!MUR,RMMR1(R0)      ;LOAD RMMR1
14048
14049  061012  012760  000000  000014          MOV     #0,RMER1(R0)    ;LOAD RMER1
14050
14051  061020  012760  000000  000042          MOV     #0,RMER2(R0)    ;LOAD RMER2
14052
14053  061026  012760  000015  000000          MOV     #OFFSET!GO,RMCS1(R0)    ;LOAD RMCS1
14054
14055  061034  016037  000012  001142          MOV     RMDS(R0),$BDDAT ;STORE RMDS AT $BDDAT
14056  061042  042737  177776  001142          BIC     #^COM,$BDDAT
14057  061050  001015                          BNE     10$             ;BRANCH IF OFFSET ON
14058  061052  012737  000001  001140          MOV     #OM,$GDDAT
14059  061060  010037  001136                  MOV     R0,$BDADR
14060  061064  062737  000012  001136          ADD     #RMDS,$BDADR
14061  061072  062716  000002                  ADD     #2,(SP)         ;MOVE RETURN ADDRESS TO ERROR
14062  061076  112776  000200  000000          MOVB    #200,@(SP)      ;WRITE ERROR NUMBER
14063  061104                          10$:
14064  061104  000207                  RTS     PC              ;RETURN TO USER
14065
```

```
14066                                   .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES
14067
14068                                   ;;**********************************************************************
14069                                   ;*SAVE R0-R5
14070                                   ;*CALL:
14071                                   ;*      SAVREG
14072                                   ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
14073                                   ;*
14074                                   ;*TOP---(+16)
14075                                   ;* +2---(+18)
14076                                   ;* +4---R5
14077                                   ;* +6---R4
14078                                   ;* +8---R3
14079                                   ;*+10---R2
14080                                   ;*+12---R1
14081                                   ;*+14---R0
14082
14083  061106                           $SAVREG:
14084  061106  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
14085  061110  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
14086  061112  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
14087  061114  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
14088  061116  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
14089  061120  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
14090  061122  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
14091  061126  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
14092  061132  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
14093  061136  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
14094  061142  000002                          RTI
14095
14096                                   ;*RESTORE R0-R5
14097                                   ;*CALL:
14098                                   ;*      RESREG
14099  061144                           $RESREG:
14100  061144  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
14101  061150  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
14102  061154  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
14103  061160  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
14104  061164  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
14105  061166  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
14106  061170  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
14107  061172  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
14108  061174  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
14109  061176  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
14110  061200  000002                          RTI
14111                                   .SBTTL  BINARY TO ASCII AND TYPE ROUTINE
14112
14113                                   ;;**********************************************************************
14114                                   ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 16-BIT
14115                                   ;*BINARY-ASCII NUMBER AND TYPE IT.
14116                                   ;*CALL:
14117                                   ;*      MOV     NUMBER,-(SP)    ;;NUMBER TO BE TYPED
14118                                   ;*      TYPBN                   ;;TYPE IT
14119
14120  061202  010146                   $TYPBN: MOV     R1,-(SP)        ;;SAVE R1 ON THE STACK
14121  061204  016601  000006                  MOV     6(SP),R1        ;;GET THE INPUT NUMBER
```

```
14122  061210  000261                        SEC                     ;;SET "C" SO CAN KEEP TRACK OF THE NUMBER OF BITS
14123  061212  112737  000060  061254  1$:   MOVB    #'0,$BIN        ;;SET CHARACTER TO AN ASCII "0".
14124  061220  006101                        ROL     R1              ;;GET THIS BIT
14125  061222  001406                        BEQ     2$              ;;DONE?
14126  061224  105537  061254                ADCB    $BIN            ;;NO--SET THE CHARACTER EQUAL TO THIS BIT
14127  061230  104401  061254                TYPE    ,$BIN           ;;GO TYPE THIS BIT
14128  061234  000241                        CLC                     ;;CLEAR "C" SO CAN KEEP TRACK OF BITS
14129  061236  000765                        BR      1$              ;;GO DO THE NEXT BIT
14130  061240  012601                2$:     MOV     (SP)+,R1        ;;POP THE STACK INTO R1
14131  061242  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
14132  061250  012616                        MOV     (SP)+,(SP)
14133  061252  000002                        RTI                     ;;RETURN TO USER
14134  061254     000     000        $BIN:   .BYTE   0,0             ;;STORAGE FOR ASCII CHAR. AND TERMINATOR
14135                                .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE
14136
14137                                ;;**************************************************************
14138                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
14139                                ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
14140                                ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
14141                                ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
14142                                ;*REPLACED WITH SPACES.
14143                                ;*CALL:
14144                                ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
14145                                ;*      TYPDS                   ;;GO TO THE ROUTINE
14146
14147  061256                        $TYPDS:
14148  061256  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
14149  061260  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
14150  061262  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
14151  061264  010346                        MOV     R3,-(SP)        ;;PUSH R3 ON STACK
14152  061266  010546                        MOV     R5,-(SP)        ;;PUSH R5 ON STACK
14153  061270  012746  020200                MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
14154  061274  016605  000020                MOV     20(SP),R5       ;;GET THE INPUT NUMBER
14155  061300  100004                        BPL     1$              ;;BR IF INPUT IS POS.
14156  061302  005405                        NEG     R5              ;;MAKE THE BINARY NUMBER POS.
14157  061304  112766  000055  000001        MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
14158  061312  005000                1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
14159  061314  012703  061472                MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
14160  061320  112723  000040                MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
14161  061324  005002                2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
14162  061326  016001  061462                MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
14163  061332  160105                3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
14164  061334  002402                        BLT     4$              ;;BR IF DONE
14165  061336  005202                        INC     R2              ;;INCREASE THE BCD DIGIT BY 1
14166  061340  000774                        BR      3$
14167  061342  060105                4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
14168  061344  005702                        TST     R2              ;;CHECK IF BCD DIGIT=0
14169  061346  001002                        BNE     5$              ;;FALL THROUGH IF 0
14170  061350  105716                        TSTB    (SP)            ;;STILL DOING LEADING 0'S?
14171  061352  100407                        BMI     7$              ;;BR IF YES
14172  061354  106316                5$:     ASLB    (SP)            ;;MSD?
14173  061356  103003                        BCC     6$              ;;BR IF NO
14174  061360  116663  000001  177777        MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
14175  061366  052702  000060        6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
14176  061372  052702  000040        7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
14177  061376  110223                        MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
```

```
14178  061400  005720                        TST     (R0)+           ;;JUST INCREMENTING
14179  061402  020027  000010                CMP     R0,#10          ;;CHECK THE TABLE INDEX
14180  061406  002746                        BLT     2$              ;;GO DO THE NEXT DIGIT
14181  061410  003002                        BGT     8$              ;;GO TO EXIT
14182  061412  010502                        MOV     R5,R2           ;;GET THE LSD
14183  061414  000764                        BR      6$              ;;GO CHANGE TO ASCII
14184  061416  105726                8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
14185  061420  100003                        BPL     9$              ;;BR IF NO
14186  061422  116663  177777  177776        MOVB    -1(SP),2(R3)    ;;YES--SET THE SIGN FOR TYPING
14187  061430  105013                9$:     CLRB    (R3)            ;;SET THE TERMINATOR
14188  061432  012605                        MOV     (SP)+,R5        ;;POP STACK INTO R5
14189  061434  012603                        MOV     (SP)+,R3        ;;POP STACK INTO R3
14190  061436  012602                        MOV     (SP)+,R2        ;;POP STACK INTO R2
14191  061440  012601                        MOV     (SP)+,R1        ;;POP STACK INTO R1
14192  061442  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
14193  061444  104401  061472                TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
14194  061450  016666  000002  000004        MOV     2(SP),4(SP)     ;;ADJUST THE STACK
14195  061456  012616                        MOV     (SP)+,(SP)
14196  061460  000002                        RTI                     ;;RETURN TO USER
14197  061462  023420                $DTBL:  10000.
14198  061464  001750                        1000.
14199  061466  000144                        100.
14200  061470  000012                        10.
14201  061472  000004                $DBLK:  .BLKW   4
14202                                 .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
14203
14204                                 ;;**************************************************************
14205                                 ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
14206                                 ;*OCTAL (ASCII) NUMBER AND TYPE IT.
14207                                 ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
14208                                 ;*CALL:
14209                                 ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
14210                                 ;*      TYPOS                   ;;CALL FOR TYPEOUT
14211                                 ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
14212                                 ;*      .BYTE   M               ;;M=1 OR 0
14213                                 ;*                                      ;;1=TYPE LEADING ZEROS
14214                                 ;*                                      ;;0=SUPPRESS LEADING ZEROS
14215                                 ;*
14216                                 ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
14217                                 ;*$TYPOS OR $TYPOC
14218                                 ;*CALL:
14219                                 ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
14220                                 ;*      TYPON                   ;;CALL FOR TYPEOUT
14221                                 ;*
14222                                 ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
14223                                 ;*CALL:
14224                                 ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
14225                                 ;*      TYPOC                   ;;CALL FOR TYPEOUT
14226
14227  061502  017646  000000        $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
14228  061506  116637  000001  061725        MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
14229  061514  112637  061727                MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
14230  061520  062716  000002                ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
14231  061524  000406                        BR      $TYPON
14232  061526  112737  000001  061725  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
14233  061534  112737  000006  061727        MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
```

```
14234  061542  112737  000005  061724  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
14235  061550  010346                          MOV     R3,-(SP)        ;;SAVE R3
14236  061552  010446                          MOV     R4,-(SP)        ;;SAVE R4
14237  061554  010546                          MOV     R5,-(SP)        ;;SAVE R5
14238  061556  113704  061727                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
14239  061562  005404                          NEG     R4
14240  061564  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
14241  061570  110437  061726                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
14242  061574  113704  061725                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
14243  061600  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
14244  061604  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
14245  061606  006105          1$:     ROL     R5              ;;ROTATE MSB INTO "C"
14246  061610  000404                  BR      3$              ;;GO DO MSB
14247  061612  006105          2$:     ROL     R5              ;;FORM THIS DIGIT
14248  061614  006105                  ROL     R5
14249  061616  006105                  ROL     R5
14250  061620  010503                  MOV     R5,R3
14251  061622  006103          3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
14252  061624  105337  061726          DECB    $OMODE          ;;TYPE THIS DIGIT?
14253  061630  100016                  BPL     7$              ;;BR IF NO
14254  061632  042703  177770          BIC     #177770,R3      ;;GET RID OF JUNK
14255  061636  001002                  BNE     4$              ;;TEST FOR 0
14256  061640  005704                  TST     R4              ;;SUPPRESS THIS 0?
14257  061642  001403                  BEQ     5$              ;;BR IF YES
14258  061644  005204          4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
14259  061646  052703  000060          BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
14260  061652  052703  000040  5$:     BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
14261  061656  110337  061722          MOVB    R3,8$           ;;SAVE FOR TYPING
14262  061662  104401  061722          TYPE    ,8$             ;;GO TYPE THIS DIGIT
14263  061666  105337  061724  7$:     DECB    $OCNT           ;;COUNT BY 1
14264  061672  003347                  BGT     2$              ;;BR IF MORE TO DO
14265  061674  002402                  BLT     6$              ;;BR IF DONE
14266  061676  005204                  INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
14267  061700  000744                  BR      2$              ;;GO DO THE LAST DIGIT
14268  061702  012605          6$:     MOV     (SP)+,R5        ;;RESTORE R5
14269  061704  012604                  MOV     (SP)+,R4        ;;RESTORE R4
14270  061706  012603                  MOV     (SP)+,R3        ;;RESTORE R3
14271  061710  016666  000002  000004  MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
14272  061716  012616                  MOV     (SP)+,(SP)
14273  061720  000002                  RTI                     ;;RETURN
14274  061722     000  8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
14275  061723     000          .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
14276  061724     000  $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
14277  061725     000  $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
14278  061726  000000  $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
14279                  .SBTTL  TYPE ROUTINE
14280
14281                  ;;*****************************************************************
14282                  ;*ROUTINE TO TYPE ASCIZ MESSAGE. MESSAGE MUST TERMINATE WITH A 0 BYTE.
14283                  ;*THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
14284                  ;*NOTE1:         $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER.
14285                  ;*NOTE2:         $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
14286                  ;*NOTE3:         $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
14287                  ;*
14288                  ;*CALL:
14289                  ;*1) USING A TRAP INSTRUCTION
```

```
14290                                   ;*      TYPE    ,MESADR         ;;MESADR IS FIRST ADDRESS OF AN ASCIZ STRING
14291                                   ;*OR
14292                                   ;*      TYPE
14293                                   ;*      MESADR
14294                                   ;*
14295
14296  061730  105737  001173           $TYPE:  TSTB    $TPFLG          ;;IS THERE A TERMINAL?
14297  061734  100002                           BPL     1$              ;;BR IF YES
14298  061736  000000                           HALT                    ;;HALT HERE IF NO TERMINAL
14299  061740  000430                           BR      3$              ;;LEAVE
14300  061742  010046                   1$:     MOV     R0,-(SP)        ;;SAVE R0
14301  061744  017600  000002                   MOV     @2(SP),R0       ;;GET ADDRESS OF ASCIZ STRING
14302  061750  122737  000001  001242           CMPB    #APTENV,$ENV    ;;RUNNING IN APT MODE
14303  061756  001011                           BNE     62$             ;;NO,GO CHECK FOR APT CONSOLE
14304  061760  132737  000100  001243           BITB    #APTSPOOL,$ENVM ;;SPOOL MESSAGE TO APT
14305  061766  001405                           BEQ     62$             ;;NO,GO CHECK FOR CONSOLE
14306  061770  010037  062000                   MOV     R0,61$          ;;SETUP MESSAGE ADDRESS FOR APT
14307  061774  004737  065020                   JSR     PC,$ATY3        ;;SPOOL MESSAGE TO APT
14308  062000  000000                   61$:    .WORD   0               ;;MESSAGE ADDRESS
14309  062002  132737  000040  001243   62$:    BITB    #APTCSUP,$ENVM  ;;APT CONSOLE SUPPRESSED
14310  062010  001003                           BNE     60$             ;;YES,SKIP TYPE OUT
14311  062012  112046                   2$:     MOVB    (R0)+,-(SP)     ;;PUSH CHARACTER TO BE TYPED ONTO STACK
14312  062014  001005                           BNE     4$              ;;BR IF IT ISN'T THE TERMINATOR
14313  062016  005726                           TST     (SP)+           ;;IF TERMINATOR POP IT OFF THE STACK
14314  062020  012600                   60$:    MOV     (SP)+,R0        ;;RESTORE R0
14315  062022  062716  000002           3$:     ADD     #2,(SP)         ;;ADJUST RETURN PC
14316  062026  000002                           RTI                     ;;RETURN
14317  062030  122716  000011           4$:     CMPB    #HT,(SP)        ;;BRANCH IF <HT>
14318  062034  001430                           BEQ     8$
14319  062036  122716  000200                   CMPB    #CRLF,(SP)      ;;BRANCH IF NOT <CRLF>
14320  062042  001006                           BNE     5$
14321  062044  005726                           TST     (SP)+           ;;POP  <CR><LF> EQUIV
14322  062046  104401                           TYPE                    ;;TYPE A CR AND LF
14323  062050  001217                           $CRLF
14324  062052  105037  062206                   CLRB    $CHARCNT        ;;CLEAR CHARACTER COUNT
14325  062056  000755                           BR      2$              ;;GET NEXT CHARACTER
14326  062060  004737  062142           5$:     JSR     PC,$TYPEC       ;;GO TYPE THIS CHARACTER
14327  062064  123726  001172           6$:     CMPB    $FILLC,(SP)+    ;;IS IT TIME FOR FILLER CHARS.?
14328  062070  001350                           BNE     2$              ;;IF NO GO GET NEXT CHAR.
14329  062072  013746  001170                   MOV     $NULL,-(SP)     ;;GET # OF FILLER CHARS. NEEDED
14330                                                                   ;;AND THE NULL CHAR.
14331  062076  105366  000001           7$:     DECB    1(SP)           ;;DOES A NULL NEED TO BE TYPED?
14332  062102  002770                           BLT     6$              ;;BR IF NO--GO POP THE NULL OFF OF STACK
14333  062104  004737  062142                   JSR     PC,$TYPEC       ;;GO TYPE A NULL
14334  062110  105337  062206                   DECB    $CHARCNT        ;;DO NOT COUNT AS A COUNT
14335  062114  000770                           BR      7$              ;;LOOP
14336
14337                                   ;HORIZONTAL TAB PROCESSOR
14338
14339  062116  112716  000040           8$:     MOVB    #' ,(SP)        ;;REPLACE TAB WITH SPACE
14340  062122  004737  062142           9$:     JSR     PC,$TYPEC       ;;TYPE A SPACE
14341  062126  132737  000007  062206           BITB    #7,$CHARCNT     ;;BRANCH IF NOT AT
14342  062134  001372                           BNE     9$              ;;TAB STOP
14343  062136  005726                           TST     (SP)+           ;;POP SPACE OFF STACK
14344  062140  000724                           BR      2$              ;;GET NEXT CHARACTER
14345  062142  105777  117016           $TYPEC: TSTB    @$TPS           ;;WAIT UNTIL PRINTER IS READY
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14346  062146  100375                        BPL     $TYPEC
14347  062150  116677  000002  117010        MOVB    2(SP),@$TPB     ;;LOAD CHAR TO BE TYPED INTO DATA REG.
14348  062156  122766  000015  000002        CMPB    #CR,2(SP)       ;;IS CHARACTER A CARRIAGE RETURN?
14349  062164  001003                        BNE     1$              ;;BRANCH IF NO
14350  062166  105037  062206                CLRB    $CHARCNT        ;;YES--CLEAR CHARACTER COUNT
14351  062172  000406                        BR      $TYPEX          ;;EXIT
14352  062174  122766  000012  000002  1$:   CMPB    #LF,2(SP)       ;;IS CHARACTER A LINE FEED?
14353  062202  001402                        BEQ     $TYPEX          ;;BRANCH IF YES
14354  062204  105227                        INCB    (PC)+           ;;COUNT THE CHARACTER
14355  062206  000000              $CHARCNT: .WORD   0               ;;CHARACTER COUNT STORAGE
14356  062210  000207              $TYPEX:   RTS     PC
14357
14358                                .SBTTL  SCOPE HANDLER ROUTINE
14359
14360                                ;;**************************************************************
14361                                ;*THIS ROUTINE CONTROLS THE LOOPING OF SUBTESTS. IT WILL INCREMENT
14362                                ;*AND LOAD THE TEST NUMBER($TSTNM) INTO THE DISPLAY REG.(DISPLAY<7:0>)
14363                                ;*AND LOAD THE ERROR FLAG ($ERFLG) INTO DISPLAY<15:08>
14364                                ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
14365                                ;*SW14=1         LOOP ON TEST
14366                                ;*SW11=1         INHIBIT ITERATIONS
14367                                ;*SW09=1         LOOP ON ERROR
14368                                ;*SW08=1         LOOP ON TEST IN SWR<7:0>
14369                                ;*CALL
14370                                ;*      SCOPE           ;;SCOPE=IOT
14371
14372  062212                        $SCOPE:
14373  062212  104410                        CKSWR                   ;;TEST  FOR CHANGE IN SOFT-SWR
14374  062214  032777  040000  116732  1$:   BIT     #BIT14,@SWR     ;;LOOP ON PRESENT TEST?
14375  062222  001131                        BNE     $OVER           ;;YES IF SW14=1
14376                                ;#####START OF CODE FOR THE XOR TESTER#####
14377  062224  000416              $XTSTR:   BR      6$              ;;IF RUNNING ON THE "XOR" TESTER CHANGE
14378                                                                ;;THIS INSTRUCTION TO A "NOP" (NOP=240)
14379  062226  013746  000004                MOV     @#ERRVEC,-(SP)  ;;SAVE THE CONTENTS OF THE ERROR VECTOR
14380  062232  012737  062252  000004        MOV     #5$,@#ERRVEC    ;;SET FOR TIMEOUT
14381  062240  005737  177060                TST     @#177060        ;;TIME OUT ON XOR?
14382  062244  012637  000004                MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
14383  062250  000500                        BR      $SVLAD          ;;GO TO THE NEXT TEST
14384  062252  022626              5$:       CMP     (SP)+,(SP)+     ;;CLEAR THE STACK AFTER A TIME OUT
14385  062254  012637  000004                MOV     (SP)+,@#ERRVEC  ;;RESTORE THE ERROR VECTOR
14386  062260  000440                        BR      7$              ;;LOOP ON THE PRESENT TEST
14387  062262                        6$:;#####END OF CODE FOR THE XOR TESTER#####
14388  062262  032777  000400  116664        BIT     #BIT08,@SWR     ;;LOOP ON SPEC. TEST?
14389  062270  001421                        BEQ     2$              ;;BR IF NO
14390  062272  005046                        CLR     -(SP)           ;;CLEAR A TEMP. LOCATION
14391  062274  117716  116654                MOVB    @SWR,(SP)       ;;PICKUP THE DESIRED TEST NUMBER
14392  062300  001414                        BEQ     8$              ;;BRANCH IF BAD TEST NUMBER IN SWR
14393  062302  022716  000121                CMP     #121,(SP)       ;;CHECK THE NUMBER IN THE SWR
14394  062306  002411                        BLT     8$              ;;BRANCH IF TEST NUMBER IS OUT OF RANGE
14395  062310  011637  001116                MOV     (SP),$TSTNM     ;;UPDATE THE TEST NUMBER
14396  062314  005316                        DEC     (SP)            ;;BACKUP BY ONE
14397  062316  006316                        ASL     (SP)            ;;SCALE THE TEST NUMBER AS AN INDEX
14398  062320  062716  062524                ADD     #$SWOPTBL,(SP)  ;;FORM THE ADDRESS OF TEST POINTER
14399  062324  013637  001122                MOV     @(SP)+,$LPADR   ;;SET LOOP ADDRESS TO DESIRED TEST
14400  062330  000466                        BR      $OVER           ;;GO LOOP ON THE TEST
14401  062332  005726              8$:       TST     (SP)+           ;;CLEAN THE BAD TEST NUMBER OFF OF THE STACK
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14402  062334  105737  001117          2$:     TSTB    $ERFLG          ;;HAS AN ERROR OCCURRED?
14403  062340  001421                          BEQ     3$              ;;BR IF NO
14404  062342  123737  001131  001117          CMPB    $ERMAX,$ERFLG   ;;MAX. ERRORS FOR THIS TEST OCCURRED?
14405  062350  101015                          BHI     3$              ;;BR IF NO
14406  062352  032777  001000  116574          BIT     #BIT09,@SWR     ;;LOOP ON ERROR?
14407  062360  001404                          BEQ     4$              ;;BR IF NO
14408  062362  013737  001124  001122  7$:     MOV     $LPERR,$LPADR   ;;SET LOOP ADDRESS TO LAST SCOPE
14409  062370  000446                          BR      $OVER
14410  062372  105037  001117          4$:     CLRB    $ERFLG          ;;ZERO THE ERROR FLAG
14411  062376  005037  001206                  CLR     $TIMES          ;;CLEAR THE NUMBER OF ITERATIONS TO MAKE
14412  062402  000415                          BR      1$              ;;ESCAPE TO THE NEXT TEST
14413  062404  032777  004000  116542  3$:     BIT     #BIT11,@SWR     ;;INHIBIT ITERATIONS?
14414  062412  001011                          BNE     1$              ;;BR IF YES
14415  062414  005737  001230                  TST     $PASS           ;;IF FIRST PASS OF PROGRAM
14416  062420  001406                          BEQ     1$              ;;      INHIBIT ITERATIONS
14417  062422  005237  001120                  INC     $ICNT           ;;INCREMENT ITERATION COUNT
14418  062426  023737  001206  001120          CMP     $TIMES,$ICNT    ;;CHECK THE NUMBER OF ITERATIONS MADE
14419  062434  002024                          BGE     $OVER           ;;BR IF MORE ITERATION REQUIRED
14420  062436  012737  000001  001120  1$:     MOV     #1,$ICNT        ;;REINITIALIZE THE ITERATION COUNTER
14421  062444  013737  062522  001206          MOV     $MXCNT,$TIMES   ;;SET NUMBER OF ITERATIONS TO DO
14422  062452  105237  001116          $SVLAD: INCB    $TSTNM          ;;COUNT TEST NUMBERS
14423  062456  113737  001116  001226          MOVB    $TSTNM,$TESTN   ;;SET TEST NUMBER IN APT MAILBOX
14424  062464  011637  001122                  MOV     (SP),$LPADR     ;;SAVE SCOPE LOOP ADDRESS
14425  062470  011637  001124                  MOV     (SP),$LPERR     ;;SAVE ERROR LOOP ADDRESS
14426  062474  005037  001210                  CLR     $ESCAPE         ;;CLEAR THE ESCAPE FROM ERROR ADDRESS
14427  062500  112737  000001  001131          MOVB    #1,$ERMAX       ;;ONLY ALLOW ONE(1) ERROR ON NEXT TEST
14428  062506  013777  001116  116442  $OVER:  MOV     $TSTNM,@DISPLAY ;;DISPLAY TEST NUMBER
14429  062514  013716  001122                  MOV     $LPADR,(SP)     ;;FUDGE RETURN ADDRESS
14430  062520  000002                          RTI                     ;;FIXES PS
14431  062522  000012                  $MXCNT: 10.                     ;;MAX. NUMBER OF ITERATIONS
14432  062524                          $SWO8TBL:
14433  062524  006340                          .WORD   TST1+2          ;;STARTING ADDRESS OF TEST 1
14434  062526  006714                          .WORD   TST2+2          ;;STARTING ADDRESS OF TEST 2
14435  062530  007134                          .WORD   TST3+2          ;;STARTING ADDRESS OF TEST 3
14436  062532  007350                          .WORD   TST4+2          ;;STARTING ADDRESS OF TEST 4
14437  062534  007536                          .WORD   TST5+2          ;;STARTING ADDRESS OF TEST 5
14438  062536  010674                          .WORD   TST6+2          ;;STARTING ADDRESS OF TEST 6
14439  062540  012054                          .WORD   TST7+2          ;;STARTING ADDRESS OF TEST 7
14440  062542  012234                          .WORD   TST10+2         ;;STARTING ADDRESS OF TEST 10
14441  062544  012356                          .WORD   TST11+2         ;;STARTING ADDRESS OF TEST 11
14442  062546  012654                          .WORD   TST12+2         ;;STARTING ADDRESS OF TEST 12
14443  062550  013266                          .WORD   TST13+2         ;;STARTING ADDRESS OF TEST 13
14444  062552  014114                          .WORD   TST14+2         ;;STARTING ADDRESS OF TEST 14
14445  062554  014650                          .WORD   TST15+2         ;;STARTING ADDRESS OF TEST 15
14446  062556  015006                          .WORD   TST16+2         ;;STARTING ADDRESS OF TEST 16
14447  062560  015362                          .WORD   TST17+2         ;;STARTING ADDRESS OF TEST 17
14448  062562  015522                          .WORD   TST20+2         ;;STARTING ADDRESS OF TEST 20
14449  062564  016044                          .WORD   TST21+2         ;;STARTING ADDRESS OF TEST 21
14450  062566  016220                          .WORD   TST22+2         ;;STARTING ADDRESS OF TEST 22
14451  062570  016404                          .WORD   TST23+2         ;;STARTING ADDRESS OF TEST 23
14452  062572  016714                          .WORD   TST24+2         ;;STARTING ADDRESS OF TEST 24
14453  062574  017252                          .WORD   TST25+2         ;;STARTING ADDRESS OF TEST 25
14454  062576  017732                          .WORD   TST26+2         ;;STARTING ADDRESS OF TEST 26
14455  062600  020072                          .WORD   TST27+2         ;;STARTING ADDRESS OF TEST 27
14456  062602  020416                          .WORD   TST30+2         ;;STARTING ADDRESS OF TEST 30
14457  062604  020770                          .WORD   TST31+2         ;;STARTING ADDRESS OF TEST 31
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14458  062606  021316                .WORD   TST32+2          ;;STARTING ADDRESS OF TEST 32
14459  062610  022072                .WORD   TST33+2          ;;STARTING ADDRESS OF TEST 33
14460  062612  022442                .WORD   TST34+2          ;;STARTING ADDRESS OF TEST 34
14461  062614  022772                .WORD   TST35+2          ;;STARTING ADDRESS OF TEST 35
14462  062616  023352                .WORD   TST36+2          ;;STARTING ADDRESS OF TEST 36
14463  062620  023740                .WORD   TST37+2          ;;STARTING ADDRESS OF TEST 37
14464  062622  024460                .WORD   TST40+2          ;;STARTING ADDRESS OF TEST 40
14465  062624  025010                .WORD   TST41+2          ;;STARTING ADDRESS OF TEST 41
14466  062626  025252                .WORD   TST42+2          ;;STARTING ADDRESS OF TEST 42
14467  062630  025712                .WORD   TST43+2          ;;STARTING ADDRESS OF TEST 43
14468  062632  026120                .WORD   TST44+2          ;;STARTING ADDRESS OF TEST 44
14469  062634  026536                .WORD   TST45+2          ;;STARTING ADDRESS OF TEST 45
14470  062636  027304                .WORD   TST46+2          ;;STARTING ADDRESS OF TEST 46
14471  062640  027636                .WORD   TST47+2          ;;STARTING ADDRESS OF TEST 47
14472  062642  030276                .WORD   TST50+2          ;;STARTING ADDRESS OF TEST 50
14473  062644  030570                .WORD   TST51+2          ;;STARTING ADDRESS OF TEST 51
14474  062646  031034                .WORD   TST52+2          ;;STARTING ADDRESS OF TEST 52
14475  062650  031724                .WORD   TST53+2          ;;STARTING ADDRESS OF TEST 53
14476  062652  032234                .WORD   TST54+2          ;;STARTING ADDRESS OF TEST 54
14477  062654  032466                .WORD   TST55+2          ;;STARTING ADDRESS OF TEST 55
14478  062656  032730                .WORD   TST56+2          ;;STARTING ADDRESS OF TEST 56
14479  062660  033162                .WORD   TST57+2          ;;STARTING ADDRESS OF TEST 57
14480  062662  033400                .WORD   TST60+2          ;;STARTING ADDRESS OF TEST 60
14481  062664  033654                .WORD   TST61+2          ;;STARTING ADDRESS OF TEST 61
14482  062666  034052                .WORD   TST62+2          ;;STARTING ADDRESS OF TEST 62
14483  062670  034326                .WORD   TST63+2          ;;STARTING ADDRESS OF TEST 63
14484  062672  034472                .WORD   TST64+2          ;;STARTING ADDRESS OF TEST 64
14485  062674  034674                .WORD   TST65+2          ;;STARTING ADDRESS OF TEST 65
14486  062676  035162                .WORD   TST66+2          ;;STARTING ADDRESS OF TEST 66
14487  062700  035430                .WORD   TST67+2          ;;STARTING ADDRESS OF TEST 67
14488  062702  035706                .WORD   TST70+2          ;;STARTING ADDRESS OF TEST 70
14489  062704  036174                .WORD   TST71+2          ;;STARTING ADDRESS OF TEST 71
14490  062706  036436                .WORD   TST72+2          ;;STARTING ADDRESS OF TEST 72
14491  062710  036700                .WORD   TST73+2          ;;STARTING ADDRESS OF TEST 73
14492  062712  037164                .WORD   TST74+2          ;;STARTING ADDRESS OF TEST 74
14493  062714  037330                .WORD   TST75+2          ;;STARTING ADDRESS OF TEST 75
14494  062716  037512                .WORD   TST76+2          ;;STARTING ADDRESS OF TEST 76
14495  062720  037672                .WORD   TST77+2          ;;STARTING ADDRESS OF TEST 77
14496  062722  040054                .WORD   TST100+2                 ;;STARTING ADDRESS OF TEST 100
14497  062724  040236                .WORD   TST101+2                 ;;STARTING ADDRESS OF TEST 101
14498  062726  040456                .WORD   TST102+2                 ;;STARTING ADDRESS OF TEST 102
14499  062730  040716                .WORD   TST103+2                 ;;STARTING ADDRESS OF TEST 103
14500  062732  041102                .WORD   TST104+2                 ;;STARTING ADDRESS OF TEST 104
14501  062734  041344                .WORD   TST105+2                 ;;STARTING ADDRESS OF TEST 105
14502  062736  041532                .WORD   TST106+2                 ;;STARTING ADDRESS OF TEST 106
14503  062740  041764                .WORD   TST107+2                 ;;STARTING ADDRESS OF TEST 107
14504  062742  042212                .WORD   TST110+2                 ;;STARTING ADDRESS OF TEST 110
14505  062744  042520                .WORD   TST111+2                 ;;STARTING ADDRESS OF TEST 111
14506  062746  043062                .WORD   TST112+2                 ;;STARTING ADDRESS OF TEST 112
14507  062750  043334                .WORD   TST113+2                 ;;STARTING ADDRESS OF TEST 113
14508  062752  044756                .WORD   TST114+2                 ;;STARTING ADDRESS OF TEST 114
14509  062754  046534                .WORD   TST115+2                 ;;STARTING ADDRESS OF TEST 115
14510  062756  050720                .WORD   TST116+2                 ;;STARTING ADDRESS OF TEST 116
14511  062760  051330                .WORD   TST117+2                 ;;STARTING ADDRESS OF TEST 117
14512  062762  053502                .WORD   TST120+2                 ;;STARTING ADDRESS OF TEST 120
14513  062764  056020                .WORD   TST121+2                 ;;STARTING ADDRESS OF TEST 121
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14514                                   .SBTTL  ERROR HANDLER ROUTINE
14515
14516                                   ;;**********************************************************************
14517                                   ;*THIS ROUTINE WILL INCREMENT THE ERROR FLAG AND THE ERROR COUNT,
14518                                   ;*SAVE THE ERROR ITEM NUMBER AND THE ADDRESS OF THE ERROR CALL
14519                                   ;*AND GO TO ERRTYP ON ERROR
14520                                   ;*THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
14521                                   ;*SW15=1        HALT ON ERROR
14522                                   ;*SW13=1        INHIBIT ERROR TYPEOUTS
14523                                   ;*SW10=1        BELL ON ERROR
14524                                   ;*SW09=1        LOOP ON ERROR
14525                                   ;*CALL
14526                                   ;*      ERROR   N       ;;ERROR=EMT AND N=ERROR ITEM NUMBER
14527
14528  062766                           $ERROR:
14529  062766  104410                           CKSWR                           ;;TEST FOR CHANGE IN SOFT-SWR
14530  062770  105237  001117           7$:     INCB    $ERFLG                  ;;SET THE ERROR FLAG
14531  062774  001775                           BEQ     7$                      ;;DON'T LET THE FLAG GO TO ZERO
14532  062776  013777  001116  116152           MOV     $TSTNM,@DISPLAY         ;;DISPLAY TEST NUMBER AND ERROR FLAG
14533  063004  032777  002000  116142           BIT     #BIT10,@SWR             ;;BELL ON ERROR?
14534  063012  001402                           BEQ     1$                      ;;NO - SKIP
14535  063014  104401  001212                   TYPE    ,$BELL                  ;;RING BELL
14536  063020  005237  001126           1$:     INC     $ERTTL                  ;;COUNT THE NUMBER OF ERRORS
14537  063024  011637  001132                   MOV     (SP),$ERRPC             ;;GET ADDRESS OF ERROR INSTRUCTION
14538  063030  162737  000002  001132           SUB     #2,$ERRPC
14539  063036  117737  116070  001130           MOVB    @$ERRPC,$ITEMB          ;;STRIP AND SAVE THE ERROR ITEM CODE
14540  063044  032777  020000  116102           BIT     #BIT13,@SWR             ;;SKIP TYPEOUT IF SET
14541  063052  001004                           BNE     20$                     ;;SKIP TYPEOUTS
14542  063054  004737  057442                   JSR     PC,ERRTYP               ;;GO TO USER ERROR ROUTINE
14543  063060  104401  001217                   TYPE    ,$CRLF
14544  063064                           20$:
14545  063064  122737  000001  001242           CMPB    #APTENV,$ENV            ;;RUNNING IN APT MODE
14546  063072  001007                           BNE     2$                      ;;NO,SKIP APT ERROR REPORT
14547  063074  113737  001130  063106           MOVB    $ITEMB,21$              ;;SET ITEM NUMBER AS ERROR NUMBER
14548  063102  004737  065030                   JSR     PC,$ATY4                ;;REPORT FATAL ERROR TO APT
14549  063106     000                   21$:    .BYTE   0
14550  063107     000                           .BYTE   0
14551  063110  000777                   22$:    BR      22$                     ;;APT ERROR LOOP
14552  063112  005777  116036           2$:     TST     @SWR                    ;;HALT ON ERROR
14553  063116  100002                           BPL     3$                      ;;SKIP IF CONTINUE
14554  063120  000000                           HALT                            ;;HALT ON ERROR!
14555  063122  104410                           CKSWR                           ;;TEST FOR CHANGE IN SOFT-SWR
14556  063124  032777  001000  116022   3$:     BIT     #BIT09,@SWR             ;;LOOP ON ERROR SWITCH SET?
14557  063132  001402                           BEQ     4$                      ;;BR IF NO
14558  063134  013716  001124                   MOV     $LPERR,(SP)             ;;FUDGE RETURN FOR LOOPING
14559  063140  005737  001210           4$:     TST     $ESCAPE                 ;;CHECK FOR AN ESCAPE ADDRESS
14560  063144  001402                           BEQ     5$                      ;;BR IF NONE
14561  063146  013716  001210                   MOV     $ESCAPE,(SP)            ;;FUDGE RETURN ADDRESS FOR ESCAPE
14562  063152                           5$:
14563  063152  022737  057422  000042           CMP     #$ENDAD,@#42            ;;ACT-11 AUTO-ACCEPT?
14564  063160  001001                           BNE     6$                      ;;BRANCH IF NO
14565  063162  000000                           HALT                            ;;YES
14566  063164                           6$:
14567  063164  000002                           RTI                             ;;RETURN
14568                                   .SBTTL  TTY INPUT ROUTINE
14569
```

```
14570                                   ;;*****************************************************************
14571                                   .ENABL  LSB
14572  063166  000000                   $TKCNT: .WORD   0               ;;NUMBER OF ITEMS IN QUEUE
14573  063170  000000                   $TKQIN: .WORD   0               ;;INPUT POINTER
14574  063172  000000                   $TKQOUT: .WORD  0               ;;OUTPUT POINTER
14575  063174  000001                   $TKQSRT: .BLKB  1               ;;TTY KEYBOARD QUEUE
14576          063175                   $TKQEND=.
14577          063176                   .EVEN
14578
14579                                   ;*TK INITIALIZE ROUTINE
14580                                   ;*THIS ROUTINE WILL INITIALIZE THE TTY KEYBOARD INPUT QUEUE
14581                                   ;*SETUP THE INTERRUPT VECTOR AND TURN ON THE KEYBOARD INTERRUPT
14582                                   ;
14583                                   ;*CALL:
14584                                   ;*      JSR     PC,$TKINT
14585                                   ;*      RETURN
14586                                   ;
14587  063176  005037  063166           $TKINT: CLR     $TKCNT          ;;CLEAR COUNT OF ITEMS IN QUEUE
14588  063202  012737  063174  063170           MOV     #$TKQSRT,$TKQIN ;;MOVE THE STARTING ADDRESS OF THE
14589  063210  013737  063170  063172           MOV     $TKQIN,$TKQOUT  ;;QUEUE INTO THE INPUT & OUTPUT POINTERS.
14590  063216  012737  063246  000060           MOV     #$TKSRV,@#TKVEC ;;INITIALIZE THE KEYBOARD VECTOR
14591  063224  012737  000200  000062           MOV     #200,@#TKVEC+2  ;;"BR" LEVEL 4
14592  063232  005777  115724                   TST     @$TKB           ;;CLEAR DONE FLAG
14593  063236  012777  000100  115714           MOV     #100,@$TKS      ;;ENABLE TTY KEYBOARD INTERRUPT
14594  063244  000207                           RTS     PC              ;;RETURN TO CALLER
14595
14596                                   ;*TK SERVICE ROUTINE
14597                                   ;*THIS ROUTINE WILL SERVICE THE TTY KEYBOARD INTERRUPT
14598                                   ;*BY READING THE CHARACTER FROM THE INPUT BUFFER AND PUTTING
14599                                   ;*IT IN THE QUEUE.
14600                                   ;*IF THE CHARACTER IS A "CONTROL-C" (↑C) $TKINT IS CALLED AND
14601                                   ;*UPON RETURN EXIT IS MADE TO THE "CONTROL-C" RESTART ADDRESS (START)
14602                                   ;
14603  063246  117746  115710          $TKSRV: MOVB    @$TKB,-(SP)     ;;PICKUP THE CHARACTER
14604  063252  042716  177600                   BIC     #↑C177,(SP)     ;;STRIP THE JUNK
14605  063256  021627  000003                   CMP     (SP),#3         ;;IS IT A CONTROL C?
14606  063262  001007                           BNE     1$              ;;BRANCH IF NO
14607  063264  104401  064362                   TYPE    ,$CNTLC         ;;TYPE A CONTROL-C (↑C)
14608  063270  004737  063176                   JSR     PC,$TKINT       ;;INIT THE KEYBOARD
14609  063274  005726                           TST     (SP)+           ;;CLEAN UP STACK
14610  063276  000137  004542                   JMP     START           ;;CONTROL C RESTART
14611  063302  021627  000007          1$:      CMP     (SP),#7         ;;IS IT A CONTROL G?
14612  063306  001004                           BNE     2$              ;;BRANCH IF NO
14613  063310  022737  000176  001154           CMP     #SWREG,SWR      ;;IS SOFT-SWR SELECTED?
14614  063316  001500                           BEQ     6$              ;;GO TO SWR CHANGE
14615
14616  063320                           2$:
14617  063320  022737  000001  063166           CMP     #1,$TKCNT       ;;IS THE QUEUE FULL?
14618  063326  001004                           BNE     3$              ;;BRANCH IF NO
14619  063330  104401  001212                   TYPE    ,$BELL          ;;RING THE TTY BELL
14620  063334  005726                           TST     (SP)+           ;;CLEAN CHARACTER OFF OF STACK
14621  063336  000451                           BR      5$              ;;EXIT
14622  063340  021627  000023          3$:      CMP     (SP),#23        ;;IS IT A CONTROL-S?
14623  063344  001021                           BNE     32$             ;;BRANCH IF NO
14624  063346  005077  115608                   CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
14625  063352  005726                           TST     (SP)+           ;;CLEAN CHAR OFF STACK
```

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14626  063354  105777  115600          31$:    TSTB    @$TKS           ;;WAIT FOR A CHAR
14627  063360  100375                          BPL     31$             ;;LOOP UNTIL ITS THERE
14628  063362  117746  115574                  MOVB    @$TKB,-(SP)     ;;GET THE CHARACTER
14629  063366  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
14630  063372  022627  000021                  CMP     (SP)+,#21       ;;IS IT A CONTROL-Q?
14631  063376  001366                          BNE     31$             ;;BRANCH IF NO
14632  063400  012777  000100  115552          MOV     #100,@$TKS      ;;REENABLE TTY KEYBOARD INTERRUPTS
14633  063406  000002                          RTI                     ;;RETURN
14634  063410  005237  063166          32$:    INC     $TKCNT          ;;COUNT THIS CHARACTER
14635  063414  021627  000140                  CMP     (SP),#140       ;;IS IT UPPER CASE?
14636  063420  002405                          BLT     4$              ;;BRANCH IF YES
14637  063422  021627  000175                  CMP     (SP),#175       ;;IS IT A SPECIAL CHAR?
14638  063426  003002                          BGT     4$              ;;BRANCH IF YES
14639  063430  042716  000040                  BIC     #40,(SP)        ;;MAKE IT UPPER CASE
14640  063434  112677  177530          4$:     MOVB    (SP)+,@$TKQIN   ;;AND PUT IT IN QUEUE
14641  063440  005237  063170                  INC     $TKQIN          ;;UPDATE THE POINTER
14642  063444  023727  063170  063175          CMP     $TKQIN,#$TKQEND ;;GO OFF THE END?
14643  063452  001003                          BNE     5$              ;;BRANCH IF NO
14644  063454  012737  063174  063170          MOV     #$TKQSRT,$TKQIN ;;RESET THE POINTER
14645  063462  000002          5$:     RTI                             ;;RETURN
14646
14647                                  ;;*****************************************************************
14648                                  ;*SOFTWARE SWITCH REGISTER CHANGE ROUTINE.
14649                                  ;*ROUTINE IS ENTERED  FROM THE TRAP HANDLER, AND WILL
14650                                  ;*SERVICE THE TEST FOR CHANGE IN SOFTWARE SWITCH REGISTER TRAP
14651                                  ;*CALL WHEN OPERATING IN TTY INTERRUPT MODE.
14652  063464  022737  000176  001154  $CKSWR: CMP     #SWREG,SWR      ;;IS THE SOFT-SWR SELECTED
14653  063472  001124                          BNE     15$             ;;EXIT IF NOT
14654  063474  105777  115460                  TSTB    @$TKS           ;;IS A CHAR WAITING?
14655  063500  100121                          BPL     15$             ;;IF NOT, EXIT
14656  063502  117746  115454                  MOVB    @$TKB,-(SP)     ;;YES
14657  063506  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT  7-BIT ASCII
14658  063512  021627  000007                  CMP     (SP),#7         ;;IS IT A CONTROL-G?
14659  063516  001300                          BNE     2$              ;;IF NOT, PUT IT IN THE TTY QUEUE
14660                                                                  ;;AND EXIT
14661
14662                                  ;;*****************************************************************
14663                                  ;*CONTROL IS PASSED TO THIS POINT FROM EITHER THE TTY INTERRUPT SERVICE
14664                                  ;*ROUTINE OR FROM THE SOFTWARE SWITCH REGISTER TRAP CALL, AS A RESULT OF A
14665                                  ;*CONTROL-G BEING TYPED, AND THE SOFTWARE SWITCH REGISTER BEING SELECTED.
14666  063520  123727  001150  000001  6$:     CMPB    $AUTOB,#1       ;;ARE WE RUNNING IN AUTO-MODE?
14667  063526  001674                          BEQ     2$              ;;BRANCH IF YES
14668  063530  005726                          TST     (SP)+           ;;CLEAR CONTROL-G OFF STACK
14669  063532  004737  063176                  JSR     PC,$TKINT       ;;FLUSH THE TTY INPUT QUEUE
14670  063536  005077  115416                  CLR     @$TKS           ;;DISABLE TTY KEYBOARD INTERRUPTS
14671  063542  112737  000001  001151          MOVB    #1,$INTAG       ;;SET INTERRUPT MODE INDICATOR
14672
14673  063550  104401  064374                  TYPE    ,$CNTLG         ;;ECHO THE CONTROL-G (^G)
14674  063554  104401  064401          $GTSWR: TYPE    ,$MSWR          ;;TYPE CURRENT CONTENTS
14675  063560  013746  000176                  MOV     SWREG,-(SP)     ;;SAVE SWREG FOR TYPEOUT
14676  063564  104402                          TYPOC                   ;;GO TYPE--OCTAL ASCII(ALL DIGITS)
14677  063566  104401  064412                  TYPE    ,$MNEW          ;;PROMPT FOR NEW SWR
14678  063572  005046                  19$:    CLR     -(SP)           ;;CLEAR COUNTER
14679  063574  005046                          CLR     -(SP)           ;;THE NEW SWR
14680  063576  105777  115356          7$:     TSTB    @$TKS           ;;CHAR THERE?
14681  063602  100375                          BPL     7$              ;;IF NOT TRY AGAIN
```

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14682
14683  063604  117746  115352                  MOVB    @$TKB,-(SP)     ;;PICK UP CHAR
14684  063610  042716  177600                  BIC     #^C177,(SP)     ;;MAKE IT 7-BIT ASCII
14685
14686  063614  021627  000003                  CMP     (SP),#3         ;;IS IT A CONTROL-C?
14687  063620  001015                          BNE     9$              ;;BRANCH IF NOT
14688  063622  104401  064362                  TYPE    ,$CNTLC         ;;YES, ECHO CONTROL-C (^C)
14689  063626  062706  000006                  ADD     #6,SP           ;;CLEAN UP STACK
14690  063632  123727  001151  000001          CMPB    $INTAG,#1       ;;REENABLE TTY KEYBOARD INTERRUPTS?
14691  063640  001003                          BNE     8$              ;;BRANCH IF NO
14692  063642  012777  000100  115310          MOV     #100,@$TKS      ;;ALLOW TTY KEYBOARD INTERRUPTS
14693  063650  000137  004542          8$:     JMP     START           ;;CONTROL-C RESTART
14694
14695
14696  063654  021627  000025          9$:     CMP     (SP),#25        ;;IS IT A CONTROL-U?
14697  063660  001005                          BNE     10$             ;;BRANCH IF NOT
14698  063662  104401  064367                  TYPE    ,$CNTLU         ;;YES, ECHO CONTROL-U (^U)
14699  063666  062706  000006          20$:    ADD     #6,SP           ;;IGNORE PREVIOUS INPUT
14700  063672  000737                          BR      19$             ;;LET'S TRY IT AGAIN
14701
14702
14703  063674  021627  000015          10$:    CMP     (SP),#15        ;;IS IT A <CR>?
14704  063700  001022                          BNE     16$             ;;BRANCH IF NO
14705  063702  005766  000004                  TST     4(SP)           ;;YES, IS IT THE FIRST CHAR?
14706  063706  001403                          BEQ     11$             ;;BRANCH IF YES
14707  063710  016677  000002  115236          MOV     2(SP),@SWR      ;;SAVE NEW SWR
14708  063716  062706  000006          11$:    ADD     #6,SP           ;;CLEAR UP STACK
14709  063722  104401  001217          14$:    TYPE    ,$CRLF          ;;ECHO <CR> AND <LF>
14710  063726  123727  001151  000001          CMPB    $INTAG,#1       ;;RE-ENABLE TTY KBD INTERRUPTS?
14711  063734  001003                          BNE     15$             ;;BRANCH IF NOT
14712  063736  012777  000100  115214          MOV     #100,@$TKS      ;;RE-ENABLE TTY KBD INTERRUPTS
14713  063744  000002                  15$:    RTI                     ;;RETURN
14714  063746  004737  062142          16$:    JSR     PC,$TYPEC       ;;ECHO CHAR
14715  063752  021627  000060                  CMP     (SP),#60        ;;CHAR < 0?
14716  063756  002420                          BLT     18$             ;;BRANCH IF YES
14717  063760  021627  000067                  CMP     (SP),#67        ;;CHAR > 7?
14718  063764  003015                          BGT     18$             ;;BRANCH IF YES
14719  063766  042726  000060                  BIC     #60,(SP)+       ;;STRIP-OFF ASCII
14720  063772  005766  000002                  TST     2(SP)           ;;IS THIS THE FIRST CHAR
14721  063776  001403                          BEQ     17$             ;;BRANCH IF YES
14722  064000  006316                          ASL     (SP)            ;;NO, SHIFT PRESENT
14723  064002  006316                          ASL     (SP)            ;;    CHAR OVER TO MAKE
14724  064004  006316                          ASL     (SP)            ;;    ROOM FOR NEW ONE.
14725  064006  005266  000002          17$:    INC     2(SP)           ;;KEEP COUNT OF CHAR
14726  064012  056616  177776                  BIS     -2(SP),(SP)     ;;SET IN NEW CHAR
14727  064016  000667                          BR      7$              ;;GET THE NEXT ONE
14728  064020  104401  001216          18$:    TYPE    ,$QUES          ;;TYPE ?<CR><LF>
14729  064024  000720                          BR      20$             ;;SIMULATE CONTROL-U
14730                                  .DSABL  LSB
14731
14732
14733                                  ;;*****************************************************************
14734                                  ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
14735                                  ;*CALL:
14736                                  ;*      RDCHR                   ;;GET A CHARACTER FROM THE QUEUE
14737                                  ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
```

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14738                                ;*                                  ;;WITH PARITY BIT STRIPPED OFF
14739                                ;
14740
14741  064026  011646                $RDCHR: MOV     (SP),-(SP)          ;;PUSH DOWN THE PC AND
14742  064030  016666  000004  000002        MOV     4(SP),2(SP)         ;;THE PS
14743  064036  005066  000004              CLR     4(SP)               ;;GET READY FOR A CHARACTER
14744  064042  005046                      CLR     -(SP)               ;;PUT NEW PS ON STACK
14745  064044  012746  064052              MOV     #64$,-(SP)          ;;PUT NEW PC ON  STACK
14746  064050  000002                      RTI                         ;;POP NEW PC AND PS
14747  064052                        64$:
14748  064052  005737  063166        1$:     TST     $TKCNT              ;;WAIT ON A CHARACTER
14749  064056  001775                      BEQ     1$
14750  064060  005337  063166              DEC     $TKCNT              ;;DECREMENT THE COUNTER
14751  064064  117766  177102  000004      MOVB    @$TKQOUT,4(SP)      ;;GET ONE CHARACTER
14752  064072  005237  063172              INC     $TKQOUT             ;;UPDATE THE POINTER
14753  064076  023727  063172  063175      CMP     $TKQOUT,#$TKQEND    ;;DID IT GO OFF OF THE END?
14754  064104  001003                      BNE     2$                  ;;BRANCH IF NO
14755  064106  012737  063174  063172      MOV     #$TKQSRT,$TKQOUT    ;;RESET THE POINTER
14756  064114  000002                2$:   RTI                         ;;RETURN
14757                                ;;*****************************************************************
14758                                ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
14759                                ;*CALL:
14760                                ;*      RDLIN                       ;;INPUT A STRING FROM THE TTY
14761                                ;*      RETURN HERE                 ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
14762                                ;*                                  ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
14763
14764  064116  010346                $RDLIN: MOV     R3,-(SP)            ;;SAVE R3
14765  064120  005046                      CLR     -(SP)               ;;CLEAR THE RUBOUT KEY
14766  064122  012703  064352        1$:     MOV     #$TTYIN,R3          ;;GET ADDRESS
14767  064126  022703  064362        2$:     CMP     #$TTYIN+8.,R3       ;;BUFFER FULL?
14768  064132  101456                      BLOS    4$                  ;;BR IF YES
14769  064134  104411                      RDCHR                       ;;GO READ ONE CHARACTER FROM THE TTY
14770  064136  112613                      MOVB    (SP)+,(R3)          ;;GET CHARACTER
14771  064140  122713  000177        10$:    CMPB    #177,(R3)           ;;IS IT A RUBOUT
14772  064144  001022                      BNE     5$                  ;;BR IF NO
14773  064146  005716                      TST     (SP)                ;;IS THIS THE FIRST RUBOUT?
14774  064150  001007                      BNE     6$                  ;;BR IF NO
14775  064152  112737  000134  064350      MOVB    #'\,9$              ;;TYPE A BACK SLASH
14776  064160  104401  064350              TYPE    9$
14777  064164  012716  177777              MOV     #-1,(SP)            ;;SET THE RUBOUT KEY
14778  064170  005303                6$:   DEC     R3                  ;;BACKUP BY ONE
14779  064172  020327  064352              CMP     R3,#$TTYIN          ;;STACK EMPTY?
14780  064176  103434                      BLO     4$                  ;;BR IF YES
14781  064200  111337  064350              MOVB    (R3),9$             ;;SETUP TO TYPEOUT THE DELETED CHAR.
14782  064204  104401  064350              TYPE    9$                  ;;GO TYPE
14783  064210  000746                      BR      2$                  ;;GO READ ANOTHER CHAR.
14784  064212  005716                5$:   TST     (SP)                ;;RUBOUT KEY SET?
14785  064214  001406                      BEQ     7$                  ;;BR IF NO
14786  064216  112737  000134  064350      MOVB    #'\,9$              ;;TYPE A BACK SLASH
14787  064224  104401  064350              TYPE    9$
14788  064230  005016                      CLR     (SP)                ;;CLEAR THE RUBOUT KEY
14789  064232  122713  000025        7$:     CMPB    #25,(R3)            ;;IS CHARACTER A CTRL U?
14790  064236  001003                      BNE     8$                  ;;BR IF NO
14791  064240  104401  064367              TYPE    $CNTLU              ;;TYPE A CONTROL "U"
14792  064244  000726                      BR      1$                  ;;GO START OVER
14793  064246  122713  000022        8$:     CMPB    #22,(R3)            ;;IS CHARACTER A "↑R"?
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14794  064252  001011                        BNE     3$              ;;BRANCH IF NO
14795  064254  105013                        CLRB    (R3)            ;;CLEAR THE CHARACTER
14796  064256  104401  001217                TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
14797  064262  104401  064352                TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
14798  064266  000717                        BR      2$              ;;GO PICKUP ANOTHER CHACTER
14799  064270  104401  001216        4$:     TYPE    ,$QUES          ;;TYPE A '?'
14800  064274  000712                        BR      1$              ;;CLEAR THE BUFFER AND LOOP
14801  064276  111337  064350        3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
14802  064302  104401  064350                TYPE    ,9$
14803  064306  122723  000015                CMPB    #15,(R3)+       ;;CHECK FOR RETURN
14804  064312  001305                        BNE     2$              ;;LOOP IF NOT RETURN
14805  064314  105063  177777                CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
14806  064320  104401  001220                TYPE    ,$LF            ;;TYPE A LINE FEED
14807  064324  005726                        TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
14808  064326  012603                        MOV     (SP)+,R3        ;;RESTORE R3
14809  064330  011646                        MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
14810  064332  016666  000004  000002        MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
14811  064340  012766  064352  000004        MOV     #$TTYIN,4(SP)
14812  064346  000002                        RTI                     ;;RETURN
14813  064350     000        9$:     .BYTE   0                       ;;STORAGE FOR ASCII CHAR. TO TYPE
14814  064351     000                .BYTE   0                       ;;TERMINATOR
14815  064352  000010        $TTYIN: .BLKB   8.                      ;;RESERVE 8 BYTES FOR TTY INPUT
14816  064362  041536  005015  000   $CNTLC: .ASCIZ  /↑C/<15><12>    ;;CONTROL "C"
14817  064367     136  006525  000012$CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
14818  064374  043536  005015  000   $CNTLG: .ASCIZ  /↑G/<15><12>    ;;CONTROL "G"
14819  064401     015  051412  051127$MSWR:  .ASCIZ  <15><12>/SWR = /
14820  064406  036440  000040
14821  064412  020040  042516  020127$MNEW:  .ASCIZ  /  NEW = /
14822  064420  020075     000
14823          064424                .EVEN
14824                        .SBTTL  READ AN OCTAL NUMBER FROM THE TTY
14825
14826                        ;;**************************************************************
14827                        ;*THIS ROUTINE WILL READ AN OCTAL (ASCII) NUMBER FROM THE TTY AND
14828                        ;*CHANGE IT TO BINARY.
14829                        ;*CALL:
14830                        ;*      RDOCT                   ;;READ AN OCTAL NUMBER
14831                        ;*      RETURN HERE             ;;LOW ORDER BITS ARE ON TOP OF THE STACK
14832                        ;*                              ;;HIGH ORDER BITS ARE IN $HIOCT
14833
14834  064424  011646        $RDOCT: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR THE
14835  064426  016666  000004  000002        MOV     4(SP),2(SP)     ;;INPUT NUMBER
14836  064434  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
14837  064436  010146                        MOV     R1,-(SP)        ;;PUSH R1 ON STACK
14838  064440  010246                        MOV     R2,-(SP)        ;;PUSH R2 ON STACK
14839  064442  104412        1$:     RDLIN                   ;;READ AN ASCIZ LINE
14840  064444  012600                        MOV     (SP)+,R0        ;;GET ADDRESS OF 1ST CHARACTER
14841  064446  005001                        CLR     R1              ;;CLEAR DATA WORD
14842  064450  005002                        CLR     R2
14843  064452  112046        2$:     MOVB    (R0)+,-(SP)     ;;PICKUP THIS CHARACTER
14844  064454  001412                        BEQ     3$              ;;IF ZERO GET OUT
14845  064456  006301                        ASL     R1              ;;*2
14846  064460  006102                        ROL     R2
14847  064462  006301                        ASL     R1              ;;*4
14848  064464  006102                        ROL     R2
14849  064466  006301                        ASL     R1              ;;*8
```

```
14850  064470  006102                  ROL     R2
14851  064472  042716  177770          BIC     #^C7,(SP)       ;;STRIP THE ASCII JUNK
14852  064476  062601                  ADD     (SP)+,R1        ;;ADD IN THIS DIGIT
14853  064500  000764                  BR      2$              ;;LOOP
14854  064502  005726          3$:     TST     (SP)+           ;;CLEAN TERMINATOR FROM STACK
14855  064504  010166  000012          MOV     R1,12(SP)       ;;SAVE THE RESULT
14856  064510  010237  064524          MOV     R2,$HIOCT
14857  064514  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
14858  064516  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
14859  064520  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
14860  064522  000002                  RTI                     ;;RETURN
14861  064524  000000          $HIOCT: .WORD   0               ;;HIGH ORDER BITS GO HERE
14862                          .SBTTL  TRAP DECODER
14863
14864                          ;;**************************************************************
14865                          ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
14866                          ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
14867                          ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
14868                          ;*GO TO THAT ROUTINE.
14869
14870  064526  016646  000002  $TRAP:  MOV     2(SP),-(SP)     ;;ASSUME THE STATUS OF
14871  064532  042716  000020          BIC     #20,(SP)        ;;  THE CALLER--DO NOT ALLOW
14872  064536  012746  064544          MOV     #1$,-(SP)       ;;  T-BIT TRAPS
14873  064542  000002                  RTI                     ;;SET THE NEW STATUS
14874  064544  010046          1$:     MOV     R0,-(SP)        ;;SAVE R0
14875  064546  016600  000002          MOV     2(SP),R0        ;;GET TRAP ADDRESS
14876  064552  005740                  TST     -(R0)           ;;BACKUP BY 2
14877  064554  111000                  MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
14878  064556  006300                  ASL     R0              ;;POSITION FOR INDEXING
14879  064560  016000  064600          MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
14880  064564  000200                  RTS     R0              ;;GO TO ROUTINE
14881
14882
14883                          ;;THIS IS USE TO HANDLE THE "GETPRI" MACRO
14884
14885  064566  011646          $TRAP2: MOV     (SP),-(SP)      ;;MOVE THE PC DOWN
14886  064570  016666  000004  000002  MOV     4(SP),2(SP)     ;;MOVE THE PSW DOWN
14887  064576  000002                  RTI                     ;;RESTORE THE PSW
14888
14889                          .SBTTL  TRAP TABLE
14890
14891                          ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
14892                          ;*BY THE "TRAP" INSTRUCTION.
14893
14894                          ;       ROUTINE
14895                          ;       -------
14896  064600  064566  $TRPAD: .WORD   $TRAP2
14897  064602  061730          $TYPE   ;;CALL=TYPE      TRAP+1(104401)  TTY TYPEOUT ROUTINE
14898  064604  061526          $TYPOC  ;;CALL=TYPOC     TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
14899  064606  061502          $TYPOS  ;;CALL=TYPOS     TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
14900  064610  061542          $TYPON  ;;CALL=TYPON     TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
14901  064612  061256          $TYPDS  ;;CALL=TYPDS     TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)
14902  064614  061202          $TYPBN  ;;CALL=TYPBN     TRAP+6(104406)  TYPE BINARY (ASCII) NUMBER
14903
14904  064616  063554          $GTSWR  ;;CALL=GTSWR     TRAP+7(104407)  GET SOFT-SWR SETTING
14905
```

```
14906  064620  063464                          $CKSWR  ;;CALL=CKSWR    TRAP+10(104410) TEST FOR CHANGE IN SOFT-SWR
14907  064622  064026                          $RDCHR  ;;CALL=RDCHR    TRAP+11(104411) TTY TYPEIN CHARACTER ROUTINE
14908  064624  064116                          $RDLIN  ;;CALL=RDLIN    TRAP+12(104412) TTY TYPEIN STRING ROUTINE
14909  064626  064424                          $RDOCT  ;;CALL=RDOCT    TRAP+13(104413) READ AN OCTAL NUMBER FROM TTY
14910  064630  061106                          $SAVREG ;;CALL=SAVREG   TRAP+14(104414) SAVE R0-R5 ROUTINE
14911  064632  061144                          $RESREG ;;CALL=RESREG   TRAP+15(104415) RESTORE R0-R5 ROUTINE
14912                                  .SBTTL  POWER DOWN AND UP ROUTINES
14913
14914                                  ;;**********************************************************************
14915                                  ;POWER DOWN ROUTINE
14916  064634  012737  064774  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
14917  064642  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
14918  064650  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
14919  064652  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
14920  064654  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
14921  064656  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
14922  064660  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
14923  064662  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
14924  064664  017746  114264                  MOV     @SWR,-(SP)      ;;PUSH @SWR ON STACK
14925  064670  010637  065000                  MOV     SP,$SAVR6       ;;SAVE SP
14926  064674  012737  064706  000024          MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
14927  064702  000000                          HALT
14928  064704  000776                          BR      .-2             ;;HANG UP
14929
14930                                  ;;**********************************************************************
14931                                  ;POWER UP ROUTINE
14932  064706  012737  064774  000024  $PWRUP: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST DOWN
14933  064714  013706  065000                  MOV     $SAVR6,SP       ;;GET SP
14934  064720  005037  065000                  CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
14935  064724  005237  065000          1$:     INC     $SAVR6          ;;WAIT FOR THE INC
14936  064730  001375                          BNE     1$              ;;OF  WORD
14937  064732  012677  114216                  MOV     (SP)+,@SWR      ;;POP STACK INTO @SWR
14938  064736  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
14939  064740  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
14940  064742  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
14941  064744  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
14942  064746  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
14943  064750  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
14944  064752  012737  064634  000024          MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
14945  064760  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
14946  064766  104401                          TYPE                    ;REPORT THE POWER FAILURE
14947  064770  065002          $PWRMG: .WORD   $POWER                  ;;POWER FAIL MESSAGE POINTER
14948  064772  000002                  RTI
14949  064774  000000          $ILLUP: HALT                            ;;THE POWER UP SEQUENCE WAS STARTED
14950  064776  000776                  BR      .-2                     ;;  BEFORE THE POWER DOWN WAS COMPLETE
14951  065000  000000          $SAVR6: 0                               ;;PUT THE SP HERE
14952  065002  005015  047520  042527  $POWER: .ASCIZ  <15><12>"POWER"
14953  065010  000122
14954                                  .EVEN
14955                                  .SBTTL  APT COMMUNICATIONS ROUTINE
14956
14957                                  ;;**********************************************************************
14958  065012  112737  000001  065256  $ATY1:  MOVB    #1,$FFLG        ;;TO REPORT FATAL ERROR
14959  065020  112737  000001  065254  $ATY3:  MOVB    #1,$MFLG        ;;TO TYPE A MESSAGE
14960  065026  000403                  BR      $ATYC
14961  065030  112737  000001  065256  $ATY4:  MOVB    #1,$FFLG        ;;TO ONLY REPORT FATAL ERROR
```

```
14962  065036                          $ATYC:
14963  065036  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
14964  065040  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
14965  065042  105737  065254                  TSTB    $MFLG           ;;SHOULD TYPE A MESSAGE?
14966  065046  001450                          BEQ     5$              ;;IF NOT:  BR
14967  065050  122737  000001  001242          CMPB    #APTENV,$ENV    ;;OPERATING UNDER APT?
14968  065056  001031                          BNE     3$              ;;IF NOT:  BR
14969  065060  132737  000100  001243          BITB    #APTSPOOL,$ENVM ;;SHOULD SPOOL MESSAGES?
14970  065066  001425                          BEQ     3$              ;;IF NOT:  BR
14971  065070  017600  000004                  MOV     @4(SP),R0       ;;GET MESSAGE ADDR.
14972  065074  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
14973  065102  005737  001222          1$:     TST     $MSGTYPE        ;;SEE IF DONE W/ LAST XMISSION?
14974  065106  001375                          BNE     1$              ;;IF NOT:  WAIT
14975  065110  010037  001236                  MOV     R0,$MSGAD       ;;PUT ADDR IN MAILBOX
14976  065114  105720                  2$:     TSTB    (R0)+           ;;FIND END OF MESSAGE
14977  065116  001376                          BNE     2$
14978  065120  163700  001236                  SUB     $MSGAD,R0       ;;SUB START OF MESSAGE
14979  065124  006200                          ASR     R0              ;;GET MESSAGE LNGTH IN WORDS
14980  065126  010037  001240                  MOV     R0,$MSGLGT      ;;PUT LENGTH IN MAILBOX
14981  065132  012737  000004  001222          MOV     #4,$MSGTYPE     ;;TELL APT TO TAKE MSG.
14982  065140  000413                          BR      5$
14983  065142  017637  000004  065166  3$:     MOV     @4(SP),4$       ;;PUT MSG ADDR IN JSR LINKAGE
14984  065150  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDRESS
14985  065156  013746  177776                  MOV     177776,-(SP)    ;;PUSH 177776 ON STACK
14986  065162  004737  061730                  JSR     PC,$TYPE        ;;CALL TYPE MACRO
14987  065166  000000                  4$:     .WORD   0
14988  065170                          5$:
14989  065170  105737  065256          10$:    TSTB    $FFLG           ;;SHOULD REPORT FATAL ERROR?
14990  065174  001416                          BEQ     12$             ;;IF NOT:  BR
14991  065176  005737  001242                  TST     $ENV            ;;RUNNING UNDER APT?
14992  065202  001413                          BEQ     12$             ;;IF NOT:  BR
14993  065204  005737  001222          11$:    TST     $MSGTYPE        ;;FINISHED LAST MESSAGE?
14994  065210  001375                          BNE     11$             ;;IF NOT:  WAIT
14995  065212  017637  000004  001224          MOV     @4(SP),$FATAL   ;;GET ERROR #
14996  065220  062766  000002  000004          ADD     #2,4(SP)                ;;BUMP RETURN ADDR.
14997  065226  005237  001222                  INC     $MSGTYPE        ;;TELL APT TO TAKE FRROR
14998  065232  105037  065256          12$:    CLRB    $FFLG           ;;CLEAR FATAL FLAG
14999  065236  105037  065255                  CLRB    $LFLG           ;;CLEAR LOG FLAG
15000  065242  105037  065254                  CLRB    $MFLG           ;;CLEAR MESSAGE FLAG
15001  065246  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
15002  065250  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
15003  065252  000207                          RTS     PC              ;;RETURN
15004  065254     000          $MFLG:  .BYTE   0               ;;MESSG. FLAG
15005  065255     000          $LFLG:  .BYTE   0               ;;LOG FLAG
15006  065256     000          $FFLG:  .BYTE   0               ;;FATAL FLAG
15007               065260                  .EVEN
15008               000200          APTSIZE=200
15009               000001          APTENV=001
15010               000100          APTSPOOL=100
15011               000040          APTCSUP=040
15012
```

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15013                                          .SBTTL  CONSOLE MESSAGES
15014
15015  065260      051                         CLSPRN: .ASCII  @)@
15016  065261      075      000                EQUALS: .ASCIZ  @=@
15017  065263      015   025012      000       PROMPT: .ASCIZ  <CR><LF>@*@
15018  065267      077      000                QSTMRK: .ASCIZ  @?@
15019  065271                                  HELPQST:
15020  065271      015   052012   050131        .ASCIZ  <CR><LF>@TYPE HELP TEXT (Y OR N)??@
15021  065276   020105   042510   050114
15022  065304   052040   054105   020124
15023  065312   054450   047440   020122
15024  065320   024516   037477      000
15025  065325                                  UBUSQST:
15026  065325      015   041412   040510        .ASCIZ  <CR><LF>@CHANGE RM03 UNIBUS ADDRESS OR VECTOR ADDRESS (Y OR N)<CR> ??@
15027  065332   043516   020105   046522
15028  065340   031460   052440   044516
15029  065346   052502   020123   042101
15030  065354   051104   051505   020123
15031  065362   051117   053040   041505
15032  065370   047524   020122   042101
15033  065376   051104   051505   020123
15034  065404   054450   047440   020122
15035  065412   024516   041474   037122
15036  065420   037440   000077
15037  065424   005015   051525   020105  CNSL00: .ASCIZ  <CR><LF>@USE SAME DEVICES (Y OR N) ??@
15038  065432   040523   042515   042040
15039  065440   053105   041511   051505
15040  065446   024040   020131   051117
15041  065454   047040   020051   037477
15042  065462      000
15043  065463      015   051012   030115  CNSL01: .ASCIZ  <CR><LF>@RM03 BUS ADDRESS (@
15044  065470   020063   052502   020123
15045  065476   042101   051104   051505
15046  065504   020123   000050
15047  065510   005015   047105   051124  CNSL02: .ASCII  <CR><LF>@ENTRY NOT IN I/O PAGE@
15048  065516   020131   047516   020124
15049  065524   047111   044440   047457
15050  065532   050040   043501      105
15051  065537      015   040412   042104          .ASCIZ  <CR><LF>@ADDRESS MUST BE >160000@
15052  065544   042522   051523   046440
15053  065552   051525   020124   042502
15054  065560   037040   033061   030060
15055  065566   030060      000
15056  065571      015   051012   030115  CNSL03: .ASCIZ  <CR><LF>@RM03 VECTOR ADDRESS (@
15057  065576   020063   042526   052103
15058  065604   051117   040440   042104
15059  065612   042522   051523   024040
15060  065620      000
15061  065621      015   042412   052116  CNSL04: .ASCII  <CR><LF>@ENTRY OUT OF RANGE@
15062  065626   054522   047440   052125
15063  065634   047440   020106   040522
15064  065642   043516      105
15065  065645      015   040412   042104          .ASCIZ  <CR><LF>@ADDRESS MUST BE <1000@
15066  065652   042522   051523   046440
15067  065660   051525   020124   042502
15068  065666   036040   030061   030060
```

```
15069  065674     000
15070  065675     015  051012  030115  CNSL05: .ASCIZ  <CR><LF>@RM03 INTERRUPT PRIORITY (@
15071  065702  020063  047111  042524
15072  065710  051122  050125  020124
15073  065716  051120  047511  044522
15074  065724  054524  024040     000
15075  065731     015  042412  052116  CNSL06: .ASCIZ  <CR><LF>@ENTRY OUT OF RANGE@
15076  065736  054522  047440  052125
15077  065744  047440  020106  040522
15078  065752  043516  000105
15079  065756                          CNSL07:
15080  065756  005015  054524  042520  .ASCII  <CR><LF>@TYPE (A) TO TEST ALL DEVICES, OR TYPE DEVICE@
15081  065764  024040  024501  052040
15082  065772  020117  042524  052123
15083  066000  040440  046114  042040
15084  066006  053105  041511  051505
15085  066014  020054  051117  052040
15086  066022  050131  020105  042504
15087  066030  044526  042503
15088  066034  047040  046525  042502  .ASCII  @ NUMBER(S)@
15089  066042  024122  024523
15090  066046  005015  042524  046522  .ASCIZ  <CR><LF>@TERMINATE INPUT WITH CARRIAGE RETURN@
15091  066054  047111  052101  020105
15092  066062  047111  052520  020124
15093  066070  044527  044124  041440
15094  066076  051101  044522  043501
15095  066104  020105  042522  052524
15096  066112  047122     000
15097  066115     015  047012  052117  NOTEX:  .ASCIZ  <CR><LF>/NOT EXIST DRIVE  /
15098  066122  042440  044530  052123
15099  066130  042040  044522  042526
15100  066136  020040     000
15101
15102          066142                  .EVEN
```

```
15103
15104  066142                  FNCDTB:                         ;FUNCTION CODE TABLE
15105
15106  066142  020000          .WORD   OPI                     ;NOP
15107  066144  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (2)
15108  066146  132000          .WORD   ATA!OPI!IVC!IAE         ;SEEK
15109  066150  130000          .WORD   ATA!OPI!IVC             ;RECALIBRATE
15110  066152  020000          .WORD   OPI                     ;DRIVE CLEAR
15111  066154  030000          .WORD   OPI!IVC                 ;RELEASE
15112  066156  130000          .WORD   OPI!ATA!IVC             ;OFFSET
15113  066160  130000          .WORD   OPI!ATA!IVC             ;RETURN TO CENTERLINE
15114  066162  020000          .WORD   OPI                     ;READ IN PRESET
15115  066164  020000          .WORD   OPI                     ;PACK ACKNOWLEDGE
15116  066166  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (24)
15117  066170  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (26)
15118  066172  132000          .WORD   ATA!OPI!IVC!IAE         ;SEARCH
15119  066174  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (32)
15120  066176  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (34)
15121  066200  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (36)
15122  066202  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (40)
15123  066204  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (42)
15124  066206  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (44)
15125  066210  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (46)
15126  066212  073300          .WORD   WCE!OPI!IVC!IAE!AOE!HCE!ECH  ;WRITE CHECK DATA
15127  066214  073300          .WORD   WCE!OPI!IVC!IAE!AOE!HCE!ECH  ;WRITE CHECK HEADER AND DATA
15128  066216  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (54)
15129  066220  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (56)
15130  066222  037200          .WORD   OPI!IVC!WLE!IAE!AOE!HCE ;WRITE DATA
15131  066224  037000          .WORD   OPI!IVC!WLE!IAE!AOE     ;WRITE HEADER AND DATA
15132  066226  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (64)
15133  066230  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (66)
15134  066232  033300          .WORD   OPI!IVC!IAE!AOE!HCE!ECH  ;READ DATA
15135  066234  033300          .WORD   OPI!IVC!IAE!AOE!HCE!ECH  ;READ HEADER AND DATA
15136  066236  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (74)
15137  066240  130001          .WORD   OPI!ATA!ILF!IVC         ;ILLEGAL FUNCTION (76)
15138
15139  066242       001        ATNTBL: .BYTE   1.
15140  066243       002                .BYTE   2.
15141  066244       004                .BYTE   4.
15142  066245       010                .BYTE   8.
15143  066246       020                .BYTE   16.
15144  066247       040                .BYTE   32.
15145  066250       100                .BYTE   64.
15146  066251       200                .BYTE   128.
15147
15148  066252                  RGDTPT:
15149  066252  000000                  .WORD   0.
15150  066254  000001                  .WORD   1.
15151  066256  000003                  .WORD   3.
15152  066260  000007                  .WORD   7.
15153  066262  000017                  .WORD   15.
15154  066264  000037                  .WORD   31.
15155  066266  000077                  .WORD   63.
15156  066270  000177                  .WORD   127.
15157  066272  000377                  .WORD   255.
15158  066274  000777                  .WORD   511.
```

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15159  066276  001777                        .WORD   1023.
15160  066300  003777                        .WORD   2047.
15161  066302  007777                        .WORD   4095.
15162  066304  017777                        .WORD   8191.
15163  066306  037777                        .WORD   16383.
15164  066310  077777                        .WORD   32767.
15165  066312  177777              ONES:     .WORD   65535.
15166  066314  177777                        .WORD   65535.
15167  066316  077777                        .WORD   32767.
15168  066320  037777                        .WORD   16383.
15169  066322  017777                        .WORD   8191.
15170  066324  007777                        .WORD   4095.
15171  066326  003777                        .WORD   2047.
15172  066330  001777                        .WORD   1023.
15173  066332  000777                        .WORD   511.
15174  066334  000377                        .WORD   255.
15175  066336  000177                        .WORD   127.
15176  066340  000077                        .WORD   63.
15177  066342  000037                        .WORD   31.
15178  066344  000017                        .WORD   15.
15179  066346  000007                        .WORD   7.
15180  066350  000003                        .WORD   3.
15181  066352  000001                        .WORD   1.
15182  066354  000000              ZEROS:    .WORD   0.
15183  066356  000000                        .WORD   0.
15184  066360  000001                        .WORD   1.
15185  066362  000002                        .WORD   2.
15186  066364  000004                        .WORD   4.
15187  066366  000010                        .WORD   8.
15188  066370  000020                        .WORD   16.
15189  066372  000040                        .WORD   32.
15190  066374  000100                        .WORD   64.
15191  066376  000200                        .WORD   128.
15192  066400  000400                        .WORD   256.
15193  066402  001000                        .WORD   512.
15194  066404  002000                        .WORD   1024.
15195  066406  004000                        .WORD   2048.
15196  066410  010000                        .WORD   4096.
15197  066412  020000                        .WORD   8192.
15198  066414  040000                        .WORD   16384.
15199  066416  100000                        .WORD   32768.
15200  066420  100000                        .WORD   32768.
15201  066422  040000                        .WORD   16384.
15202  066424  020000                        .WORD   8192.
15203  066426  010000                        .WORD   4096.
15204  066430  004000                        .WORD   2048.
15205  066432  002000                        .WORD   1024.
15206  066434  001000                        .WORD   512.
15207  066436  000400                        .WORD   256.
15208  066440  000200                        .WORD   128.
15209  066442  000100                        .WORD   64.
15210  066444  000040                        .WORD   32.
15211  066446  000020                        .WORD   16.
15212  066450  000010                        .WORD   8.
15213  066452  000004                        .WORD   4.
15214  066454  000002                        .WORD   2.
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15215  066456  000001                    .WORD   1.
15216  066460  000000                    .WORD   0.
15217  066462  177777                    .WORD   65535.
15218  066464  177776                    .WORD   65534.
15219  066466  177774                    .WORD   65532.
15220  066470  177770                    .WORD   65528.
15221  066472  177760                    .WORD   65520.
15222  066474  177740                    .WORD   65504.
15223  066476  177700                    .WORD   65472.
15224  066500  177600                    .WORD   65408.
15225  066502  177400                    .WORD   65280.
15226  066504  177000                    .WORD   65024.
15227  066506  176000                    .WORD   64512.
15228  066510  174000                    .WORD   63488.
15229  066512  170000                    .WORD   61440.
15230  066514  160000                    .WORD   57344.
15231  066516  140000                    .WORD   49152.
15232  066520  100000                    .WORD   32768.
15233  066522  000000                    .WORD   0.
15234  066524  000000                    .WORD   0.
15235  066526  100000                    .WORD   32768.
15236  066530  140000                    .WORD   49152.
15237  066532  160000                    .WORD   57344.
15238  066534  170000                    .WORD   61440.
15239  066536  174000                    .WORD   63488.
15240  066540  176000                    .WORD   64512.
15241  066542  177000                    .WORD   65024.
15242  066544  177400                    .WORD   65280.
15243  066546  177600                    .WORD   65408.
15244  066550  177700                    .WORD   65472.
15245  066552  177740                    .WORD   65504.
15246  066554  177760                    .WORD   65520.
15247  066556  177770                    .WORD   65528.
15248  066560  177774                    .WORD   65532.
15249  066562  177776                    .WORD   65534.
15250  066564  177777                    .WORD   65535.
15251  066566  125252                    .WORD   43690.
15252  066570  152525                    .WORD   43690./2
15253  066572  125252                    .WORD   43690.
15254  066574  177777                    .WORD   65535.
15255  066576  177776                    .WORD   65534.
15256  066600  177775                    .WORD   65533.
15257  066602  177773                    .WORD   65531.
15258  066604  177767                    .WORD   65527
15259  066606  177757                    .WORD   65519.
15260  066610  177737                    .WORD   65503.
15261  066612  177677                    .WORD   65471.
15262  066614  177577                    .WORD   65407.
15263  066616  177377                    .WORD   65279.
15264  066620  176777                    .WORD   65023.
15265  066622  175777                    .WORD   64511.
15266  066624  173777                    .WORD   63487.
15267  066626  167777                    .WORD   61439.
15268  066630  157777                    .WORD   57343.
15269  066632  137777                    .WORD   49151.
15270  066634  077777                    .WORD   32767.
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15271  066636  077777                    .WORD   32767.
15272  066640  137777                    .WORD   49151.
15273  066642  157777                    .WORD   57343.
15274  066644  167777                    .WORD   61439.
15275  066646  173777                    .WORD   63487.
15276  066650  175777                    .WORD   64511.
15277  066652  176777                    .WORD   65023.
15278  066654  177377                    .WORD   65279.
15279  066656  177577                    .WORD   65407.
15280  066660  177677                    .WORD   65471.
15281  066662  177737                    .WORD   65503.
15282  066664  177757                    .WORD   65519.
15283  066666  177767                    .WORD   65527.
15284  066670  177773                    .WORD   65531.
15285  066672  177775                    .WORD   65533.
15286  066674  177776                    .WORD   65534.
15287  066676  177777                    .WORD   65535.
15288  066700                    ENRGDT:
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15289                                          .EVEN
15290
15291   066700  102051  074726  000000  EMT1:   .WORD   EMS300,EMS1,0
15292   066706  102067  102112  102137  EMT2:   .WORD   EMS301,EMS302,EMS303,EMS1,EMS304
15293   066714  074726  102150
15294   066720  105055  104276  104436          .WORD   EMS511,EMS500,EMS501,EMS502,EMS503,0
15295   066726  104463  104532  000000
15296   066734  102067  102157  102112  EMT3:   .WORD   EMS301,EMS306,EMS302
15297   066742  105055  104602  104436          .WORD   EMS511,EMS505,EMS501,EMS502,0
15298   066750  104463  000000
15299   066754  102051  102112  102173  EMT4:   .WORD   EMS300,EMS302,EMS307,EMS2
15300   066762  074777
15301   066764  105055  104463  104436          .WORD   EMS511,EMS502,EMS501,EMS503,0
15302   066772  104532  000000
15303   066776  102067  102234  102251  EMT5:   .WORD   EMS301,EMS310,EMS311
15304   067004  105055  104463  104436          .WORD   EMS511,EMS502,EMS501,EMS503,EMS504
15305   067012  104532  104556
15306   067016  102315  000000                  .WORD   EMS312,0
15307   067022  102067  102157  102251  EMT6:   .WORD   EMS301,EMS306,EMS311
15308   067030  105055  104463  104436          .WORD   EMS511,EMS502,EMS501,EMS503,EMS504,0
15309   067036  104532  104556  000000
15310   067044  102067  102353  102112  EMT7:   .WORD   EMS301,EMS313,EMS302
15311   067052  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,EMS504,EMS503,0
15312   067060  104556  104532  000000
15313   067066  102461  102502  102404  EMT10:  .WORD   EMS316,EMS317,EMS314
15314   067074  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15315   067102  000000
15316   067104  102461  102502  102433  EMT11:  .WORD   EMS316,EMS317,EMS315
15317   067112  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15318   067120  000000
15319   067122  102461  102522  102404  EMT12:  .WORD   EMS316,EMS320,EMS314
15320   067130  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15321   067136  000000
15322   067140  102461  102522  102433  EMT13:  .WORD   EMS316,EMS320,EMS315
15323   067146  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15324   067154  000000
15325   067156  102461  102542  102404  EMT14:  .WORD   EMS316,EMS321,EMS314
15326   067164  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15327   067172  000000
15328   067174  102461  102542  102433  EMT15:  .WORD   EMS316,EMS321,EMS315
15329   067202  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15330   067210  000000
15331   067212  102461  102562  102404  EMT16:  .WORD   EMS316,EMS322,EMS314
15332   067220  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15333   067226  000000
15334   067230  102461  102562  102433  EMT17:  .WORD   EMS316,EMS322,EMS315
15335   067236  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15336   067244  000000
15337   067246  102067  102621  101337  EMT20:  .WORD   EMS301,EMS324,EMS250
15338   067254  105055  104556                  .WORD   EMS511,EMS504
15339   067260  102315  102652  000000          .WORD   EMS312,EMS326,0
15340   067266  102067  102602  101337  EMT21:  .WORD   EMS301,EMS323,EMS250
15341   067274  105055  104556                  .WORD   EMS511,EMS504
15342   067300  102315  102641  000000          .WORD   EMS312,EMS325,0
15343   067306  102067  102353  101337  EMT22:  .WORD   EMS301,EMS313,EMS250
15344   067314  105055  104556  000000          .WORD   EMS511,EMS504,0
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15345  067322  102067  102621  101375  EMT23:  .WORD   EMS301,EMS324,EMS251
15346  067330  105055  104436                  .WORD   EMS511,EMS501
15347  067334  102315  102652  000000          .WORD   EMS312,EMS326,0
15348  067342  102067  102602  101375  EMT24:  .WORD   EMS301,EMS323,EMS251
15349  067350  105055  104436                  .WORD   EMS511,EMS501
15350  067354  102315  102641  000000          .WORD   EMS312,EMS325,0
15351  067362  102067  102353  101375  EMT25:  .WORD   EMS301,EMS313,EMS251
15352  067370  105055  104436  000000          .WORD   EMS511,EMS501,0
15353  067376  102067  102157  101441  EMT26:  .WORD   EMS301,EMS306,EMS252,EMS253,EMS327.EMS254
15354  067404  101474  102662  101527
15355  067412  105055  104532  104436          .WORD   EMS511,EMS503,EMS501,EMS502
15356  067420  104463
15357  067422  102670  102404  000000          .WORD   EMS330,EMS314,0
15358  067430  102051  101441          EMT27:  .WORD   EMS300,EMS252
15359  067434  105055  104436  000000          .WORD   EMS511,EMS501,0
15360  067442  102051  101441          EMT30:  .WORD   EMS300,EMS252
15361  067446  105055  104436  104556          .WORD   EMS511,EMS501,EMS504,0
15362  067454  000000
15363  067456  102051  101441          EMT31:  .WORD   EMS300,EMS252
15364  067462  105055  104436  104532          .WORD   EMS511,EMS501,EMS503,0
15365  067470  000000
15366  067472  102067  102621  101441  EMT32:  .WORD   EMS301,EMS324,EMS252
15367  067500  105055  104436  000000          .WORD   EMS511,EMS501,0
15368  067506  102067  102621  101441  EMT33:  .WORD   EMS301,EMS324,EMS252
15369  067514  105055  104436  104556          .WORD   EMS511,EMS501,EMS504,0
15370  067522  000000
15371  067524  102067  102621  101441  EMT34:  .WORD   EMS301,EMS324,EMS252
15372  067532  105055  104436  104532          .WORD   EMS511,EMS501,EMS503,0
15373  067540  000000
15374  067542  102067  102602  101441  EMT35:  .WORD   EMS301,EMS323,EMS252
15375  067550  105055  104436  000000          .WORD   EMS511,EMS501,0
15376  067556  102067  102353  101441  EMT36:  .WORD   EMS301,EMS313,EMS252
15377  067564  105055  104436  000000          .WORD   EMS511,EMS501,0
15378  067572  102067  102621  101570  EMT37:  .WORD   EMS301,EMS324,EMS255
15379  067600  102315  102652  000000          .WORD   EMS312,EMS326,0
15380  067606  102067  102602  101570  EMT40:  .WORD   EMS301,EMS323,EMS255
15381  067614  105055  104556                  .WORD   EMS511,EMS504
15382  067620  102315  102641  000000          .WORD   EMS312,EMS325,0
15383  067626  102067  102353  101570  EMT41:  .WORD   EMS301,EMS313,EMS255
15384  067634  105055  104556  000000          .WORD   EMS511,EMS504,0
15385  067642  102067  102602  101337  EMT42:  .WORD   EMS301,EMS323,EMS250,EMS327,EMS255
15386  067650  102662  101570
15387  067654  105055  104556  104436          .WORD   EMS511,EMS504,EMS501,EMS503,0
15388  067662  104532  000000
15389  067666  102051  075046          EMT43:  .WORD   EMS300,EMS3
15390  067672  105055  104436  000000          .WORD   EMS511,EMS501,0
15391  067700  102707  075113  101474  EMT44:  .WORD   EMS331,EMS4,EMS253
15392  067706  105055  104436  000000          .WORD   EMS511,EMS501,0
15393
15394  067714  102051  101474          EMT45:  .WORD   EMS300,EMS253
15395  067720  105055  104436  104532          .WORD   EMS511,EMS501,EMS503,0
15396  067726  000000
15397
15398  067730  102051  101474          EMT46:  .WORD   EMS300,EMS253
15399  067734  105055  104436  104556          .WORD   EMS511,EMS501,EMS504,0
15400  067742  000000
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15401
15402  067744  102067  102621  101474  EMT47:  .WORD   EMS301,EMS324,EMS253
15403  067752  105055  104436  104532          .WORD   EMS511,EMS501,EMS503
15404  067760  102315  102652  000000          .WORD   EMS312,EMS326,0
15405
15406  067766  102067  102621  101474  EMT50:  .WORD   EMS301,EMS324,EMS253
15407  067774  105055  104436  104556          .WORD   EMS511,EMS501,EMS504
15408  070002  102315  102652  000000          .WORD   EMS312,EMS326,0
15409
15410  070010  102067  102602  101474  EMT51:  .WORD   EMS301,EMS323,EMS253
15411  070016  105055  104436                  .WORD   EMS511,EMS501
15412  070022  102315  102641  000000          .WORD   EMS312,EMS325,0
15413
15414  070030  102067  102353  101474  EMT52:  .WORD   EMS301,EMS313,EMS253
15415  070036  105055  104436  000000          .WORD   EMS511,EMS501,0
15416
15417  070044  102707  075113  101632  EMT53:  .WORD   EMS331,EMS4,EMS256
15418  070052  105055  104436  000000          .WORD   EMS511,EMS501,0
15419
15420  070060  102067  102621  101632  EMT54:  .WORD   EMS301,EMS324,EMS256
15421  070066  105055  104436                  .WORD   EMS511,EMS501
15422  070072  102315  102652  000000          .WORD   EMS312,EMS326,0
15423
15424  070100  102067  102602  101632  EMT55:  .WORD   EMS301,EMS323,EMS256
15425  070106  105055  104436                  .WORD   EMS511,EMS501
15426  070112  102315  102641  000000          .WORD   EMS312,EMS325,0
15427
15428  070120  102067  102353  101632  EMT56:  .WORD   EMS301,EMS313,EMS256
15429  070126  105055  104436  000000          .WORD   EMS511,EMS501,0
15430
15431  070134  101662  102737          EMT57:  .WORD   EMS257,EMS332
15432  070140  105055  104655  104436          .WORD   EMS511,EMS506,EMS501,0
15433  070146  000000
15434
15435  070150  075144  102755          EMT60:  .WORD   EMS5,EMS333
15436  070154  105055  104712  104436          .WORD   EMS511,EMS507,EMS501,0
15437  070162  000000
15438
15439  070164  102067  102621  101716  EMT61:  .WORD   EMS301,EMS324,EMS260
15440  070172  105055  104436                  .WORD   EMS511,EMS501
15441  070176  102315  102652  000000          .WORD   EMS312,EMS326,0
15442
15443  070204  102067  102602  101716  EMT62:  .WORD   EMS301,EMS323,EMS260
15444  070212  105055  104436                  .WORD   EMS511,EMS501
15445  070216  102315  102641  000000          .WORD   EMS312,EMS325,0
15446
15447  070224  102067  102353  101716  EMT63:  .WORD   EMS301,EMS313,EMS260
15448  070232  105055  104436  000000          .WORD   EMS511,EMS501,0
15449
15450  070240  102051  075465          EMT64:  .WORD   EMS300,EMS12
15451  070244  105055  104436  000000          .WORD   EMS511,EMS501,0
15452
15453  070252  075465  103001  103077  EMT65:  .WORD   EMS12,EMS335,EMS342
15454  070260  105055  104436  000000          .WORD   EMS511,EMS501,0
15455
15456  070266  075465  103024  103077  EMT66:  .WORD   EMS12,EMS336,EMS342
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15457  070274  105055  104436  000000          .WORD   EMS511,EMS501,0
15458
15459  070302  102051  075214          EMT67:  .WORD   EMS300,EMS6
15460  070306  105055  104436                  .WORD   EMS511,EMS501
15461  070312  075260  102755  000000          .WORD   EMS7,EMS333,0
15462
15463  070320  102051  075214  102662  EMT70:  .WORD   EMS300,EMS6,EMS327,EMS7
15464  070326  075260
15465  070330  105055  104436  104556          .WORD   EMS511,EMS501,EMS504,0
15466  070336  000000
15467
15468  070340  075214  103001  103057  EMT71:  .WORD   EMS6,EMS335,EMS340,EMS10,EMS333,EMS342
15469  070346  075331  102755  103077
15470  070354  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15471  070362  000000
15472
15473  070364  075214  103024  103057  EMT72:  .WORD   EMS6,EMS336,EMS340,EMS10,EMS334,EMS342
15474  070372  075331  102771  103077
15475  070400  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15476  070406  000000
15477
15478  070410  102067  101716  102137  EMT73:  .WORD   EMS301,EMS260,EMS303,EMS11
15479  070416  075374
15480  070420  105055  104436  104463          .WORD   EMS511,EMS501,EMS502,0
15481  070426  000000
15482
15483  070430  103131  103145  103077  EMT74:  .WORD   EMS343,EMS344,EMS342,0
15484  070436  000000
15485
15486  070440  102051  075543          EMT75:  .WORD   EMS300,EMS13
15487  070444  105055  104532  000000          .WORD   EMS511,EMS503,0
15488
15489  070452  103222  075543  103174  EMT76:  .WORD   EMS346,EMS13,EMS345
15490  070460  105055  104532  000000          .WORD   EMS511,EMS503,0
15491
15492  070466  103043  075543  103174  EMT77:  .WORD   EMS337,EMS13,EMS345
15493  070474  105055  104532  000000          .WORD   EMS511,EMS503,0
15494
15495  070502  102067  102353  101527  EMT100: .WORD   EMS301,EMS313,EMS254,EMS347,EMS13
15496  070510  103240  075543
15497  070514  105055  104532  000000          .WORD   EMS511,EMS503,0
15498
15499  070522  103222  075612  103070  EMT101: .WORD   EMS346,EMS14,EMS341,EMS15
15500  070530  075657
15501  070532  105055  104532  104436          .WORD   EMS511,EMS503,EMS501,0
15502  070540  000000
15503
15504  070542  103043  075612  103070  EMT102: .WORD   EMS337,EMS14,EMS341,EMS15
15505  070550  075657
15506  070552  105055  104532  104436          .WORD   EMS511,EMS503,EMS501,0
15507  070560  000000
15508
15509  070562  102067  102353  101527  EMT103: .WORD   EMS301,EMS313,EMS254,EMS347,EMS15
15510  070570  103240  075657
15511  070574  105055  104532                  .WORD   EMS511,EMS503
15512  070600  075612  102737  000000          .WORD   EMS14,EMS332,0
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15513
15514  070606  103222  076016  103070  EMT104:  .WORD   EMS346,EMS17,EMS341,EMS16
15515  070614  075735
15516  070616  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15517  070624  000000
15518
15519  070626  103043  076016  103070  EMT105:  .WORD   EMS337,EMS17,EMS341,EMS16
15520  070634  075735
15521  070636  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15522  070644  000000
15523
15524  070646  102067  102353  101527  EMT106:  .WORD   EMS301,EMS313,EMS254,EMS347,EMS16
15525  070654  103240  075735
15526  070660  105055  104532                   .WORD   EMS511,EMS503
15527  070664  076016  102737  000000           .WORD   EMS17,EMS332,0
15528
15529  070672  103222  076057  103070  EMT107:  .WORD   EMS346,EMS20,EMS341,EMS21
15530  070700  076123
15531  070702  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15532  070710  000000
15533
15534  070712  076057  103266  076123  EMT110:  .WORD   EMS20,EMS351,EMS21,EMS350,EMS22,EMS315
15535  070720  103261  076202  102433
15536  070726  105055  104436  000000           .WORD   EMS511,EMS501,0
15537
15538  070734  076057  102771  103261  EMT111:  .WORD   EMS20,EMS334,EMS350,EMS22,EMS333
15539  070742  076202  102755
15540  070746  105055  104436  000000           .WORD   EMS511,EMS501,0
15541
15542  070754  103043  076057  103070  EMT112:  .WORD   EMS337,EMS20,EMS341,EMS21
15543  070762  076123
15544  070764  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15545  070772  000000
15546
15547  070774  103043  076057  103070  EMT113:  .WORD   EMS337,EMS20,EMS341,EMS21,EMS350,EMS22,EMS334
15548  071002  076123  103261  076202
15549  071010  102771
15550  071012  105055  104436  000000           .WORD   EMS511,EMS501,0
15551
15552  071020  076057  103304  076123  EMT114:  .WORD   EMS20,EMS352,EMS21,EMS350.EMS22,EMS333
15553  071026  103261  076202  102755
15554  071034  105055  104436  000000           .WORD   EMS511,EMS501,0
15555
15556  071042  102067  102353  101527  EMT115:  .WORD   EMS301,EMS313,EMS254,EMS347,EMS21
15557  071050  103240  076123
15558  071054  105055  104532                   .WORD   EMS511,EMS503
15559  071060  076057  102737  000000           .WORD   EMS20,EMS332,0
15560
15561  071066  103222  076247  103070  EMT116:  .WORD   EMS346,EMS23,EMS341,EMS24
15562  071074  076325
15563  071076  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15564  071104  000000
15565
15566  071106  103043  076247  103070  EMT117:  .WORD   EMS337,EMS23,EMS341,EMS24
15567  071114  076325
15568  071116  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
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15569  071124  000000
15570
15571  071126  102067  102353  101527  EMT120:  .WORD   EMS301,EMS313,EMS254,EMS347,EMS24
15572  071134  103240  076325
15573  071140  105055  104532                   .WORD   EMS511,EMS503
15574  071144  076247  102737  000000           .WORD   EMS23,EMS332,0
15575
15576  071152  103222  076404  103070  EMT121:  .WORD   EMS346,EMS25,EMS341,EMS26
15577  071160  076462
15578  071162  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15579  071170  000000
15580
15581  071172  103043  076404  103070  EMT122:  .WORD   EMS337,EMS25,EMS341,EMS26
15582  071200  076462
15583  071202  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15584  071210  000000
15585
15586  071212  102067  102353  101527  EMT123:  .WORD   EMS301,EMS313,EMS254,EMS347,EMS26
15587  071220  103240  076462
15588  071224  105055  104532                   .WORD   EMS511,EMS503
15589  071230  076404  102737  000000           .WORD   EMS25,EMS332,0
15590
15591  071236  102051  076541  102173  EMT124:  .WORD   EMS300,EMS27,EMS307,EMS2
15592  071244  074777
15593  071246  105055  104532  000000           .WORD   EMS511,EMS503,0
15594
15595  071254  102707  076541  103320  EMT125:  .WORD   EMS331,EMS27,EMS353
15596  071262  105055  104532                   .WORD   EMS511,EMS503
15597  071266  076605  102433  000000           .WORD   EMS30,EMS315,0
15598
15599  071274  103043  076541  103070  EMT126:  .WORD   EMS337,EMS27,EMS341,EMS30
15600  071302  076605
15601  071304  105055  104532  000000           .WORD   EMS511,EMS503,0
15602
15603  071312  102067  102353  101527  EMT127:  .WORD   EMS301,EMS313,EMS254,EMS347,EMS30
15604  071320  103240  076605
15605  071324  105055  104532                   .WORD   EMS511,EMS503
15606  071330  076541  102737  000000           .WORD   EMS27,EMS332,0
15607
15608  071336  076665  103344  101337  EMT130:  .WORD   EMS31,EMS354,EMS250
15609  071344  105055  104556  104532           .WORD   EMS511,EMS504,EMS503,0
15610  071352  000000
15611
15612  071354  076736  103344  101337  EMT131:  .WORD   EMS32,EMS354,EMS250
15613  071362  105055  104556  104532           .WORD   EMS511,EMS504,EMS503,0
15614  071370  000000
15615
15616  071372  103377  077016  101337  EMT132:  .WORD   EMS355,EMS33,EMS250,EMS341,EMS30
15617  071400  103070  076605
15618  071404  105055  104556  000000           .WORD   EMS511,EMS504,0
15619
15620  071412  103377  077055  101337  EMT133:  .WORD   EMS355,EMS34,EMS250,EMS341,EMS30
15621  071420  103070  076605
15622  071424  105055  104556  000000           .WORD   EMS511,EMS504,0
15623
15624  071432  102707  075113  101570  EMT134:  .WORD   EMS331,EMS4,EMS255
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15625  071440  105055  104556  000000          .WORD   EMS511,EMS504,0
15626
15627  071446  077113  103441  103463  EMT135: .WORD   EMS35,EMS357,EMS360,EMS15
15628  071454  075657
15629  071456  105055  104436  000000          .WORD   EMS511,EMS501,0
15630
15631  071464  101747  103537          EMT136: .WORD   EMS261,EMS362
15632  071470  105055  104532  000000          .WORD   EMS511,EMS503,0
15633
15634  071476  102051  077155  002173  EMT137: .WORD   EMS300,EMS36,EMS307,EMS2
15635  071504  074777
15636  071506  105055  104436  000000          .WORD   EMS511,EMS501,0
15637
15638  071514  103377  077205  101570  EMT140: .WORD   EMS355,EMS37,EMS255,EMS341,EMS30
15639  071522  103070  076605
15640  071526  105055  104556  000000          .WORD   EMS511,EMS504,0
15641
15642  071534  103222  077245  103174  EMT141: .WORD   EMS346,EMS40,EMS345
15643  071542  105055  104556  000000          .WORD   EMS511,EMS504,0
15644
15645  071550  103043  077245  103070  EMT142: .WORD   EMS337,EMS40,EMS341,EMS30
15646  071556  076605
15647  071560  105055  104556  000000          .WORD   EMS511,EMS504,0
15648
15649  071566  103560  102234  077323  EMT143: .WORD   EMS363,EMS310,EMS41
15650  071574  105055  104436  000000          .WORD   EMS511,EMS501,0
15651
15652  071602  103043  077323  103070  EMT144: .WORD   EMS337,EMS41,EMS341,EMS252,EMS327,EMS253
15653  071610  101441  102662  101474
15654  071616  105055  104436  000000          .WORD   EMS511,EMS501,0
15655
15656  071624  077323  103344  103575  EMT145: .WORD   EMS41,EMS354,EMS364,EMS252,EMS365,EMS253
15657  071632  101441  103616  101474
15658  071640  105055  104436  000000          .WORD   EMS511,EMS501,0
15659
15660  071646  102067  102157  077155  EMT146: .WORD   EMS301,EMS306,EMS36
15661  071654  105055  104436  104532          .WORD   EMS511,EMS501,EMS503,0
15662  071662  000000
15663
15664  071664  103623  077371          EMT147: .WORD   EMS366,EMS42
15665  071670  105055  104532  000000          .WORD   EMS511,EMS503,0
15666
15667  071676  103646  103320  103616  EMT150: .WORD   EMS367,EMS353,EMS365,EMS42,EMS354,EMS3
15668  071704  077371  103344  075046
15669  071712  105055  104532  000000          .WORD   EMS511,EMS503,0
15670
15671  071720  103043  077155          EMT151: .WORD   EMS337,EMS36
15672  071724  105055  104436  000000          .WORD   EMS511,EMS501,0
15673
15674  071732  077453  103344  077155  EMT152: .WORD   EMS43,EMS354,EMS36
15675  071740  105055  104436  000000          .WORD   EMS511,EMS501,0
15676
15677  071746  103646  103320  103616  EMT153: .WORD   EMS367,EMS353,EMS365,EMS36,EMS370
15678  071754  077155  103716
15679  071760  105055  104532  000000          .WORD   EMS511,EMS503,0
15680
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15681  071766  103646  103320  103616  EMT154:  .WORD   EMS367,EMS353,EMS365,EMS36,EMS371
15682  071774  077155  103733
15683  072000  105055  104532  000000           .WORD   EMS511,EMS503,0
15684
15685  072006  102051  077524  102173  EMT155:  .WORD   EMS300,EMS44,EMS307,EMS2
15686  072014  074777
15687  072016  105055  104532  000000           .WORD   EMS511,EMS503,0
15688
15689  072024  103646  103320  103616  EMT156:  .WORD   EMS367,EMS353,EMS365,EMS44,EMS354,EMS3
15690  072032  077524  103344  075046
15691  072040  105055  104532  000000           .WORD   EMS511,EMS503,0
15692
15693  072046  102051  077565  102173  EMT157:  .WORD   EMS300,EMS45,EMS307,EMS2
15694  072054  074777
15695  072056  105055  104532  000000           .WORD   EMS511,EMS503,0
15696
15697  072064  103646  103320  103616  EMT160:  .WORD   EMS367,EMS353,EMS365,EMS45,EMS354,EMS3
15698  072072  077565  103344  075046
15699  072100  105055  104532  104436           .WORD   EMS511,EMS503,EMS501
15700  072106  077113  102755  000000           .WORD   EMS35,EMS333,0
15701
15702  072114  102051  077642  102173  EMT161:  .WORD   EMS300,EMS46,EMS307,EMS2
15703  072122  074777
15704  072124  105055  104532  000000           .WORD   EMS511,EMS503,0
15705
15706  072132  103043  077642  103320  EMT162:  .WORD   EMS337,EMS46,EMS353
15707  072140  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15708  072146  000000
15709
15710  072150  077113  103001  103043  EMT163:  .WORD   EMS35,EMS335,EMS337,EMS41,EMS334,EMS372
15711  072156  077323  102771  103762
15712  072164  105055  104436  000000           .WORD   EMS511,EMS501,0
15713
15714  072172  077724  103001  103043  EMT164:  .WORD   EMS47,EMS335,EMS337,EMS41,EMS335,EMS372
15715  072200  077323  103001  103762
15716  072206  105055  104436  000000           .WORD   EMS511,EMS501,0
15717
15718  072214  103043  077113  102662  EMT165:  .WORD   EMS337,EMS35,EMS327,EMS47
15719  072222  077724
15720  072224  105055  104436                   .WORD   EMS511,EMS501
15721  072230  077323  102755  103762           .WORD   EMS41,EMS333,EMS372,0
15722  072236  000000
15723
15724  072240  102051  077724  102173  EMT166:  .WORD   EMS300,EMS47,EMS307,EMS2
15725  072246  074777
15726  072250  105055  104436  104532           .WORD   EMS511,EMS501,EMS503,0
15727  072256  000000
15728
15729  072260  077764  103001  103057  EMT167:  .WORD   EMS50,EMS335,EMS340.EMS36,EMS333
15730  072266  077155  102755
15731  072272  105055  104436  104532           .WORD   EMS511,EMS501,EMS503,0
15732  072300  000000
15733
15734  072302  103043  077113                   .WORD   EMS337,EMS35
15735  072306  105055  104436  000000           .WORD   EMS511,EMS501,0
15736
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15737  072314  077764  077055  075046  EMT171: .WORD   EMS50,EMS34,EMS3
15738  072322  105055  104436  000000          .WORD   EMS511,EMS501,0
15739
15740  072330  102067  102157  100033  EMT172: .WORD   EMS301,EMS306,EMS51
15741  072336  105055  104436  104556          .WORD   EMS511,EMS501,EMS504,0
15742  072344  000000
15743
15744  072346  103646  103320  103616  EMT173: .WORD   EMS367,EMS353,EMS365,EMS47,EMS354,EMS3
15745  072354  077724  103344  075046
15746  072362  105055  104436  000000          .WORD   EMS511,EMS501,0
15747
15748  072370  102051  101337  102662  EMT174: .WORD   EMS300,EMS250,EMS327,EMS255,EMS327,EMS256
15749  072376  101570  102662  101632
15750  072404  103070  105154          .WORD   EMS341,EMS600
15751  072410  105055  104436  000000          .WORD   EMS511,EMS501,0
15752
15753  072416  102051  101632  103070  EMT175: .WORD   EMS300,EMS256,EMS341,EMS600
15754  072424  105154
15755  072426  105055  104436  000000          .WORD   EMS511,EMS501,0
15756
15757  072434  102051  101337  103070  EMT176: .WORD   EMS300,EMS250,EMS341,EMS600
15758  072442  105154
15759  072444  105055  104556  000000          .WORD   EMS511,EMS504,0
15760
15761  072452  102051  101570  103070  EMT177: .WORD   EMS300,EMS255,EMS341,EMS600
15762  072460  105154
15763  072462  105055  104556  000000          .WORD   EMS511,EMS504,0
15764
15765  072470  103043  100102  103070  EMT200: .WORD   EMS337,EMS52,EMS341,EMS601
15766  072476  105204
15767  072500  105055  104436  000000          .WORD   EMS511,EMS501,0
15768
15769  072506  103222  100102  103070  EMT201: .WORD   EMS346,EMS52,EMS341,EMS602
15770  072514  105224
15771  072516  105055  104436  000000          .WORD   EMS511,EMS501,0
15772
15773  072524  103222  100033  103070  EMT202: .WORD   EMS346,EMS51,EMS341,EMS602
15774  072532  105224
15775  072534  105055  104436  000000          .WORD   EMS511,EMS501,0
15776
15777  072542  103222  100102  103174  EMT203: .WORD   EMS346,EMS52,EMS345,EMS373,EMS255
15778  072550  104014  101570
15779  072554  105055  104556  104436          .WORD   EMS511,EMS504,EMS501,0
15780  072562  000000
15781
15782  072564  103222  100102  103070  EMT204: .WORD   EMS346,EMS52,EMS341,EMS27
15783  072572  076541
15784  072574  105055  104556  104436          .WORD   EMS511,EMS504,EMS501,0
15785  072602  000000
15786
15787  072604  100143  103344  075046  EMT205: .WORD   EMS53,EMS354,EMS3
15788  072612  105055  104532  104463          .WORD   EMS511,EMS503,EMS502,EMS510,0
15789  072620  105002  000000
15790
15791  072624  103043  100204  104020  EMT206: .WORD   EMS337,EMS54,EMS374,EMS250,EMS327,EMS255
15792  072632  101337  102662  101570
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15793  072640  102662  075046                        .WORD   EMS327,EMS3
15794  072644  105055  104556  104436                .WORD   EMS511,EMS504,EMS501,0
15795  072652  000000
15796
15797  072654  100204  103344  075046  EMT207:       .WORD   EMS54,EMS354,EMS3
15798  072662  105055  104436  000000                .WORD   EMS511,EMS501,0
15799
15800  072670  100204  103344  103575  EMT210:       .WORD   EMS54,EMS354,EMS364,EMS250
15801  072676  101337
15802  072700  105055  104556  000000                .WORD   EMS511,EMS504,0
15803
15804  072706  100204  103344  103575  EMT211:       .WORD   EMS54,EMS354,EMS364,EMS255
15805  072714  101570
15806  072716  105055  104556  000000                .WORD   EMS511,EMS504,0
15807
15808  072?  1 103043  100261          EMT212:       .WORD   EMS337,EMS55
15809  07273U  105055  104556  000000                .WORD   EMS511,EMS504,0
15810
15811  072736  100337  102771  103174  EMT213:       .WORD   EMS56,EMS334,EMS345,EMS373,EMS262,EMS327,EMS251
15812  07?744  104014  102006  102662
15813  07?752  101375
15814  072754  105055  104436                        .WORD   EMS511,EMS501
15815  072760  100337  103001  000000                .WORD   EMS56,EMS335,0
15816
15817  072766  103043  100337          EMT214:       .WORD   EMS337,EMS56
15818  072772  105055  104436  000000                .WORD   EMS511,EMS501,0
15819
15820  073000  100432  102755  103261  EMT215:       .WORD   EMS57,EMS333,EMS350,EMS60,EMS334
15821  073006  100516  102771
15822  073012  105055  104436  000000                .WORD   EMS511,EMS501,0
15823
15824  073020  103560  102157  075144  EMT216:       .WORD   EMS363,EMS306,EMS5
15825  073026  105055  104436  000000                .WORD   EMS511,EMS501,0
15826
15827  073034  103560  102157  100570  EMT217:       .WORD   EMS363,EMS306,EMS61
15828  073042  105055  104436  000000                .WORD   EMS511,EMS501,0
15829
15830  073050  100643  102755  104051  EMT220:       .WORD   EMS62,EMS333,EMS375,EMS251
15831  073056  101375
15832  073060  105055  104436  000000                .WORD   EMS511,EMS501,0
15833
15834  073066  100643  102755  104065  EMT221:       .WORD   EMS62,EMS333,EMS376,EMS262
15835  073074  102006
15836  073076  105055  104436  000000                .WORD   EMS511,EMS501,0
15837
15838  073104  100643  102755  104065  EMT222:       .WORD   EMS62,EMS333,EMS376,EMS250
15839  073112  101337
15840  073114  105055  104436  000000                .WORD   EMS511,EMS501,0
15841
15842  073122  103222  100643  103070  EMT223:       .WORD   EMS346,EMS62,EMS341,EMS603
15843  073130  105265
15844  073132  105055  104436  000000                .WORD   EMS511,EMS501,0
15845
15846  073140  103222  100724  104065  EMT224:       .WORD   EMS346,EMS63,EMS376,EMS262
15847  073146  102006
15848  073150  105055  104436  104532                .WORD   EMS511,EMS501,EMS503,0
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15849  073156  000000
15850
15851  073160  100724  102755  103261  EMT225:  .WORD   EMS63,EMS333,EMS350,EMS363,EMS310,EMS262
15852  073166  103560  102234  102006
15853  073174  105055  104436  000000           .WORD   EMS511,EMS501,0
15854
15855  073202  100724  103441  077155  EMT226:  .WORD   EMS63,EMS357,EMS36,EMS372
15856  073210  103762
15857  073212  105055  104436  000000           .WORD   EMS511,EMS501,0
15858
15859  073220  100724  103421  103463  EMT227:  .WORD   EMS63,EMS356,EMS360,EMS15
15860  073226  075657
15861  073230  105055  104436  000000           .WORD   EMS511,EMS501,0
15862
15863  073236  100724  103421  103511  EMT230:  .WORD   EMS63,EMS356,EMS361,EMS15
15864  073244  075657
15865  073246  105055  104436  000000           .WORD   EMS511,EMS501,0
15866
15867  073254  100724  103421  077323  EMT231:  .WORD   EMS63,EMS356,EMS41
15868  073262  105055  104436  000000           .WORD   EMS511,EMS501,0
15869
15870  073270  077323  104101  103077  EMT232:  .WORD   EMS41,EMS377,EMS342,EMS365,EMS63,EMS332
15871  073276  103616  100724  102737
15872  073304  105055  104436  000000           .WORD   EMS511,EMS501,0
15873
15874  073312  103646  103320  103616  EMT233:  .WORD   EMS367,EMS353,EMS365,EMS63,EMS401
15875  073320  100724  104127
15876  073324  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15877  073332  000000
15878
15879  073334  075735  104101  103762  EMT234:  .WORD   EMS16,EMS377,EMS372,EMS365,EMS64,EMS354,EMS3
15880  073342  103616  100764  103344
15881  073350  075046
15882  073352  105055  104532  104436           .WORD   EMS511,EMS503,EMS501,0
15883  073360  000000
15884
15885  073362  102051  101034  102173  EMT235:  .WORD   EMS300,EMS65,EMS307,EMS2
15886  073370  074777
15887  073372  105055  104463  104532           .WORD   EMS511,EMS502,EMS503,0
15888  073400  000000
15889
15890  073402  100337  104101  104065  EMT236:  .WORD   EMS56,EMS377,EMS376,EMS252,EMS372,EMS350
15891  073410  101441  103762  103261
15892  073416  101034  104127           .WORD   EMS65,EMS401
15893  073422  105055  104463  104532           .WORD   EMS511,EMS502,EMS503,EMS501,0
15894  073430  104436  000000
15895
15896  073434  102051  101075  102173  EMT237:  .WORD   EMS300,EMS66,EMS307,EMS2
15897  073442  074777
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15898  073444  105055  104436  104532          .WORD   EMS511,EMS501,EMS503,0
15899  073452  000000
15900
15901  073454  075657  104112  103762  EMT240: .WORD   EMS15,EMS400,EMS372,EMS350,EMS66,EMS401
15902  073462  103261  101075  104127
15903  073470  105055  104532  104436          .WORD   EMS511,EMS503,EMS501,0
15904  073476  000000
15905
15906  073500  101075  103024  103057  EMT241: .WORD   EMS66,EMS336,EMS340,EMS15,EMS406,EMS405,EMS604
15907  073506  075657  104243  104233
15908  073514  105306
15909  073516  105055  104532  000000          .WORD   EMS511,EMS503,0
15910
15911  073524  104153  105306  104144  EMT242: .WORD   EMS403,EMS604,EMS402,EMS21,EMS377
15912  073532  076123  104101
15913  073536  105055  104532                  .WORD   EMS511,EMS503
15914  073542  077155  103001  000000          .WORD   EMS36,EMS335,0
15915
15916  073550  101075  103024  103057  EMT243: .WORD   EMS66,EMS336,EMS340,EMS26,EMS404,EMS405,EMS604
15917  073556  076462  104214  104233
15918  073564  105306
15919  073566  105055  104532  000000          .WORD   EMS511,EMS503,0
15920
15921  073574  100724  104127  104233  EMT244: .WORD   EMS63,EMS401,EMS405,EMS604
15922  073602  105306
15923  073604  105055  104532  000000          .WORD   EMS511,EMS503,0
15924
15925  073612  077155  103716  104233  EMT245: .WORD   EMS36,EMS370,EMS405,EMS604
15926  073620  105306
15927  073622  105055  104532  000000          .WORD   EMS511,EMS503,0
15928
15929  073630  104153  105306  104144  EMT246: .WORD   EMS403,EMS604,EMS402,EMS24,EMS377
15930  073636  076325  104101
15931  073642  105055  104532                  .WORD   EMS511,EMS503
15932  073646  077155  103001  000000          .WORD   EMS36,EMS335,0
15933
15934  073654  101157  102737  104233  EMT247: .WORD   EMS67,EMS332,EMS405,EMS604
15935  073662  105306
15936  073664  105055  104532  000000          .WORD   EMS511,EMS503,0
15937
15938  073672  101075  103024  103057  EMT250: .WORD   EMS66,EMS336,EMS340,EMS15,EMS406,EMS405,EMS605
15939  073700  075657  104243  104233
15940  073706  105333
15941  073710  105055  104532  000000          .WORD   EMS511,EMS503,0
15942
15943  073716  104153  105333  104144  EMT251: .WORD   EMS403,EMS605,EMS402,EMS21,EMS377
15944  073724  076123  104101
15945  073730  105055  104532                  .WORD   EMS511,EMS503
15946  073734  077155  103001  000000          .WORD   EMS36,EMS335,0
15947
15948  073742  101075  103024  103057  EMT252: .WORD   EMS66,EMS336,EMS340,EMS26,EMS404,EMS405,EMS605
15949  073750  076462  104214  104233
15950  073756  105333
15951  073760  105055  104532  000000          .WORD   EMS511,EMS503,0
15952
15953  073766  100724  104127  104233  EMT253: .WORD   EMS63,EMS401,EMS405,EMS605
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15954  073774  105333
15955  073776  105055  104532  000000          .WORD   EMS511,EMS503,0
15956
15957  074004  077155  103716  104233  EMT254: .WORD   EMS36,EMS370,EMS405,EMS605
15958  074012  105333
15959  074014  105055  104532  000000          .WORD   EMS511,EMS503,0
15960
15961  074022  104153  105333  104144  EMT255: .WORD   EMS403,EMS605,EMS402,EMS24,EMS377
15962  074030  076325  104101
15963  074034  105055  104532                  .WORD   EMS511,EMS503
15964  074040  077155  103001  000000          .WORD   EMS36,EMS335,0
15965
15966  074046  101157  102737  104233  EMT256: .WORD   EMS67,EMS332,EMS405,EMS605
15967  074054  105333
15968  074056  105055  104532  000000          .WORD   EMS511,EMS503,0
15969
15970  074064  101075  103024  103057  EMT257: .WORD   EMS66,EMS336,EMS340,EMS15,EMS406,EMS405,EMS606
15971  074072  075657  104243  104233
15972  074100  105351
15973  074102  105055  104532  000000          .WORD   EMS511,EMS503,0
15974
15975  074110  104153  105351  104144  EMT260: .WORD   EMS403,EMS606,EMS402,EMS21,EMS377
15976  074116  076123  104101
15977  074122  105055  104532                  .WORD   EMS511,EMS503
15978  074126  077155  103001  000000          .WORD   EMS36,EMS335,0
15979
15980  074134  101075  103024  103057  EMT261: .WORD   EMS66,EMS336,EMS340,EMS25,EMS404,EMS405,EMS606
15981  074142  076462  104214  104233
15982  074150  105351
15983  074152  105055  104532  000000          .WORD   EMS511,EMS503,0
15984
15985  074160  100724  104127  104233  EMT262: .WORD   EMS63,EMS401,EMS405,EMS606
15986  074166  105351
15987  074170  105055  104532  000000          .WORD   EMS511,EMS503,0
15988
15989  074176  077155  103716  104233  EMT263: .WORD   EMS36,EMS370,EMS405,EMS606
15990  074204  105351
15991  074206  105055  104532  000000          .WORD   EMS511,EMS503,0
15992
15993  074214  104153  105351  104144  EMT264: .WORD   EMS403,EMS606,EMS402,EMS24,EMS377
15994  074222  076325  104101
15995  074226  105055  104532                  .WORD   EMS511,EMS503
15996  074232  077155  103001  000000          .WORD   EMS36,EMS335,0
15997
15998  074240  101271  104127  104233  EMT265: .WORD   EMS70,EMS401,EMS405,EMS606
15999  074246  105351
16000  074250  105055  104532  000000          .WORD   EMS511,EMS503,0
16001
16002  074256  101157  102737  104233  EMT266: .WORD   EMS67,EMS332,EMS405,EMS606
16003  074264  105351
16004  074266  105055  104532  000000          .WORD   EMS511,EMS503,0
16005
16006  074274  101075  103421  104256  EMT267: .WORD   EMS66,EMS356,EMS407
16007  074302  105055  104532  000000          .WORD   EMS511,EMS503,0
16008
16009  074310  101075  103024  103057  EMT270: .WORD   EMS66,EMS336,EMS340,EMS15,EMS406,EMS405,EMS607
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16010  074316  075657  104243  104233
16011  074324  105371
16012  074326  105055  104532  000000          .WORD   EMS511,EMS503,0
16013
16014  074334  104153  105371  104144  EMT271: .WORD   EMS403,EMS607,EMS402,EMS21,EMS377
16015  074342  076123  104101
16016  074346  105055  104532          .WORD   EMS511,EMS503
16017  074352  076541  103024  000000  .WORD   EMS27,EMS336,0
16018
16019  074360  076541  103716  104233  EMT272: .WORD   EMS27,EMS370,EMS405,EMS607
16020  074366  105371
16021  074370  105055  104532  000000          .WORD   EMS511,EMS503,0
16022
16023  074376  076541  103733  104233  EMT273: .WORD   EMS27,EMS371,EMS405,EMS607
16024  074404  105371
16025  074406  105055  104532  000000          .WORD   EMS511,EMS503,0
16026
16027  074414  077155  104214  104233  EMT274: .WORD   EMS36,EMS404,EMS405,EMS607
16028  074422  105371
16029  074424  105055  104532  000000          .WORD   EMS511,EMS503,0
16030
16031  074432  100143  104127  104233  EMT275: .WORD   EMS53,EMS401,EMS405,EMS607
16032  074440  105371
16033  074442  105055  104532  104463          .WORD   EMS511,EMS503,EMS502,0
16034  074450  000000
16035
16036  074452  101157  102737  104233  EMT276: .WORD   EMS67,EMS332,EMS405,EMS607
16037  074460  105371
16038  074462  105055  104532  000000          .WORD   EMS511,EMS503,0
16039
16040  074470  101075  103024  103057  EMT277: .WORD   EMS66,EMS336,EMS340,EMS26,EMS404,EMS405,EMS607
16041  074476  076462  104214  104233
16042  074504  105371
16043  074506  105055  104532  000000          .WORD   EMS511,EMS503,0
16044
16045  074514  104153  105371  104144  EMT300: .WORD   EMS403,EMS607,EMS402,EMS24,EMS377
16046  074522  076325  104101
16047  074526  105055  104532          .WORD   EMS511,EMS503
16048  074532  076541  103024  000000  .WORD   EMS27,EMS336,0
16049
16050  074540  101271  104127  104233  EMT301: .WORD   EMS70,EMS401,EMS405,EMS607
16051  074546  105371
16052  074550  105055  104532  000000          .WORD   EMS511,EMS503,0
16053
16054  074556  105407  000000          EHT1:   .WORD   EH1,0
16055  074562  105466  000000          EHT2:   .WORD   EH2,0
16056  074566  105504  000000          EHT5:   .WORD   EH5,0
16057  074572  105543  000000          EHT7:   .WORD   EH7,0
16058  074576  105562  000000          EHT57:  .WORD   EH57,0
16059  074602  105661  000000          EHT65:  .WORD   EH65,0
16060  074606  105736  000000          EHT71:  .WORD   EH71,0
16061  074612  105475  000000          EHT74:  .WORD   EH3,0
16062  074616  106014  000000          EHT115: .WORD   EH115,0
16063  074622  106112  000000          EHT130: .WORD   EH130,0
16064  074626  106231  000000          EHT132: .WORD   EH132,0
16065  074632  106330  000000          EHT145: .WORD   EH145,0
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16066  074636  106446  000000          EHT150: .WORD   EH150,0
16067  074642  106545  000000          EHT213: .WORD   EH213,0
16068  074646  106643  000000          EHT220: .WORD   EH220,0
16069
16070  074652  106702                  EDT1:   .WORD   ED1
16071  074654  106712                  EDT2:   .WORD   ED2
16072  074656  106716                  EDT5:   .WORD   ED5
16073  074660  106724                  EDT57:  .WORD   ED57
16074  074662  106736                  EDT65:  .WORD   ED65
16075  074664  106746                  EDT71:  .WORD   ED71
16076  074666  106712                  EDT74:  .WORD   ED2
16077  074670  106756                  EDT115: .WORD   ED115
16078  074672  106770                  EDT130: .WORD   ED130
16079  074674  106756                  EDT132: .WORD   ED115
16080  074676  107004                  EDT220: .WORD   ED220
16081
16082  074700  107010                  EFT1:   .WORD   EF1
16083  074702  107013                  EFT2:   .WORD   EF2
16084  074704  107014                  EFT5:   .WORD   EF5
16085  074706  107016                  EFT57:  .WORD   EF57
16086  074710  107010                  EFT65:  .WORD   EF1
16087  074712  107010                  EFT71:  .WORD   EF1
16088  074714  107013                  EFT74:  .WORD   EF2
16089  074716  107016                  EFT115: .WORD   EF57
16090  074720  107022                  EFT130: .WORD   EF130
16091  074722  107016                  EFT132: .WORD   EF57
16092  074724  107014                  EFT220: .WORD   EF5
16093
16094  074726  047516  042516  044530  EMS1:   .ASCIZ  @NONEXISTENT DEVICE "NED" (RMCS2,BIT 12) @
16095  074734  052123  047105  020124
16096  074742  042504  044526  042503
16097  074750  021040  042516  021104
16098  074756  024040  046522  051503
16099  074764  026062  044502  020124
16100  074772  031061  020051     000
16101  074777     103  047117  051124  EMS2:   .ASCIZ  @CONTROLLER CLEAR "CLR" (RMCS2,BIT 05) @
16102  075004  046117  042514  020122
16103  075012  046103  040505  020122
16104  075020  041442  051114  020042
16105  075026  051050  041515  031123
16106  075034  041054  052111  030040
16107  075042  024465  000040
16108  075046  052506  041516  044524  EMS3:   .ASCIZ  @FUNCTION CODE (RMCS1, BITS 01 - 05) @
16109  075054  047117  041440  042117
16110  075062  020105  051050  041515
16111  075070  030523  020054  044502
16112  075076  051524  030040  020061
16113  075104  020055  032460  020051
16114  075112     000
16115  075113     125  052516  042523  EMS4:   .ASCIZ  @UNUSED BIT POSITIONS OF @
16116  075120  020104  044502  020124
16117  075126  047520  044523  044524
16118  075134  047117  020123  043117
16119  075142  000040
16120  075144  042504  044526  042503  EMS5:   .ASCIZ  @DEVICE AVAILABLE "DVA" (RMCS1, BIT 11) @
16121  075152  040440  040526  046111
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16122  075160  041101  042514  021040
16123  075166  053104  021101  024040
16124  075174  046522  051503  026061
16125  075202  041040  052111  030440
16126  075210  024461  000040
16127  075214  040520  052122  054511  EMS6:   .ASCIZ  @PARTIY ERROR "PAR" (RMER1, BIT 03) @
16128  075222  042440  051122  051117
16129  075230  021040  040520  021122
16130  075236  024040  046522  051105
16131  075244  026061  041040  052111
16132  075252  030040  024463  000040
16133  075260  040504  040524  050040  EMS7:   .ASCIZ  @DATA PARITY ERROR "DPE" (RMER2, BIT 03) @
16134  075266  051101  052111  020131
16135  075274  051105  047522  020122
16136  075302  042042  042520  020042
16137  075310  051050  042515  031122
16138  075316  020054  044502  020124
16139  075324  031460  020051     000
16140  075331     120  051101  052111  EMS10:  .ASCIZ  @PARITY TEST "PAT" (RMCS2, BIT 04) @
16141  075336  020131  042524  052123
16142  075344  021040  040520  021124
16143  075352  024040  046522  051503
16144  075360  026062  041040  052111
16145  075366  030040  024464  000040
16146  075374  040515  051523  052502  EMS11:  .ASCII  @MASSBUS CONTROL BUS PARITY ERROR "MCPE" @
16147  075402  020123  047503  052116
16148  075410  047522  020114  052502
16149  075416  020123  040520  044522
16150  075424  054524  042440  051122
16151  075432  051117  021040  041515
16152  075440  042520  020042
16153  075444  051050  041515  030523          .ASCIZ  @(RMCS1, BIT 13) @
16154  075452  020054  044502  020124
16155  075460  031461  020051     000
16156  075465     111  046114  043505  EMS12:  .ASCIZ  @ILLEGAL REGISTER ERROR "ILR" (RMER1, BIT 01) @
16157  075472  046101  051040  043505
16158  075500  051511  042524  020122
16159  075506  051105  047522  020122
16160  075514  044442  051114  020042
16161  075522  051050  042515  030522
16162  075530  020054  044502  020124
16163  075536  030460  020051     000
16164  075543     104  040511  047107  EMS13:  .ASCIZ  @DIAGNOSTIC MODE "DMD" (RMMR1, BIT 00) @
16165  075550  051517  044524  020103
16166  075556  047515  042504  021040
16167  075564  046504  021104  024040
16168  075572  046522  051115  026061
16169  075600  041040  052111  030040
16170  075606  024460  000040
16171  075612  042515  044504  046525  EMS14:  .ASCIZ  @MEDIUM ON LINE "MOL" (RMDS, BIT 12) @
16172  075620  047440  020116  044514
16173  075626  042516  021040  047515
16174  075634  021114  024040  046522
16175  075642  051504  020054  044502
16176  075650  020124  031061  020051
16177  075656     000
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16178  075657      115  044501  052116  EMS15:  .ASCIZ  @MAINTENANCE UNIT READY "MUR" (RMMR1, BIT 09) @
16179  075664  047105  047101  042503
16180  075672  052440  044516  020124
16181  075700  042522  042101  020131
16182  075706  046442  051125  020042
16183  075714  051050  046515  030522
16184  075722  020054  044502  020124
16185  075730  034460  020051      000
16186  075735      115  044501  052116  EMS16:  .ASCIZ  @MAINTENANCE WRITE PROTECT "MWP" (RMMR1, BIT 03) @
16187  075742  047105  047101  042503
16188  075750  053440  044522  042524
16189  075756  050040  047522  042524
16190  075764  052103  021040  053515
16191  075772  021120  024040  046522
16192  076000  051115  026061  041040
16193  076006  052111  030040  024463
16194  076014  000040
16195  076016  051127  052111  020105  EMS17:  .ASCIZ  @WRITE LOCK "WRL" (RMDS, BIT 11) @
16196  076024  047514  045503  021040
16197  076032  051127  021114  024040
16198  076040  046522  051504  020054
16199  076046  044502  020124  030461
16200  076054  020051      000
16201  076057      104  053105  041511  EMS20:  .ASCIZ  @DEVICE CHECK "DVC" (RMER2, BIT 07) @
16202  076064  020105  044103  041505
16203  076072  020113  042042  041526
16204  076100  020042  051050  042515
16205  076106  031122  020054  044502
16206  076114  020124  033460  020051
16207  076122      000
16208  076123      115  044501  052116  EMS21:  .ASCIZ  @MAINTENANCE DRIVE FAULT "MDF" (RMMR1, BIT 06) @
16209  076130  047105  047101  042503
16210  076136  042040  044522  042526
16211  076144  043040  052501  052114
16212  076152  021040  042115  021106
16213  076160  024040  046522  051115
16214  076166  026061  041040  052111
16215  076174  030040  024466  000040
16216  076202  047125  040523  042506  EMS22:  .ASCIZ  @UNSAFE STATUS "UNS" (RMER1, BIT 14) @
16217  076210  051440  040524  052524
16218  076216  020123  052442  051516
16219  076224  020042  051050  042515
16220  076232  030522  020054  044502
16221  076240  020124  032061  020051
16222  076246      000
16223  076247      123  042505  020113  EMS23:  .ASCIZ  @SEEK INCOMPLETE STATUS "SKI" (RMER2, BIT 14) @
16224  076254  047111  047503  050115
16225  076262  042514  042524  051440
16226  076270  040524  052524  020123
16227  076276  051442  044513  020042
16228  076304  051050  042515  031122
16229  076312  020054  044502  020124
16230  076320  032061  020051      000
16231  076325      115  044501  052116  EMS24:  .ASCIZ  @MAINTENANCE SEEK ERROR "MSER" (RMMR1, BIT 07) @
16232  076332  047105  047101  042503
16233  076340  051440  042505  020113
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16234  076346  051105  047522  020122
16235  076354  046442  042523  021122
16236  076362  024040  046522  051115
16237  076370  026061  041040  052111
16238  076376  030040  024467  000040
16239  076404  047520  044523  044524  EMS25:  .ASCIZ  @POSITIONING IN PROGRESS "PIP" (RMDS, BIT 13) @
16240  076412  047117  047111  020107
16241  076420  047111  050040  047522
16242  076426  051107  051505  020123
16243  076434  050042  050111  020042
16244  076442  051050  042115  026123
16245  076450  041040  052111  030440
16246  076456  024463  000040
16247  076462  040515  047111  042524  EMS26:  .ASCIZ  @MAINTENANCE ON CYLINDER "MOC" (RMMR1, BIT 08) @
16248  076470  040516  041516  020105
16249  076476  047117  041440  046131
16250  076504  047111  042504  020122
16251  076512  046442  041517  020042
16252  076520  051050  046515  030522
16253  076526  020054  044502  020124
16254  076534  034060  020051      000
16255  076541      105  042116  047440  EMS27:  .ASCIZ  @END OF BLOCK "EBL" (RMMR1, BIT 13) @
16256  076546  020106  046102  041517
16257  076554  020113  042442  046102
16258  076562  020042  051050  046515
16259  076570  030522  020054  044502
16260  076576  020124  031461  020051
16261  076604      000
16262  076605      104  040511  047107  EMS30:  .ASCIZ  @DIAGNOSTIC END OF BLOCK "DEBL" (RMMR1, BIT 13) @
16263  076612  051517  044524  020103
16264  076620  047105  020104  043117
16265  076626  041040  047514  045503
16266  076634  021040  042504  046102
16267  076642  020042  051050  046515
16268  076650  030522  020054  044502
16269  076656  020124  031461  020051
16270  076664      000
16271  076665      114  051501  020124  EMS31:  .ASCIZ  @LAST SECTOR STATUS "LS" (RMMR1, BIT 02) @
16272  076672  042523  052103  051117
16273  076700  051440  040524  052524
16274  076706  020123  046042  021123
16275  076714  024040  046522  051115
16276  076722  026061  041040  052111
16277  076730  030040  024462  000040
16278  076736  040514  052123  051440  EMS32:  .ASCIZ  @LAST SECTOR/TRACK STATUS "LST" (RMMR1, BIT 01) @
16279  076744  041505  047524  027522
16280  076752  051124  041501  020113
16281  076760  052123  052101  051525
16282  076766  021040  051514  021124
16283  076774  024040  046522  051115
16284  077002  026061  041040  052111
16285  077010  030040  024461  000040
16286  077016  042523  052103  051117  EMS33:  .ASCIZ  @SECTOR ADDRESS, BITS 00-04 OF @
16287  077024  040440  042104  043522
16288  077032  051523  020054  044502
16289  077040  051524  030040  026460
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16290  077046  032060  047440  020106
16291  077054     000
16292  077055     124  040522  045503  EMS34:  .ASCIZ  @TRACK ADDRESS, BITS 08-10 OF @
16293  077062  040440  042104  042522
16294  077070  051523  020054  044502
16295  077076  051524  030040  026470
16296  077104  030061  047440  020106
16297  077112     000
16298  077113     126  046117  046525  EMS35:  .ASCIZ  @VOLUME VALID "VV" (RMDS, BIT 06) @
16299  077120  020105  040526  044514
16300  077126  020104  053042  021126
16301  077134  024040  046522  051504
16302  077142  020054  044502  020124
16303  077150  033060  020051     000
16304  077155     107  020117  044502  EMS36:  .ASCIZ  @GO BIT (RMCS1, BIT 00) @
16305  077162  020124  051050  041515
16306  077170  030523  020054  044502
16307  077175  020124  030060  020051
16308  077204     000
16309  077205     103  046131  047111  EMS37:  .ASCIZ  @CYLINDER ADDRESS, BIT 00-09 OF @
16310  077212  042504  020122  042101
16311  077220  051104  051505  026123
16312  077226  041040  052111  030040
16313  077234  026460  034460  047440
16314  077242  020106     000
16315  077245     114  051501  020124  EMS40:  .ASCIZ  @LAST BLOCK TAKEN STATUS "LBT" (RMDS, BIT 10) @
16316  077252  046102  041517  020113
16317  077260  040524  042513  020116
16318  077266  052123  052101  051525
16319  077274  021040  041114  021124
16320  077302  024040  046522  051504
16321  077310  020054  044502  020124
16322  077316  030061  020051     000
16323  077323     103  046517  047520  EMS41:  .ASCIZ  @COMPOSITE ERROR "ERR" (RMDS, BIT 14) @
16324  077330  044523  042524  042440
16325  077336  051122  051117  021040
16326  077344  051105  021122  024040
16327  077352  046522  051504  020054
16328  077360  044502  020124  032061
16329  077366  020051     000
16330  077371     103  046517  040515  EMS42:  .ASCIZ  @COMMAND SEQUENCER TEST BIT "TST" (RMMR2, BIT 12) @
16331  077376  042116  051440  050505
16332  077404  042525  041516  051105
16333  077412  052040  051505  020124
16334  077420  044502  020124  052042
16335  077426  052123  020042  051050
16336  077434  046515  031122  020054
16337  077442  044502  020124  031061
16338  077450  020051     000
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16339  077453      104  044522  042526  EMS43:  .ASCIZ  @DRIVE READY STATUS "DRY" (RMDS, BIT 07) @
16340  077460  051040  040505  054504
16341  077466  051440  040524  052524
16342  077474  020123  042042  054522
16343  077502  020042  051050  042115
16344  077510  026123  041040  052111
16345  077516  030040  024467  000040
16346  077524  047503  052116  047111  EMS44:  .ASCIZ  @CONTINUE "CONT" (RMMR1, BIT 06) @
16347  077532  042525  021040  047503
16348  077540  052116  020042  051050
16349  077546  046515  030522  020054
16350  077554  044502  020124  033060
16351  077562  020051      000
16352  077565      111  053116  046101  EMS45:  .ASCIZ  @INVALID COMMAND ERROR "IVC" (RMER2, BIT 12) @
16353  077572  042111  041440  046517
16354  077600  040515  042116  042440
16355  077606  051122  051117  021040
16356  077614  053111  021103  024040
16357  077622  046522  051105  026062
16358  077630  041040  052111  030440
16359  077636  024462  000040
16360  077642  047514  051523  047440  EMS46:  .ASCIZ  @LOSS OF SYSTEM CLOCK ERROR "LSC" (RMER2, BIT 11) @
16361  077650  020106  054523  052123
16362  077656  046505  041440  047514
16363  077664  045503  042440  051122
16364  077672  051117  021040  051514
16365  077700  021103  024040  046522
16366  077706  051105  026062  041040
16367  077714  052111  030440  024461
16368  077722  000040
16369  077724  041517  052503  044520  EMS47:  .ASCIZ  @OCCUPIED "OCC" (RMMR1, BIT 15) @
16370  077732  042105  021040  041517
16371  077740  021103  024040  046522
16372  077746  051115  026061  041040
16373  077754  052111  030440  024465
16374  077762  000040
16375  077764  046111  042514  040507  EMS50:  .ASCIZ  @ILLEGAL FUNCTION "ILF" (RMER1, BIT 0) @
16376  077772  020114  052506  041516
16377  100000  044524  047117  021040
16378  100006  046111  021106  024040
16379  100014  046522  051105  026061
16380  100022  041040  052111  030040
16381  100030  020051      000
16382  100033      117  043106  042523  EMS51:  .ASCIZ  @OFFSET DIRECTION "OFD" (RMOF, BIT 07) @
16383  100040  020124  044504  042522
16384  100046  052103  047511  020116
16385  100054  047442  042106  020042
16386  100062  051050  047515  026106
16387  100070  041040  052111  030040
16388  100076  024467  000040
16389  100102  043117  051506  052105  EMS52:  .ASCIZ  @OFFSET MODE "OM" (RMDS, BIT 00) @
16390  100110  046440  042117  020105
16391  100116  047442  021115  024040
16392  100124  046522  051504  020054
16393  100132  044502  020124  030060
16394  100140  020051      000
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16395  100143    122  047125  040440  EMS53:  .ASCIZ  @RUN AND GO "RG" (RMMR1, BIT 14) @
16396  100150 042116  043440  020117
16397  100156 051042  021107  024040
16398  100164 046522  051115  026061
16399  100172 041040  052111  030440
16400  100200 024464  000040
16401  100204 047111  040526  044514  EMS54:  .ASCIZ  @INVALID ADDRESS ERROR "IAE" (RMER1, BIT 10) @
16402  100212 020104  042101  051104
16403  100220 051505  020123  051105
16404  100226 047522  020122  044442
16405  100234 042501  020042  051050
16406  100242 042515  030522  020054
16407  100250 044502  020124  030061
16408  100256 020051     000
16409  100261    101  042104  042522  EMS55:  .ASCIZ  @ADDRESS OVERFLOW ERROR "AOE" (RMER1, BIT 09) @
16410  100266 051523  047440  042526
16411  100274 043122  047514  020127
16412  100302 051105  047522  020122
16413  100310 040442  042517  020042
16414  100316 051050  042515  030522
16415  100324 020054  044502  020124
16416  100332 034460  020051     000
16417  100337    122  043505  051511  EMS56:  .ASCII  @REGISTER MODIFICATION REFUSED ERROR @
16418  100344 042524  020122  047515
16419  100352 044504  044506  040503
16420  100360 044524  047117  051040
16421  100366 043105  051525  042105
16422  100374 042440  051122  051117
16423  100402     040
16424  100403     042  046522  021122          .ASCIZ  @"RMR" (RMER1, BIT 02) @
16425  100410 024040  046522  051105
16426  100416 026061  041040  052111
16427  100424 030040  024462  000040
16428  100432 051104  053111  020105  EMS57:  .ASCIZ  @DRIVE REQUEST REQUIRED STATUS "DRQ" (RMDT, BIT 11) @
16429  100440 042522  052521  051505
16430  100446 020124  042522  052521
16431  100454 051111  042105  051440
16432  100462 040524  052524  020123
16433  100470 042042  050522  020042
16434  100476 051050  042115  026124
16435  100504 041040  052111  030440
16436  100512 024461  000040
16437  100516 051120  043517  040522  EMS60:  .ASCIZ  @PROGRAMMABLE STATUS "PGM" (RMDS, BIT 09) @
16438  100524 046515  041101  042514
16439  100532 051440  040524  052524
16440  100540 020123  050042  046507
16441  100546 020042  051050  042115
16442  100554 026123  041040  052111
16443  100562 030040  024471  000040
16444  100570 051104  053111  020105  EMS61:  .ASCIZ  @DRIVE PRESENT STATUS "DPR" (RMDS, BIT 08) @
16445  100576 051120  051505  047105
16446  100604 020124  052123  052101
16447  100612 051525  021040  050104
16448  100620 021122  024040  046522
16449  100626 051504  020054  044502
16450  100634 020124  034060  020051
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16451  100642      000
16452  100643      120  051117  020124  EMS62:  .ASCIZ  @PORT REQUEST FLOP "RQA,RQB" (RMMR2, BITS 15,14) @
16453  100650   042522  052521  051505
16454  100656   020124  046106  050117
16455  100664   021040  050522  026101
16456  100672   050522  021102  024040
16457  100700   046522  051115  026062
16458  100706   041040  052111  020123
16459  100714   032461  030454  024464
16460  100722   000040
16461  100724   052101  042524  052116  EMS63:  .ASCIZ  @ATTENTION "ATA" (RMDS, BIT 15) @
16462  100732   047511  020116  040442
16463  100740   040524  020042  051050
16464  100746   042115  026123  041040
16465  100754   052111  030440  024465
16466  100762   000040
16467  100764   051127  052111  020105  EMS64:  .ASCIZ  @WRITE LOCK ERROR "WLE" (RMER1, BIT 11) @
16468  100772   047514  045503  042440
16469  101000   051122  051117  021040
16470  101006   046127  021105  024040
16471  101014   046522  051105  026061
16472  101022   041040  052111  030440
16473  101030   024461  000040
16474  101034   054105  042503  052120  EMS65:  .ASCIZ  @EXCEPTION "REX" (RMMR1, BIT 12) @
16475  101042   047511  020116  051042
16476  101050   054105  020042  051050
16477  101056   046515  030522  020054
16478  101064   044502  020124  031061
16479  101072   020051      000
16480  101075      117  042520  040522  EMS66:  .ASCIZ  @OPERATION INCOMPLETE ERROR "OPI" (RMER1, BIT 13) @
16481  101102   044524  047117  044440
16482  101110   041516  046517  046120
16483  101116   052105  020105  051105
16484  101124   047522  020122  047442
16485  101132   044520  020042  051050
16486  101140   042515  030522  020054
16487  101146   044502  020124  031461
16488  101154   020051      000
16489  101157      124  043501  041040  EMS67:  .ASCIZ  @TAG BUS (RMMR2, BITS 00-09) OR TAG CONTROL @
16490  101164   051525  024040  046522
16491  101172   051115  026062  041040
16492  101200   052111  020123  030060
16493  101206   030055  024471  047440
16494  101214   020122  040524  020107
16495  101222   047503  052116  047522
16496  101230   020114      000
16497  101233      114  047111  051505          .ASCIZ  @LINES (RMMR2, BITS 10,11,13) @
16498  101240   024040  046522  051115
16499  101246   026062  041040  052111
16500  101254   020123  030061  030454
16501  101262   026061  031461  020051
16502  101270      000
16503  101271      123  040505  041522  EMS70:  .ASCIZ  @SEARCH ENABLE "ESRC" (RMMR1, BIT 11) @
16504  101276   020110  047105  041101
16505  101304   042514  021040  051505
16506  101312   041522  020042  051050
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16507  101320  046515  030522  020054
16508  101326  044502  020124  030461
16509  101334  020051     000
16510
16511  101337     104  051511  020113  EMS250: .ASCIZ  @DISK ADDRESS REGISTER (RMDA) @
16512  101344  042101  051104  051505
16513  101352  020123  042522  044507
16514  101360  052123  051105  024040
16515  101366  046522  040504  020051
16516  101374     000
16517  101375     103  047117  051124  EMS251: .ASCIZ  @CONTROL STATUS REGISTER #1 (RMCS1) @
16518  101402  046117  051440  040524
16519  101410  052524  020123  042522
16520  101416  044507  052123  051105
16521  101424  021440  020061  051050
16522  101432  041515  030523  020051
16523  101440     000
16524  101441     105  051122  051117  EMS252: .ASCIZ  @ERROR REGISTER #1 (RMER1) @
16525  101446  051040  043505  051511
16526  101454  042524  020122  030443
16527  101462  024040  046522  051105
16528  101470  024461  000040
16529  101474  051105  047522  020122  EMS253: .ASCIZ  @ERROR REGISTER #2 (RMER2) @
16530  101502  042522  044507  052123
16531  101510  051105  021440  020062
16532  101516  051050  042515  031122
16533  101524  020051     000
16534  101527     115  044501  052116  EMS254: .ASCIZ  @MAINTENANCE REGISTER #1 (RMMR1) @
16535  101534  047105  047101  042503
16536  101542  051040  043505  051511
16537  101550  042524  020122  030443
16538  101556  024040  046522  051115
16539  101564  024461  000040
16540  101570  042504  044523  042522  EMS255: .ASCIZ  @DESIRED CYLINDER REGISTER (RMDC) @
16541  101576  020104  054503  044514
16542  101604  042116  051105  051040
16543  101612  043505  051511  042524
16544  101620  020122  051050  042115
16545  101626  024503  000040
16546  101632  043117  051506  052105  EMS256: .ASCIZ  @OFFSET REGISTER (RMOF) @
16547  101640  051040  043505  051511
16548  101646  042524  020122  051050
16549  101654  047515  024506  000040
16550  101662  051104  053111  020105  EMS257: .ASCIZ  @DRIVE TYPE REGISTER (RMDT) @
16551  101670  054524  042520  051040
16552  101676  043505  051511  042524
16553  101704  020122  051050  042115
16554  101712  024524  000040
16555  101716  047510  042114  047111  EMS260: .ASCIZ  @HOLDING REGISTER (RMHR) @
16556  101724  020107  042522  044507
16557  101732  052123  051105  024040
16558  101740  046522  051110  020051
16559  101746     000
16560  101747     123  051105  040511  EMS261: .ASCIZ  @SERIAL NUMBER REGISTER (RMSN) @
16561  101754  020114  052516  041115
16562  101762  051105  051040  043505
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16563  101770  051511  042524  020122
16564  101776  051050  051515  024516
16565  102004  000040
16566  102006  052101  042524  052116  EMS262: .ASCIZ  @ATTENTION SUMMARY REGISTER (RMAS) @
16567  102014  047511  020116  052523
16568  102022  046515  051101  020131
16569  102030  042522  044507  052123
16570  102036  051105  024040  046522
16571  102044  051501  020051     000
16572
16573  102051     103  047101  047516  EMS300: .ASCIZ  @CANNOT CLEAR @
16574  102056  020124  046103  040505
16575  102064  020122     000
16576  102067     103  047101  047516  EMS301: .ASCIZ  @CANNOT WRITE/READ @
16577  102074  020124  051127  052111
16578  102102  027505  042522  042101
16579  102110  000040
16580  102112  047101  020131  042504  EMS302: .ASCIZ  @ANY DEVICE REGISTER @
16581  102120  044526  042503  051040
16582  102126  043505  051511  042524
16583  102134  020122     000
16584  102137     127  052111  047510  EMS303: .ASCIZ  @WITHOUT @
16585  102144  052125  000040
16586  102150  051105  047522  020122  EMS304: .ASCIZ  @ERROR @
16587  102156     000
16588  102157     101  047440  042516  EMS306: .ASCIZ  @A ONE FROM @
16589  102164  043040  047522  020115
16590  102172     000
16591  102173     125  044523  043516  EMS307: .ASCIZ  @USING MASSBUS INITIALIZE, I.E., @
16592  102200  046440  051501  041123
16593  102206  051525  044440  044516
16594  102214  044524  046101  055111
16595  102222  026105  044440  042456
16596  102230  026056  000040
16597  102234  020101  042532  047522  EMS310: .ASCIZ  @A ZERO FROM @
16598  102242  043040  047522  020115
16599  102250     000
16600  102251     105  042526  054522  EMS311: .ASCIZ  @EVERY DEVICE REGISTER BIT POSITION @
16601  102256  042040  053105  041511
16602  102264  020105  042522  044507
16603  102272  052123  051105  041040
16604  102300  052111  050040  051517
16605  102306  052111  047511  020116
16606  102314     000
16607  102315     124  042510  043040  EMS312: .ASCIZ  @THE FOLLOWING BITS ARE STUCK @
16608  102322  046117  047514  044527
16609  102330  043516  041040  052111
16610  102336  020123  051101  020105
16611  102344  052123  041525  020113
16612  102352     000
16613  102353     101  051440  044510  EMS313: .ASCIZ  @A SHIFTING ONE BIT FROM @
16614  102360  052106  047111  020107
16615  102366  047117  020105  044502
16616  102374  020124  051106  046517
16617  102402  000040
16618  102404  050101  042520  051101  EMS314: .ASCIZ  @APPEARS STUCK AT ZERO @
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16619  102412  020123  052123  041525
16620  102420  020113  052101  055040
16621  102426  051105  020117     000
16622  102433     101  050120  040505  EMS315: .ASCIZ  @APPEARS STUCK AT ONE @
16623  102440  051522  051440  052524
16624  102446  045503  040440  020124
16625  102454  047117  020105     000
16626  102461     122  043505  051511  EMS316: .ASCIZ  @REGISTER SELECT @
16627  102466  042524  020122  042523
16628  102474  042514  052103  000040
16629  102502  020061  030450  031054  EMS317: .ASCIZ  @1 (1,2,4,8,16) @
16630  102510  032054  034054  030454
16631  102516  024466  000040
16632  102522  020062  030450  031054  EMS320: .ASCIZ  @2 (1,2,4,8,16) @
16633  102530  032054  034054  030454
16634  102536  024466  000040
16635  102542  020064  030450  031054  EMS321: .ASCIZ  @4 (1,2,4,8,16) @
16636  102550  032054  034054  030454
16637  102556  024466  000040
16638  102562  020070  030450  031054  EMS322: .ASCIZ  @8 (1,2,4,8,16) @
16639  102570  032054  034054  030454
16640  102576  024466  000040
16641  102602  046101  020114  047117  EMS323: .ASCIZ  @ALL ONES FROM @
16642  102610  051505  043040  047522
16643  102616  020115     020
16644  102621     101  046114  055040  EMS324: .ASCIZ  @ALL ZEROS FROM @
16645  102626  051105  051517  043040
16646  102634  047522  020115     000
16647  102641     101  020124  042532  EMS325: .ASCIZ  @AT ZERO @
16648  102646  047522  000040
16649  102652  052101  047440  042516  EMS326: .ASCIZ  @AT ONE @
16650  102660  000040
16651  102662  020054  051117  000040  EMS327: .ASCIZ  @, OR @
16652  102670  005015  051503  046440  EMS330: .ASCIZ  <CR><LF>@CS MBA CLRL @
16653  102676  040502  041440  051114
16654  102704  020114     000
16655  102707     103  047101  047516  EMS331: .ASCIZ  @CANNOT READ ZEROS FROM @
16656  102714  020124  042522  042101
16657  102722  055040  051105  051517
16658  102730  043040  047522  020115
16659  102736     000
16660  102737     111  020123  047111  EMS332: .ASCIZ  @IS INCORRECT @
16661  102744  047503  051122  041505
16662  102752  020124     000
16663  102755     111  020123  047516  EMS333: .ASCIZ  @IS NOT SET @
16664  102762  020124  042523  020124
16665  102770     000
16666  102771     111  020123  042523  EMS334: .ASCIZ  @IS SET @
16667  102776  020124     000
16668  103001     123  047510  046125  EMS335: .ASCIZ  @SHOULD NOT BE SET @
16669  103006  020104  047516  020124
16670  103014  042502  051440  052105
16671  103022  000040
16672  103024  044123  052517  042114  EMS336: .ASCIZ  @SHOULD BE SET @
16673  103032  041040  020105  042523
16674  103040  020124     000
```

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16675  103043      103  047101  047516  EMS337: .ASCIZ  @CANNOT SET @
16676  103050  020124   042523  020124
16677  103056      000
16678  103057      102  041505  052501  EMS340: .ASCIZ  @BECAUSE @
16679  103064  042523   000040
16680  103070  051525   047111  020107  EMS341: .ASCIZ  @USING @
16681  103076      000
16682  103077      104  051125  047111  EMS342: .ASCIZ  @DURING REGISTER TRANSFER @
16683  103104  020107   042522  044507
16684  103112  052123   051105  052040
16685  103120  040522   051516  042506
16686  103126  020122      000
16687  103131      125  042516  050130  EMS343: .ASCIZ  @UNEXPECTED @
16688  103136  041505   042524  020104
16689  103144      000
16690  103145      102  051525  052040  EMS344: .ASCIZ  @BUS TIMEOUT (04 TRAP) @
16691  103152  046511   047505  052125
16692  103160  024040   032060  052040
16693  103166  040522   024520  000040
16694  103174  054502   051040  043505  EMS345: .ASCIZ  @BY REGISTER TRANSFER @
16695  103202  051511   042524  020122
16696  103210  051124   047101  043123
16697  103216  051105   000040
16698  103222  040503   047116  052117  EMS346: .ASCIZ  @CANNOT RESET @
16699  103230  051040   051505  052105
16700  103236  000040
16701  103240  044527   044124  052517  EMS347: .ASCIZ  @WITHOUT SETTING @
16702  103246  020124   042523  052124
16703  103254  047111   020107      000
16704  103261      102  052125  000040  EMS350: .ASCIZ  @BUT @
16705  103266  040527   020123  042522  EMS351: .ASCIZ  @WAS RESET BY @
16706  103274  042523   020124  054502
16707  103302  000040
16708  103304  040527   020123  042523  EMS352: .ASCIZ  @WAS SET BY @
16709  103312  020124   054502  000040
16710  103320  047111   042040  040511  EMS353: .ASCIZ  @IN DIAGNOSTIC MODE @
16711  103326  047107   051517  044524
16712  103334  020103   047515  042504
16713  103342  000040
16714  103344  051511   044440  041516  EMS354: .ASCIZ  @IS INCORRECT ACCORDING TO @
16715  103352  051117   042522  052103
16716  103360  040440   041503  051117
16717  103366  044504   043516  052040
16718  103374  020117      000
16719  103377      103  047101  047516  EMS355:  ASCIZ  @CANNOT INCREMENT @
16720  103404  020124   047111  051103
16721  103412  046505   047105  020124
16722  103420      000
16723  103421      127  051501  047040  EMS356: .ASCIZ  @WAS NOT SET BY @
16724  103426  052117   051440  052105
16725  103434  041040   020131      000
16726  103441      127  051501  047040  EMS357: .ASCIZ  @WAS NOT RESET BY @
16727  103446  052117   051040  051505
16728  103454  052105   041040  020131
16729  103462      000
16730  103463      060  052040  020117  EMS360: .ASCIZ  @0 TO 1 TRANSITION OF @
```

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16731  103470  020061  051124  047101
16732  103476  044523  044524  047117
16733  103504  047440  020106     000
16734  103511     061  052040  020117  EMS361: .ASCIZ  @1 TO 0 TRANSITION OF @
16735  103516  020060  051124  047101
16736  103524  044523  044524  047117
16737  103532  047440  020106     000
16738  103537     111  020123  047111  EMS362: .ASCIZ  @IS INCONSISTENT @
16739  103544  047503  051516  051511
16740  103552  042524  052116  000040
16741  103560  040503  047116  052117  EMS363: .ASCIZ  @CANNOT READ @
16742  103566  051040  040505  020104
16743  103574     000
16744  103575     124  051505  020124  EMS364: .ASCIZ  @TEST PATTERN IN @
16745  103602  040520  052124  051105
16746  103610  020116  047111  000040
16747  103616  047101  020104     000  EMS365: .ASCIZ  @AND @
16748  103623     103  047101  047516  EMS366: .ASCIZ  @CANNOT INITIALIZE @
16749  103630  020124  047111  052111
16750  103636  040511  044514  042532
16751  103644  000040
16752  103646  044124  020105  047503  EMS367: .ASCIZ  @THE COMMAND SEQUENCER HAS BEEN CLOCKED @
16753  103654  046515  047101  020104
16754  103662  042523  052521  047105
16755  103670  042503  020122  040510
16756  103676  020123  042502  047105
16757  103704  041440  047514  045503
16758  103712  042105  000040
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16759  103716  042522  042523  020124  EMS370: .ASCIZ  @RESET EARLY @
16760  103724  040505  046122  020131
16761  103732     000
16762  103733     104  042111  047040  EMS371: .ASCIZ  @DID NOT RESET ON TIME @
16763  103740  052117  051040  051505
16764  103746  052105  047440  020116
16765  103754  044524  042515  000040
16766  103762  052504  044522  043516  EMS372: .ASCIZ  @DURING COMMAND EXECUTION @
16767  103770  041440  046517  040515
16768  103776  042116  042440  042530
16769  104004  052503  044524  047117
16770  104012  000040
16771  104014  047524  000040          EMS373: .ASCIZ  @TO @
16772  104020  044527  044124  040440  EMS374: .ASCIZ  @WITH ANY COMBINATION OF @
16773  104026  054516  041440  046517
16774  104034  044502  040516  044524
16775  104042  047117  047440  020106
16776  104050     000
16777  104051     102  020131  042522  EMS375: .ASCIZ  @BY READING @
16778  104056  042101  047111  020107
16779  104064     000
16780  104065     102  020131  051127  EMS376: .ASCIZ  @BY WRITING @
16781  104072  052111  047111  020107
16782  104100     000
16783  104101     127  051501  051440  EMS377: .ASCIZ  @WAS SET @
16784  104106  052105  000040
16785  104112  040527  020123  047516  EMS400: .ASCIZ  @WAS NOT SET @
16786  104120  020124  042523  020124
16787  104126     000
16788  104127     104  042111  047040  EMS401: .ASCIZ  @DID NOT SET @
16789  104134  052117  051440  052105
16790  104142  000040
16791  104144  044127  046111  020105  EMS402: .ASCIZ  @WHILE @
16792  104152     000
16793  104153     103  046517  040515  EMS403: .ASCIZ  @COMMAND SEQUENCER DID NOT ABORT @
16794  104160  042116  051440  050505
16795  104166  042525  041516  051105
16796  104174  042040  042111  047040
16797  104202  052117  040440  047502
16798  104210  052122  000040
16799  104214  040527  020123  047516  EMS404: .ASCIZ  @WAS NOT RESET @
16800  104222  020124  042522  042523
16801  104230  020124     000
16802  104233     104  051125  047111  EMS405: .ASCIZ  @DURING @
16803  104240  020107     000
16804  104243     127  051501  051040  EMS406: .ASCIZ  @WAS RESET @
16805  104250  051505  052105  000040
16806  104256  042523  051101  044103  EMS407: .ASCIZ  @SEARCH TIMEOUT @
16807  104264  052040  046511  047505
16808  104272  052125  000040
16809
16810  104276  042011  053105  041511  EMS500: .ASCII  @       DEVICE IS NONEXISTENT,@<CR><LF>
16811  104304  020105  051511  047040
16812  104312  047117  054105  051511
16813  104320  042524  052116  006454
16814  104326     012
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16815  104327    011  042504  044526          .ASCII  @      DEVICE IS SWITCHED TO OTHER PORT@<CR><LF>
16816  104334  042503  044440  020123
16817  104342  053523  052111  044103
16818  104350  042105  052040  020117
16819  104356  052117  042510  020122
16820  104364  047520  052122  005015
16821  104372  052011  040522  051516          .ASCIZ  @      TRANSCEIVER ENABLE SWITCH IS OFF@<CR><LF>
16822  104400  042503  053111  051105
16823  104406  042440  040516  046102
16824  104414  020105  053523  052111
16825  104422  044103  044440  020123
16826  104430  043117  006506  000012
16827  104436  044411  020106  047515  EMS501: .ASCIZ  @      IF MODULE, M7686,@<CR><LF>
16828  104444  052504  042514  020054
16829  104452  033515  034066  026066
16830  104460  005015     000
16831  104463     011  040515  051523  EMS502: .ASCIZ  @      MASSBUS TRANSCEIVER,M5922 OR M5923      @<CR><LF>
16832  104470  052502  020123  051124
16833  104476  047101  041523  044505
16834  104504  042526  026122  032515
16835  104512  031071  020062  051117
16836  104520  046440  034465  031462
16837  104526  006411  000012
16838  104532  041411  020123  047515  EMS503: .ASCIZ  @      CS MODULE,M7684,@<CR><LF>
16839  104540  052504  042514  046454
16840  104546  033067  032070  006454
16841  104554  000012
16842  104556  042011  020123  047515  EMS504: .ASCIZ  @      DS MODULE,M7685,@<CR><LF>
16843  104564  052504  042514  046454
16844  104572  033067  032470  006454
16845  104600  000012
16846  104602  042011  053105  041511  EMS505: .ASCIZ  @      DEVICE IS SWITCHED TO A/B PORT POSITION@<CR><LF>
16847  104610  020105  051511  051440
16848  104616  044527  041524  042510
16849  104624  020104  047524  040440
16850  104632  041057  050040  051117
16851  104640  020124  047520  044523
16852  104646  044524  047117  005015
16853  104654     000
16854  104655     011  042504  044526  EMS506: .ASCIZ  @      DEVICE IS NOT AN RM03, OR@<CR><LF>
16855  104662  042503  044440  020123
16856  104670  047516  020124  047101
16857  104676  051040  030115  026063
16858  104704  047440  006522  000012
16859  104712  042011  053105  041511  EMS507: .ASCIZ  @      DEVICE IS SWITCHED TO PROGRAMMABLE PORT POSITION, OR@<CR><LF>
16860  104720  020105  051511  051440
16861  104726  044527  041524  042510
16862  104734  020104  047524  050040
16863  104742  047522  051107  046501
16864  104750  040515  046102  020105
16865  104756  047520  052122  050040
16866  104764  051517  052111  047511
16867  104772  026116  047440  006522
16868  105000  000012
16869  105002  040411  051523  046525  EMS510: .ASCIZ  @      ASSUMING THE RH CONTROLLER HAS NO FAULT@<CR><LF>
16870  105010  047111  020107  044124
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16871  105016  020105  044122  041440
16872  105024  047117  051124  046117
16873  105032  042514  020122  040510
16874  105040  020123  047516  043040
16875  105046  052501  052114  005015
16876  105054     000
16877  105055     015  004412  051120  EMS511: .ASCII  <CR><LF>@       PROBABLE FAULT(S):@<CR><LF>
16878  105062  041117  041101  042514
16879  105070  043040  052501  052114
16880  105076  051450  035051  005015
16881  105104  024011  047516  020124          .ASCIZ  @       (NOT INCLUDING CABLES OR CONNECTORS)@<CR><LF>
16882  105112  047111  046103  042125
16883  105120  047111  020107  040503
16884  105126  046102  051505  047440
16885  105134  020122  047503  047116
16886  105142  041505  047524  051522
16887  105150  006451  000012
16888
16889  105154  042522  042101  044440  EMS600: .ASCIZ  @READ IN PRESET COMMAND @
16890  105162  020116  051120  051505
16891  105170  052105  041440  046517
16892  105176  040515  042116  000040
16893  105204  043117  051506  052105  EMS601: .ASCIZ  @OFFSET COMMAND @
16894  105212  041440  046517  040515
16895  105220  042116  000040
16896  105224  042522  052524  047122  EMS602: .ASCIZ  @RETURN TO CENTER CENTER COMMAND @
16897  105232  052040  020117  042503
16898  105240  052116  051105  041440
16899  105246  047105  042524  020122
16900  105254  047503  046515  047101
16901  105262  020104     000
16902  105265     122  046105  040505  EMS603: .ASCIZ  @RELEASE COMMAND @
16903  105272  042523  041440  046517
16904  105300  040515  042116  000040
16905  105306  042522  040503  044514  EMS604: .ASCIZ  @RECALIBRATE COMMAND @
16906  105314  051102  052101  020105
16907  105322  047503  046515  047101
16908  105330  020104     000
16909  105333     123  042505  020113  EMS605: .ASCIZ  @SEEK COMMAND @
16910  105340  047503  046515  047101
16911  105346  020104     000
16912  105351     123  040505  041522  EMS606: .ASCIZ  @SEARCH COMMAND @
16913  105356  020110  047503  046515
16914  105364  047101  020104     000
16915  105371     104  052101  020101  EMS607: .ASCIZ  @DATA COMMAND @
16916  105376  047503  046515  047101
16917  105404  020104     000
16918
16919  105407     105  050130  052103  EH1:    .ASCII  @EXPCTD  RECEVD  REGSTR@<CR><LF>
16920  105414  020104  051040  041505
16921  105422  053105  020104  051040
16922  105430  043505  052123  006522
16923  105436     012
16924  105437     123  040524  052524          .ASCIZ  @STATUS  STATUS  ADRESS@
16925  105444  020123  051440  040524
16926  105452  052524  020123  040440
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16927   105460  051104  051505  000123
16928   105466  041040  051501  006505  EH2:    .ASCII  @ BASE@<CR><LF>
16929   105474     012
16930   105475     101  051104  051505  EH3:    .ASCIZ  @ADRESS@
16931   105502  000123
16932   105504  054105  041520  042124  EH5:    .ASCII  @EXPCTD   STUCK@<CR><LF>
16933   105512  020040  051440  052524
16934   105520  045503  005015
16935   105524  042522  052523  052114          .ASCIZ  @RESULT  BIT(S)@
16936   105532  020040  044502  024124
16937   105540  024523     000
16938   105543     105  050130  052103  EH7:    .ASCIZ  @EXPCTD  RECEVD@
16939   105550  020104  051040  041505
16940   105556  053105  000104
16941   105562  047123  050107  052122  EH57:   .ASCII  @SNGPRT  DULPRT  RECEVD  DRVTYP@<CR><LF>
16942   105570  020040  052504  050114
16943   105576  052122  020040  042522
16944   106004  042503  042126  020040
16945   105612  051104  052126  050131
16946   105620  005015
16947   105622  051104  052126  050131          .ASCIZ  @DRVTYP  DRVTYP  DRVTYP  REGADR@
16948   105630  020040  051104  052126
16949   105636  050131  020040  051104
16950   105644  052126  050131  020040
16951   105652  042522  040507  051104
16952   105660     000
16953   105661     105  050130  052103  EH65:   .ASCII  @EXPCTD  RECEVD  TEST@<CR><LF>
16954   105666  020104  051040  041505
16955   105674  053105  020104  052040
16956   105702  051505  006524     012
16957   105707     123  040524  052524          .ASCIZ  @STATUS  STATUS  REGSTR@
16958   105714  020123  051440  040524
16959   105722  052524  020123  051040
16960   105730  043505  052123  000122
16961   105736  054105  041520  042124  EH71:   .ASCII  @EXPCTD  RECEVD   TEST@<CR><LF>
16962   105744  020040  042522  042503
16963   105752  042126  020040  052040
16964   105760  051505  006524     012
16965   105765     123  040524  052524          .ASCIZ  @STATUS  STATUS  PATTRN@
16966   105772  020123  051440  040524
16967   106000  052524  020123  050040
16968   106006  052101  051124  000116
16969   106014  054105  041520  042124  EH115:  .ASCII  @EXPCTD  RECEVD  REGSTR   TEST@<CR><LF>
16970   106022  020040  042522  042503
16971   106030  042126  020040  042522
16972   106036  051507  051124  020040
16973   106044  052040  051505  006524
16974   106052     012
16975   106053     123  040524  052524          .ASCIZ  @STATUS  STATUS  ADRESS  PATTRN@
16976   106060  020123  051440  040524
16977   106066  052524  020123  040440
16978   106074  051104  051505  020123
16979   106102  050040  052101  051124
16980   106110  000116
16981   106112  054105  041520  042124  EH130:  .ASCII  @EXPCTD  RECEVD  REGSTR   TEST   OFFSET@<CR><LF>
16982   106120  020040  042522  042503
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16983  106126  042126  020040  042522
16984  106134  051507  051124  020040
16985  106142  052040  051505  020124
16986  106150  020040  043117  051506
16987  106156  052105  005015
16988  106162  052123  052101  051525          .ASCIZ  @STATUS  STATUS  ADRESS  PATTRN  REGSTR@
16989  106170  020040  052123  052101
16990  106176  051525  020040  042101
16991  106204  042522  051523  020040
16992  106212  040520  052124  047122
16993  106220  020040  042522  051507
16994  106226  051124     000
16995  106231     105  050130  052103  EH132:  .ASCII  @EXPCTD  ACTUAL  REGSTR  OFFSET@<CR><LF>
16996  106236  020104  040440  052103
16997  106244  040525  020114  051040
16998  106252  043505  052123  020122
16999  106260  047440  043106  042523
17000  106266  006524     012
17001  106271     103  052517  052116          .ASCIZ  @COUNT   COUNT   ADRESS  REGSTR@
17002  106276  020040  041440  052517
17003  106304  052116  020040  040440
17004  106312  051104  051505  020123
17005  106320  051040  043505  052123
17006  106326  000122
17007  106330  054105  041520  042124  EH145:  .ASCII  @EXPCTD  ACTUAL  REGSTR  RMER1   RMER2@<CR><LF>
17008  106336  020040  041501  052524
17009  106344  046101  020040  042522
17010  106352  051507  051124  020040
17011  106360  046522  051105  020061
17012  106366  020040  046522  051105
17013  106374  006462     012
17014  106377     103  050115  051105          .ASCIZ  @CMPERR  CMPERR  ADRESS  PATTRN  PATTRN@
17015  106404  020122  041440  050115
17016  106412  051105  020122  040440
17017  106420  051104  051505  020123
17018  106426  050040  052101  051124
17019  106434  020116  050040  052101
17020  106442  051124  000116
17021
17022  106446  054105  041520  042124  EH150:  .ASCII  @EXPCTD  ACTUAL  REGSTR FUNCTION@<CR><LF>
17023  106454  020040  041501  052524
17024  106462  046101  020040  042522
17025  106470  051507  051124  043040
17026  106476  047125  052103  047511
17027  106504  006516     012
17028  106507     122  051505  046125          .ASCIZ  @RESULT  RESULT  ADRESS   CODE@
17029  106514  020124  051040  051505
17030  106522  046125  020124  040440
17031  106530  051104  051505  020123
17032  106536  020040  047503  042504
17033  106544     000
17034  106545     105  050130  052103  EH213:  .ASCII  @EXPCTD  ACTUAL  STATUS   TEST@<CR><LF>
17035  106552  020104  040440  052103
17036  106560  040525  020114  051440
17037  106566  040524  052524  020123
17038  106574  020040  042524  052123
```

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17039  106602  005015
17040  106604  042522  052523  052114          .ASCIZ  @RESULT  RESULT  ADRESS  REGSTR@
17041  106612  020040  042522  052523
17042  106620  052114  020040  042101
17043  106626  042522  051523  020040
17044  106634  042522  051507  051124
17045  106642     000
17046  106643     101  052103  040525  EM220:  .ASCII  @ACTUAL  REGSTR@<CR><LF>
17047  106650  020114  051040  043505
17048  106656  052123  006522     012
17049  106663     122  051505  046125          .ASCIZ  @RESULT  ADRESS@
17050  106670  020124  040440  051104
17051  106676  051505  000123
17052                              .EVEN
17053  106702  001140  001142  001136  ED1:    .WORD   $GDDAT,$BDDAT,$BDADR,0
17054  106710  000000
17055  106712  001136  000000          ED2:    .WORD   $BDADR,0
17056  106716  001140  001142  000000  ED5:    .WORD   $GDDAT,$BDDAT,0
17057  106724  001174  001176  001142  ED57:   .WORD   $TMP0,$TMP1,$BDDAT,$BDADR,0
17058  106732  001136  000000
17059  106736  001140  001142  001174  ED65:   .WORD   $GDDAT,$BDDAT,$TMP0,0
17060  106744  000000
17061  106746  001140  001142  001440  ED71:   .WORD   $GDDAT,$BDDAT,RMHR0,0
17062  106754  000000
17063  106756  001140  001142  001136  ED115:  .WORD   $GDDAT,$BDDAT,$BDADR,$TMP0,0
17064  106764  001174  000000
17065  106770  001140  001142  001136  ED130:  .WORD   $GDDAT,$BDDAT,$BDADR,$TMP0,$TMP1,0
17066  106776  001174  001176  000000
17067  107004  001142  001136          ED220:  .WORD   $BDDAT,$BDADR
17068
17069  107010     000     000     000  EF1:    .BYTE   0,0,0
17070  107013     000                  EF2:    .BYTE   0
17071  107014     000     000          EF5:    .BYTE   0,0
17072  107016     000     000     000  EF57:   .BYTE   0,0,0,0
17073  107021     000
17074  107022     000     000     000  EF130:  .BYTE   0,0,0,0,0
17075  107025     000     000
17076
17077              107030               .EVEN
17078  107030                          BUFFER:
17079  107030  000402                  BUFONE: .BLKW   258.
17080  110034  000402                  BUFTWO: .BLKW   258.
17081              107030               .      =        BUFFER
17082  107030                          HELP:
17083  107030  005015                   .ASCII  <CR><LF>
17084  107032  044514  052123  047440   .ASCII  @LIST OF TESTS@<CR><LF>
17085  107040  020106  042524  052123
17086  107046  006523     012
17087  107051     055  026455  026455   .ASCII  @-------------@<CR><LF>
17088  107056  026455  026455  026455
17089  107064  026455  005015
17090  107070  005015                   .ASCII  <CR><LF>
17091  107072  030524  052011  040522   .ASCII  @T1     TRANSFER TEST@<CR><LF>
17092  107100  051516  042506  020122
17093  107106  042524  052123  005015
17094  107114  031124  041411  047524   .ASCII  @T2     CTOD TEST@<CR><LF>
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17095  107122  020104  042524  052123
17096  107130  005015
17097  107132  031524  046411  051501  .ASCII  @T3     MASSBUS INITIALIZE TEST@<CR><LF>
17098  107140  041123  051525  044440
17099  107146  044516  044524  046101
17100  107154  055111  020105  042524
17101  107162  052123  005015
17102  107166  032124  041411  042514  .ASCII  @T4     CLEAR STUCK ACTIVE TEST@<CR><LF>
17103  107174  051101  051440  052524
17104  107202  045503  040440  052103
17105  107210  053111  020105  042524
17106  107216  052123  005015
17107  107222  032524  052011  044522  .ASCII  @T5     TRISTATE TRANSFER TEST@<CR><LF>
17108  107230  052123  052101  020105
17109  107236  051124  047101  043123
17110  107244  051105  052040  051505
17111  107252  006524      012
17112  107255      124  004466  042522  .ASCII  @T6     REGISTER SELECT TEST@<CR><LF>
17113  107262  044507  052123  051105
17114  107270  051440  046105  041505
17115  107276  020124  042524  052123
17116  107304  005015
17117  107306  033524  042011  044522  .ASCII  @T7     DRIVE TYPE TEST@<CR><LF>
17118  107314  042526  052040  050131
17119  107322  020105  042524  052123
17120  107330  005015
17121  107332  030524  004460  042504  .ASCII  @T10    DEVICE AVAILABLE TEST@<CR><LF>
17122  107340  044526  042503  040440
17123  107346  040526  046111  041101
17124  107354  042514  052040  051505
17125  107362  006524      012
17126  107365      124  030461  044011  .ASCII  @T11    HOLDING REGISTER TRANSFER TEST@<CR><LF>
17127  107372  046117  044504  043516
17128  107400  051040  043505  051511
17129  107406  042524  020122  051124
17130  107414  047101  043123  051105
17131  107422  052040  051505  006524
17132  107430      012
17133  107431      124  031061  041411  .ASCII  @T12    CONTROL STATUS #1 TRANSFER TEST@<CR><LF>
17134  107436  047117  051124  046117
17135  107444  051440  040524  052524
17136  107452  020123  030443  052040
17137  107460  040522  051516  042506
17138  107466  020122  042524  052123
17139  107474  005015
17140  107476  030524  004463  051105  .ASCII  @T13    ERROR REGISTER 1 TRANSFER TEST@<CR><LF>
17141  107504  047522  020122  042522
17142  107512  044507  052123  051105
17143  107520  030440  052040  040522
17144  107526  051516  042506  020122
17145  107534  042524  052123  005015
17146  107542  030524  004464  051105  .ASCII  @T14    ERROR REGISTER 2 TRANSFER TEST@<CR><LF>
17147  107550  047522  020122  042522
17148  107556  044507  052123  051105
17149  107564  031040  052040  040522
17150  107572  051516  042506  020122
```

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17151  107600  042524  052123  005015
17152  107606  030524  004465  046103  .ASCII  @T15    CLEAR OFFSET STUCK ACTIVE TEST@<CR><LF>
17153  107614  040505  020122  043117
17154  107622  051506  052105  051440
17155  107630  052524  045503  040440
17156  107636  052103  053111  020105
17157  107644  042524  052123  005015
17158  107652  030524  004466  043117  .ASCII  @T16    OFFSET REGISTER TRANSFER TEST@<CR><LF>
17159  107660  051506  052105  051040
17160  107666  043505  051511  042524
17161  107674  020122  051124  047101
17162  107702  043123  051105  052040
17163  107710  051505  006524      012
17164  107715      124  033461  051411  .ASCII  @T17    SERIAL NUMBER TEST@<CR><LF>
17165  107722  051105  040511  020114
17166  107730  052516  041115  051105
17167  107736  052040  051505  006524
17168  107744      012
17169  107745      124  030062  041411  .ASCII  @T20    CONTROL BUS PARITY DETECTION TEST@<CR><LF>
17170  107752  047117  051124  046117
17171  107760  041040  051525  050040
17172  107766  051101  052111  020131
17173  107774  042504  042524  052103
17174  110002  047511  020116  042524
17175  110010  052123  005015
17176  110014  031124  004461  047503  .ASCII  @T21    CONTROL BUS PARITY GENERATION TEST@<CR><LF>
17177  110022  052116  047522  020114
17178  110030  052502  020123  040520
17179  110036  044522  054524  043440
17180  110044  047105  051105  052101
17181  110052  047511  020116  042524
17182  110060  052123  005015
17183  110064  031124  004462  046522  .ASCII  @T22    RMDA,RMDC FAULT TEST@<CR><LF>
17184  110072  040504  051054  042115
17185  110100  020103  040506  046125
17186  110106  020124  042524  052123
17187  110114  005015
17188  110116  031124  004463  044504  .ASCII  @T23    DISK ADDRESS TRANSFER TEST@<CR><LF>
17189  110124  045523  040440  042104
17190  110132  042522  051523  052040
17191  110140  040522  051516  042506
17192  110146  020122  042524  052123
17193  110154  005015
17194  110156  031124  004464  042504  .ASCII  @T24    DESIRED CYLINDER TRANSFER TEST@<CR><LF>
17195  110164  044523  042522  020104
17196  110172  054503  044514  042116
17197  110200  051105  052040  040522
17198  110206  051516  042506  020122
17199  110214  042524  052123  005015
17200  110222  031124  004465  046111  .ASCII  @T25    ILLEGAL REGISTER TEST@<CR><LF>
17201  110230  042514  040507  020114
17202  110236  042522  044507  052123
17203  110244  051105  052040  051505
17204  110252  006524      012
17205  110255      124  033062  051011  .ASCII  @T26    RESET GO BY INIT TEST@<CR><LF>
17206  110262  051505  052105  043440
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17207  110270  020117  054502  044440
17208  110276  044516  020124  042524
17209  110304  052123  005015
17210  110310  031124  004467  044504  .ASCII  @T27    DIAGNOSTIC MODE TEST@<CR><LF>
17211  110316  043501  047516  052123
17212  110324  041511  046440  042117
17213  110332  020105  042524  052123
17214  110340  005015
17215  110342  031524  004460  047515  .ASCII  @T30    MOL TEST@<CR><LF>
17216  110350  020114  042524  052123
17217  110356  005015
17218  110360  031524  004461  051127  .ASCII  @T31    WRITE LOCK TEST@<CR><LF>
17219  110366  052111  020105  047514
17220  110374  045503  052040  051505
17221  110402  006524     012
17222  110405     124  031063  042011  .ASCII  @T32    DRIVE FAULT TEST@<CR><LF>
17223  110412  044522  042526  043040
17224  110420  052501  052114  052040
17225  110426  051505  006524     012
17226  110433     124  031463  051411  .ASCII  @T33    SEEK ERROR TEST@<CR><LF>
17227  110440  042505  020113  051105
17228  110446  047522  020122  042524
17229  110454  052123  005015
17230  110460  031524  004464  044520  .ASCII  @T34    PIP TEST@<CR><LF>
17231  110466  020120  042524  052123
17232  110474  005015
17233  110476  031524  004465  041105  .ASCII  @T35    EBL TEST@<CR><LF>
17234  110504  020114  042524  052123
17235  110512  005015
17236  110514  031524  004466  040514  .ASCII  @T36    LAST SECTOR, LAST TRACK TEST@<CR><LF>
17237  110522  052123  051440  041505
17238  110530  047524  026122  046040
17239  110536  051501  020124  051124
17240  110544  041501  020113  042524
17241  110552  052123  005015
17242  110556  031524  004467  046522  .ASCII  @T37    RMDA COUNT TEST@<CR><LF>
17243  110564  040504  041440  052517
17244  110572  052116  052040  051505
17245  110600  006524     012
17246  110603     124  030064  051011  .ASCII  @T40    RMDC COUNT TEST@<CR><LF>
17247  110610  042115  020103  047503
17248  110616  047125  020124  042524
17249  110624  052123  005015
17250  110630  032124  004461  041114  .ASCII  @T41    LBT TEST@<CR><LF>
17251  110636  020124  042524  052123
17252  110644  005015
17253  110646  032124  004462  047503  .ASCII  @T42    COMPOSITE ERROR TEST@<CR><LF>
17254  110654  050115  051517  052111
17255  110662  020105  051105  047522
17256  110670  020122  042524  052123
17257  110676  005015
17258  110700  032124  004463  051127  .ASCII  @T43    WRITE GO TEST@<CR><LF>
17259  110706  052111  020105  047507
17260  110714  052040  051505  006524
17261  110722     012
17262  110723     124  032064  041011  .ASCII  @T44    BRANCH MULTIPLEXOR TEST@<CR><LF>
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17263  110730  040522  041516  020110
17264  110736  052515  052114  050111
17265  110744  042514  047530  020122
17266  110752  042524  052123  005015
17267  110760  032124  004465  042523  .ASCII  @T45    SET/RESET GO TEST@<CR><LF>
17268  110766  027524  042522  042523
17269  110774  020124  047507  052040
17270  111002  051505  006524     012
17271  111007     124  033064  042411  .ASCII  @T46    END 1 RESET GO TEST@<CR><LF>
17272  111014  042116  030440  051040
17273  111022  051505  052105  043440
17274  111030  020117  042524  052123
17275  111036  005015
17276  111040  032124  004467  042523  .ASCII  @T47    SET PULSE TEST@<CR><LF>
17277  111046  020124  052520  051514
17278  111054  020105  042524  052123
17279  111062  005015
17280  111064  032524  004460  042523  .ASCII  @T50    SET/RESET IVC TEST@<CR><LF>
17281  111072  027524  042522  042523
17282  111100  020124  053111  020103
17283  111106  042524  052123  005015
17284  111114  032524  004461  042523  .ASCII  @T51    SET LSC TEST@<CR><LF>
17285  111122  020124  051514  020103
17286  111130  042524  052123  005015
17287  111136  032524  004462  042504  .ASCII  @T52    DECODE TEST@<CR><LF>
17288  111144  047503  042504  052040
17289  111152  051505  006524     012
17290  111157     124  031465  051411  .ASCII  @T53    SET/RESET VOLUME VALID TEST@<CR><LF>
17291  111164  052105  051057  051505
17292  111172  052105  053040  046117
17293  111200  046525  020105  040526
17294  111206  044514  020104  042524
17295  111214  052123  005015
17296  111220  032524  004464  046111  .ASCII  @T54    ;LLEGAL FUNCTION TEST@<CR><LF>
17297  111226  042514  040507  020114
17298  111234  052506  041516  044524
17299  111242  047117  052040  051505
17300  111250  006524     012
17301  111253     124  032465  047411  .ASCII  @T55    OCCUPIED TEST@<CR><LF>
17302  111260  041503  050125  042511
17303  111266  020104  042524  052123
17304  111274  005015
17305  111276  032524  004466  042522  .ASCII  @T56    READ IN PRESET TEST@<CR><LF>
17306  111304  042101  044440  020116
17307  111312  051120  051505  052105
17308  111320  052040  051505  006524
17309  111326     012
17310  111327     124  033465  051011  .ASCII  @T57    RIP/RMOF TEST@<CR><LF>
17311  111334  050111  051057  047515
17312  111342  020106  042524  052123
17313  111350  005015
17314  111352  033124  004460  046522  .ASCII  @T60    RMDA/RMDC/RIP TEST@<CR><LF>
17315  111360  040504  051057  042115
17316  111366  027503  044522  020120
17317  111374  042524  052123  005015
17318  111402  033124  004461  043117  .ASCII  @T61    OFFSET COMMAND TEST@<CR><LF>
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17319  111410  051506  052105  041440
17320  111416  046517  040515  042116
17321  111424  052040  051505  006524
17322  111432     012
17323  111433     124  031066  051011  .ASCII  @T62    RETURN TO CENTER TEST@<CR><LF>
17324  111440  052105  051125  020116
17325  111446  047524  041440  047105
17326  111454  042524  020122  042524
17327  111462  052123  005015
17328  111466  033124  004463  046522  .ASCII  @T63    RMDC CLEAR OFFSET TEST@<CR><LF>
17329  111474  041504  041440  042514
17330  111502  051101  047440  043106
17331  111510  042523  020124  042524
17332  111516  052123  005015
17333  111522  033124  004464  041105  .ASCII  @T64    EBL CLEAR OFFSET TEST@<CR><LF>
17334  111530  020114  046103  040505
17335  111536  020122  043117  051506
17336  111544  052105  052040  051505
17337  111552  006524     012
17338  111555     124  032466  051011  .ASCII  @T65    RUN AND GO TEST@<CR><LF>
17339  111562  047125  040440  042116
17340  111570  043440  020117  042524
17341  111576  052123  005015
17342  111602  033124  004466  042523  .ASCII  @T66    SET IAE TEST@<CR><LF>
17343  111610  020124  040511  020105
17344  111616  042524  052123  005015
17345  111624  033124  004467  042523  .ASCII  @T67    SEARCH, SEEK, READ WRITE TEST@<CR><LF>
17346  111632  051101  044103  020054
17347  111640  042523  045505  020054
17348  111646  042522  042101  053440
17349  111654  044522  042524  052040
17350  111662  051505  006524     012
17351  111667     124  030067  044411  .ASCII  @T70    INVALID SECTOR/TRACK TEST@<CR><LF>
17352  111674  053116  046101  042111
17353  111702  051440  041505  047524
17354  111710  027522  051124  041501
17355  111716  020113  042524  052123
17356  111724  005015
17357  111726  033524  004461  047111  .ASCII  @T71    INVALID CYLINDER TEST@<CR><LF>
17358  111734  040526  044514  020104
17359  111742  054503  044514  042116
17360  111750  051105  052040  051505
17361  111756  006524     012
17362  111761     124  031067  051411  .ASCII  @T72    SET AOE TEST@<CR><LF>
17363  111766  052105  040440  042517
17364  111774  052040  051505  006524
17365  112002     012
17366  112003     124  031467  051411  .ASCII  @T73    SET RMR TEST@<CR><LF>
17367  112010  052105  051040  051115
17368  112016  052040  051505  006524
17369  112024     012
17370  112025     124  032067  050011  .ASCII  @T74    PGM STATUS CHECK@<CR><LF>
17371  112032  046507  051440  040524
17372  112040  052524  020123  044103
17373  112046  041505  006513     012
17374  112053     124  032467  042011  .ASCII  @T75    DPR STATUS CHECK@<CR><LF>
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17375  112060  051120  051440  040524
17376  112066  052524  020123  044103
17377  112074  041505  006513     012
17378  112101     124  033067  050011  .ASCII  @T76    PORT REQUEST TEST, PART 1@<CR><LF>
17379  112106  051117  020124  042522
17380  112114  052521  051505  020124
17381  112122  042524  052123  020054
17382  112130  040520  052122  030440
17383  112136  005015
17384  112140  033524  004467  047520  .ASCII  @T77    PORT REQUEST TEST, PART 2@<CR><LF>
17385  112146  052122  051040  050505
17386  112154  042525  052123  052040
17387  112162  051505  026124  050040
17388  112170  051101  020124  006462
17389  112176     012
17390  112177     124  030061  004460  .ASCII  @T100   PORT REQUEST TEST, PART 3@<CR><LF>
17391  112204  047520  052122  051040
17392  112212  050505  042525  052123
17393  112220  052040  051505  026124
17394  112226  050040  051101  020124
17395  112234  006463     012
17396  112237     124  030061  004461  .ASCII  @T101   RELEASE TEST@<CR><LF>
17397  112244  042522  042514  051501
17398  112252  020105  042524  052123
17399  112260  005015
17400  112262  030524  031060  053411  .ASCII  @T102   WRITE ATA TEST@<CR><LF>
17401  112270  044522  042524  040440
17402  112276  040524  052040  051505
17403  112304  006524     012
17404  112307     124  030061  004463  .ASCII  @T103   RESET ATA BY GO TEST@<CR><LF>
17405  112314  042522  042523  020124
17406  112322  052101  020101  054502
17407  112330  043440  020117  042524
17408  112336  052123  005015
17409  112342  030524  032060  052411  .ASCII  @T104   UNIT READY ATA TEST@<CR><LF>
17410  112350  044516  020124  042522
17411  112356  042101  020131  052101
17412  112364  020101  042524  052123
17413  112372  005015
17414  112374  030524  032460  042411  .ASCII  @T105   ERROR ATA TEST@<CR><LF>
17415  112402  051122  051117  040440
17416  112410  040524  052040  051505
17417  112416  006524     012
17418  112421     124  030061  004466  .ASCII  @T106   REGISTER TRANSFER ATA TEST@<CR><LF>
17419  112426  042522  044507  052123
17420  112434  051105  052040  040522
17421  112442  051516  042506  020122
17422  112450  052101  020101  042524
17423  112456  052123  005015
17424  112462  030524  033460  050011  .ASCII  @T107   P SET ATA TEST@<CR><LF>
17425  112470  051440  052105  040440
17426  112476  040524  052040  051505
17427  112504  006524     012
17428  112507     124  030461  004460  .ASCII  @T110   SET WLE TEST@<CR><LF>
17429  112514  042523  020124  046127
17430  112522  020105  042524  052123
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17431  112530  005015
17432  112532  030524  030461  042411  .ASCII  @T111   EXCEPTION TEST@<CR><LF>
17433  112540  041530  050105  044524
17434  112546  047117  052040  051505
17435  112554  006524     012
17436  112557     124  030461  004462  .ASCII  @T112   SET OPI TEST@<CR><LF>
17437  112564  042523  020124  050117
17438  112572  020111  042524  052123
17439  112600  005015
17440  112602  030524  031461  051011  .ASCII  @T113   RECALIBRATE TEST@<CR><LF>
17441  112610  041505  046101  041111
17442  112616  040522  042524  052040
17443  112624  051505  006524     012
17444  112631     124  030461  004464  .ASCII  @T114   SEEK TEST@<CR><LF>
17445  112636  042523  045505  052040
17446  112644  051505  006524     012
17447  112651     124  030461  004465  .ASCII  @T115   SEARCH TEST@<CR><LF>
17448  112656  042523  051101  044103
17449  112664  052040  051505  006524
17450  112672     012
17451  112673     124  030461  004466  .ASCII  @T116   SEARCH TIMEOUT TEST@<CR><LF>
17452  112700  042523  051101  044103
17453  112706  052040  046511  047505
17454  112714  052125  052040  051505
17455  112722  006524     012
17456  112725     124  030461  004467  .ASCII  @T117   DATA COMMAND TESTS (1)@<CR><LF>
17457  112732  040504  040524  041440
17458  112740  046517  040515  042116
17459  112746  052040  051505  051524
17460  112754  024040  024461  005015
17461  112762  030524  030062  042011  .ASCII  @T120   DATA COMMAND TESTS (2)@<CR><LF>
17462  112770  052101  020101  047503
17463  112776  046515  047101  020104
17464  113004  042524  052123  020123
17465  113012  031050  006451     012
17466  113017     124  031061  004461  .ASCII  @T12.   DATA COMMAND TESTS(3)@<CR><LF>
17467  113024  040504  040524  041440
17468  113032  046517  040515  042116
17469  113040  052040  051505  051524
17470  113046  031450  006451     012
17471  113053     015     012          .ASCII  <CR><LF>
17472  113055     015     012          .ASCII  <CR><LF>
17473  113057     123  044527  041524  .ASCII  @SWITCH                 USE@<CR><LF>
17474  113064  004510  004411  051525
17475  113072  006505     012
17476  113075     055  026455  026455  .ASCII  @------          ----------------------@<CR><LF>
17477  113102  004455  026411  026455
17478  113110  026455  026455  026455
17479  113116  026455  026455  026455
17480  113124  026455  026455  006455
17481  113132     012
17482  113133     040  030440  004465  .ASCII  @  15           HALT ON ERROR@<CR><LF>
17483  113140  044011  046101  020124
17484  113146  047117  042440  051122
17485  113154  051117  005015
17486  113160  020040  032061  004411  .ASCII  @  14           LOOP ON TEST@<CR><LF>
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17487  113166  047514  050117  047440
17488  113174  020116  042524  052123
17489  113202  005015
17490  113204  020040  031461  004411  .ASCII  @  13          INHIBIT ERROR TYPEOUTS@<CR><LF>
17491  113212  047111  044510  044502
17492  113220  020124  051105  047522
17493  113226  020122  054524  042520
17494  113234  052517  051524  005015
17495  113242  020040  030461  004411  .ASCII  @  11          INHIBIT ITERATIONS@<CR><LF>
17496  113250  047111  044510  044502
17497  113256  020124  052111  051105
17498  113264  052101  047511  051516
17499  113272  005015
17500  113274  020040  030061  004411  .ASCII  @  10          BELL ON ERROR@<CR><LF>
17501  113302  042502  046114  047440
17502  113310  020116  051105  047522
17503  113316  006522     012
17504  113321     040  020040  004471  .ASCII  @   9          LOOP ON ERROR@<CR><LF>
17505  113326  046011  047517  020120
17506  113334  047117  042440  051122
17507  113342  051117  005015
17508  113346  020040  034040  004411  .ASCII  @   8          LOOP ON TEST IN SWR<7:0>@<CR><LF>
17509  113354  047514  050117  047440
17510  113362  020116  042524  052123
17511  113370  044440  020116  053523
17512  113376  036122  035067  037060
17513  113404  005015
17514  113406  020040  033440  004411  .ASCII  @   7          TN128@<CR><LF>
17515  113414  047124  031061  006470
17516  113422     012
17517  113423     040  020040  004466  .ASCII  @   6          TN64@<CR><LF>
17518  113430  052011  033116  006464
17519  113436     012
17520  113437     040  020040  004465  .ASCII  @   5          TN32@<CR><LF>
17521  113444  052011  031516  006462
17522  113452     012
17523  113453     040  020040  004464  .ASCII  @   4          TN16@<CR><LF>
17524  113460  052011  030516  006466
17525  113466     012
17526  113467     040  020040  004463  .ASCII  @   3          TN8@<CR><LF>
17527  113474  052011  034116  005015
17528  113502  020040  031040  004411  .ASCII  @   2          TN4@<CR><LF>
17529  113510  047124  006464     012
17530  113515     040  020040  004461  .ASCII  @   1          TN2@<CR><LF>
17531  113522  052011  031116  005015
17532  113530  020040  030040  004411  .ASCII  @   0          TN1@<CR><LF>
17533  113536  047124  006461     012
17534  113543     015  000012          .ASCIZ  <CR><LF>
17535          000001                  .END
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ABASE = 176700          3119#  3227   3268
ACDW1 = 000000          3227   3270
ACDW2 = 000000          3227   3271
ACPUOP= 000000          3227   3242
ADDW0 = 000000          3227   3272
ADDW1 = 000000          3227   3273
ADDW10= 000000          3227
ADDW11= 000000          3227
ADDW12= 000000          3227
ADDW13= 000000          3227
ADDW14= 000000          3227
ADDW15= 000000          3227
ADDW2 = 000000          3227   3274
ADDW3 = 000000          3227   3275
ADDW4 = 000000          3227   3276
ADDW5 = 000000          3227   3277
ADDW6 = 000000          3227   3278
ADDW7 = 000000          3227   3279
ADDW8 = 000000          3227
ADDW9 = 000000          3227
ADEVCT= 000000          3227   3233
ADEVM = 000000          3227   3269
AENV  = 000000          3227   3238
AENVM = 000000          3227   3239
AFATAL= 000000          3227   3230
AMADR1= 000000          3227   3255
AMADR2= 000000          3227   3259
AMADR3= 000000          3227   3262
AMADR4= 000000          3227   3265
AMAMS1= 000000          3227   3249
AMAMS2= 000000          3227   3257
AMAMS3= 000000          3227   3260
AMAMS4= 000000          3227   3263
AMSGAD= 000000          3227   3235
AMSGLG= 000000          3227   3236
AMSGTY= 000000          3227   3229
AMTYP1= 000000          3227   3250
AMTYP2= 000000          3227   3258
AMTYP3= 000000          3227   3261
AMTYP4= 000000          3227   3264
AOE   = 001000          2896#  2907   6235   6266   9281   10159  10163  15126  15127  15130  15131  15134  15135
APASS = 000000          3227   3232
APE   = 100000          3098#
APRIOR= 000000          3227
APTCSU= 000040         14309  15011#
APTENV= 000001         14302  14545  14967  15009#
APTSIZ= 000200          4985  15008#
APTSPD= 000100         14304  14969  15010#
ASWREG= 000000          3227   3240
ATA   = 100000          2876#  10553  10604  10645  10649  10659  10663  10700  10702  10741  10763  10817  10821
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                       15118  15119  15120  15121  15122  15123  15124  15125  15128  15129  15132  15133  15136
                       15137
ATESTN= 000000          3227   3231
ATNMSK= 000377          2913#  10547
ATNTBL  066242          5182   5200   10546  15139#
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AUSWR  = 000000          3227    3241
AVECT1= 100254           3120#   3227    3266
AVECT2= 000000           3227    3267
A16    = 000400          3069#   7026
A17    = 001000          3068#   7026
BAI    = 000010          3088#
B800   = 000001          3005#
B801   = 000002          3004#
B802   = 000004          3003#   13566
B803   = 000010          3002#   13562   13565
B804   = 000020          3001#
B805   = 000040          3000#
B806   = 000100          2999#   11434   11435   11436   11437   11438   11439   11440   11441   11442   11443
B807   = 000200          2998#
B808   = 000400          2997#
B809   = 001000          2996#
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                         6400    6416    6521    6528    6544    6809    6877    6889    7117    7185    7271    7356    7483
                         7569    7643    7657    8704
BIT00  = 000001          2782#   2792    2818    2867    2886    2905    2943    2962    3005    3092    3108
BIT01  = 000002          2781#   2791    2817    2866    2904    2942    2961    3004    3091    3107
BIT02  = 000004          2780#   2790    2816    2865    2903    2941    2960    3003    3090    3106
BIT03  = 000010          2779#   2789    2815    2864    2902    2940    2959    3002    3017    3088    3105
BIT04  = 000020          2778#   2788    2814    2863    2901    2958    3001    3087
BIT05  = 000040          2777#   2787    2813    2900    2939    2957    3000    3086
BIT06  = 000100          2776#   2786    2885    2899    2921    2938    2956    2999    3071    3085    3104
BIT07  = 000200          2775#   2785    2884    2898    2920    2937    2955    2979    2998    3016    3070    3084
BIT08  = 000400          2774#   2784    2862    2883    2897    2919    2936    2954    2997    3069    3082    14388
BIT09  = 001000          2773#   2783    2861    2882    2896    2918    2935    2953    2996    3068    3081    14406   14556
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                         7389    7498    7580    7670
BIT10  = 002000          2772#   2860    2881    2895    2917    2934    2952    2978    2995    3015    3067    3080    3103
                         14533
BIT11  = 004000          2771#   2812    2880    2894    2933    2951    2969    2977    2994    3014    3079    3102    14413
BIT12  = 010000          2770#   2879    2893    2932    2950    2976    2993    3013    3078    3101
BIT13  = 020000          2769#   2878    2892    2931    2949    2968    2992    3012    3065    3077    3100    14540
BIT14  = 040000          2768#   2877    2891    2930    2948    2967    2991    3011    3023    3064    3076    3099    14374
BIT15  = 100000          2767#   2876    2890    2929    2947    2966    2990    3010    3022    3063    3075    3098
BIT2   = 000004          2790#
BIT3   = 000010          2789#
BIT4   = 000020          2788#
BIT5   = 000040          2787#
BIT6   = 000100          2786#
BIT7   = 000200          2785#   5024
BIT8   = 000400          2784#
BIT9   = 001000          2783#
BOTADR  060202           13806#  13824#  13827   13842   13887#
BOTFLG  060204           13792#  13834#  13837   13840#  13888#
BPTVEC= 000014           2799#
BSE    = 100000          3010#
BUFFER  107030           10136   13450   17078#  17081
BUFONE  107030           17079#
BUFTWO  110034           17080#
CC     = 004000          2994#   11434   11435   11436   11437   11438   11439   11440   11441   11442   11443   11823   11824
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CH      = 002000
CHRCNT  060205
CKSWR = 104410
CLOCK   001526
CLR     = 000040
CLSPRN  065260
CMNSTA  006162
CNSL00  065424
CNSL01  065463
CNSL02  065510
CNSL03  065571
CNSL04  065621
CNSL05  065675
CNSL06  065731
CNSL07  065756
CONT    = 000100
CR      = 000015
CRLF    = 000200
CYLMSK= 001777
DBCK    = 100000
DBEN    = 040000

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IPCK3  = 000010          3105#
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MCPE    = 020000     3065#  6723
MDF     = 000100     2938#  7381   7429   11198  11203  11205  11558  11563  11565  11947  11952  11954  12242
                    12247  12249  12554  12559  12561  12570  12572  12590  12592  12601  12603  12622  12624
                    12756  12761  12763  12772  12774  13083  13085  13268  13273  13275  13284  13286  13387
                    13392  13394  13403  13405
MDPE    = 000400     3082#
MI      = 000004     2941#  12053  12208
MOC     = 000400     2936#  7562   7596   11270  11281  11283  11290  11295  11297  11324  11335  11337  11395
                    11424  11636  11651  11653  11660  11665  11667  11695  11710  11712  11772  11806  12029
                    12044  12046  12056  12061  12063  12069  12071  12073  12078  12080  12108  12123  12125
                    12184  12199  12201  12211  12216  12218  12229  12231  12242  12247  12249  12276  12308
                    12310  12373  12388  12390  12397  12402  12404  12412  12414  12430  12477  12492  12494
                    12499  12504  12506  12532  12547  12549  12554  12559  12561  12570  12572  12590  12592
                    12601  12603  12622  12624  12649  12664  12666  12684  12686  12713  12749  12751  12756
                    12761  12763  12772  12774  12805  12838  12840  12847  12862  12864  12948  12981  12983
                    13006  13039  13041  13083  13085  13122  13151  13153  13161  13166  13168  13205  13234
                    13236  13244  13249  13251  13284  13286  13313  13346  13348  13359  13361  13369  13371
                    13387  13392  13394  13403  13405  13495  13533  13535  13549  13580  13582  13597  13607
                    13609
MOH     = 020000     2968#
MOL     = 010000     2879#  7181   7194   7196   7219   7223
MRD     = 002000     2934#
MS      = 000040     2939#  12071
MSC     = 000002     2942#  12069  12071  12073
MSE     = 100000     3022#
MSER    = 000200     2937#  7492   7517   11363  11368  11370  11738  11743  11745  12151  12156  12158  13067
                    13072  13074
MUR     = 001000     2935#  7191   7221   8203   8256   8286   8288   8399   8441   8443   8573   8599   8601
                     8668   8697   8699   8824   8844   8846   8950   8952   8977   8979   9004   9006   9047
                     9121   9143   9145   9203   9210   9212   9262   9271   9273   9322   9340   9342   9389
                     9402   9404   9440   9455   9457   9510   9516   9518   9569   9575   9577   9676   9680
                     9682   9787   9798   9800   9885   9894   9896   9955   9961   9963   10057  10063  10065
                    10128  10146  10148  10153  10155  10193  10203  10484  10490  10492  10542  10598  10642
                    10801  10809  10811  10868  10986  10992  10994  11128  11139  11141  11180  11191  11193
                    11198  11203  11205  11230  11241  11243  11270  11281  11283  11288  11290  11295  11297
                    11324  11335  11337  11342  11347  11349  11363  11368  11370  11395  11422  11424  11479
                    11494  11496  11536  11551  11553  11558  11563  11565  11591  11606  11608  11636  11651
                    11653  11658  11660  11665  11667  11695  11710  11712  11717  11722  11724  11738  11743
                    11745  11772  11804  11806  11868  11883  11885  11925  11940  11942  11947  11952  11954
                    11983  11998  12000  12029  12044  12046  12053  12056  12061  12063  12069  12071  12073
                    12078  12080  12108  12123  12125  12130  12135  12137  12151  12156  12158  12184  12199
                    12201  12208  12211  12216  12218  12229  12231  12242  12247  12249  12276  12308  12310
                    12373  12388  12390  12395  12397  12402  12404  12412  12414  12430  12477  12492  12494
                    12532  12547  12549  12554  12559  12561  12570  12572  12590  12592  12601  12603  12622
                    12624  12649  12664  12666  12684  12686  12713  12749  12751  12756  12761  12763  12772
                    12774  12805  12838  12840  12845  12847  12862  12864  12948  12981  12983  13006  13039
                    13041  13046  13051  13053  13060  13062  13067  13072  13074  13083  13085  13122  13151
                    13153  13159  13161  13166  13168  13205  13234  13236  13242  13244  13249  13251  13256
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                    13261  13263  13268  13273  13275  13284  13286  13313  13346  13348  13354  13359  13361
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                    13582  13595  13597  13607  13609  14014  14047
MWD    = 000010      2959#
MWP    = 000010      2940#  7277   7301   10912  10920  10924
MXF    = 001000      3081#
NDTMSK= 115760       2907#
NED    = 010000      3078#  5034   5283   5298   5304   5317
NEM    = 004000      3079#
NOP    = 000000      2823#  8313   8317   8728
NOTEX    066115      5042   15097#
NSA    = 100000      2966#
OCC    = 100000      2947#  9011   9071   9279   9283
OFD    = 000200      2979#  5372   6479   6481   6549   9555   9591   13447  13563
OFFSET= 000014       2829#  8497   8752   9512   10835  14053
OM     = 000001      2886#  9498   9524   9583   9633   9685   14056  14058
ONES     066312      15165#
OPE    = 020000      3012#  6366   6390   12990
OPI    = 020000      2892#  6243   6275   11061  11085  11087  11158  11160  11249  11253  11513  11515  11614
                    11618  11902  11904  12006  12010  12436  12441  12511  12513  12988  13174  13176  15106
                    15107  15108  15109  15110  15111  15112  15113  15114  15115  15116  15117  15118  15119
                    15120  15121  15122  15123  15124  15125  15126  15127  15128  15129  15130  15131  15132
                    15133  15134  15135  15136  15137
OR     = 000200      3084#
PACACK= 000022       2833#  8946   14020  14030
PAKACK= 000022       2832#  2833   8345   8764   9169
PAR    = 000010      2902#  6227   6310   6312   6647   6666   6682
PAT    = 000020      3087#  6669   6678   6681
PCLOCK   060504     13913  13951#
PCOUNT   060572     13915  13972#
PDA    = 000400      2954#
PGE    = 002000      3080#
PGM    = 001000      2882#  10270  10353  10400  10447
PHA    = 000200      2955#
PIP    = 020000      2878#  7565   7576   7578   7594   7598
PIRQ   = 177772      2712#
PIRQVE= 000240       2806#
PLCLK    060530      13953  13957#
PLFS   = 002000      2952#
PLSTP    060640      13985  13989#
PROMPT   065263      5159   5168   15017#
PR0    = 000000      2729#
PR1    = 000040      2730#
PR2    = 000100      2731#
PR3    = 000140      2732#  4989   5227
PR4    = 000200      2733#
PR5    = 000240      2734#  13964
PR6    = 000300      2735#  6969   7013   13909  13916  13929  13962
PR7    = 000340      2736#  13961
PS     = 177776      2709#  2710
PSEL   = 002000      3067#
PSTOP    060626      13914  13984#
PSW    = 177776      2710#
PWRVEC= 000024       2801#  4360*  4961*  14916*  14917*  14926*  14932*  14944*  14945*
QSTMRK   065267      5073   5178   15018#
RC     = 000070      2853#  8357   9843   10919  12487  12542  12659  12723  12815  12958  13016  13128  13211
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                    13323  13448
RDCHR = 104411       5065   5079  5089  5092  5160  5169  14769 14907#
RDLIN = 104412      14839  14908#
RDOCT = 104413       5103   5119  5140  14909#
RDY   = 000200       3070#
READY  006322        5070   5228# 13686 13734
RECAL = 000006       2826#  8494  8740  11134 11186 11236 11276 11330 11401
RESREG= 104415      13882  14911#
RESVEC= 000010       2796#
REX   = 010000       2950#  10967 11005 11010
RG    = 040000       2948#  9733  9750  12672 12674 12730 12735 12822 12827 12965 12970 13023 13028
                    13135  13140 13218 13223 13330 13335 13508 13513
RGDTPT  066252      15148#
RH    = 000072       2854#  8365  9834
RIP   = 000020       2831#  9337  8760  8973  9166  9336  9398  9451  10923
RLEASE= 000012       2828#  8329  8629  8748  10341 10388 10435 10486
RMAS  = 000016       3031#  5331  5785* 10230 10396* 10549* 10563 10569 10639* 10654* 10694* 10734* 10759
RMASI   001344       3297#
RMASO   001420       3327#
RMBA  = 000004       3113#  5327  10136* 13492*
RMBAE = 000050       3116#
RMBAEI  001376       3310#  7027* 7028*
RMBAEO  001452       3340#
RMBAI   001332       3292#
RMBAO   001406       3322#  13450* 13492
RMCS1 = 000000       3027#  3111# 5036  5366* 5377  5419* 5429  5509* 5520* 5533  5582* 5595  5847*
                     6027   6134* 6138  6143  6149* 6151* 6153  6158  6164* 6166* 6168  6174  6186*
                     6188* 6190  6196  6722  7026* 7065* 7069  7835* 7887* 7975* 8058* 8212* 8214
                     8279* 8409* 8411  8445  8584* 8586  8603  8687* 8842* 8904* 8946* 8973* 9000*
                     9081* 9138* 9207* 9266* 9336* 9398* 9451* 9512* 9571* 9678* 9729* 9792* 9889*
                     9957* 10059* 10140* 10200* 10298 10341* 10349 10388* 10435* 10486* 10601* 10765 10805*
                    10875* 10988* 11074* 11134* 11186* 11209 11236* 11276* 11330* 11354 11374 11401* 11489*
                    11546* 11569 11601* 11646* 11705* 11729 11749 11782* 11878* 11935* 11958 11993* 12039*
                    12118* 12142 12162 12194* 12253 12286* 12383* 12487* 12542* 12628 12659* 12723* 12815*
                    12958* 13016* 13128* 13211* 13323* 13501* 14020* 14053#
RMCS1I  001326       3290#  5377* 5387* 5429* 5435* 5437  5533* 5546* 5550* 5556  5595* 5607* 5612
RMCS1O  001402       3320#  13448* 13501
RMCS2 = 000010       3114#  5031* 5032* 5033  5279* 5280* 5262  5289  5298  5300* 5301* 5303  5310
                     5317   5329  5362* 5363* 5415* 5416* 5425* 5426* 5463* 5464* 5505* 5506* 5570*
                     5571* 5631* 5632* 5753* 5754* 5776* 5777* 5808* 5809* 5840* 5841* 5864* 5865*
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                     6136* 6222* 6223* 6304* 6305* 6352* 6353* 6434* 6435* 6473* 6474* 6595* 6596*
                     6641* 6642* 6661* 6714* 6715* 6751* 6752* 6794* 6795* 6863* 6864* 6950* 6951*
                     6971   7060* 7061* 7066* 7067* 7097* 7098* 7171* 7172* 7261* 7262* 7337* 7338*
                     7466* 7467* 7552* 7553* 7636* 7637* 7719* 7720* 7819* 7820* 7876* 7877* 7943*
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                     8251* 8252* 8394* 8395* 8568* 8569* 8663* 8664* 8819* 8820* 8885* 8886* 9042*
                     9043* 9116* 9117* 9317* 9318* 9384* 9385* 9435* 9436* 9712* 9713* 10188* 10189*
                    10261* 10262* 10295* 10296* 10533* 10534* 10589* 10590* 10630* 10631* 10685* 10686* 10727*
                    10728* 10963* 10964* 11057* 11058* 14009* 14010*
RMCS2I  001336       3294#
RMCS2O  001412       3324#  6634* 6635* 6661  6669  6678  6681*
RMCS3 = 000052       3117#
RMCS3I  001400       3311#
RMCS3O  001454       3341#
RMDA  = 000006       3028#  5368* 5379  5511* 5522* 5535  5575* 5584* 5597  5635* 5646  5779* 5791
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RMDAI    001334   5811*  5823   5899*  5907   5924*  5932   5954*  6061*  6063*  6075*  6077*  6095*  6097*
                  6756*  6760*  6764   6798*  6800*  6802   6807   6813*  6815*  6817   6822   6831*  6833*
                  6835   6840   7738*  7806   7828*  7844   7881*  7895   7969*  8035*  9329*  9347   9446*
                  9462   9466   9673*  9780*  9878*  9952*  10052* 10132* 10236  10443* 10762  10982* 11481*
                 11538* 11593* 11638* 11697* 11774* 11870* 11927* 11985* 12031* 12110* 12186* 12278* 12381*
                 12483* 12538* 12655* 12719* 12811* 12954* 13014* 13111* 13194* 13319* 13477*
RMDAO    001410   3293*  5379*  5389   5535*  5551*  5557   5597*  5613   5646*  5658   5791*  5796   5823*
                  5828   5907*  5910   5932*  5935   6764*  6767
RMDB   = 000022   3323*  7865*  7881   7906*  7908*  7949*  7969   8001*  13444* 13445* 13477  13571
RMDBI    001350   3115*  5333
RMDBO    001424   3299*
RMDC   = 000034   3329*
                  3037*  5370*  5381   5528*  5541   5579*  5588*  5601   5639*  5650   5758*  5766   5845*
                  5853   5871*  5883   5926*  5946*  5958   6758*  6762*  6766   6867   6871*  6873   6881*
                  6883*  6885   6893*  6895*  6897   6912*  6914*  6918   7947   7952*  7982   8037*  9331*
                  9351   9448*  9471   9475   9507*  9630*  9782*  9880*  9948*  10054* 10134* 10984* 11483*
                 11540* 11595* 11640* 11699* 11776* 11872* 11929* 11987* 12033* 12112* 12188* 12280* 12379*
                 12485* 12540* 12657* 12721* 12813* 12956* 13012* 13113* 13196* 13321* 13479*
RMDCI    001362   3304*  5381*  5391*  5541*  5548*  5554*  5560   5601*  5609*  5615   5650*  5668   5766*
                  5769*  5770   5853*  5857*  5858   5883*  5889*  5890   5958*  5963   5964   6766*  6769*
                  6770
RMDCO    001436   3334*  13446* 13479  13529
RMDS   = 000012   3029*  5903*  5950*  7174   7180   7193   7205   7218   7259   7267   7279   7298   7556
                  7564   7575   7593   8023   8039   8064   8091   8101   8113   8133   8159   8428   8433
                  8470   8473   8956   8963   8983   8990   9054   9056   9063   9112   9127   9149   9497
                  9523   9546   9582   9616   9632   9657   9684   10266  10274  10307  10312  10352  10399
                 10446  10552  10556  10603  10608  10644  10648  10658  10662  10699  10704  10740  10747
                 10816  10820  11302  11307  11672  11677  12085  12090  14022  14026  14055  14060
RMDSI    001340   3295*
RMDSO    001414   3325*
RMDT   = 000026   3034*  5873*  5991   6003   10264  10497
RMDTI    001354   3301*
RMDTO    001430   3331*
RMEC1  = 000044   3041*  5877*
RMEC1I   001372   3308*
RMEC1O   001446   3338*
RMEC2  = 000046   3042*  5335   5821*  6983
RMEC2I   001374   3309*
RMEC2O   001450   3339*
RMER1  = 000014   3030*  5421*  5431   5467*  5474   5513*  5524*  5537   5590*  5603   5641*  5652   5756*
                  5764   5843*  5851   5867*  5879   5922*  5930   5952*  6221*  6225   6231   6239   6247
                  6252*  6254*  6256   6262   6270   6279   6285*  6287*  6289   6294   6307*  6309   6320
                  6644   6650   6665   6953   6958   6991   7350*  7362   7367   7399   7404   7824*  8054*
                  8097*  8109*  8127*  8131*  8153*  8205*  8258*  8401*  8575*  8670*  8826*  8892*  8944*
                  8971*  8998*  9049*  9083   9087   9123*  9216   9223   9324*  9391*  9442*  9444*  9719*
                  9805   9901   9908   9968   9973   10070  10075  10158  10162  10184  10195* 10206  10538*
                 10594* 10635* 10690* 10697* 10732* 10887  10893  10999* 11054  11060  11084  11130* 11157
                 11162  11182* 11232* 11248  11252  11272* 11326* 11397* 11485* 11512  11517  11542* 11597*
                 11613  11617  11642* 11701* 11778* 11874* 11901  11906  11931* 11989* 12005  12009  12035*
                 12114* 12190* 12282* 12375* 12435  12443  12479* 12510  12515  12534* 12651* 12715* 12807*
                 12950* 12987  12992  13008* 13124* 13173  13178  13207* 13315* 13497* 14016* 14049*
RMER1I   001342   3296*  5431*  5439   5474*  5479*  5537*  5552*  5558   5603*  5616   5652*  5674   5764*
                  5767   5851*  5854*  5855   5879*  5884   5930*  5933   6225*  6226   6234   6242   6256*
                  6257   6265   6274
RMER1O   001416   3326*  8938*  8944   8959   8971   8986   8998   9013   9022   9031*
RMER2  = 000042   3040*  5423*  5433   5469*  5476   5517*  5530*  5543   5592*  5605   5643*  5654   5783*
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                    5795    5815*   5827    5875*   5901*   5909    5928*   5948*   5960    6346    6351*   6355    6382*
                    6384*   6386    6406*   6408*   6410    6437*   6439    6646    7341    7348*   7352    7383    7387
                    7422*   7426    7435    7470    7476*   7478    7490*   7494    7510*   7514    7826*   8056*   8099*
                    8111*   8129*   8155*   8157*   8207*   8260*   8403*   8577*   8672*   8815    8828*   8830    8848
                    8882    8894*   8896    8914    9051*   9125*   9326*   9393*   9721*   10197*  10540*  10596*  10637*
                   10692*  11132*  11184*  11234*  11274*  11328*  11399*  11487*  11544*  11599*  11644*  11703*  11780*
                   11876*  11933*  11991*  12037*  12116*  12192*  12284*  12377*  12481*  12536*  12653*  12717*  12809*
                   12952*  13010*  13126*  13209*  13317*  13499*  14018*  14051*
RMER2I  001370      3307#   5433*   5436*   5441    5476*   5481*   5543*   5549*   5555*   5561    5605*   5610*   5617
                    5654*   5678    5795*   5801*   5802    5827*   5833*   5834    5909*   5912*   5913    5960*   5966*
                    5967    6355*   6358    6365    6372    6386*   6389    6396    6410*   6412    6419    6646*   6651
RMER20  001444      3337#
RMHR   = 000036     3038#   5762*   5819*   6055    6065    6079    6099    6663*   6717*   6720
RMHRI   001364      3305#   6720*
RMHR0   001440      3335#   6636*   6638*   6663    6676    6683*   6706*   6711*   6717    6730    17061
RMLA   = 000020     3032#   5817*
RMLAI   001346      3298#
RMLA0   001422      3328#
RMMR1  = 000024     3033#   5471*   5478    5760*   7094    7100    7108*   7110*   7112    7121*   7123*   7125    7139*
                    7141*   7143    7178*   7189*   7191*   7214*   7216*   7265*   7275*   7277*   7294*   7296*   7346*
                    7379*   7381*   7420*   7424*   7474*   7488*   7492*   7508*   7512*   7560*   7562*   7573*   7589*
                    7591*   7633    7639    7647*   7649*   7651*   7653    7661*   7663*   7665    7679*   7681*   7683
                    7723    7740    7822*   7833*   7840*   7842*   7883*   7885*   7890*   7892*   7971*   7973*   7978*
                    7980*   8052*   8060*   8062*   8095*   8125*   8151*   8201*   8203*   8254*   8256*   8286*   8288*
                    8397*   8399*   8441*   8443*   8571*   8573*   8599*   8601*   8659    8666*   8668*   8675    8697*
                    8699*   8701    8822*   8824*   8844*   8846*   8888*   8890*   8912*   8950*   8952*   8977*   8979*
                    9004*   9006*   9010    9017    9045*   9047*   9070    9074    9119*   9121*   9143*   9145*   9203*
                    9210*   9212*   9262*   9271*   9273*   9278    9288    9320*   9322*   9340*   9342*   9387*   9389*
                    9402*   9404*   9438*   9440*   9455*   9457*   9510*   9516*   9518*   9569*   9575*   9577*   9676*
                    9680*   9682*   9709    9715*   9717*   9732    9787*   9798*   9800*   9885*   9894*   9896*   9955*
                    9961*   9963*   10057*  10063*  10065*  10128*  10146*  10148*  10153*  10155*  10191*  10193*  10233
                   10484*  10490*  10492*  10536*  10542*  10592*  10598*  10633*  10642*  10656*  10688*  10730*  10801*
                   10809*  10811*  10870*  10879*  10882*  10966   10970   10986*  10992*  10994*  11004   11012   11068*
                   11070*  11078*  11080*  11120*  11139*  11141*  11146*  11150*  11152*  11180*  11191*  11193*  11198*
                   11203*  11205*  11230*  11241*  11243*  11270*  11281*  11283*  11288*  11290*  11295*  11297*  11324*
                   11335*  11337*  11342*  11347*  11349*  11363*  11368*  11370*  11395*  11422*  11424*  11479*  11494*
                   11496*  11501*  11505*  11507*  11536*  11551*  11553*  11558*  11563*  11565*  11591*  11606*  11608*
                   11636*  11651*  11653*  11658*  11660*  11665*  11667*  11695*  11710*  11712*  11717*  11722*  11724*
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                   12061*  12063*  12069*  12071*  12073*  12078*  12080*  12108*  12123*  12125*  12130*  12135*  12137*
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                   12237   12242*  12247*  12249*  12276*  12308*  12310*  12373*  12388*  12390*  12395*  12397*  12402*
                   12404*  12412*  12414*  12416   12424   12430*  12477*  12492*  12494*  12499*  12504*  12506*  12532*
                   12547*  12549*  12554*  12559*  12561*  12570*  12572*  12574   12582   12590*  12592*  12601*  12603*
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                   12737   12749*  12751*  12756*  12761*  12763*  12772*  12774*  12776   12784   12805*  12821   12829
                   12838*  12840*  12845*  12847*  12862*  12864*  12948*  12964   12972   12981*  12983*  13006*  13022
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                   13225   13234*  13236*  13242*  13244*  13249*  13251*  13256*  13261*  13263*  13268*  13273*  13275*
                   13284*  13286*  13288   13296   13313*  13329   13337   13346*  13348*  13354*  13359*  13361*  13369*
                   13371*  13373   13381   13387*  13392*  13394*  13403*  13405*  13408   13416   13495*  13507   13515
                   13533*  13535*  13547*  13549*  13580*  13582*  13595*  13597*  13607*  13609*  14012*  14014*  14047*
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RMMR1O  001426      3330#
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                 10454  10499  10512  11406  11412  11787  11794  12291  12298  12690  12696  12852  12879
                 13526  13540  13554  13588  13602  13614
RMMR2I   001366  3306#
RMMR20   001442  3336#
RMOF   = 000032  3036#  5372#  5383  5515#  5526#  5539  5577#  5586#  5599  5637#  5648  5781#  5793
                 5813#  5825  5869#  5881  5905#  5944#  5956  6476#  6478  6483  6506  6511#  6513#
                 6515  6534#  6536#  6538  6563#  6565#  6567  7736#  7830#  7879#  7954#  7967#  8033#
                 9333#  9355  9380  9395#  9409  9555#  9590  9595  9671#  9784#  9882#  9950#  10130#
                 13481#
RMOFI    001360  3303#  5383#  5393#  5539#  5547#  5553#  5559  5599#  5608#  5614  5648#  5662  5793#
                 5798#  5799  5825#  5830#  5831  5881#  5886#  5887  5956#  5961#  6515#  6517  6524
                 6538#  6540  6547
RMOFO    001434  3333#  7724#  7736  7744  7756  7762  7782  7784#  7807#  7830  7831  7879  7913
                 7915#  7948#  7954  7955  7967  7998  8000#  13447#  13458#  13481  13563
RMR    = 000004  2903#  6227  6258  10207  10212  10237  11031
RMSN   = 000030  3035#  5787#  5849#  6598  6602  6606
RMSNI    001356  3302#
RMSNO    001432  3332#
RMWC   = 000002  3112#  5325  10138#  13490#
RMWCI    001330  3291#
RMWCO    001404  3321#  13449#  13490
RQA    = 100000  2990#  10345  10357  10392  10404  10439  10451  10500  10504  11407  11788  12292  12691
                 12853  13527  13555  13603
RQB    = 040000  2991#  10345  10357  10392  10404  10439  10451  10500  10506  11407  11788  12292  12691
                 12853  13527  13555  13603
RTC    = 000016  2830#  8500  8756  9571  10837
SADMSK = 000037  2872#
SAVREG = 104414  13753  14910#
SA1    = 000001  2867#
SA16   = 000020  2863#
SA2    = 000002  2866#
SA4    = 000004  2865#
SA8    = 000010  2864#
SC     = 100000  3063#
SCTMSK = 003700  2923#
SC0    = 000100  2921#
SC1    = 000200  2920#
SC2    = 000400  2919#
SC3    = 001000  2918#
SC4    = 002000  2917#
SEARCH = 000030  2836#  8353  8632  8776  9822  9957  10059  11878  11935  11993  12039  12118  12194
                 12286  12383
SEEK   = 000004  2825#  8491  8736  9825  11489  11546  11601  11646  11705  11782
SETOM    061004  9557  9624  9665  13115  13198  13483  14045#
SETVV    060654  9196  9255  9501  9549  9563  9618  9659  9773  9870  9940  10045  10120  10334
                 10381  10428  10477  10794  10861  10975  11121  11172  11223  11263  11317  11388  11471
                 11527  11583  11628  11687  11764  11860  11916  11975  12021  12100  12176  12268  12366
                 12470  12525  12642  12706  12798  12941  12999  13104  13187  13306  13470  14008#
SIZCLK   060244  5210  13905#
SKI    = 040000  3011#  5481  6440  6442  7479  7495  7497  7515  7519
SNGPRT = 020024  2971#  5992  5996  6000
STACK  = 001100  2700#  4952  5273  5359  5412  5460  5501  5715  5987  6021  6048  6125  6215
                 6341  6470  6501  6592  6629  6701  6748  6790  6859  6942  7057  7090  7168
                 7254  7334  7463  7549  7628  7716  7802  7940  8019  8085  8190  8243  8387
                 8560  8655  8811  8878  8935  9108  9190  9247  9313  9376  9429  9493  9542
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                          9612    9653    9703    9767    9864    9933   10039   10116   10180   10257   10291   10330   10377
                         10424   10472   10529   10586   10626   10681   10721   10787   10855   10957   11049   11113   11463
                         11852   12362   12464   1293?   13434
STANDA  005334            5020    5055#
START   004542            3149    4940#  14610   14693
STKLMT= 177774            2711#
STOP    001530            3362#   8909    9738    9743   11009   11018   12440   12447   12734   12741   12826   12833   12969
                         12976   13027   13034   13139   13146   13222   13229   13334   13341   13512   13519   13914*  13927*
SWR     001154            3202#   4950    4972*   4974    4980*   4987*   5005    5221   13754   14374   14388   14391   14406
                         14413   14533   14540   14552   14556   14613   14652   14707*  14924   14937*
SWREG   000176            3131#   4980    5005    5221    4613   14652   14675
SW0   = 000001            2764#
SW00  = 000001            2754#   2764
SW01  = 000002            2753#   2763
SW02  = 000004            2752#   2762
SW03  = 000010            2751#   2761
SW04  = 000020            2750#   2760
SW05  = 000040            2749#   2759
SW06  = 000100            2748#   2758
SW07  = 000200            2747#   2757
SW08  = 000400            2746#   2756
SW09  = 001000            2745#   2755
SW1   = 000002            2763#
SW10  = 002000            2744#
SW11  = 004000            2743#
SW12  = 010000            2742#
SW13  = 020000            2741#   13754
SW14  = 040000            2740#
SW15  = 100000            2739#
SW2   = 000004            2762#
SW3   = 000010            2761#
SW4   = 000020            2760#
SW5   = 000040            2759#
SW6   = 000100            2758#
SW7   = 000200            2757#
SW8   = 000400            2756#
SW9   = 001000            2755#
^ADMSK= 003400            2871#
^AG   = 020000            2992#   11436   11437   11438   11439   11440   11441   11825   11826   11827   11828   11829   11830
                         12332   12333   12334   12335   12336   12337   12691   12888   12889   12890   12891   12892   12893
                         13629   13630   13631   13632   13633   13634   13640   13641   13642   13643   13644   13645   13672
                         13673   13674   13675   13676
TAGADR= 001114            3174#   3181
^AP   = 040000            2967#
^A1   = 000400            2862#
TA2   = 001000            2861#
TA4   = 002000            2860#
^BITVE= 000014            2797#
TIME    001522            3359#   13957*  13974*  13976*
TKVEC = 000060            2804#   14590*  14591#
^PVEC = 000064            2805#
^RAPVE= 000034            2803#   4958*   4959*
TRE   = 040000            3064#
TRTVEC= 000014            2798#
TST   = 010000            2993#   8265    8267    8268    8295    8323    8331    8339    8347    8355    8363   11407   11788
                         12292   12853   13527   13555   13603
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                         7092    7170    7256    7336    7465    7551    7630    7718    7804    7942    8021    8087    8192
                         8245    8389    8562    8657    8813    8880    8937    9110    9192    9249    9315    9378    9431
                         9495    9544    9614    9655    9705    9769    9866    9935    10041   10118   10182   10259   10293
                        10332   10379   10426   10474   10531   10588   10628   10683   10723   10789   10857   10959   11051
                        11115   11465   11854   12364   12466   12937   13436   13681   13683*  13687*
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TST101  040234          10463#  14497
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TST103  040714          10577#  14499
TST104  041100          10617#  14500
TST105  041342          10672#  14501
TST106  041530          10713#  14502
TST107  041762          10778#  14503
TST11   012354           6039#  14441
TST110  042210          10846#  14504
TST111  042516          10936#  14505
TST112  043060          11040#  14506
TST113  043332          11104#  14507
TST114  044754          11454#  14508
TST115  046532          11843#  14509
TST116  050716          12353#  14510
TST117  051326          12455#  14511
TST12   012652           6116#  14442
TST120  053500          12926#  14512
TST121  056016          13425#  14513
TST13   013264           6206#  14443
TST14   014112           6332#  14444
TST15   014646           6461#  14445
TST16   015004           6492#  14446
TST17   015360           6583#  14447
TST2    006712           5351#  14434
TST20   015520           6620#  14448
TST21   016042           6692#  14449
TST22   016216           6739#  14450
TST23   016402           6782#  14451
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TST25   017250           6934#  14453
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TST27   020070           7081#  14455
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TST40   024456           7931#  14464
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TST7    012052          5978#  14439
TST70   035704          9924#  14488
TST71   036172         10030#  14489
TST72   036434         10107#  14490
TST73   036676         10171#  14491
TST74   037162         10248#  14492
TST75   037326         10282#  14493
TST76   037510         10321#  14494
TST77   037670         10368#  14495
TYPBN = 104406         13875   14902#
TYPDS = 104405         13715   13722   13869   14901#
TYPE  = 104401          4999    5042    5064    5057    5073    5078    5081    5084    5088    5091    5099    5102    5108
                        5113    5118    5124    5134    5139    5145    5158    5159    5162    5168    5171    5178   13709
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                       13860   13878   13880   14127   14193   14262   14322   14535   14543   14607   14619   14673   14674
                       14677   14688   14698   14709   14728   14776   14782   14787   14791   14796   14797   14799   14802
                       14806   14897#  14946
TYPOC = 104402          5101   13872   14676   14898#
TYPON = 104404         14900#
TYPOS = 104403          5044    5115    5136   13762   13770   13779   13785   14899#
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T10     012274          6018    6019    6020#
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T101    040276         10469   10470   10471#
T102    040516         10526   10527   10528#
T103    040756         10583   10584   10585#
T104    041142         10623   10624   10625#
T105    041404         10678   10679   10680#
T106    041572         10718   10719   10720#
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T11     012416          6045    6046    6047#
T110    042252         10852   10853   10854#
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T115	046574	11849	11850	11851#
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T120	053542	12932	12933	12934#
T121	056060	13431	13432	13433#
T13	013326	6212	6213	6214#
T14	014154	6338	6339	6340#
T15	014710	6467	6468	6469#
T16	015046	6498	6499	6500#
T17	015422	6589	6590	6591#
T2	006754	5356	5357	5358#
T20	015562	6626	6627	6628#
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T22	016260	6745	6746	6747#
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T24	016754	6856	6857	6858#
T25	017312	6939	6940	6941#
T26	017772	7054	7055	7056#
T27	020132	7087	7088	7089#
T3	007174	5409	5410	5411#
T30	020456	7165	7166	7167#
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T32	021356	7331	7332	7333#
T33	022132	7460	7461	7462#
T34	022502	7546	7547	7548#
T35	023032	7625	7626	7627#
T36	023412	7713	7714	7715#
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T4	007410	5457	5458	5459#
T40	024520	7937	7938	7939#
T41	025050	8016	8017	8018#
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T60	033440	9426	9427	9428#
T61	033714	9490	9491	9492#
T62	034112	9539	9540	9541#
T63	034366	9609	9610	9611#

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T65      034734            9700    9701    9702#
T66      035222            9764    9765    9766#
T67      035470            9861    9862    9863#
T7       012114            5984    5985    5986#
T70      035746            9930    9931    9932#
T71      036234           10036   10037   10038#
T72      036476           10113   10114   10115#
T73      036740           10177   10178   10179#
T74      037224           10254   10255   10256#
T75      037370           10288   10289   10290#
T76      037552           10327   10328   10329#
T77      037732           10374   10375   10376#
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UNIMSK = 000007            3095#   5286    5307    6635   10545
UPE    = 020000            3077#
USE    = 040000            3023#
U0     = 000001            3092#
U1     = 000002            3091#
U2     = 000004            3090#
VV     = 000100            2885#   7206    8957    8984    9064    9128    9150    9153   14023   14027
WATCH    001524            3360#   8905*   8907    9726*   9736   11000*  11007   12431*  12438   12725*  12732   12817*  12824
                          12960*  12967   13018*  13025   13130*  13137   13213*  13220   13325*  13332   13503*  13510   13977*
                          13979#
WC     = 000040            2957#
WCD    = 000050            2845#   8325    9000    9748    9840
WCE    = 040000            3076#  15126   15127
WCEHI  = 010000            3101#
WCELO  = 004000            3102#
WCF    = 000040            2900#   2907    6235    6266
WCH    = 000052            2846#   8333    9831
WD     = 000060            2849#   8341    9837   10140   10911   10915   10988
WH     = 000062            2850#   8349    9828
WLE    = 004000            2894#   2907   10888   10913   15130   15131
WRL    = 004000            2880#   7268    7280    7282    7299    7303
XNUDC  = 176000            2985#   5391    5548    5588    5609    5669    5672    5769    5857    5889    5963    6769    6874
                           6886    6898    6916    9352    9472
XNUER2 = 001567            3018#   5436    5549    5592    5610    5679    5682    5801    5833    5912    5966    6359    6413
                           6420    6421    6447    8162
XNUOF  = 161577            2980#   5393    5547    5586    5608    5663    5666    5798    5830    5886    5961    6518    6525
                           6541    6548    6569    9356    9410
XSIZ     005212            5024#   5165
ZEROS    066354           15182#
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$ATY1    065012           14958#
$ATY3    065020           14307   14959#
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$AUTOB   001150            3199#   5009*   5225*  14666   14823
$BASE    001276            3268#   5030    5100    5110*   5274    5341    5360    5413    5461    5502    5716    5988    6022
                           6049    6126    6216    6342    6471    6502    6593    6630    6702    6749    6791    6860    6943
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6751 6794 6863 6950 7060 7066 7093 7171 7261 7337 7466 7552 7636 7719 7819
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COMMEN 2807#

ENDCOM 2807#

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ERROR 2701# 5212 5290 5311 5342 5396 5444 5485 5566 5623 5693 5772 5804 5836 5860
5892 5915 5937 5969 6004 6032 6069 6084 6104 6144 6159 6175 6197 6232 6240
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ESCAPE 2807#

GETAS 2666# 10562

GETBA 2666#

GETBAE 2666#

GETCS1 2666# 5375 5428 5532 5594 6026 6137 6152 6167 6189 6721 7068 8213 8410 8444
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GETCS2 2666# 5281 5302

GETDA 2666# 5378 5534 5596 5645 5790 5822 5906 5931 6763 6801 6816 6834 7843 7894
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GETDB 2666#

GETDC 2666# 5380 5540 5600 5649 5765 5852 5882 5957 6765 6872 6884 6896 6917 7981
9350 9470

GETDS 2666# 7179 7192 7204 7217 7266 7278 7297 7563 7574 7592 8038 8063 8130 8112

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GETEC1	2666#														
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	13132	13215	13287	13327	13372	13407	13505								
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	13524	13552	13600												
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	9589														
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	15002														
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       12378  12484 12539 12656 12720 12812 12955 13011 13112 13195 13320 13478
PUTDS   2666#  5902  5949
PUTDT   2666#  5872
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 RUN-TIME RATIO: 602/101=5.9
 CORE USED:  33K  (65 PAGES)

 DOCUMENT PAGES:  384
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