

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZQGA-C-D
 (SUPERSEDES ALL EARLIER PROGRAMS IN THE SERIES
 MAINDEC-11-D9H AND MAINDEC-11-DZQGA)

PRODUCT NAME: GENERAL TEST PROGRAM (GTP)
 8K OF MEMORY REQUIRED

DATE CREATED: JULY, 1973

MAINTAINER: DIAGNOSTIC GROUP

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FACTORY ACCEPTANCE

SR1: - - - - -
 SR2: - - - - -
 SR3: - - - - -

FIELD ACCEPTANCE

SR1: - - - - -
 SR2: - - - - -
 SR3: - - - - -

THE ABOVE SWITCH REGISTER SET UP WAS USED TO ACCEPT THIS CONFIGURATION

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1. ABSTRACT

THIS PROGRAM IS AN INTERACTIVE MULTI-DEVICE EXERCISER. THE PROGRAM OPERATES IN BACKGROUND-FOREGROUND MODE WITH PROCESSOR AND IN-LINE DEVICE TEST CODE AS THE BACKGROUND AND INTERRUPT DRIVEN DEVICE TEST CODE AS THE FOREGROUND. IN THIS MANNER, THE CENTRAL PROCESSOR MAY BE EXERCISED CONCURRENTLY WITH THE TEST OF ANY, OR ALL OF THE DEVICES THAT OPERATE IN THE INTERRUPT MODE.

IF AN ERROR OCCURS IN ANY OF THE DEVICES THAT HAVE BEEN SELECTED FOR TESTING, IT IS RECOMMENDED THAT THE INDIVIDUAL DIAGNOSTIC FOR THE DEVICE THAT FAILED BE USED TO CORRECT THE MALFUNCTION.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11/10 OR
PDP-11/20 OR
PDP-11/40 OR
PDP-11/45 PROCESSOR
8KW OF MEMORY

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE OR INTERACT WITH

AA11	DIGITAL TO ANALOG CONVERTER WITH SCOPE
AD01	ANALOG TO DIGITAL CONVERTER
AFC11	LOW LEVEL ANALOG MULTIPLEXER AND CONVERTER
BM792YA	DIODE BOOT FOR PAPER TAPE
BM792YB, MR11-DB	DIODE BOOT FOR TC11,RC11,RF11,RK11 AND RP11
CD11	CARD READER
CM11	CARD READER
CR11	CARD READER
DC11	ASYNCHRONOUS LINE UNIT
DM11	ASYNCHRONOUS MULTIPLEXER
DM11-BB	MODEM CONTROL MULTIPLEXER
DN11	DIGITAL DIALER
DP11	SYNCHRONOUS LINE UNIT
DR11-A	DEVICE REGISTER INTERFACE (INTERRUPT ONLY)
DR11-B	GENERAL DEVICE REGISTER INTERFACE (NPR)
DR11-C	DEVICE REGISTER INTERFACE (INTERRUPT ONLY)

2.1.1 OPTIONAL HARDWARE CONTINUED

DT11	BUS SWITCH
KE11	ARITHMETIC UNIT
KG11	REDUNDANT CHECK OPTION
KL11	ASR 33 OR 35 (VTO5,VTO6,LC11)
KT11	MEMORY MANAGEMENT OPTION
KW11-L	LINE CLOCK
KW11-P	PROGRAMMABLE CLOCK
LP11	LINE PRINTER
MM11	UP TO 28KW OF MEMORY
PC11	HIGH SPEED READER/PUNCH
RC11	DISK 64KW
RF11	DISK 256KW
RK11	DISK (IBM TYPE 2315)
RP11	DISK
TC11	DECTAPE
TM11	MAGNETIC TAPE - INDUSTRY COMPATIBLE
UDC11	UNIVERSAL DIGITAL CONTROLLER

2.1.2 HARDWARE EXERCISED IF PRESENT (NOT SWITCH REGISTER INHIBITABLE)

KE11-E	EIS FOR PDP 11/40
KE11-F	FIS FOR PDP 11/40
FP11	FLOATING POINT PROCESSOR

2.2 STORAGE

2.2.1 PROGRAM STORAGE

THE PROGRAM USES MEMORY LOCATIONS 000000-37450.
IF MEMORY EXPANSION HAS BEEN SELECTED, THE PROGRAM
WILL USE ALL AVAILABLE MEMORY UP TO 1000 BYTES (OCTAL)
FROM THE END OF THE LAST AVAILABLE BANK, OR 1000 BYTES
BELOW THE END OF 28K, WHICHEVER IS LESS.

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

4.1 STARTING PROCEDURE FOR SINGLE PROCESSOR, SINGLE BUS SYSTEMS

4.1.1 LOAD PROGRAM INTO MEMORY.

NOTE: THE PROGRAM IS INITIALIZED WITH A SPECIFIC DEVICE REGISTER
AND VECTOR ASSIGNMENT FOR FLOATING VECTOR DEVICES.
TO ACCOMODATE OTHER CONFIGURATIONS, APPROPRIATE CHANGES
SHOULD BE MADE IN THE "DEVICE REGISTER AND VECTOR
TABLE" (SEE LISTING) AFTER THE PROGRAM HAS BEEN LOADED.

4.1.2 SET SWITCH REGISTER TO STARTING ADDRESS 000200.
PRESS LOAD ADDRESS.

4.1.3 SET UP DEVICE INHIBIT SWITCHES AS DESCRIBED BELOW

NOTE: IF THE SWITCH REGISTER=0, UPON INITIAL START,
THE PROGRAM WILL PROCEED DIRECTLY TO 4.1.6, AND NO DEVICES
WILL BE TESTED.

NOTE: IF A NON-EXISTENT DEVICE IS SELECTED IN ANY OF
THE THREE DEVICE INHIBIT SETTINGS, A BUS ERROR TRAP WILL
OCCUR AND THE PROGRAM WILL HALT AT LOCATION 000006.

AFTER STARTING ADDRESS HAS BEEN LOADED:

SW00=1 INHIBIT DT11 BUS SWITCH SELECTION
SW01=1 INHIBIT MULTI-PROCESSOR TESTING
SW02=1 INHIBIT PC11 HSP
SW03=1 INHIBIT PC11 HSR
SW04=1 INHIBIT KW11-L LINE CLOCK
SW05=1 INHIBIT CR11 CARD READER
SW06=1 INHIBIT KW11-P PROGRAMMABLE REAL TIME CLOCK
SW07=1 INHIBIT LP11 LINE PRINTER --- IF LINE PRINTER IS USED, MUST RESTART AT 600
SW08=1 INHIBIT SECTION ONE AND TWO OF THE BUS TESTER (FACTORY USE ONLY)
SW09=1 INHIBIT SECTION THREE AND FOUR OF THE BUS TESTER (FACTORY USE ONLY)
SW10=1 INHIBIT RF11 DISK
SW11=1 INHIBIT UDC11
SW12=1 INHIBIT RC11 DISK
SW13=1 INHIBIT TC11 DECTAPE
SW14=1 INHIBIT KL11 TTY OUTPUT
SW15=1 INHIBIT KL11 TTY INPUT

PRESS START.

4.1.4 PROGRAM WILL HALT.
SET UP DEVICE INHIBIT SWITCHES AS DESCRIBED BELOW

AFTER FIRST HALT

SW00=1 INHIBIT DC11 #1 VECTOR 300
SW01=1 INHIBIT DC11 #2 VECTOR 310
SW02=1 INHIBIT AA11 DAC WITH SCOPE OPTION
SW03=1 INHIBIT AFC11 ANALOG MULTIPLEXER
SW04=1 INHIBIT RK11 DISK
SW05=1 INHIBIT DR11-B GENERAL INTERFACE (NPR)
SW06=1 INHIBIT KE11 EXTENDED ARITHMETIC ELEMENT
SW07=1 INHIBIT AD01-D A/D CONVERTER
SW08=1 INHIBIT RP11 DISK
SW09=1 INHIBIT BUS LATENCY TESTER (FACTORY UES ONLY)
SW10=1 INHIBIT DN11 DIGITAL DIALER
SW11=1 INHIBIT TM11 MAGNETIC TAPE
SW12=1 INHIBIT M792YA (DIODE BOOT FOR PC11, KL11)
SW13=1 INHIBIT M792YB, MR11-DB (RF, RC, RK AND TC11) BOOT
SW14=1 INHIBIT DP11 SYNCHRONOUS LINE UNIT --- VECTOR 320
SW15=1 INHIBIT DM11 ASYNCHRONOUS MULTIPLEXER --- VECTOR 330
PRESS CONTINUE.

4.1.5 PROGRAM WILL HALT.
SET UP DEVICE INHIBIT SWITCHES AS DESCRIBED BELOW

AFTER SECOND HALT

SW00=1 INHIBIT KG11-A REDUNDANCY CHECK OPTION
SW01=1 INHIBIT CD11 CARD READER
SW02=1 INHIBIT DR11-A, DR11-C GENERAL INTERFACE (INTERRUPT ONLY)
SW03=1 INHIBIT DM11-BB MODEM CONTROL MULTIPLEXER
SW04=1 INHIBIT VR20 2 COLOR SCOPE OPTION
SW05=1 INHIBIT KT11 MEMORY MANAGEMENT OPTION
SW06=1 INHIBIT RESERVED
SW07=1 INHIBIT RESERVED
SW08=1 INHIBIT RESERVED
SW09=1 INHIBIT RESERVED
SW10=1 INHIBIT RESERVED
SW11=1 INHIBIT RESERVED
SW12=1 INHIBIT RESERVED
SW13=1 INHIBIT RESERVED
SW14=1 INHIBIT RESERVED
SW15=1 INHIBIT RESERVED

PRESS CONTINUE.

4.1.6 PROGRAM WILL HALT.
SET SWITCHES AS DESCRIBED IN SECTION 5.1.2.
WORST CASE IS ALL SWITCHES DOWN.
PRESS CONTINUE.

4.1.7 THE PROGRAM WILL BEGIN TEST EXECUTION.

NOTE: A MINIMUM OF TWO PASSES SHOULD BE RUN.

4.2 STARTING PROCEDURE FOR SYSTEMS WITH BUS SWITCH

4.2.1 PUT BUS SWITCH INTO MANUAL MODE AND CONNECT TO PROCESSOR
INTO WHICH PROGRAM IS TO BE LOADED.

4.2.2 LOAD PROGRAM INTO MEMORY

4.2.3 SET SWITCH REGISTER TO STARTING ADDRESS 000200
PRESS LOAD ADDRESS

4.2.4 SELECT DEVICES AS DESCRIBED IN 4.1.3 TO 4.1.5, WITH
THE FOLLOWING EXCEPTIONS.

AFTER THE STARTING ADDRESS HAS BEEN LOADED, SW00
MUST BE SET TO 0 TO PERMIT BUS SWITCH SELECTION BY THE PROGRAM.

AFTER THE FIRST HALT, SW01 MUST BE SET TO 0 IF THE
PROGRAM IS TO BE RUN IN MULTI-PROCESSOR MODE.

4.2.5 AFTER DEVICE SELECTION HAS BEEN ACCOMPLISHED,
SWITCH THE BUS SWITCH TO THE OTHER PROCESSOR AND REPEAT
4.2.2 TO 4.2.4 FOR THE OTHER PROCESSOR

4.2.6 PLACE BUS SWITCH IN PROGRAMMABLE MODE.

4.2.7 PERFORM 4.1.6 FOR EACH PROCESSOR
PROGRAM WILL BEGIN TEST EXECUTION

4.3 STARTING PROCEDURE WITH OVERLAY

4.3.1 LOAD GTP

4.3.2 LOAD OVERLAY

NOTE: IF MEMORY EXPANSION IS TO BE RUN, THE OVERLAY
MUST BE LOADED INTO MEMORY STARTING AT
LOCATION 40000 (OCTAL)

4.3.3 LOAD GTP STARTING ADDRESS

4.3.4 SELECT DEVICES AS DESCRIBED IN 4.1.3 TO 4.1.5

NOTE: IF THE OVERLAY HAS AN INITIALIZATION SECTION, PROGRAM CONTROL WILL BE TRANSFERED TO THE OVERLAY WHEN CONTINUE IS PRESSED. THE APPROPRIATE ACTION MAY NOW BE TAKEN TO INPUT ANY INFORMATION TO THE OVERLAY THAT IS REQUIRED. THE INITIALIZATION CODE WILL RETURN CONTROL TO GTP AT LOCATION "RUNSW" FOR SETUP OF OPERATIONAL SWITCHES.

4.3.5 PERFORM 4.1.6
PROGRAM WILL BEGIN TEST EXECUTION

5. OPERATING PROCEDURE

5.1 SWITCH REGISTER OPTIONS

SW15=1 UP---HALT ON ERROR
SW14=1 UP---SCOPE LOOP - PROCESSOR TEST
SW13=1 UP---INHIBIT PRINT OUT
SW12=1 UP---FREEZE PROCESSOR IN CURRENT MODE
SW11=1 UP---INHIBIT SUB-PROBLEM ITERATION
SW10=1 UP---INHIBIT PROCESSOR TEST
SW09=1 UP---INHIBIT MEMORY EXPANSION
SW08=1 UP---ISOLATION--BY DROPOUT
SW07=1 UP---SWITCH ERROR MESSAGES TO HIGH SPEED PUNCH
SW06=1 UP---RESTART PROGRAM ON ERROR
SW05=1 UP---RESERVED
SW04=1 UP---RESERVED
SW03=1 UP---RESERVED
SW02=1 UP---RESERVED FOR OVERLAYS
SW01=1 UP---RESERVED FOR OVERLAYS
SW00=1 UP---RESERVED FOR OVERLAYS

5.2 OPERATING PROCEDURE FOR SINGLE PROCESSOR SINGLE BUS SYSTEMS

5.2.1 NORMAL OPERATION-ALL SWITCHES DOWN

WITH ALL SWITCHES DOWN, THE PROGRAM WILL INITIALIZE ALL SELECTED DEVICES AND THEN BEGIN EXECUTION OF PROCESSOR TEST CODE. AFTER ALL PROCESSOR AND IN-LINE DEVICE TEST CODE HAS BEEN RUN, THE PROGRAM WILL CHECK THE DEVICE WATCHDOGS TO VERIFY THAT SELECTED DEVICES HAVE INTERRUPTED AT LEAST ONCE DURING THE CURRENT PASS. THE PROGRAM WILL BEGIN EXECUTION OF THE MEMORY EXPANSION TEST (IF MORE THAN 8KW OF MEMORY IS AVAILABLE). AFTER THE MEMORY EXPANSION TEST IS COMPLETED, THE PROGRAM WILL TYPE AN ASTERISK AND RESTART THE PROCESSOR TEST.

IF AN ERROR OCCURS, THE PROGRAM WILL OUTPUT AN ERROR MESSAGE TO THE TELEPRINTER AND CONTINUE TESTING.

ON ALTERNATE PASSES, THE PROCESSOR 'T' BIT WILL BE SET CAUSING A TRACE TRAP TO OCCUR FOLLOWING THE EXECUTION OF EVERY PROCESSOR TEST INSTRUCTION.

IF THE PROCESSOR UNDER TEST IS A PDP-11/45 THEN THE FOLLOWING SEQUENCE OF PASSES WILL BE EXECUTED:

PASS 0,14,ETC KERNEL MODE,R0-R5,NO 'T' TRAP
 PASS 1,15,ETC KERNEL MODE,R0-R5,'T' TRAP
 PASS 2,16,ETC KERNEL MODE,R10-R15,NO'T' TRAP
 PASS 3,17,ETC KERNEL MODE,R10-R15,'T' TRAP
 PASS 4,20,ETC SUPERVISOR MODE,R0-R5,NO 'T' TRAP
 PASS 5,21,ETC SUPERVISOR MODE,R0-R5,'T' TRAP
 PASS 6,22,ETC SUPERVISOR MODE,R10-R15,NO 'T' TRAP
 PASS 7,23,ETC SUPERVISOR MODE,R10-R15,'T' TRAP
 PASS 10,24,ETC USER MODE,R0-R5,NO 'T' TRAP .
 PASS 11,25,ETC USER MODE,R0-R5,'T' TRAP
 PASS 12,26,ETC USER MODE,R10-R15,NO 'T' TRAP
 PASS 13,27,ETC USER MODE,R10-R15,'T' TRAP

IF THE KT11 OPTION IS AVAILABLE AND NOT INHIBITED, ALL PASSES (EXCEPT 0 AND 1) ARE RUN WITH THE KT11 ENABLED (WITH VIRTUAL ADDRESSES MAPPED EQUAL TO PHYSICAL ADDRESSES).

NOTE: THE PASS COUNT CAN BE FOUND IN LOCATION "PASCNT". IF THE PROCESSOR IS A PDP-11/45, THE PASS COUNT WILL BE DISPLAYED IN THE PROCESSOR DISPLAY REGISTER.

5.2.1 NORMAL OPERATION CONTINUED

NOTE: IF A POWER FAILURE OCCURS, AN ERROR MESSAGE WILL BE TYPED IN THE STANDARD FORMAT AFTER POWER UP OCCURS. THE PROGRAM WILL THEN BEGIN EXECUTION OF PROCESSOR TEST AND WILL COMPLETE THE PROCESSOR TEST BEFORE RE-INITIALIZING SELECTED DEVICES. THIS DELAY IS NECESSARY TO ALLOW MECHANICAL DEVICES TO RECOVER FROM THE POWER FAILURE.

NOTE: THE PROCESSOR STACK POINTER WILL BE SET TO LOCATION "STACK" EACH TIME THAT THE PROCESSOR TEST IS STARTED. AT THE END OF EACH PASS, THE PROCESSOR STACK POINTER WILL BE SET TO LOCATION "STACKK". IF THE PROCESSOR (PDP-11/45) IS OPERATING IN OTHER THAN KERNEL MODE THE CURRENT MODE STACK POINTER WILL BE INITIALIZED TO "STACK" AND THE KERNEL STACK POINTER WILL BE SET TO "STACKK".

5.2.2 WITH SWITCH 15=1

THE PROGRAM WILL OPERATE AS DESCRIBED IN 5.2.1, EXCEPT THAT IF AN ERROR OCCURS, THE PROGRAM WILL HALT AFTER TYPEOUT.

NOTE: IF THIS OPTION IS USED, FURTHER ERRORS MAY OCCUR IF THE PROGRAM IS CONTINUED FROM THE HALT. THESE ERRORS MAY NOT BE DUE TO DEVICE FAILURES, BUT MAY BE CAUSED BY UNSATISFIED INTERRUPT AND NPR REQUESTS THAT WERE PENDING AT THE TIME OF THE HALT.

5.2.3 WITH SWITCH 15=1, AND SWITCH 6=1

THE PROGRAM WILL PERFORM AS DESCRIBED IN 5.2.2, EXCEPT THAT ALL DEVICES THAT HAVE BEEN SELECTED WILL BE RE-INITIALIZED, AND PROCESSOR TEST WILL BE RESTARTED.

5.2.4 WITH SWITCH 12=1

THE PROGRAM WILL PERFORM AS DESCRIBED IN 5.2.1, EXCEPT THAT THE CURRENT PROCESSOR MODE WILL BE FROZEN, I.E., IF THE 'T' BIT IS SET, IT WILL REMAIN SET, IF IT IS CLEARED, IT WILL STAY CLEARED, ETC.

NOTE: IF THE PROCESSOR IS A PDP-11/45, THE MODE IN PROGRESS AT THE TIME THAT SWITCH 12 IS SET TO 1 WILL BE CONTINUOUSLY EXECUTED.

5.2.5 WITH SWITCH 11=1

THE PROGRAM WILL PERFORM AS DESCRIBED IN 5.2.1, EXCEPT THAT EACH SUB-LOOP OF PROCESSOR TEST WILL BE EXECUTED ONLY ONCE PER PASS, AND THE DEVICE WATCHDOGS WILL NOT BE CHECKED.

5.2.6 WITH SWITCH 10=1

NO PROCESSOR TEST CODE WILL BE EXECUTED, AND NO END OF PASS INDICATION WILL BE GIVEN. ERROR MESSAGES WILL OCCUR IN THE NORMAL MANNER.

5.2.7 WITH SWITCH 9=1

THE PROGRAM WILL PERFORM AS DESCRIBED IN 5.2.1, EXCEPT THAT THE MEMORY EXPANSION TEST WILL NOT BE EXECUTED.

5.2.8 WITH SWITCH 8=1

THE PROGRAM WILL PERFORM AS DESCRIBED IN 5.2.1, EXCEPT THAT AT THE END OF A PASS, OR IF AN ERROR OCCURS THE PROGRAM WILL DELETE ONE OF THE DEVICES THAT HAS BEEN SELECTED FOR TESTING. ON EVERY SUBSEQUENT ENTRY INTO THE ROUTINE, THE PREVIOUSLY DELETED DEVICE WILL BE RESTORED, AND A NEW DEVICE WILL BE DELETED. THE PROGRAM WILL THEN RE-INITIALIZE ALL SELECTED DEVICES AND PROCESSOR TEST EXECUTION WILL BE RESTARTED.

5.2.9 WITH SWITCH 7=1

THE PROGRAM WILL PERFORM AS DESCRIBED IN 5.2.1, EXCEPT THAT ALL ERROR MESSAGES, AND THE END OF PASS ASTERISK WILL BE TRANSMITTED TO THE HIGH SPEED PUNCH INSTEAD OF THE TELETYPE.

5.2.10 WITH SWITCH 6=1

THE PROGRAM WILL PERFORM AS DESCRIBE IN 5.2.1, EXCEPT THAT IF AN ERROR OCCURS, ALL SELECTED DEVICES WILL BE RE-INITIALIZED, AND PROCESSOR TEST WILL BE RESTARTED.

5.3 OPERATING PROCEDURE FOR SYSTEMS WITH BUS SWITCH

5.3.1 NORMAL OPERPATION-ALL SWITCHES DOWN

THE PROGRAM WILL PERFORM AS DESCRIBED IN 5.2.1, EXCEPT THAT AT THE END OF EVERY PASS, THE BUS SWITCH WILL BE RELEASED BY THE PROCESSOR THAT IT IS CONNECTED TO AND THE OTHER PROCESSOR WILL ASSUME CONTROL.

5.3.2 SWITCH REGISTER OPTIONS

THE SWITCH REGISTER OPTIONS FUNCTION THE SAME AS FOR A SINGLE PROCESSOR WITH THE EXCEPTION THAT SW6=1 (RESTART ON ERROR) WILL CAUSE THE BUS SWITCH TO BE DISCONNECTED, AND THE OTHER PROCESSOR WILL BE CONNECTED.

5.4 OPERATION WITH OVERLAY LOADED

5.4.1 BACKGROUND OVERLAY

IF A BACKGROUND OVERLAY HAS BEEN LOADED, THE PROGRAM WILL PERFORM AS DESCRIBED IN SECTION 5.2, EXCEPT THAT AT THE END OF EACH PASS (BEFORE THE ASTERISK), GTP WILL TRANSFER CONTROL TO THE OVERLAY. WHEN ALL OVERLAY CODE HAS BEEN EXECUTED, CONTROL WILL BE TRANSFERED BACK TO GTP, AND THE END OF PASS ASTERISK WILL BE TYPED.

5.4.2 FOREGROUND OVERLAY

PROGRAM OPERATION WILL BE AS DESCRIBED IN SECTION 5.2.

6. ERRORS

6.1 ERROR PRINTOUT

THE FORMAT FOR ALL ERROR PRINTOUTS IS SEVEN COLUMNS OF DATA THE SIGNIFICANCE OF EACH COLUMN IS DESCRIBED BELOW

COLUMN 1- PC+2 OF THE TEST THAT FAILED
COLUMN 2- PROCESSOR STATUS AT THE TIME OF FAILURE
COLUMN 3- PROCESSOR TEST IN PROGRESS AT THE TIME OF FAILURE
COLUMN 4- STACK OFFSET
COLUMN 5- FIRST DEVICE SELECTION (SR1) REGISTER
COLUMN 6- SECOND DEVICE SELECTION (SR2) REGISTER
COLUMN 7- THIRD DEVICE SELECTION (SR3) REGISTER

6.2 ERROR RECOVERY

FOR TTY READER AND HSR, TAPE MUST BE REPOSITIONED TO LEADER BEFORE RESTARTING TEST.

7. RESTRICTIONS

7.1 STARTING RESTRICTION

IF LINE PRINTER IS USED RESTART ADDRESS MUST BE 400 FOR HSR AND TTY READER, TAPE MUST BE ON LEADER. FOR MAGNETIC TAPE, UNIT ZERO MUST BE SELECTED. FOR DECTAPE, UNIT ONE MUST BE SELECTED.

7.2 OPERATIONAL RESTRICTION

IF THE TELEPRINTER (AND/OR TELETYPE PUNCH) IS BEING USED FOR ERROR MESSAGE OUTPUT, THE READER PUNCH COMBINATION CANNOT BE TESTED UNLESS THE INPUT TO THE READER IS A BINARY COUNT TAPE THAT IS INDEPENDENT OF THE PUNCH OUTPUT.

IF THE HIGH SPEED PUNCH IS BEING USED FOR ERROR MESSAGE OUTPUT, THE READER-PUNCH COMBINATION CANNOT BE TESTED UNLESS THE INPUT TO THE READER IS A BINARY COUNT TAPE THAT IS INDEPENDENT OF THE PUNCH OUTPUT.

IF ISOLATION BY DROPOUT IS TO BE USED, THE INPUT TO THE TELEPRINTER (HIGH SPEED) READER MUST BE INDEPENDENT OF THE OUTPUT FROM THE TELETYPE (HIGH SPEED) PUNCH SINCE THESE DEVICES ARE TREATED AS INDEPENDENT BY THE ISOLATION ROUTINE.

8. TROUBLESHOOTING USING GTP

8.1 TRACKING DOWN UNUSUAL FAILURES

IF A FAILURE OCCURS THAT IS NOT IMMEDIATELY OBVIOUS, THE FOLLOWING SET OF CHECKPOINTS IS PROVIDED AS AN AID TO TROUBLESHOOTING.

8.1.1 CAN THE FAILURE BE ISOLATED TO THE DEVICE THAT FAILS BY SELECTING ONLY THAT DEVICE.

8.1.2 IS THE PROBLEM
A) A DEVICE FAILURE
B) A UNIBUS NOISE PROBLEM
C) A SYSTEM CONFIGURATION PROBLEM

- 8.1.3 DOES THE FAILURE OCCUR IF PROCESSOR TEST IS INHIBITED
- 8.1.4 DOES THE FAILURE OCCUR IF PROCESSOR TEST IS ENABLED
BUT CORE EXPANSION IS INHIBITED
- 8.1.5 DOES THE FAILURE OCCUR CONSISTENTLY
- 8.1.6 DOES THE FAILURE OCCUR CONSISTENTLY IN ONE PROCESSOR SUBTEST
- 8.1.7 IS THE PROBLEM AN NPR LATENCY ERROR, IF SO
A) IS BUS POSITION CORRECT
B) IS A NO SACK TIMEOUT OCCURING
- 8.1.8 IS THE PROBLEM A BR LATENCY PROBLEM, IF SO
A) IS THE POSITION ON THE BUS CORRECT
B) ARE DEVICES AT THEIR STANDARD BR LEVEL, IF NOT
1) HAS GTP BEEN MODIFIED TO ACCOUNT FOR THIS FACT
2) THE DEVICES MAY HAVE TO BE RECONFIGURED TO STANDARD
LEVELS FOR GTP TO RUN
- 8.1.9 IF THE PROGRAM COMES TO A HALT AT LOCATION 6, A BUS
ERROR TIMEOUT HAS OCCURED. IF THIS HAPPENS
A) WHERE WAS THE PROGRAM WHEN THE TRAP OCCURED
B) WHICH DEVICE DID NOT RAISE SLAVE SYNC
- 8.1.10 IF THE PROGRAM COMES TO A HALT AT LOCATION 12, AN
ILLEGAL INSTRUCTION TRAP HAS OCCURED. IF THIS HAPPENS
A) WAS THE PROGRAM MODIFIED
B) IS THE PROCESSOR KNOWN TO BE GOOD
C) ARE THE MEMORIES KNOWN TO BE GOOD
- 8.1.11 IF THE PROCESSOR IS HUNG
A) WHAT DEVICE, IF ANY, IS BUS MASTER
B) WHAT IS THE STATE OF THE C LINES
C) WHAT BRS AND NPRS ARE PENDING
D) WHAT GRANTS ARE PENDING
E) WHAT WAS THE PROCESSOR DOING WHEN THE HANG OCCURED
F) DID THE PROCESSOR, OR A DEVICE, CAUSE THE BUS TO HANG
- 8.1.12 IF A "NON-EXISTENT MEMORY" ERROR OCCURS FOR AN NPR DEVICE
A) WHAT IS THE ADDRESS (ALL 18 BITS) IN THE DEVICE BUS
ADDRESS REGISTER
B) IS THE ADDRESS VALID
C) DOES THE OFFSET OF THE DEVICE BUS ADDRESS
REGISTER FROM THE START OF THE MEMORY BUFFER
AND THE COUNT IN DEVICE WORD COUNT REGISTER AGREE
D) IS THE DEVICE TIMEOUT TOO SHORT

- 8.1.13 ARE THERE MORE THAN 20 UNIT LOADS ON THE UNIBUS WITHOUT A BUS BUFFER
- 8.1.14 IS THERE MORE THAN 50 FEET OF UNIBUS CABLE
- 8.1.15 IS THE UNIBUS TERMINATED CORRECTLY
- 8.1.16 IF A POWER FAILURE OCCURES
 - A) IS ANY POWER SUPPLY OVERLOADED
 - B) WHAT IS THE LINE VOLTAGE
 - C) DOES THE SYSTEM RECOVER PROPERLY
- 8.1.17 IF A DEVICE FAILURE, OR PROCESSOR FAILURE OCCURS
 - A) DO ALL DEVICE AND PROCESSOR DIAGNOSTICS RUN WITHOUT ERROR
 - B) HAVE ALL DIAGNOSTICS BEEN RUN BEFORE GTP
- 8.1.18 IF THE SIZE OF THE SYSTEM IS REDUCED BY REMOVING DEVICES FROM THE BUS, OR SHORTENING THE LENGTH OF BUS CABLE
 - A) DOES THE DEVICE IN QUESTION STILL FAIL
 - B) DOES IT FAIL THE SAME WAY
 - C) HOW SMALL DOES THE SYSTEM HAVE TO BE MADE BEFORE THE SYSTEM FUNCTIONS CORRECTLY

8.2 GTP TROUBLESHOOTING FEATURES

SECTION 8.1 GIVES A LIST OF HARDWARE CHECKPOINTS THAT CAN BE USED TO ISOLATE SYSTEM HARDWARE FAILURES. THIS SECTION DESCRIBES THE FEATURES IN GTP THAT CAN BE USED AS AN AID TO TROUBLE SHOOTING.

8.2.1 LOCATIONS OF INTEREST IN GTP

8.2.1.1 RETURN

THIS LOCATION CONTAINS THE STARTING ADDRESS OF THE PROCESSOR, OR IN-LINE DEVICE TEST CURRENTLY IN PROGRESS.

8.2.1.2 ICOUNT

THIS LOCATION CONTAINS THE NUMBER OF TIMES THAT THE CURRENT PROCESSOR, OR IN-LINE DEVICE TEST WILL BE EXECUTED

8.2.1.3 SCOPEF

THIS LOCATION CONTAINS THE NUMBER OF TIMES THAT A PARTICULAR SUBTEST HAS BEEN EXECUTED.

8.2.1.4 PASCNT

THIS LOCATION CONTAINS THE NUMBER OF PASSES THAT THE PROGRAM HAS EXECUTED

8.2.1.5 REGISTER 6

THIS REGISTER CONTAINS THE PROCESSOR STACK POINTER. WHEN ANY PROCESSOR TEST IS ENTERED, THIS REGISTER SHOULD CONTAIN THE VALUE "STACK"

8.3 MODIFYING GTP FOR TROUBLESHOOTING

8.3.1 IN ORDER TO OBTAIN TIGHTER LOOPS ON A PROCESSOR SUBTEST, CHANGE THE "SCOPE" INSTRUCTION AT THE END OF THE SUBTEST TO A BRANCH TO THE FIRST INSTRUCTION OF THAT SUBTEST.

8.3.2 IN ORDER TO DETERMINE THE CONTENTS OF A DEVICE STATUS REGISTER WHEN A FAILURE OCCURS, REPLACE THE CALL TO THE GTP ERROR ROUTINE, "HLT", WITH HALT (OP CODE 000000) THE CONTENTS OF THE DEVICE REGISTER MAY NOW BE EXAMINED.

8.3.3 THE CONTENTS OF UP TO THREE (3) DEVICE REGISTERS MAY BE TYPED BY THE GTP ERROR HANDLER, AFTER AN ERROR HAS OCCURED. THIS MAY BE ACCOMPLISHED BY CHANGING THE LITERAL(S) LOCATED AT PREG1+2(PREG2+2,PREG3+2) TO THE ADDRESS(ES) OF THE DEVICE REGISTER(S) TO BE TYPED(SEE LISTING). WHEN AN ERROR OCCURS, THE CONTENTS OF THE SELECTED DEVICE REGISTER(S) WILL BE TYPED IN COLUMN(S) 5(6,7) OF THE ERROR TYPEOUT, INSTEAD OF THE CONTENTS OF THE DEVICE SELECTION REGISTERS.

NOTE: IF THE CONTENTS OF A REGISTER IS TYPED AS DESCRIBED IN 8.3.3, CARE SHOULD BE TAKEN WHEN INTERPRETING THE CONTENTS SINCE THE ERROR ROUTINE WILL NOT READ THAT REGISTER UNTIL SEVERAL SECONDS AFTER THE ERROR HAS OCCURED.

9. WRITING OVERLAYS FOR GTP

GTP HAS THE FACILITY TO INTERFACE WITH A USER OVERLAY FOR TESTING ANY DEVICE NOT INCLUDED IN GTP.

THE OVERLAY MAY BE EITHER A NON-INTERRUPTING BACKGROUND TEST (SUCH AS A SPECIAL PROCESSOR TEST, OR A TEST OF A NON-INTERRUPTING DEVICE SUCH AS A KE11 EXTENDED ARITHMETIC UNIT) OR A TEST FOR AN INTERRUPT-DRIVEN DEVICE THAT IS TO BE RUN CONCURRENTLY WITH DEVICES ALREADY INCLUDED IN GTP.

NOTE: THE USER SHOULD REFERENCE THE LISTING OF GTP FOR EXAMPLES OF TEST CODE THAT IS COMPATIBLE WITH GTP.

9.1 OVERLAY LINKING

9.1.1 BACKGROUND OVERLAY

A BACKGROUND OVERLAY IS CALLED BY GTP USING THE "IOT" INSTRUCTION. THEREFORE, THE USER MUST TERMINATE HIS OVERLAY WITH AN "RTI" INSTRUCTION TO RETURN TO GTP.

LOCATION 000020 MUST BE SET UP BY THE OVERLAY AT PROGRAM LOAD TIME WITH THE POINTER TO THE FIRST EXECUTABLE INSTRUCTION IN THE OVERLAY.

9.1.2 OVERLAY INITIALIZATION (FOR EITHER BACKGROUND OR FOREGROUND OVERLAYS)

IF THE USER REQUIRES INPUTS TO HIS OVERLAY FROM EITHER THE PROCESSOR CONSOLE SWITCHES, OR THE TELETYPE HE MUST PROVIDE A ROUTINE TO PERFORM THIS FUNCTION.

THIS ROUTINE IS CALLED BY GTP WITH THE INSTRUCTION "JSR %7,@GETSW", AFTER THE DEVICE INHIBIT SWITCHES HAVE BEEN SET (SEE SECTION 4.3.4 FOR DETAILS OF SELECTION)

THE USER MUST SET UP LOCATION 001020 WITH A POINTER TO HIS OVERLAY INITIALIZATION ROUTINE AT OVERLAY LOAD TIME.

THE ROUTINE MUST BE TERMINATED WITH AN "RTS %7" TO RETURN CONTROL TO GTP AFTER OVERLAY INITIALIZATION HAS BEEN COMPLETED.

9.1.2 DEVICE PRIMING CODE

IF THE OVERLAY IS A TEST OF AN INTERRUPT DRIVEN DEVICE THAT IS TO RUN CONCURRENTLY WITH OTHER SELECTED DEVICES THE DEVICE MUST BE INITIALIZED, OR "PRIMED", IMMEDIATELY AFTER ALL OTHER SELECTED DEVICES HAVE BEEN "PRIMED" BY GTP.

THE USER PRIMING CODE IS CALLED BY GTP WITH "JSR %7,@PRIME" IMMEDIATELY AFTER ALL INTERNAL PRIMING CODE HAS BEEN EXECUTED.

THE OVERLAY MUST SET UP LOCATION 001022 WITH A POINTER TO THE USER PRIMING CODE AT OVERLAY LOAD TIME.

THE PRIMING CODE MUST BE TERMINATED WITH AN "RTS %7" TO RETURN CONTROL TO GTP.

9.2 SCOPE LOOPS

IT IS SUGGESTED THAT THE OVERLAY USE THE INTERNAL SCOPE AND ITERATION LOOP ROUTINE. THIS ROUTINE IS CALLED BY A "TRAP" INSTRUCTION.

9.3 ERRORS

IT IS SUGGESTED THAT THE OVERLAY USE THE ERROR HANDLER INTERNAL TO GTP FOR ERROR REPORTING, UNLESS DETAILED ERROR INFORMATION IS REQUIRED.

THIS ROUTINE IS CALLED BY AN "EMT" INSTRUCTION.

9.4 RESTRICTIONS

9.4.1 THE ONLY LOCATIONS AVAILABLE TO THE USER OVERLAY IN THE FIRST 8KW OF MEMORY (000000-037777) ARE

000020	LINK TO USER BACKGROUND OVERLAY
170-174	USER VECTORS
270-274	USER VECTORS
300-776	FLOATING DEVICE VECTORS
001020	LINK TO USER OVERLAY INITIALIZATION ROUTINE
001022	LINK TO USER DEVICE PRIMING CODE

9.4.2 THE FOLLOWING INSTRUCTIONS MUST NOT BE USED

RESET, WAIT, IOT, BR ., JMP ., 3 (TRACE TRAP)

9.4.3 LIMITED USE INSTRUCTIONS

HALT-MAY BE USED ONLY IN OVERLAY INITIALIZATION ROUTINE
EMT-MAY BE USED ONLY AS CALL TO GTP ERROR HANDLER
TRAP-MAY BE USED ONLY AS CALL TO GTP SCOPE LOOP AND ITERATION HANDLER

9.4.4 THE PROCESSOR STACK POINTER (R6) MUST NOT BE MODIFIED

9.4.5 IF THE GENERAL REGISTERS (R0-R5) ARE USED BY A DEVICE INTERRUPT SERVICE ROUTINE, THEIR CONTENTS MUST BE SAVED IMMEDIATELY UPON ENTRANCE TO THE ROUTINE AND RESTORED IMMEDIATELY BEFORE EXITING THE ROUTINE.

9.4.6 ALL DEVICE INTERRUPT SERVICE ROUTINES SHOULD BE SERVICED AT THE DEVICE HARDWARE INTERRUPT LEVEL.

9.4.7 ONLY BITS 0-3 AND 5-8 OF THE PROCESSOR STATUS WORD MAY BE MODIFIED, AND ONLY BY "BIS" AND "BIC" INSTRUCTIONS

9.4.8 THE OVERLAY MUST NOT CAUSE A TIMEOUT TRAP IN EITHER DEVICE PRIMING, INTERRUPT SERVICE, OR BACKGROUND TEST CODE.

9.4.9 SCOPE LOOPS ARE NOT PERMITTED IN INTERRUPT SERVICE ROUTINES

9.4.10 THE FIRST INSTRUCTION OF A BACKGROUND OVERLAY MUST NOT BE AN EMT (CALL TO GTP SCOPE LOOP ROUTINE).

10. MISCELLANIOUS
 10.1 EXECUTION TIME

EXECUTION VARIES WITH NUMBER OF DEVICES, FOR 8KW SYSTEMS WITH TTY AND HSR ONLY, ABOUT 1 MINUTE WITH THE TRACE BIT CLEARED ABOUT 1.5 MINUTES WITH THE TRACE BIT SET. DEVICES SUCH AS THE AA11 DAC AND AD01-D A/D CONVERTER MAY LENGTHEN EXECUTION TIME TO OVER AN HOUR. (INTERRUPT MAY OCCUR AS OFTEN AS EVERY 30 MICROSECONDS.)

	PROCESSOR ONLY (2 ASTERISKS)	RF, RK AND TC11 (2 ASTERISKS)
8KW	2.5 MINUTES	3 MINUTES
	-----	----
12KW	5	6
	-----	----
16KW	7.5	9
	-----	----
20KW	10	12
	-----	----
24KW	12.5	15
	-----	----
28KW	20	22
	-----	----

NOTE: IF THE PROGRAM IS BEING RUN UNDER ACT11 AUTO ACCEPT, A SINGLE PASS OF ACT11 WILL EQUAL ONE CYCLE THRU THE PASS TABLE. FOR AN 11/45 THIS WILL BE 12 ASTERISKS, FOR AN 11/40 IT WILL BE 4 ASTERISKS, AND FOR AN 11/10 OR AN 11/20 IT WILL BE 2 ASTERISKS.

10.2 THE MEMORY LAYOUT IS BROKEN INTO FOUR DISTINCT PARTS:

- (1) THE TRAP CATCHER,
- (2) THE SET UP AND I/O PRIMER AREA AND I/O TEST ROUTINES,
- (3) THE PROCESSOR TESTS AND
- (4) CONTROL AND UTILITY ROUTINES.

11. PROGRAM DESCRIPTION

THE DESIGN OF THIS SYSTEM EXERCISER IS PREDICATED UPON IT BEING PRIMARILY INTENDED FOR A PAPER TAPE SYSTEM WITH EIGHT KW OF MEMORY, AND THAT IT BE EASY TO RUN AND UNDERSTAND. ALSO, THAT IT MAY BE MODIFIED EASILY TO EXERCISE A WIDE MULTITUDE OF PERIPHERALS, INCLUDING THOSE OF THE CUSTOMER'S OWN DESIGN. THE CONCEPT IS TO HAVE ALL DESIRED I/O RUNNING CONCURRENTLY WITH THE PROCESSOR TEST FOR BACKGROUND. THE DECISION OF WHICH I/O DEVICES ARE TO BE USED IS MADE AT STARTUP TIME. THE DATA PATTERNS USED IN THE EXERCISER ARE FIXED. FOR MECHANICAL DEVICES, SUCH AS THE TTY READER, THERE IS NO AUTOMATIC RESYNCHRONIZATION. IF PAPER TAPE BECOMES OUT OF PHASE WITH THE DATA, STOP THE EXERCISER, RESYNC THE TAPE, AND THEN RESTART THE EXERCISER.

THERE IS NO MONITOR IN THE CONVENTIONAL SENSE. EACH DEVICE THAT IS TO BE EXERCISED HAS IT'S OWN STAND ALONE ROUTINE THAT OPERATES IN THE INTERRUPT MODE. THESE ROUTINES NEED NO SUPERVISION OR MONITORING AFTER THEY ARE INITIATED. THERE IS A PRIMER AREA THAT CHECKS THE SWITCH REGISTER TO SEE WHAT DEVICES ARE TO BE INITIATED. THE PRIMER AREA SETS THE INTERRUPT ENABLE BIT IN THE DEVICE STATUS REGISTER, INITIALIZES THE DATA PATTERN AND INITIATES AN OPERATION TO RAISE DATA FLAGS ON DEVICES THAT CAN NOT INITIATE THEM THEMSELVES. THEN, THE PRIMER JUMPS TO THE PROCESSOR TEST WHERE THE INDIVIDUAL DEVICES ARE SERVICED AT THE INTERRUPT RATE.

NOTE: SEE THE FIRST PAGE OF THE LISTING FOR A TABLE OF CONTENTS. IN THE LEFTMOST COLUMN OF THE TABLE OF CONTENTS IS THE LINE NUMBER AT WHICH THE PARTICULAR ROUTINE CAN BE FOUND. LISTING LINE NUMBERS ARE SEQUENTIAL AND ARE IN THE LEFTMOST COLUMN OF EACH PAGE.

(11. CONT'D)

THE INSTRUCTION EXERCISER IS A STRAIGHT LINE TEST OF INSTRUCTIONS. THE SEQUENCE IN WHICH THEY ARE EXECUTED IS THE SAME SEQUENCE IN WHICH THEY ARE SHOWN IN THE LISTING. EACH AREA OF CODE FROM "SCOPE TO SCOPE" IS AN INDIVIDUAL SUB-TEST. WITH SWITCH 11 UP THE SUB-TEST IS EXECUTED ONE TIME AND THEN THE NEXT SUB-TEST IS EXECUTED, AND SO ON TILL ALL SUBTESTS HAVE BEEN EXECUTED. HOWEVER IF SWITCH 11 IS DOWN THE SUB-TEST WILL BE EXECUTED SOME "N" NUMBER OF TIMES BEFORE ENTERING THE NEXT SUB-TEST. IF SWITCH 14 IS UP YOU WILL NEVER LEAVE THE CURRENT SUB-TEST YOU ARE IN. THIS USE IS INTENDED FOR TROUBLE SHOOTING A MALFUNCTION IN A SUB-TEST. THE FIRST GROUP OF SUB-TESTS ARE THE BINARYS AND UNARYS. THOSE INSTRUCTIONS ARE TESTED IN THE INDEX MODE: SOURCE ONLY, DESTINATION ONLY, THEN BOTH SOURCE AND DESTINATION. THE SAME INSTRUCTIONS ARE THEN TESTED USING THE IMMEDIATE MODE INDIRECT. THESE MODES ARE TESTED AGAINST OTHER MODES WHICH MAY USE A REGISTER OR MEMORY LOCATION. THESE WILL BE SWAPPED BETWEEN SOURCE AND DESTINATION.

AFTER THE MODES AND INSTRUCTION HAVE BEEN PROVEN IN THE WORD MODE, THEY ARE THEN TESTED IN THE BYTE MODE. OTHER TESTING IS ALSO DONE WHERE THE "JSR" INSTRUCTION IS TESTED IN NESTED COMBINATIONS. ALL COMBINATIONS OF NUMBERS ARE TESTED USING THE COMPARE, ROTATE, ADD AND COMPLIMENT INSTRUCTIONS. THERE IS ALSO A MINIMUM TEST OF POWER FAIL AND AUTO RECOVERY, WHICH IS NOT ENABLED UNTIL AFTER THE FIRST PASS OF THE PROGRAM. THE PROGRAM REQUIRES TWO ASTERISKS ON THE TTY TO MAKE ONE TRUE PASS OF THE PROGRAM. THE FIRST ASTERISK OCCURS AFTER ONE PASS OF THE INSTRUCTION TEST WITH THE TRACE BIT CLEARED. THE SECOND ASTERISK MARKS THE END OF AN INSTRUCTION TEST PASS WITH THE TRACE BIT SET. THE REASON FOR EXECUTING ALL INSTRUCTIONS WITH THE TRACE BIT SET IS TO TAKE US INTO SERVICE AT THE END OF EACH INSTRUCTION.

NOTE: THE KT11 OPTION IS NOT ENABLED UNTIL TWO PASSES HAVE BEEN COMPLETED (TWO ASTERISKS).

NOTE: IF THE PROCESSOR UNDER TEST IS A PDP-11/45 THEN A MINIMUM OF 12 PASSES WILL BE REQUIRED FOR COMPLETE TESTING OF THE PROCESSOR. (SEE SECTION 5.2.1 FOR DETAILS OF THE PROCESSOR MODES THAT WILL BE EXERCISED).

11.1. SUBROUTINE ABSTRACTS

11.1.1 BEGIN SA 200

11.1.2 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST IN THE INSTRUCTION SECTION. IT RECORDS THE STARTING ADDRESS OF EACH SUB-TEST AS IT IS BEING ENTERED. IF A SCOPE LOOP IS REQUESTED, IT WILL JUMP TO THE START OF THE SUBTEST THAT THE SCOPE LOOP IS REQUESTED FOR. IF A SCOPE LOOP IS NOT REQUESTED, THERE WILL BE EITHER A FIXED OR RANDOM NUMBER OF ITERATIONS ON THAT SUB-TEST BEFORE THE NEXT SUBTEST IS ENTERED. SWITCH 11 ON A 1 INHIBITS ITERATION OF SUBTESTS. ALSO SWITCH 10 IS TESTED TO SEE IF A WAIT INSTRUCTION SHOULD BE EXECUTED IN PLACE OF THE PROCESSOR TEST.

11.1.3 PRINT

THIS ROUTINE HANDLES THE ERROR CALL HLT, TYPING OUT THE ERROR ARGUMENTS AS LISTED IN SECTION 6.1.

11.1.4 ENDPAS

THIS ROUTINE IS EXECUTED AT THE END OF A PROGRAM PASS, AFTER THE END OF PASS ASTERISK IS PRINTED.

THIS ROUTINE PERFORMES THE FOLLOWING THREE FUNCTIONS:

- A) TYPE AN ERROR MESSAGE INDICATING THAT A PASS HAS BEEN COMPLETED AND THAT NO ERRORS OCCURED DURING THE CURRENT PASS. CONTROL WILL THEN BE TRANSFERED TO THE ISOLATION ROUTINE (ISOLAT) AND THE PROGRAM WILL BE RESTARTED.
- B) THE ROUTINE WILL SET THE PROCESSOR STATUS WORD TO THE NEXT MODE IN SEQUENCE, OR FREEZE IT IN THE CURRENT MODE, DEPENDING UPON WHETHER SW12=0 OR 1.
- C) IF THE PROGRAM IS RUNNING IN MULTI-PROCESSOR MODE THE ROUTINE WILL RELEASE THE BUS SWITCH, AND THEN, AFTER A DELAY TO ALLOW THE OTHER PROCESSOR TO CONNECT THE SWITCH WILL BE REQUESTED, AND THE PROGRAM WILL BE RESTARTED WHEN THE SWITCH CONNECTS.

11.1.5 TRAPCATCHER

THIS IS A SERIES OF INSTRUCTIONS STARTING AT LOCATION 0, DESIGNED TO DETECT AND ISOLATE UNEXPECTED TRAPS AND INTERRUPTS TO THE TRAP AND INTERRUPT VECTOR AREA OF MEMORY.

THE PRINCIPAL OF THIS ROUTINE IS: THE VECTOR ENTRANCE ADDRESS POINTS TO THE NEXT SEQUENTIAL WORD WHICH CONTAINS A HALT (00000). (THIS LOCATION IS ALSO THE STATUS FOR THAT VECTOR ENTRANCE, BUT THIS HAS NO EFFECT ON IT ALSO BEING THE NEXT INSTRUCTION).

IF A HALT OCCURS IN THE TRAP OR INTERRUPT VECTOR AREA, REGISTER SIX SHOULD BE EXAMINED TO DETERMINE ITS CONTENTS, THEN USE REGISTER SIX CONTENTS AS AN ADDRESS TO DETERMINE THE LOCATION WHERE THE PROGRAM WAS WHEN THE INTERRUPT OR TRAP OCCURRED. (MEMORY AS SPECIFIED BY R6 CONTAINS THE PC OF THE INSTRUCTION FOLLOWING THE INSTRUCTION WHERE THE TRAP OCCURRED).

11.1.7 WATCH (DEVICE WATCHDOGS)

THIS ROUTINE DETERMINES, AFTER ALL OF THE PROCESSOR TEST HAS BEEN EXECUTED, WHETHER ALL INTERRUPT DRIVEN DEVICES THAT HAVE BEEN SELECTED INTERRUPTED AT LEAST ONCE DURING THE CURRENT PASS. IF A DEVICE DOES NOT INTERRUPT ON A GIVEN PASS, THE INTERRUPT OCCURED FLAG FOR THAT DEVICE IS NOT SET AND AN ERROR MESSAGE WILL BE TYPED INDICATING WHICH DEVICE IS FAILING.

11.1.8 ISOLAT

THIS ROUTINE WILL DELETE, SEQUENTIALLY, ONE OF THE DEVICES THAT HAS BEEN SELECTED FOR TESTING, AFTER THE INITIAL OCCURENCE OF ANY ERROR. EACH TIME ANOTHER ERROR OCCURS, OR AT THE END OF EVERY PASS IF NO ERROR OCCURS THAT PASS, THE PREVIOUSLY DELETED DEVICE WILL BE RESTORED TO OPERATION, AND THE NEXT SELECTED DEVICE WILL BE DELETED. THE PROGRAM WILL THEN REINITIALIZE ALL THOSE DEVICES THAT HAVE BEEN SELECTED FOR TESTING AND THE PROCESSOR TEST WILL BE RESTARTED.

11.1.9 TTYIN1 (TTY INPUT)

THIS ROUTINE OPERATES IN THE INTERRUPT MODE AND CHECKS FOR A COUNT PATTERN IN THE READER OF THE TTY. THE ROUTINE WILL ACCEPT AN INFINITE NUMBER OF ZERO BYTES (BLANK TAPE). BUT THE FIRST BYTE THAT IS NOT A ZERO MUST BE A ONE AND ALL SEQUENTIAL BYTES MUST BE ONE GREATER.

11.1.10 TYOUT (TTY OUTPUT)

THIS IS A ROUTINE THAT OUTPUTS A COUNT PATTERN IN THE INTERRUPT MODE TO THE TELEPRINTER.

11.1.11 RF11 (RF-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF MEMORY IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATO" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO MEMORY). THERE IS A LOCATION IN THE PROGRAM THAT IF MODIFIED WILL ALLOW EXERCISING UP TO EIGHT DISKS.

11.1.12 TC11 (TC11 DECTAPE)

TC11 IS THE FIRST ADDRESS IN THE DECTAPE INTERRUPT VECTOR (214). THIS ROUTINE WILL READ, IN REVERSE, BLOCK NUMBERS UNTIL THE REVERSE END ZONE IS FOUND. AT THIS POINT THE INTERRUPT VECTOR AND COMMAND REGISTER ARE MODIFIED TO READ ALL BLOCK NUMBERS IN THE FORWARD DIRECTION. EACH BLOCK NUMBER READ IS COMPARED WITH THE EXPECTED BLOCK NUMBER COUNT AND MISCOMPARISONS REPORTED. WHEN EACH BLOCK IS FOUND (WITH THE EXCEPTION OF BLOCK 0) A BLOCK (400 WORDS) OF TEST DATA IS WRITTEN ONTO TAPE. AFTER ALL BLOCK NUMBERS HAVE BEEN READ THE TAPE IS DRIVEN INTO THE FORWARD END ZONE. HERE THE DIRECTION IS REVERSED AND ALL BLOCK NUMBERS ARE READ IN REVERSE. STARTING WITH BLOCK 1100 THROUGH BLOCK 1 THE DATA IS READ FROM TAPE. THE SAME BUFFER IS USED FOR BOTH READ AND WRITE OPERATIONS. THE DATA IN THE BUFFER IS CHECK-SUMMED WHILE IN THE PROCESSOR TEST "SCOPE" ROUTINE. IF THE DATA-BUFFER IS DESTROYED DURING A READ OPERATION IT MAY BE NECESSARY TO RELOAD THE PROGRAM.

NOTE: TC11 DRIVE 1 IS USED BY THIS TEST.

11.1.13 KW11L (LINE CLOCK)

THIS TEST OF THE LINE CLOCK IS IN THE INTERRUPT MODE. THE CLOCK INTERRUPTS AT LINE FREQUENCY IF AN INTERRUPT OCCURS DURING A PASS, THE INTERRUPT OCCURED FLAG IS SET FOR THE LINE CLOCK. IF THE LINE CLOCK FAILS TO INTERRUPT SUBSEQUENTLY, THE FAILURE WILL NOT BE DETECTED UNTIL THE NEXT PASS, WHEN THE INTERRUPT OCCURED FLAGS ARE CHECKED AGAIN.

11.1.14 LPINTR (LINE PRINTER)

THIS ROUTINE OUTPUTS TO THE LINE PRINTER IN THE FLAG MODE WHILE FILLING THE BUFFER IN THE INTERRUPT MODE WHILE THE BUFFER IS BEING PRINTED.

11.1.15 HSRIN1 (PC11 INPUT)

THIS ROUTINE OPERATES IN THE INTERRUPT MODE AND CHECKS FOR A COUNT PATTERN IN THE PC11 READER. THE ROUTINE WILL ACCEPT AN INFINITE NUMBER OF ZERO BYTES (BLANK TAPE). BUT THE FIRST BYTE THAT IS NOT A ZERO MUST BE A ONE AND ALL SEQUENTIAL BYTES MUST BE ONE GREATER. IF THE ROUTINE DETECTS AN ERROR IN THE COUNT PATTERN, A DATA ERROR IS FLAGED.

11.1.16 HPOUT (PC11 OUTPUT)

THIS IS A ROUTINE THAT OUTPUTS A COUNT PATTERN IN THE INTERRUPT MODE TO THE HIGH SPEED PUNCH.

11.1.17 AD01D (AD01-D A/D CONVERTER)

THIS INTERRUPT MODE ROUTINE DOES A WAS-IS TEST ON CHANNELS ZERO THRU THREE. ONE CONVERSION FOR EACH CHANNEL IS LOADED INTO A TABLE, AND THEN A SECOND CONVERSION FOR EACH IS LOADED INTO ANOTHER TABLE. THE TWO TABLES ARE THEN COMPARED TO MAKE SURE THAT THE TWO CONVERSIONS FOR EACH CHANNEL ARE WITHIN + OR -1 LSB OF EACH OTHER. AFTER THE INITIAL LOOP THRU THE ROUTINE, THE TWO TABLES ARE LOADED ALTERNATELY, TABLE A IS LOADED AND COMPARED TO TABLE B, THEN TABLE B IS LOADED AND COMPARED WITH TABLE A, AND SO ON. THE CONVERSIONS ARE DONE AT A GAIN OF X8, AND THUS EACH CHANNEL (0-3) MUST HAVE A CONSTANT DC VOLTAGE ON IT LESS THAN 1.25 VOLTS.

11.1.18 AFC11 (AFC11 LOW LEVEL MULTIPLEXER)

THIS INTERRUPT MODE ROUTINE DOES A WAS-IS TEST ON CHANNELS ZERO THRU SEVEN. AN AVERAGE OF EIGHT CONVERSIONS FOR EACH CHANNEL IS LOADED INTO A TABLE, AND THEN A SECOND SET OF AVERAGES IS TAKEN AND LOADED INTO A SECOND TABLE. THE TWO TABLES ARE COMPARED TO MAKE SURE THAT THE DIFFERENCE IN AVERAGES FOR EACH CHANNEL IS NOT GREATER THAN + OR -20 LSB. AFTER THE INITIAL TABLE OF AVERAGES IS TAKEN, THE SECOND TABLE REPLACES THE FIRST WHEN COMPARISON HAS BEEN COMPLETED. THE CONVERSIONS ARE DONE AT A GAIN OF 1000, AND THUS EACH CHANNEL MUST HAVE A CONSTANT DC VOLTAGE OF LESS THAN 5 MV AS AN INPUT.

11.1.19 CRINT (CR11/CM11 40 AND 80 COLUMN CARD READER)

THIS INTERRUPT DRIVEN ROUTINE CHECKSUMS EACH CARD READ IN BOTH CARD-IMAGE AND ENCODED FORMS. ALL CARDS IN THE ALPHANUMERIC DECK HAVE THE SAME CHECKSUMS (ONE FOR CARD-IMAGE, ONE FOR ENCODED). THE TEST FAILS IF THE SUMS TAKEN ON A CARD FAIL TO MATCH THOSE FOR THE ALPHANUMERIC DECK. WHEN THE CARD READER GOES OFF-LINE, THE ROUTINE CLEARS THE INTERRUPT CAUSED BY THAT AND RETURNS TO THE MAIN PROGRAM. WHEN THE CARD READER IS PUT BACK ON-LINE, THE CORRESPONDING INTERRUPT IS CLEARED AND CHECKSUMING IS RESUMED.

11.1.20 TM11 (MAGNETIC TAPE)

THIS IS THE FIRST TAG OF THE MAGTAPE ROUTINE, HERE THE CONTROL IS GIVEN AN INITIAL COMMAND TO REWIND TAPE. WHEN BOT IS REACHED WE COMMENCE TO WRITE A RECORD 22 BYTES LONG. UPON COMPLETION OF THE WRITE, THE TAPE IS BACKSPACED ONE RECORD, AND WE THEN READ THE PREVIOUSLY WRITTEN RECORD. UPON COMPLETION OF THE READ THE TAPE READ BUFFER IS TESTED TO SEE IF IT CONTAINS ALL 52525, IF NOT AN ERROR IS REPORTED, WHEN FINISHED CHECKING THE BUFFER THE READ BUFFER IS FLUSHED TO ZEROS AND THE NEXT RECORD IS WRITTEN. THE SEQUENCE IS CONTINUED UNTIL .EOT IS DETECTED IN THE READ ROUTINE. THEN THE PROGRAM BRANCHES TO THE ORIGINAL ENTRANCE AND THE TAPE THEN REWINDS TO BOT AND THE SEQUENCE REPEATS ITSELF.

11.1.21 RC11 (RC11 DISK) (SEE 11.1.11)

11.1.22 RK11 (RK-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF MEMORY IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATO" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO MEMORY). THERE IS A LOCATION IN THE PROGRAM THAT IF MODIFIED WILL ALLOW EXERCISING UP TO FOUR DISKS.

11.1.23 DC11T1 (DC11 ASYNCHRONOUS LINE UNIT TRANSMITTER ROUTINE)

THIS ROUTINE OUTPUTS A COUNT PATTERN IN THE INTERRUPT MODE. THE OUTPUT IS COUPLED BY SPECIAL INTERNAL HARDWARE TO THE RECEIVER WHERE THE SERIAL DATA IS REASSEMBLED. THE RECEIVER SECTION OF THE HARDWARE WILL INTERRUPT THE PROCESSOR EACH TIME A WORD IS REASSEMBLED. THE RECEIVED DATA IS COMPARED TO THE TRANSMITTED DATA BY SOFTWARE.

11.1.24 DC11T2 (2ND DC11 TRANSMITTER ROUTINE)

THIS ROUTINE IS IDENTICAL TO THE DCOUT ROUTINE EXCEPT THAT IT ALLOWS FOR A SECOND DC11 TO BE TESTED WITH THE SYSTEM.

11.1.25 AA11 (AA11 DAC WITH SCOPE OPTION)

THIS ROUTINE DISPLAYS THE MESSAGE "PDP-11" ON ANY OF THE CRT OPTIONS OF THE AA11. THIS MESSAGE IS POINT PLOTTED USING A 5 BY 7 MATRIX TWO DAC'S ARE USED ONE FOR THE Y AXIS, ONE FOR THE X AXIS. THIS ROUTINE IS INTERRUPT DRIVEN AND FLICKER MAY BE OBSERVED IF OTHER DEVICES ARE BEING TESTED AT THE SAME TIME.

11.1.26 DP11T (DP11 SYNCHRONOUS LINE UNIT)

THIS ROUTINE USES PROCESSOR TEST CODE AS AN OUTPUT BUFFER, FOR TRANSMISSION IN THE INTERRUPT MODE. THE OUTPUT IS COUPLED BY SPECIAL INTERNAL HARDWARE TO THE RECEIVER WHERE THE DATA IS REASSEMBLED. BOTH THE TRANSMITTER AND RECEIVER ARE DOUBLE BUFFERED. THE BYTE BEING TRANSMITTED AND THE BYTE BEING RECEIVED MAY BE THREE CHARACTERS APART. THE RECEIVED COMPARED TO A PREDICTED VALUE BY SOFTWARE. THE DP11 USES A SYNC CHARACTER OF 26(8).

11.1.27 DM11T (DM11 ASYNCHRONOUS MULTIPLEXER)

THE DM11 ROUTINE TRANSMITS A BINARY COUNT PATTERN ON ALL 16 DM11 LINES (UNLESS PATCHED OTHERWISE), AND RECEIVES DATA ON ALL ACTIVE LINES (IF JUMPERS ARE INSERTED, OTHERWISE DATA IS RECEIVED ON LINE 0 ONLY). RECEIVED DATA IS CHECKED ON LINE 0 ONLY. THE PROGRAM IS SET FOR THE DM11 TO INTERRUPT TO LOCATION 340 (RECEIVER) AND 344 (TRANSMITTER) AND SERVICES INTERRUPTS AT LEVELS. RECEIVED DATA IS CHECKED AT 8 BITS PER CHARACTER BUT MAY BE PATCHED OTHERWISE. LINE 0 HAS A SPECIAL INTERNAL HARDWARE MAINTENANCE LOOP.

NOTE: THE MAINTENANCE CARD MUST BE INSTALLED TO RUN THIS TEST

11.1.28 ABS DUMP ROUTINE

THE ABS DUMP ROUTINE WAS INCLUDED TO ALLOW THE CREATION OF TAILORED VERSIONS OF GTP FOR SOME OF THE FOLLOWING REASONS:

1. PRESET SWITCH REGISTER SET UP TO ALLOW STARTING AT 200 WITH ALL SWITCHES DOWN.
2. VECTORS FOR RELATIVE DEVICES SUCH AS DP11, DM11, ETC. MAY NEED TO BE CHANGED FOR CERTAIN CONFIGURATIONS.
3. ROUTINES OF USER ORIGIN MAY BE MERGED WITH THE EXISTING CODE.
4. LP11 ROUTINE MODIFIED FOR 132 COLUMNS
5. KL11 ROUTINE MODIFIED FOR THE VT05, VT06, OR LC11.

11.1.29 DR11B (DR11B GENERAL PURPOSE NPR INTERFACE)

THERE ARE TWO SEPERATE WAYS THIS OPTION MAY BE TESTED. IN MAINTENANCE MODE AND AS A INTER-PROCESSOR BUFFER.

MAINTENANCE MODE REQUIRES THAT THE MAINTENANCE MODULE BE IN SLOT C04, D04. UNDER THESE CONDITIONS A TEST IS PERFORMED ON THE "NPR", AND THE DIRECTION CONTROL LOGIC (C LINES). THIS TEST IS IN LINE AS A PROCESSOR TEST AND PERFORMS MULTIPLE "NPR" TRANSFERS WHEN ENCOUNTERED. IN THIS MODE THE FIRST WORD OF THE BUFFER IS TRANSFERED INTO THE SECOND WORD, THE THIRD WORD INTO THE FOURTH WORD. THIS SEQUENCE CONTINUES UNTIL WORD COUNT OVERFLOWS. NOTE: THE DR11B IN MAINTENANCE MODE WHEN DOING "NPR" BECOMES BUS MASTER FOR FOUR (4) NPRS.

TO BE USED AS AN INTER-PROCESSER BUFFER REQUIRES TWO COMPUTERS, EACH HAVING ITS OWN DR11B WITH A SPECIAL CABLE CONNECTING THE DR11B TOGETHER. THE PROGRAM MUST BE LOADED INTO EACH COMPUTER, BLOCK TRANSFER OF DATA IS MADE IN EACH DIRECTION CONTROLLED BY AN INTERRUPT DRIVEN ROUTINE. WHILE DOING THESE TRANSFERS THE DR11B GIVES UP THE BUS MASTER SHIP AFTER EACH "NPR" TRANSFER.

11.1.30 EXPAND (MEMORY EXPANSION)

THIS MEMORY EXPANSION IS ACCOMPLISHED BY REPEATING A UNIQUE TEST IN UNUSED MEMORY. IN THE STRAIGHT LINE CODE A TEST IS MADE TO SEE IF EXTRA MEMORY IS TO BE USED. IF SO THE MEMORY IS FILLED WITH THE UNIQUE TEST, THEN THE PROCESSOR TEST JUMPS TO THE START OF THE EXPANDED CODE. THIS CODE IS EXECUTED IN THESE MEMORIES UNTIL THE END OF THE CODE IS REACHED, THEN IT WILL RETURN TO THE NORMAL PROCESSOR TEST. IN EXPANDED MEMORY EACH COPY OF THE UNIQUE TEST IS ITERATED 4000(8) TIMES BEFORE THE NEXT COPY IS EXECUTED.

THE AMOUNT OF MEMORY IS DETERMINED BY DOING A TST (0)+ UNTIL A TIME OUT TRAP OCCURS. THE VALUE IN THE REGISTER AT THIS TIME IS CONSIDERED TO BE HIGH MEMORY. 1000(8) BYTES ARE SUBTRACTED FROM THIS VALUE TO LEAVE A BUFFER AT THE TOP OF MEMORY.

A COPY OF THE ROTATE BYTE INSTRUCTION TEST IS USED AS THE UNIQUE TEST TO FILL MEMORY. THIS TEST IS WRITTEN IN POSITION INDEPENDENT CODE.

11.1.31 CD11 (NPR CARD READER)

THIS ROUTINE READS AND CHECKSUMS 1 CARD AT A TIME IN BOTH ALPHA AND IMAGE MODES. EXCEPT FOR THE FACT THAT AN ENTIRE CARD IS READ VIA NPRS, AND THE DATA STORED IN A TEMPORARY BUFFER, THE OPERATION OF THE ROUTINE IS SIMILAR TO 11.1.19.

11.1.32 DN11 (DN11 DIGITAL DIALER)

THIS ROUTINE IS AN IN-LINE DEVICE TEST AND IS RUN AFTER ALL PROCESSOR TEST CODE (EXCEPT MEMORY EXPANSION) IS COMPLETED. THE DN11 IS OPERATED IN MAINTENANCE MODE, AND AN INTERRUPT OCCURS EACH TIME A MAINTENANCE FUNCTION IS SET. THE TEST IS REPEATED 4000 TIMES(OCTAL).

11.1.33 UDC11 (UNIVERSAL DIGITAL CONTROLLER)

THIS ROUTINE IS AN IN-LINE DEVICE TEST AND IS RUN AFTER ALL PROCESSOR TEST CODE (EXCEPT MEMORY EXPANSION) IS COMPLETED. THE UDC11 IS OPERATED IN MAINTENANCE MODE. INTERRUPTS ARE GENERATED IN IMMEDIATE AND DEFERED SCAN MODES BY SETTING THE MAINTENANCE BIT. THE TEST IS REPEATED 4000 (OCTAL) TIMES EACH PASS.

11.1.34 DRACT (DR11A,C GENERAL INTERFACE)

THIS ROUTINE IS AN IN-LINE DEVICE TEST AND IS RUN AFTER ALL PROCESSOR TEST CODE (EXCEPT MEMORY EXPANSION) IS COMPLETED. THE DEVICE IS RUN IN MAINTENANCE MODE, AND THE TEST CONSISTS OF 2 PARTS, A DIAT TEST, AND AN INTERRUPT TEST. THIS TEST IS REPEATED 4000 TIMES (OCTAL) EACH PASS.

11.1.35 KGSTRT (KG11 CYCLIC REDUNDANT CHECK OPTION)

THIS ROUTINE IS AN IN-LINE DEVICE TEST AND IS RUN AFTER ALL PROCESSOR TEST CODE (EXCEPT MEMORY EXPANSION) IS COMPLETED. THE KG11 IS A NON-INTERRUPTING DEVICE, AND THE TEST CODE IS SIMILAR TO PROCESSOR TEST. THREE FUNCTIONS OF THE KG11 ARE TESTED ,CRC12, CRC16, AND CCITT. EACH FUNCTION IS TESTED BY TRANSMITTING KNOWN DATA TO THE KG11, AND COMPARING THE RESULTS OF THE HARDWARE OPERATION WITH A TABLE F KNOWN RESULTS. THE TEST IS REPEATED 4000(OCTAL) TIMES EACH PASS.

11.1.36 DM11-BB (MODEM CONTROL MULTIPLEXER)

THIS ROUTINE IS AN IN-LINE DEVICE TEST AND IS RUN AFTER ALL PROCESSOR TEST CODE (EXCEPT MEMORY EXPANSION) IS COMPLETED. THE DM11-BB IS OPERATED IN MAINTENANCE MODE WITH INTERRUPTS ENABLED AND THE LINE SCANNER RUNNING. THE SCANNER MEMORY IS INITIALLY CLEARED TO 0, AND DETECTION OF THE MAINTENANCE MODE INPUTS TO THE SCANNER WILL CAUSE AN INTERRUPT ON EACH LINE.

11.1.37 M792YA (PAPER TAPE BOOTSTRAP LOADER)

THIS IS AN INLINE DEVICE TEST. THE CONTENTS OF THE M792YA READ ONLY MEMORY ARE ADDED TO FORM A CHECKSUM. THE RESULT IS COMPARED WITH A KNOWN VALUE. IF THE CHECKSUMS ARE DIFFERENT, AN ERROR IS REPORTED. THE TEST IS REPEATED 4000(OCTAL) TIMES.

11.1.38 M792YB (BULK BOOTSTRAP LOADER)

THIS IS AN INLINE DEVICE TEST. IT IS A COMBINED TEST FOR THE M792YB AND MR11-DB BULK STORAGE DEVICE BOOTSTRAP LOADERS, WHICH BOTH HAVE THE SAME ADDRESS ON THE I/O PAGE. AN ATTEMPT IS MADE TO DETERMINE WHICH OF THE TWO DEVICES IS INSTALLED IN THE SYSTEM. IF NEITHER DEVICE IS RECOGNIZED, AND NO TIME-OUT TRAP OCCURS, AN ERROR IS REPORTED. IF THE DEVICE IS RECOGNIZED, A CHECKSUM OF THE DEVICE'S READ ONLY MEMORY IS COMPUTED, AND COMPARED WITH A KNOWN VALUE FOR THAT DEVICE. IF THE CHECKSUMS DIFFER, AN ERROR IS REPORTED. THE TEST IS RUN 4000(OCTAL) TIMES.

12. LISTING



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8861	TEST COMPLEMENTING ALL NUMBERS
8877	TEST COMB (EVEN BYTE)
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5557	SCOPE LOOP ROUTINE
5592	ISOLATION ROUTINE
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5678	FLOATING POINT CONSTANTS AND DATA

```

1
2      THIS PROGRAM IS A MULTI-DEVICE EXERCISER
3      THIS PROGRAM IS NOT INTENDED AS EITHER
4      A COMPLETE TEST OF THE PROCESSOR, OR AS A DETAILED
5      DIAGNOSTIC FOR ANY DEVICES THAT HAVE BEEN SELECTED
6      THIS PROGRAM REQUIRES A MINIMUM OF 8KW OF MEMORY FOR OPERATION
7      COPYRIGHT 1970, 1971, 1972, 1973, DIGITAL EQUIPMENT CORP., MAYNARD MASS, 01754
8
9
10
11
12      IFOR NORMAL OPERATION RUN WITH ALL SWITCHES DOWN
13      !SR15=1 UP==HALT ON ERROR
14      !SR14=1 UP==SCOPE LOOP = PROCESSOR TEST
15      !SR13=1 UP==INHIBIT PRINT OUT
16      !SR12=1 UP==FREEZE PROCESSOR IN CURRENT MODE
17      !SR11=1 UP==INHIBIT SUB-PROGRAM ITERATION(WATCHDOGS ARE NOT CHECKED)
18      !SR10=1 UP==INHIBIT PROCESSOR TEST
19      !SR09=1 UP==INHIBIT MEMORY EXPANSION
20      !SR08=1 UP==ISOLATION==BY DROPOUT
21      !SR07=1 UP==SWITCH ERROR MESSAGES TO HIGH SPEED PUNCH
22      I      (USE ONLY IF HIGH SPEED PUNCH TESTING IS INHIBITED)
23      !SR06=1 UP==RESTART PROGRAM ON ERROR
24
25      !IF THE PROCESSOR UNDER TEST IS AN 11/45, SR12=0 ENABLES THE FOLLOWING:
26      I      PASS 0,14,ETC  KERNEL MODE,R0=R5,NO IT/ TRAP
27      I      PASS 1,15,ETC  KERNEL MODE,R0=R5,IT/ TRAP
28      I      PASS 2,16,ETC  KERNEL MODE,R10=R15,NO IT/ TRAP
29      I      PASS 3,17,ETC  KERNEL MODE,R10=R15,IT/ TRAP
30      I      PASS 4,20,ETC  SUPERVISOR MODE,R0=R5,NO IT/ TRAP
31      I      PASS 5,21,ETC  SUPERVISOR MODE,R0=R5,IT/ TRAP
32      I      PASS 6,22,ETC  SUPERVISOR MODE,R10=R15,NO IT/ TRAP
33      I      PASS 7,23,ETC  SUPERVISOR MODE,R10=R15,IT/ TRAP
34      I      PASS 10,24,ETC  USER MODE,R0=R5,NO IT/ TRAP
35      I      PASS 11,25,ETC  USER MODE,R0=R5,IT/ TRAP
36      I      PASS 12,26,ETC  USER MODE,R10=R15,NO IT/ TRAP
37      I      PASS 13,27,ETC  USER MODE,R10=R15,IT/ TRAP
38
39      !IF THE KT11 IS PRESENT, ALL PASSES EXCEPT 0 AND 1 ARE RUN WITH
40      !THE KT11 ON IF NOT INHIBITED, (SHR5 MUST BE DOWN IN THE 3RD
41      !DEVICE INHIBIT SETTING TO ALLOW USE OF THE KT11)
42
43
44      !NOTE: THE PASS COUNT IS GIVEN IN OCTAL AND IS DISPLAYED IN THE
45      !DISPLAY REGISTER (PDP=11/45 ONLY).
46
47      !IF THE PROCESSOR UNDER TEST IS A PDP=11/40, SR12=0 ENABLES THE FOLLOWING:
48      I      PASS 0,4,ETC  KERNEL MODE, NO IT/ TRAP
49      I      PASS 1,5,ETC  KERNEL MODE, IT/ TRAP
50      I      PASS 2,6,ETC  USER MODE, NO IT/ TRAP
51      I      PASS 3,7,ETC  USER MODE, IT/ TRAP
52
53
54      !IF THE KT11 IS PRESENT, ALL PASSES EXCEPT 0 AND 1 ARE RUN WITH THE
  
```

55 IK*11 ON IF NOT INHIBITED,
56
57 JSPECIAL DELETE SWITCHES-SET RESPECTIVE SWITCH TO A 1
58 JTO INHIBIT INITIALIZATION OF DEVICE
59
60 JNOTE! IF A NON-EXISTENT DEVICE IS SELECTED IN ANY OF THE
61 JTHREE DEVICE INHIBIT SETTINGS, A BUS ERROR TRAP WILL OCCUR AND
62 JTHE PROGRAM WILL HALT AT LOCATION 6
63
64 JAFTER STARTING ADDRESS HAS BEEN LOADED
65 JSW0*1 INHIBIT DT11 BUS SWITCH SELECTION
66 JSW01*1 INHIBIT MULTI-PROCESSOR TESTING
67 JSW02*1 INHIBIT PC11 HSP
68 JSW03*1 INHIBIT PC11 HSR
69 JSW04*1 INHIBIT KM11=L LINE CLOCK
70 JSW05*1 INHIBIT CR11 CARD READER
71 JSW06*1 INHIBIT KM11=P PROGRAMMABLE PEAL TIME CLOCK
72 JSW07*1 INHIBIT LP11 LINE PRINTER --- IF LINE PRINTER IS USED, MUST RESTART AT
73 JSW08*1 INHIBIT SECTION ONE AND TWO OF THE BUS TESTER (FACTORY USE ONLY)
74 JSW09*1 INHIBIT SECTION THREE AND FOUR OF THE BUS TESTER (FACTORY USE ONLY)
75 JSW10*1 INHIBIT RF11 DISK
76 JSW11*1 INHIBIT UDC11
77 JSW12*1 INHIBIT RC11 DISK
78 JSW13*1 INHIBIT TC11 DECTAPE
79 JSW14*1 INHIBIT KL11 TTY OUTPUT
80 JSW15*1 INHIBIT KL11 TTY INPUT
81
82 JNOTE! IF ALL SWITCHES ARE DOWN FOR THIS FIRST DEVICE INHIBIT
83 JSETTING, THE PREVIOUSLY CHOSEN DEVICES WILL BE TESTED
84
85 JAFTER FIRST HALT
86 JSW0*1 INHIBIT DC11 #1 ,,,, VECTOR 30#
87 JSW01*1 INHIBIT DC11 #2 ,,,, VECTOR 31#
88 JSW02*1 INHIBIT AA11 DAC WITH SCOPE OPTION
89 JSW03*1 INHIBIT AFC11 ANALOG MULTIPLEXER
90 JSW04*1 INHIBIT RK11 DISK
91 JSW05*1 INHIBIT DR11=B GENERAL INTERFACE (NPR)
92 JSW06*1 INHIBIT KE11=A (PDP-11/20) EXTENDED ARITHMETIC ELEMENT
93 JSW07*1 INHIBIT AD01=D A/D CONVERTER
94 JSW08*1 INHIBIT RP11 DISK
95 JSW09*1 INHIBIT RESERVED (FOR BUS LATENCY TESTER)
96 JSW10*1 INHIBIT DN11 DIGITAL DIALER
97 JSW11*1 INHIBIT TM11 MAGNETIC TAPE
98 JSW12*1 INHIBIT M792VA (DIODE BOOT FOR PC11, KL11)
99 JSW13*1 INHIBIT M792VB (RF, RC, RK AND TC11) BOOT
100 J OR MR11=OB BULK BOOTSTRAP LOADER
101 JSW14*1 INHIBIT DP11 SYNCHRONOUS LINE UNIT --- VECTOR 32#
102 JSW15*1 INHIBIT DM11 ASYNCHRONOUS MULTIPLEXER --- VECTOR 33#
103
104 JAFTER SECOND HALT
105 JSW0*1 INHIBIT KG11=A REDUNDANCY CHECK OPTION
106 JSW01*1 INHIBIT CD11 CARD READER
107 JSW02*1 INHIBIT DR11=A, DR11=C GENERAL INTERFACE (INTERRUPT ONLY)
108 JSW03*1 INHIBIT DM11=BB MODEM CONTROL MULTIPLEXER

109 JSW04*1 INHIBIT VR20 2 COLOR SCOPE OPTION
110 JSW05*1 INHIBIT KT11 MEMORY MANAGEMENT OPTION
111 JSW06*1 INHIBIT RESERVED
112 JSW07*1 INHIBIT RESERVED
113 JSW08*1 INHIBIT RESERVED
114 JSW09*1 INHIBIT RESERVED
115 JSW10*1 INHIBIT RESERVED
116 JSW11*1 INHIBIT RESERVED
117 JSW12*1 INHIBIT RESERVED
118 JSW13*1 INHIBIT RESERVED
119 JSW14*1 INHIBIT RESERVED
120 JSW15*1 INHIBIT RESERVED
121
122 JAFTER HALT SET SWITCHES FOR NORMAL RUNNING (ALL DOWN) CONTINUE
123
124 JTHE FORMAT FOR ALL ERROR PRINTOUTS IS SEVEN COLUMNS OF DATA
125 JTHE SIGNIFICANCE OF EACH COLUMN IS DESCRIBED BELOW
126
127 JCOLUMN 1= PC+2 OF THE TEST THAT FAILED
128 JCOLUMN 2= PROCESSOR STATUS AT THE TIME OF FAILURE
129 JCOLUMN 3= PROCESSOR TEST IN PROGRESS AT THE TIME OF FAILURE
130 JCOLUMN 4= STACK OFFSET
131 JCOLUMN 5= FIRST DEVICE SELECTION (SR1) REGISTER
132 JCOLUMN 6= SECOND DEVICE SELECTION (SR2) REGISTER
133 JCOLUMN 7= THIRD DEVICE SELECTION (SR3) REGISTER
134
135 JNOTE! IF A POWER FAILURE OCCURS, AN ERROR MESSAGE WILL BE
136 JTYPED IN THE STANDARD FORMAT AFTER POWER UP OCCURS,
137 JTHE PROGRAM WILL THEN BEGIN EXECUTION OF PROCESSOR TEST
138 JAND WILL COMPLETE THE PROCESSOR TEST BEFORE RE-INITIALIZING
139 JSELECTED DEVICES, THIS DELAY IS NECESSARY TO
140 JALLOW MECHANICAL DEVICES TO RECOVER FROM THE POWER FAILURE,
141
142 JNOTE! THE PROCESSOR STACK POINTER WILL BE SET TO LOCATION
143 J"STACK" EACH TIME THAT THE PROCESSOR TEST IS STARTED,
144 JAT THE END OF EACH PASS, THE PROCESSOR STACK POINTER WILL
145 JBE SET TO LOCATION "STACKK", IF THE PROCESSOR
146 J(PDP-11/45) IS OPERATING IN OTHER THAN KERNEL MODE
147 JTHE CURRENT MODE STACK POINTER WILL BE INITIALIZED TO "STACK"
148 JAND THE KERNEL STACK POINTER WILL BE SET TO "STACKK",
149
150 JNOTE! CORE EXPANSION MAY BE RUN WITH A GTP OVERLAY, IF THAT
151 JOVERLAY DOES NOT REQUIRE MORE THAN 4K OF CORE,
152
153 JNOTE! THE PROGRAM IS INITIALIZED WITH A SPECIFIC DEVICE
154 J REGISTER AND VECTOR ADDRESS ASSIGNMENT FOR FLOATING
155 J VECTOR DEVICES, TO ACCOMMODATE OTHER CONFIGURATIONS,
156 J APPROPRIATE CHANGES SHOULD BE MADE IN THE "DEVICE
157 J REGISTER AND VECTOR TABLE",
158
159 JNOTE! THE FOLLOWING OPTIONS WILL BE TESTED UNCONDITIONALLY IF AVAILABLE
160
161 JPDP-11/40 EIS
162 JPDP-11/40 FIS

163 JPOP=11/45 FPP
 164
 165 (NOTE) DECTAPE UNIT 1 IS NOW SELECTED FOR TEST BY THIS PROGRAM.
 166 TO SELECT A DIFFERENT DRIVE, PUT THE DRIVE SELECTION CODE
 167 IN BITS 8=10 OF LOCATION "TCNRV"
 168
 169 (NOTE) THE INPUTS OF AFC11 CHANNELS TO BE TESTED
 170 MUST EACH BE CONNECTED TO A VOLTAGE SOURCE NOT GREATER
 171 THAN +OR= 5 MILLIVOLTS

172
 173 ,SBTTL DEFINITIONS
 174 IREGISTER DEFINITIONS
 175
 176 000000 R0=X0
 177 000001 R1=X1
 178 000002 R2=X2
 179 000003 R3=X3
 180 000004 R4=X4
 181 000005 R5=X5
 182 000006 SP=X6 ;PROCESSOR STACK POINTER
 183 000007 PC=X7 ;PROGRAM COUNTER
 184
 185 FPS= X0
 186 AC0= X0
 187 AC1= X1
 188 AC2= X2
 189 AC3= X3
 190 AC4= X4
 191 AC5= X5
 192
 193 ILOCATION DEFINITIONS
 194 177776 PS=177776 ;PROCESSOR STATUS WORD
 195 177772 PIRQ=177772 ;PROGRAM INTERRUPT REQUEST REGISTER
 196 177570 SR=177570 ;CONSOLE SWITCH REGISTER
 197 177570 LIGHTS=177570 ;PDP-11/45 DISPLAY REGISTER
 198
 199 IINSTRUCTION DEFINITIONS
 200
 201 006401 MARK1=6401 ;MARK INSTRUCTION
 202 104400 SCOPE=TRAP ;CALL TO SCOPE LOOP AND ITERATION HANDLER
 203 075000 FADD=75000 ;11/40 FIS FLOATING ADD
 204 075010 FSUB=75010 ; " " SUBTRACT
 205 075020 FMUL=75020 ; " " MULTIPLY
 206 075030 FDIV=75030 ; " " DIVIDE
 207
 208 075010 ;EQUIV EMT,HLT
 209 FSUB=75010 ;11/40 FIS FLOATING SUBTRACT
 210 FMUL=75020 ;11/40 FIS FLOATING MULTIPLY
 211 FDIV=75030 ;11/40 FIS FLOATING DIVIDE
 212
 213
 214 ISYMBOL DEFINITIONS
 215
 216 140000 UM=140000
 217
 218
 219
 220 000000 ,=0


```

320 ,SBTTL ABSOLUTE CORE DUMP
321 , INSTRUCTIONS FOR USE:
322 ,
323 , 1. START THE ROUTINE AT 610,
324 , 2. THE DUMP ROUTINE WILL NOW HALT; ENTER THE ADDRESS OF THE
325 , DESIRED OUTPUT DEVICE INTO THE SWITCH REGISTER AND
326 , PRESS CONTINUE;
327 , 3. THE DUMP ROUTINE WILL HALT AGAIN; NOW ENTER THE FIRST WORD
328 , ADDRESS OF THE DATA AREA TO BE DUMPED AND PRESS CONTINUE;
329 , 4. THE ROUTINE WILL HALT A THIRD TIME; FINALLY ENTER THE LAST
330 , WORD ADDRESS OF THE DATA AREA TO BE DUMPED AND
331 , PRESS CONTINUE; DUMPING WILL NOW PROCEED IN ABSOLUTE
332 , FORMAT ON THE SELECTED DEVICE;
333 , 5. WHEN DUMPING IS COMPLETE THE ROUTINE WILL HALT;
334 , IF FURTHER DUMPING IS DESIRED PROCEED TO STEP #3; IT IS
335 , NOT NECESSARY TO RE-SPECIFY THE DEVICE ADDRESS;
336 , 6. TO PUNCH STOP CODE WHEN DUMP HAS BEEN
337 , COMPLETED, SET BIT 0 OF SWITCH REGISTER#1 AND
338 , PRESS CONTINUE; THE DUMP ROUTINE WILL HALT;
339 , SET SWITCH REGISTER BIT #0 AND
340 , PRESS CONTINUE; THE DUMP ROUTINE WILL HALT;
341 , AND THEN HALT; THE PAPER TAPE PUNCH MAY NOW BE UNLOADED,
342 ,
343 ,
344 000610 010706 MOV PC,SP ;SET UP STACK
345 000612 005746 TST =(SP) ;ADDRESS
346 000614 000000 HALT ;ENTER DEVICE ADDRESS
347 000616 013700 177970 MOV #SR,R0
348 000622 010067 000134 MOV R0,E,TCSR ;SET UP PS ADDRESS
349 000626 005200 INC R0
350 000630 005200 INC R0 ;GENERATE DATA ADDRESS
351 000632 010067 000132 MOV R0,E,TDB ;SET UP DATA ADDRESS
352 000636 000000 ;ENTER START LOCATION TO R0
353 000640 012703 000700 MOV #E,PUN,R3
354 000644 013700 177970 MOV #SR,R0
355 000650 000000 HALT ;START LOCATION TO R0
356 000652 013701 177970 MOV #SR,R1 ;ENTER ENDING LOCATION INTO SR
357 000656 012702 000010 MOV #10,R2 ;ENDING LOCATION TO R1
358 000662 005005 CLR R3 ;10 NUL FRAMES TO PUNCH
359 000664 005004 CLR R4 ;R5=CHECKSUM
360 000666 005702 E,I,1 TST R2 ;R4=CONTAINS FRAME TO PUNCH
361 000670 003403 BLE E,2 ;ALL DONE?
362 000672 004713 JSR PC,(R3) ;JUMP IF YES
363 000674 005302 DEC R2 ;PUNCH ONE NULL FRAME
364 000676 000773 BR E,1 ;DECREMENT FRAME COUNT
365 000700 005204 E,2,1 INC R4 ;SET R4=1
366 000702 004713 JSR PC,(R3) ;PUNCH A START FRAME
367 000704 005004 CLR R4 ;R4=0
368 000706 004713 JSR PC,(R3) ;PUNCH A ZERO FRAME
369 000710 010104 MOV R1,R4 ;SAVE LWA
370 000712 100004 SUB R0,R4 ;LWA=FMA
371 000714 002704 000007 ADD #7,R4 ;CORRECT COUNT
372 000720 004713 JSR PC,(R3) ;PUNCH LOWER ORDER OF COUNT
373 000722 000304 SWAB R4 ;GET UPPER BYTE
  
```

```

374 000724 004713 JSR PC,(R3) ;AND PUNCH IT
375 000726 010004 MOV R0,R4 ;GET LOAD ADDRESS
376 000730 004713 JSR PC,(R3) ;AND PUNCH ITS LOWER ORDER
377 000732 000304 SWAB R4 ;GET UPPER ORDER
378 000734 004713 JSR PC,(R3) ;AND PUNCH IT
379 000736 020001 E,3,1 CMP R0,R1 ;DONE PUNCHING DATA?
380 000740 003003 BGT E,4 ;BRANCH IF YES
381 000742 112004 MOV#B (R0)+,R4 ;GET A DATA BYTE
382 000744 004713 JSR PC,(R3) ;AND PUNCH IT
383 000746 000773 BR E,3
384 000750 005405 E,4,1 NEG R5 ;NEGATE CHECKSUM
385 000752 010504 MOV R5,R4
386 000754 004713 JSR PC,(R3) ;PUNCH CHECKSUM
387 000756 000727 BR E,0 ;AND GO BACK TO BEGINNING
388 ,
389 000760 105737 000000 E,PUN,1 TSTB #1,= ;WAIT
390 000762 000762 E,TCSR,= ;=2
391 000764 100375 BPL E,PUN ;READY
392 000766 110437 000000 MOV#B R4,#1,= ;PUNCH A FRAME
393 000770 000770 E,TDB,= ;=2
394 000772 000405 ADD R4,R5 ;ACCUMULATE CHECKSUM
395 000774 000207 RTS PC
  
```

```

396
397
398      001020      ,SBTTL DEVICE DRIVER OVERLAY LINKAGES
399
400      001020 001034 GETSWI DMVRTS      ;SET UP BY USER FOR SWITCH REGISTER INPUTS
401      001022 001034 PRIMEI DMVRTS      ;SET UP BY USER FOR DEVICE PRIMING
402      001024 000000
403      001026 000000 OVFLAGI 0          ;OVERLAY TO GTP COMMUNICATION WORD
404      001030 000000 LINKERI 0          ;OVERLAY LINKING POINTER
405      001032 000002 DMVRTSI RTI        ;DUMMY RETURN FROM BACKGROUND OVERLAY
406      001034 000207 DMVRTSI RTS         ;DUMMY RETURN FROM USER CODE
407
408      ,SBTTL GTP VARIABLES
409
410      001036 004000 ICOUNTI 4000      ;NUMBER OF ITERATIONS OF SUBTEST
411
412      001040 000000 PRFLAGI 0          ;ERROR HANDLER IN USE FLAG
413      001042 000000 PASCONTI 0        ;NUMBER OF PROGRAM PASSES
414      001044 177777 SR1I      =1        ;FIRST DEVICE SELECTION REGISTER
415      001046 177777 SR2I      =1        ;SECOND DEVICE SELECTION REGISTER
416      001050 177777 SR3I      =1        ;THIRD DEVICE SELECTION REGISTER
417      001052 040000 LOCOREI 40000    ;
418      001054 000000
419      001056 000000 HSCOREI 0          ;UPPER LIMIT FOR CORE EXPANSION
420      001060 000000 SCOPEFI 0          ;NUMBER OF ITERATIONS OF SUBTEST COMPLETED
421      001062 000000 CONFIGI 0         ;PROCESSOR CONFIGURATION
422      001064 014606 RETURNI PROCTS    ;CONTAINS ADDRESS OF LAST TEST COMPLETED
423      001066 000000 ACTFLGI 0        ;IF NOT 0, PROGRAM UNDER EXTERNAL MONITOR CONTROL
424      001067 001067 QVFLG=ACTFLG+1    ;IF NOT 0, PROGRAM RUNS IN QUICK VERIFY MODE
425
426      ,SBTTL DEVICE REGISTER AND VECTOR TABLE
427      001100      ,=1100
428
429      JKLI1
430      001100 177560 TRCSRI 177560      ;TELETYPE READER CONTROL STATUS REGISTER
431      001102 177562 TRDBRI 177562      ;TELETYPE READER DATA BUFFER
432      001104 177564 TTCRSRI 177564     ;TELEPRINTER CONTROL STATUS REGISTER
433      001106 177566 TTDBRI 177566     ;TELEPRINTER DATA BUFFER
434
435      JPC11
436
437      001110 177550 HRCSRI 177550      ;HIGH SPEED READ STATUS REGISTER
438      001112 177552 HRDBRI 177552      ;HIGH SPEED READER DATA BUFFER
439      001114 177554 HPCSRI 177554      ;HIGH SPEED PUNCH CONTROL STATUS REGISTER
440      001116 177556 HPDBRI 177556     ;HIGH SPEED PUNCH DATA BUFFER
441
442      JKWI=L
443
444      001120 177546 LKCSRI 177546      ;JKWI=L LINE CLOCK CONTROL STATUS REGISTER
445
446      JLP11
447
448      001122 177514 LPCSRI 177514     ;JLP11 LINE PRINTER CONTROL STATUS REGISTER
449      001124 177516 LPDBRI 177516     ;JLP11 LINE PRINTER DATA BUFFER
  
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450
451
452      JDR11=A,C
453      001126 167770 DRACCSI 167770     ;DR11=A,DR11=C CONTROL STATUS REGISTER
454      001130 167772 DRACOB1 167772     ;DR11=C,DR11=C OUTPUT BUFFER
455      001132 167774 DRACIB1 167774     ;DR11=A,DR11=C INPUT BUFFER
456      001134 000000 DRIVECI 0        ;DR11=A,C INPUT INTERRUPT VECTOR
457      001136 000000 DR1LVL1 0       ;DR11=A,C INPUT INTERRUPT SERVICE LEVEL
458      001140 000000 DR0VEC1 0       ;DR11=A,C OUTPUT INTERRUPT VECTOR
459      001142 000000 DR0LVL1 0       ;DR11=A,C OUTPUT INTERRUPT SERVICE LEVEL
460
461      JRF11
462
463      001144 177470 RFB AEI 177470     ;RF11 DISK ADDRESS AND ERROR
464      001146 177472 RFBARI 177472     ;RF11 DATA BUFFER
465      001150 177466 RFBARI 177466     ;RF11 DISK ADDRESS REGISTER
466      001152 177462 RFWCI 177462     ;RF11 WORD COUNT REGISTER
467      001154 177464 RFBARI 177464     ;RF11 CURRENT ADDRESS REGISTER
468      001156 177460 RFBARI 177460     ;RF11 CONTROL STATUS REGISTER
469      001160 177461 RFBARI 177461     ;HIGH BYTE ADDRESS OF CSR
470
471      JRC11
472
473      001162 177440 RCLAI 177440      ;RC11 LOOK AHEAD REGISTER
474      001164 177456 RCDBRI 177456     ;RC11 DATA BUFFER
475      001166 177442 RCABARI 177442    ;RC11 DISK ADDRESS REGISTER
476      001170 177450 RCWCI 177450     ;RC11 WORD COUNT REGISTER
477      001172 177452 RCABARI 177452    ;RC11 CURRENT ADDRESS REGISTER
478      001174 177446 RCDBRI 177446     ;RC11 CONTROL STATUS REGISTER
479      001176 177447 RCDBARI 177447    ;HIGH BYTE ADDRESS OF CSR
480
481      JDF11
482
483      001200 177420 DTSR11 177420     ;BUS SWITCH CONTROL STATUS REGISTER
484
485      JRR11
486
487      001202 177416 RKBARI 177416     ;RK11 DATA BUFFER
488      001204 177412 RKBARI 177412     ;RK11 DISK ADDRESS REGISTER
489      001206 177413 RKBARI 177413     ;RK11 HIGH BYTE OF DISK ADDRESS
490      001210 177406 RKCWI 177406     ;RK11 WORD COUNT REGISTER
491      001212 177410 RKBARI 177410     ;RK11 CURRENT ADDRESS REGISTER
492      001214 177404 RKBARI 177404     ;RK11 STATUS REGISTER
493      001216 177405 RKBARI 177405     ;RK11 HIGH BYTE ADDRESS OF CSR
494      001220 177400 RKBARI 177400     ;RK11 DRIVE STATUS REGISTER
495      001222 000000 RKBARI 0          ;RK11 DRIVE SELECTED FOR TEST
496
497      JKE11
498
499      001224 177304 MQI 177304      ;KE11 MULTIPLIER-QUOTIENT REGISTER
500      001226 177302 ACI 177302      ;KE11 ACCUMULATOR
501      001230 177310 SCI 177310      ;KE11 STEP COUNTER
502      001232 177311 SREI 177311     ;KE11 STATUS REGISTER
503      001234 177306 MULI 177306     ;KE11 MULTIPLY
  
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504	#01236	177300	DIVI	177300	JKE11 DIVIDE
505	#01240	177312	NORI	177312	JKE11 NORMALIZE
506	#01242	177314	LSHI	177314	JKE11 LOGICAL SHIFT
507	#01244	177316	ASHI	177316	JKE11 ARITHMETIC SHIFT
508					
509			ITC11		
510					
511	#01246	177342	TCCHI	177342	ITC11 CONTROL AND FUNCTION REGISTER
512	#01250	177340	TCSTI	177340	ITC11 GENERAL STATUS REGISTER
513	#01252	177350	TCBTI	177350	ITC11 DATA BUFFER
514	#01254	177344	TCWCI	177344	ITC11 WORD COUNT REGISTER
515	#01256	177346	TCSAI	177346	ITC11 BUS ADDRESS REGISTER
516	#01260	000400	TCSRVI	400	IDECTAPE DRIVE SELECTED FOR TEST
517					
518			JCR11, CM11		
519					
520	#01262	177160	CRSI	177160	JCAR0 READER PS REGISTER ADDRESS
521	#01264	177162	CRBI	177162	JCAR0 READER CARD IMAGE DATA BUFFER
522	#01266	177164	CRB2I	177164	JCAR0 READER ENCODED DATA BUFFER
523					
524			JCB11		
525					
526	#01270	172460	CDSTI	172460	JCD11 CONTROL STATUS REGISTER
527	#01272	172462	COCCI	172462	JCD11 COLUMN COUNT REGISTER
528	#01274	172464	COBAI	172464	JCD11 BUSS ADDRESS REGISTER
529					
530			JA001=0		
531					
532	#01276	176772	AD0BRI	176772	JAD01=0 DATA BUFFER
533	#01300	176770	AD0SRI	176770	JAD01=0 CONTROL STATUS REGISTER
534	#01302	176771	AD0SROI	176771	JHIGH BYTE OF CONTROL STATUS REGISTER
535					
536			JRP11		
537					
538	#01304	176722	RP0AI	176722	JRP11 CYLINDER ADDRESS DISK
539	#01306	176725	RP0AH	176725	JRP11 HIGH BYTE OF DISK ADDRESS
540	#01310	176710	RP0SRI	176710	JRP11 DRIVE STATUS REGISTER
541	#01312	176724	RP0ARI	176724	JRP11 DISK ADDRESS REGISTER
542	#01314	176716	RP0CI	176716	JRP11 WORD COUNT REGISTER
543	#01316	176720	RP0ARI	176720	JRP11 CURRENT ADDRESS REGISTER
544	#01320	176714	RP0SRI	176714	JRP11 STATUS REGISTER
545	#01322	176715	RP0SRHI	176715	JRP11 HIGH BYTE ADDRESS OF CSR
546					
547			JAA11		
548					
549	#01324	176756	SG0RI	176756	JAA11 STATUS REGISTER
550	#01326	176760	DA00I	176760	JAA11 X REGISTER
551	#01330	176762	DA01I	176762	JAA11 Y REGISTER
552					
553			JDN11		
554					
555	#01332	175200	DN0SRI	175200	JDN11 CONTROL STATUS REGISTER
556	#01334	000340	DNVECI	340	JDN11 INTERRUPT VECTOR
557	#01336	000342	DNVLVI	342	JDN11 PRIORITY

558					
559			JDN11		
560					
561	#01340	175000	DN0SRI	175000	JDN11 CONTROL STATUS REGISTER
562	#01342	175002	DN0ARI	175002	JDN11 BUS ADDRESS REGISTER
563	#01344	175004	DN0RKI	175004	JDN11 BREAK STATUS REGISTER
564	#01346	175006	DN0ASI	175006	JDN11 BASE REGISTER
565	#01350	000330	DN0RVECI	330	JDN11 RECEIVER VECTOR ADDRESS
566	#01352	000332	DN0RPTVI	332	JDN11 RECEIVER SERVICE LEVEL
567	#01354	000334	DN0TVECI	334	JDN11 TRANSMITTER VECTOR ADDRESS
568	#01356	000336	DN0RPTVI	336	JDN11 TRANSMITTER SERVICE LEVEL
569					
570			JDP11		
571					
572	#01360	174770	DP0RSI	174770	JDP11 RECEIVER STATUS REGISTER
573	#01362	174772	DP0RBI	174772	JDP11 RECEIVER DATA BUFFER
574	#01364	174774	DP0TSI	174774	JDP11 TRANSMITTER STATUS REGISTER
575	#01366	174776	DP0TBI	174776	JDP11 TRANSMITTER DATA BUFFER
576	#01370	174773	DP0SYNVI	174773	JDP11 SYNC BUFFER
577	#01372	174777	DP0SYNBI	174777	JDP11 EXTENDED SYNC BUFFER
578	#01374	000320	DP0RIVI	320	JDP11 RECEIVER INTERRUPT VECTOR
579	#01376	000322	DP0RPI	322	JDP11 RECEIVER PRIORITY
580	#01400	000324	DP0TIVI	324	JDP11 TRANSMITTER INTERRUPT VECTOR
581	#01402	000326	DP0TPI	326	JDP11 TRANSMITTER PRIORITY
582					
583			JDC11 #1		
584					
585	#01404	174004	DC0CSRI	174004	JDC11 #1 TRANSMITTER STATUS REGISTER
586	#01406	174006	DC0DBRI	174006	JDC11 #1 TRANSMITTER DATA BUFFER
587	#01410	174000	DC0CSRI	174000	JDC11 #1 RECEIVER STATUS REGISTER
588	#01412	174002	DC0DBRI	174002	JDC11 #1 RECEIVER DATA BUFFER
589					
590			JDC11 #2		
591					
592	#01414	174010	DC0RSRI	174010	JDC11 #2 RECEIVER STATUS REGISTER
593	#01416	174012	DC0RDBRI	174012	JDC11 #2 RECEIVER DATA BUFFER
594	#01420	174014	DC0CSAI	174014	JDC11 #2 TRANSMITTER STATUS REGISTER
595	#01422	174016	DC0DBAI	174016	JDC11 #2 TRANSMITTER DATA BUFFER
596					
597			JAPC11		
598					
599	#01424	172570	AF0SRI	172570	JAPC11 CONTROL STATUS REGISTER
600	#01426	172572	AF0BRI	172572	JAPC11 DATA BUFFER
601	#01430	172574	AF0ARI	172574	JAPC11 CHANNEL ADDRESS REGISTER
602					
603			JTM11		
604					
605	#01432	172520	MT0SI	172520	JTM11 STATUS REGISTER
606	#01434	172522	MT0CI	172522	JTM11 COMMAND REGISTER
607	#01436	172524	MT0BI	172524	JTM11 BYTE COUNT REGISTER
608	#01440	172526	MT0AI	172526	JTM11 CURRENT ADDRESS REGISTER
609					
610			JKW11=P		
611					

612	001442	172540	KWCSRI	172540	IKM11=P CONTROL REGISTER
613	001444	172542	KWCSRI	172542	IKM11=P COUNT SET BUFFER
614	001446	172544	KWCTRI	172544	IKM11=P COUNTER BUFFER
615					
616			IDR11=B		
617					
618	001490	172416	DR0BRI	172416	IDR11=R DATA BUFFER
619	001492	172414	DRSTI	172414	IDR11=R CONTROL STATUS REGISTER
620	001494	172412	DR8AI	172412	IDR11=R BUS ADDRESS REGISTER
621	001496	172410	DRWCI	172410	IDR11=R WORD COUNT REGISTER
622					
623			IUDC11		
624					
625	001460	171776	UD0RI	171776	IUDC11 CONTROL REGISTER
626	001462	171774	UDSRI	171774	IUDC11 STATUS REGISTER
627					
628			IKG11		
629					
630	001464	170700	KG0SRI	170700	IKG11=A CONTROL STATUS REGISTER
631	001466	170702	KG0CCI	170702	IKG11=A BCC REGISTER
632	001470	170704	KG0BRI	170704	IKG11=A DATA BUFFER
633					
634			IBUS TESTER SECTION 1		
635					
636	001472	170000	AB0BRI	170000	IBUS TESTER #1 DATA BUFFER
637	001474	170002	AB0CAI	170002	IBUS TESTER #1 CURRENT ADDRESS REGISTER
638	001476	170004	AB0WCI	170004	IBUS TESTER #1 WORD COUNT REGISTER
639	001500	170006	AB0SRI	170006	IBUS TESTER #1 CONTROL STATUS REGISTER
640					
641			IBUS TESTER SECTION 2		
642					
643	001502	170010	BB0BRI	170010	IBUS TESTER #2 DATA BUFFER
644	001504	170012	BB0CAI	170012	IBUS TESTER #2 CURRENT ADDRESS REGISTER
645	001506	170014	BB0WCI	170014	IBUS TESTER #2 WORD COUNT REGISTER
646	001510	170016	BB0SRI	170016	IBUS TESTER #2 CONTROL STATUS REGISTER
647					
648			IBUS TESTER SECTION 3		
649					
650	001512	170020	CB0BRI	170020	IBUS TESTER #3 DATA BUFFER
651	001514	170022	CB0CAI	170022	IBUS TESTER #3 CURRENT ADDRESS REGISTER
652	001516	170024	CB0WCI	170024	IBUS TESTER #3 WORD COUNT REGISTER
653	001520	170026	CB0SRI	170026	IBUS TESTER #3 CONTROL STATUS REGISTER
654					
655			IBUS TESTER SECTION 4		
656					
657	001522	170030	DB0BRI	170030	IBUS TESTER #4 DATA BUFFER
658	001524	170032	DB0CAI	170032	IBUS TESTER #4 CURRENT ADDRESS REGISTER
659	001526	170034	DB0WCI	170034	IBUS TESTER #4 WORD COUNT REGISTER
660	001530	170036	DB0SRI	170036	IBUS TESTER #4 CONTROL STATUS REGISTER
661					
662			IDM11=BB		
663					
664	001532	170500	DM0CSRI	170500	IDM11=BB CONTROL STATUS REGISTER
665	001534	170502	DM0LSRI	170502	IDM11=BB LINE STATUS REGISTER

666	001536	000350	DM0VECI	350	IDM11=BB INTERRUPT VECTOR
667	001540	000352	DM0LVLI	352	IDM11=BB PRIORITY

668 ,SBTTL PROGRAM INITIALIZATION
 669
 670 #01542 012706 036520 BEGIN1 MOV #STACK,SP ISET UP PROCESSOR STACK
 671 #01546 012707 035514 176250 MOV #PPAIL,24 ISET UP POWER FAIL SERVICE POINTER
 672 #01554 005067 034010 CLR PFFLAG ICLEAR POWER FAIL FLAG
 673 #01560 005067 177256 CLR PASCNT ICLEAR PASS COUNT
 674 #01564 005067 033720 CLR ISFLAG ICLEAR ISOLATION FLAG
 675 #01570 005067 032534 CLR PASCT ICOUNT FOR PASS PARAMETERS
 676
 677
 678 IDETERMINE PROCESSOR TYPE, AND PROCESSOR OPTIONS
 679 #01574 012737 000004 000006 MOV #4,0#6
 680 #01602 012737 000002 000006 MOV #RT1,0#6 ISET UP TO RETURN FROM
 681
 682 #01610 012700 000003 MOV #3,R0 IBUS ERROR TRAP
 683 #01614 000261 SEC IDETERMINE PROCESSOR TYPE
 684 #01616 005777 176150 TST #PIRQ ISET C BIT
 685
 686 #01622 005600 SBC R0 IIF PIRQ EXISTS, PROCESSOR
 687 #01624 000261 SEC IIS PDP=11/45, NO TRAP
 688 #01626 105737 177777 TSTB #0 IIF TRAP OCCURED, C BIT NOT CLEARED
 689 #01632 005600 SBC R0 ISET C BIT
 690 #01634 005037 177700 CLR #177700 IIF PROCESSOR IS PDP=11/40
 691
 692 IR0#3, PROCESSOR IS PDP=11/45
 693 IR0#2, PROCESSOR IS PDP=11/40
 694 IR0#1, PROCESSOR IS PDP=11/20
 695 IR0#0, PROCESSOR IS PDP=11/10
 696
 697 #01640 012737 000006 000004 MOV #6,0#4 IRESTORE TRAPCATCHER
 698 #01646 005037 000006 CLR #06
 699 #01652 010067 177204 MOV R0,CONFIG ISAVE PROCESSOR TYPE
 700 #01656 012737 001074 000010 MOV #15,0#10 ISET UP ILLEGAL INSTRUCTION TRAP
 701 #01664 070100 MUL R0,R1 IEXECUTE MULTIPLY INSTRUCTION
 702 #01666 152707 000001 177167 BISH #1,CONFIG+1 ISET EIS BIT IN PROCESSOR DESCRIPTOR WORD
 703 #01674 012737 001720 000010 1\$ MOV #25,0#10 ISET UP NEW ILLEGAL INSTRUCTION TRAP
 704 #01702 012701 036322 MOV #STACK,R1 ISET UP STACK FOR FIS
 705 #01706 005041 CLR =(R1)
 706 #01710 005041 CLR =(R1)
 707 #01712 005041 CLR =(R1)
 708 #01714 005041 CLR =(R1)
 709 #01716 075001 FADD+ R1 IEXECUTE FIS INSTRUCTION
 710 #01720 152707 000002 177135 BISH #2,CONFIG+1 ISET FIS BIT IN PROCESSOR DESCRIPTOR
 711 #01726 012737 001760 000010 2\$ MOV #35,0#10 ISET UP ILLEGAL INSTRUCTION TRAP
 712 #01734 170000 CFCC IEXECUTE 11/45 FPP INSTRUCTION
 713 #01736 152707 000004 177117 BISH #4,CONFIG+1 ISET 11/45 FPP BIT IN PROCESSOR DESCRIPTOR
 714 #01744 012777 036056 034150 MOV #FILTER,0#PVECT ILOAD INTERRUPT VECTOR
 715 #01752 012777 000000 034144 MOV #0,0#PVECT*2
 716 #01760 012737 000012 000010 3\$ MOV #12,0#10 IRESTORE TRAPCATCHER
 717 #01766 012737 002006 000004 MOV #45,0#4 ISET UP BUS ERROR TRAP
 718 #01774 005767 175572 TST SSR ITEST FOR MEMORY MANAGEMENT
 719 #02000 152707 000010 177055 BISH #10,CONFIG+1 ISET MEMORY MANAGEMENT
 720 #02006 012737 000006 000004 4\$ MOV #6,0#4 IBIT IN PROCESSOR DESCRIPTOR
 721 #02014 032707 000002 177040 BIT #2,CONFIG IIF PDP=11/40,OR 45

722 #02022 001403 BEQ START IUSE RTT FOR TRACE TRAP RETURN
 723 #02024 012707 000006 031756 MOV #RTT,TRTRET
 724 #02032 012707 000001 002450 START1 MOV #1,0#DATA1 ISET UP BASE DATA FOR TTY READER OR KEYBOARD
 725 #02040 005067 002474 CLR 0#DATA2 ISET UP BASE DATA FOR TTY PUNCH OR TELEPRINTER
 726 #02044 012707 000001 002532 MOV #1,0#DATA3 ISET UP BASE DATA FOR HSP
 727 #02052 005067 002622 CLR DATA4 ISET UP BASE DATA FOR HSP
 728 #02056 005707 175760 TST 42 IIF 42 NOT 0, ACT11 OR DDP
 729 #02062 001433 BEQ SETSW
 730 #02064 022707 033906 175750 CMP #LOGICAL,42 IIF(42)=LOGICAL, ACT11
 731 #02072 001411 BEQ 15
 732 #02074 016707 175742 176754 MOV 42,HCORE ISET LIMITS FOR CORE EXPANSION
 733 #02102 162707 000200 176746 SUB #200,HCORE
 734 #02110 004707 034470 JSR PC,SIZER IGET SYSTEM CONFIGURATION
 735 #02114 000474 BR BEGIN4 IGO TO RUN
 736 #02116 105767 176744 1\$ TSTB ACTPLG IIF ACT11, GET SYSTEM CONFIGURATION
 737 #02122 001094 BNE CORTS1
 738 #02124 004767 034454 JSR PC,SIZER IDETERMINE WHAT DEVICES ARE PRESENT
 739 #02130 105167 176732 COMB ACTPLG
 740 #02134 022707 177777 031346 CMP #=1,LOGICAL+2 IIS THIS PASS QUICK VERIFY
 741 #02142 001044 BNE CORTS1 IBRANCH IF NO
 742 #02144 105167 176717 COMB QVFLG ISET QV FLAG
 743 #02150 000441 BR CORTS1
 744 #02152 005767 175412 SETSW1 TST SR IIF SWR=0, USE PREVIOUS
 745 #02156 001415 BEQ CORTST IDEVICE SELECTION,
 746 IDETERMINE SIZE OF MEMORY
 747
 748
 749 INPUT DEVICE SELECTION FROM SWITCH REGISTER
 750 #02160 016707 175404 176656 SWITCH1 MOV SR,SR1 ISAVE 1ST SWITCH REGISTER
 751 #02166 000000 HALT ISET SWITCH FOR 2ND SET
 752 #02170 016707 175374 176650 MOV SR,SR2 ISAVE 2ND SWITCHES
 753 #02176 000000 HALT IGET SWITCHES FOR THIRD SET
 754 #02200 016707 175364 176642 MOV SR,SR3 ISAVE THIRD SWITCHES
 755 #02206 004777 176600 JSR PC,0#GETSW IGO TO USER OVERLAY FOR
 756
 757
 758 ISET UP MEMORY EXPANSION TEST LOWER LIMIT
 759 #02212 012707 040000 176632 CORTST1 MOV #40000,LOCORE ISTART OF 12K
 760 #02220 022707 001034 176574 CMP #DMYRS,PRIME IIF A FOREGROUND OVERLAY HAS BEEN
 761 #02226 001403 BEQ CORTSB ILOADED
 762 #02230 062707 020000 176614 ADD #20000,LOCORE ISTART CORE EXPANSION IN NEXT 4K
 763 #02236 022707 001032 175554 CORTSB1 CMP #DMYRT,10#VEC IIF A BACKGROUND OVERLAY
 764 #02244 001403 BNE CORTS1 IHAS BEEN LOADED
 765 #02246 062707 020000 176576 ADD #20000,LOCORE ISTART CORE EXPANSION
 766
 767
 768 IIFIND OUT HOW MUCH MEMORY IS AVAILABLE
 769 #02254 005067 176576 CORTS1 CLR HCORE ICLEAR CORE LIMIT
 770 #02260 016700 176566 MOV LOCORE,R0
 771 #02264 012707 002276 175512 MOV #15,4 ISET UP RETURN FOR TIME OUT TRAP
 772 #02272 005720 TST (R0)+ IINCREMENT TILL OUT OF MEMORY
 773 #02274 000776 RR #2 ITRAP WHEN OUT OF MEMORY
 774 #02276 162700 001000 1\$ SUB #1000,R0 IDO NOT TEST INTO CORE ABOVE START OF LOADER
 775 #02302 010067 176550 MOV R0,HCORE IHIGHEST CORE TO BE TESTED

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776 M02306 012767 000206 175470 BEGIN41 MOV #6,4 IRESTORE TIME OUT TRAP
777 M02314 016701 176542 MOV CONFIG,R1 IGET PROCESSOR CONFIGURATION
778 M02320 006301 ASL R1
779 M02322 042701 177770 BIC #177770,R1
780 M02326 016107 034332 031770 MOV PASTAB(R1),PASPASPAR IGET PASS PARAMETER TABLE
781 M02334 016107 034342 031764 MOV EXITCT(R1),PASEX
782 M02342 005767 175474 RUNSW1 TST 42
783 M02346 001001 RNE ST
784 M02350 000000 HALT
785 M02352 000005 STI RESET IPROGRAM ALSO RESTARTS HERE
786 M02354 012706 036920 MOV #STACK,SP ISET UP PROCESSOR STACK
787 M02360 012767 020340 175410 MOV #340,PS ILOCK OUT INTERRUPTS
788 M02366 032767 000001 176450 BIT #1,SR1 IIF SR1 BIT 1=1, DO NOT
789 M02374 001026 RNE STA IREQUEST BUS SWITCH
790 M02376 032777 020000 176574 BIT #20000,@DTCSR1 IWAIT FOR SWITCH TO BE RELEASED
791 M02404 001374 RNE #6
792 M02406 012777 000001 176564 MOV #1,@DTCSR1 IREQUEST BUS SWITCH
793 M02414 105777 176560 TSTB @DTCSR1 IWAIT FOR CONNECT
794 M02420 100375 RPL #4
795 M02422 005067 033176 CLR TEMP IDELAY FOR
796 M02426 005267 033172 INC TEMP IBUS TESTERS
797 M02432 001375 RNE #4
798 M02434 052777 001000 176536 BIS #1000,@DTCSR1 IISSUE SWITCHED BUS INIT
799 M02442 032777 001000 176530 BIT #1000,@DTCSR1 IWAIT FOR BUS INIT TO CLEAR
800 M02450 001374 RNE #6
801 M02452 012706 036920 STAI MOV #STACK,SP ISET UP STACK POINTER
802 M02456 005067 176356 CLR PRFLAG ICLEAR ERROR ROUTINE IN USE FLAG

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SBTTL DEVICE INITIALIZATION
 IIF INHIBIT SWITCH FOR DEVICE=I, DO NOT INITIALIZE THAT DEVICE

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803
804
805
806
807 M02462 016701 176396 MOV SR1,R1 IPUT INHIBIT SWITCHES IN
808 M02466 016702 176394 MOV SR2,R2 IGENERAL REGISTERS FOR
809 M02472 012703 000100 MOV #100,R3 IFASTER ACCESS
810 M02476 012704 000101 MOV #101,R4
811 M02502 030227 000020 BIT R2,#20 IIF SR2 BIT 4=1, DO NOT
812 M02506 001052 RNE ST00 INITIALIZE RK11 DISK
813
814 IRK11 DISK CONTROLLER INITIALIZATION
815
816 M02510 016777 176906 176466 MOV RKDRV,@RKDAR ISET DISK ADDRESS TO 0
817 M02516 105777 176476 TSTB @RKDAR IWAIT FOR DRIVE READY
818 M02522 100375 RPL #4
819 M02524 105777 176464 TSTB @RKCSR IWAIT FOR CONTROL READY
820 M02530 100375 RPL #4
821 M02532 012777 000015 176454 MOV #15,@RKCSR IRESET DRIVE
822 M02540 105777 176450 TSTB @RKCSR IWAIT FOR READY
823 M02544 100375 RPL #4
824 M02546 032777 000100 176444 BIT #100,@RKCSR ITEST ACCESS READY
825 M02554 001374 BEQ #6 IWAIT FOR ACCESS READY BIT
826 M02556 012777 000001 176430 MOV #1,@RKCSR ICLEAR CONTROL
827 M02564 105777 176424 TSTB @RKCSR IWAIT FOR READY
828 M02570 100375 RPL #4
829 M02572 016777 176424 176404 MOV RKDRV,@RKDAR

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830 M02600 012767 043503 004376 MOV #43503,RKFUNCTION ISET UP DISK FUNCTION
831
832
833 M02606 016777 004730 176376 MOV LLIMIT,@RKBAR IWRITE IN LOW BYTE
834 IWRITE CHECK IN HIGH BYTE
835 M02614 016777 004366 176366 MOV RKWORDCT,@RKWC ISET UP ADDRESS OF
836 M02622 012777 000103 176364 MOV #103,@RKCSR IWRITE/WRITE CHECK BUFFER
837 ISET UP WORDCOUNT
838 M02630 005067 030174 CLR WATCRK ISET INTERRUPT ENABLE,
839 M02634 032702 000400 ST001 BIT #400,R2 IWRITE FUNCTION, GO
840 M02640 001032 BNE ST01 ICLEAR INTERRUPT OCCURED FLAG
841 IIF SR2 BIT 8=1, DO NOT
842 INITIALIZE RP11 DISK
843
844 IRP11 DISK PACK CONTROLLER INITIALIZATION
845
846 M02642 012767 043503 004442 MOV #43503,RPFUNCTION ISET UP DISK FUNCTION
847 IWRITE IN LOW BYTE
848 IWRITE CHECK IN HIGH BYTE
849 M02650 016777 004666 176440 RP01 MOV LLIMIT,@RPBAR ISET UP ADDRESS OF
850 IWRITE/CRIT CHECK BUFFER
851 M02664 105777 176430 MOV RPWORDCT,@RPWC ISET UP WORDCOUNT
852 M02670 100375 TSTB @RPCSR IWAIT FOR CONTROLLER READY
853 M02672 012777 000015 176420 MOV #15,@RPCSR IRESET DRIVE
854 M02700 105777 176414 TSTB @RPCSR IWAIT FOR CONTROLLER READY
855 M02704 100375 RPL #4
856 M02706 005777 176376 TST @RPDSR IWAIT FOR ACCESS READY
857 M02712 100375 RPL #4
858 M02714 005077 176370 CLR @RPDSR ICLEAR ATTENTION
859 M02720 012777 000103 176372 MOV #103,@RPCSR ISET INTERRUPT ENABLE
860 IWRITE FUNCTION
861 M02726 030127 040000 ST011 BIT R1,#40000 IIF SR1 BIT 14=1, DO NOT
862 M02732 001002 BNE ST1 INITIALIZE TELETYPE PUNCH AND PRINTER
863
864 IKL11 TELETYPE TRANSMITTER INITIALIZATION
865 M02734 050377 176144 BIS #3,@TTCR IINITIALIZE TELETYPE PUNCH AND PRINTER
866 M02740 030127 100000 ST11 BIT R1,#100000 IIF SR1 BIT 15=1, DO NOT INITIALIZE
867 M02744 001002 BNE ST2 ITELETYPE READER
868
869 IKR11 TELETYPE RECEIVER INITIALIZATION
870
871 M02746 050477 176126 BIS #4,@TRCSR IINITIALIZE TELETYPE READER
872 M02752 030127 000004 ST21 BIT R1,#4 IIF SR1 BIT 2=1, DO NOT
873 M02756 001002 BNE ST3 INITIALIZE HIGH SPEED PUNCH
874
875 IPC11 HIGH SPEED PUNCH INITIALIZATION
876
877 M02760 050377 176130 BIS #3,@HPCSR IINITIALIZE HIGH SPEED PUNCH
878 M02764 030127 000010 ST31 BIT R1,#10 IIF SR1 BIT 3=1, DO NOT
879 M02770 001002 BNE ST4 INITIALIZE HIGH SPEED READER
880
881
882
883 M02772 050477 176112 BIS #4,@HRCR IINITIALIZE HIGH SPEED READER

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884 #02776 032701 000020 ST4A1 BIT #20,R1 IIF SR1 BIT 4=1, DO NOT
885 #03002 001004 BNE ST5 INITIALIZE KW11=L LINE CLOCK
886
887 IKW11=L REAL TIME CLOCK INITIALIZATION
888
889 #03004 000377 176110 BIS R3,0,KCSR INITIALIZE LINE CLOCK
890 #03010 005047 027462 CLR WATCL IFCLEAR INTERRUPT OCCURED FLAG
891 #03014 032701 002000 ST91 BIT #2000,R1 IIF SR1 BIT 12=1, DO NOT
892 #03020 001020 BNE ST6 INITIALIZE RF11 DISK
893
894 IRP11 DISK CONTROLLER INITIALIZATION
895
896 #03022 012767 043503 004510 MOV #43503,FUNCTION ISET UP DISK FUNCTION
897 IWRITE IN LOW BYTE,
898 IWRITE CHECK IN HIGH BYTE
899 #03030 105277 176124 RF01 INCB @RFGCSR IABORT ALL CURRENT DISK FUNCTIONS
900 #03034 016777 004504 176110 MOV WORDCT,@RFGC ISET UP WORD COUNT
901 #03042 016777 004474 176104 MOV LLIMIT,@RFGC ISET UP ADDRESS OF WRITE/WRITE CHECK BUFFER
902 #03050 116777 004464 176100 MOVVB FUNCTION,@RFGCSR ISTART WRITING DATA TO DISK
903 #03056 005007 027556 CLR WATCF IFCLEAR INTERRUPT OCCURED FLAG
904 #03062 030103 ST61 BIT R1,R3 IIF SR1 BIT 6=1, DO NOT
905 #03064 001012 BNE ST7 INITIALIZE KW11=P PROGRAMMABLE CLOCK
906
907 IKW11=P PROGRAMMABLE CLOCK INITIALIZATION
908
909 #03066 012777 001750 176350 MOV #1000,0,KWCSR ISET CLOCK COUNTER FOR
910 I1000 (DECIMAL) COUNTS
911 #03074 012777 000101 176340 MOV #101,0,KWCSR ISTART COUNTER AT 100KHZ
912 IRATE, INTERRUPT WHEN COUNTER
913 IGOES TO 0 (AFTER 10 MS)
914 #03102 005007 005242 CLR KHRATE INEXT COUNT RATE WILL BE 10 KHZ
915 #03106 005007 027410 CLR WATCF IFCLEAR INTERRUPT OCCURED FLAG
916 #03112 030127 000200 ST91 BIT R1,#200 IIF SR1 BIT 7=1, DO NOT
917 #03116 001015 BNE ST8 INITIALIZE LPI1 LINE PRINTER
918
919 ILP11 LINE PRINTER CONTROLLER INITIALIZATION
920
921 #03120 012767 000040 007020 MOV #40,0,LPAT IFIRST CHARACTER TO BE
922 IPRINTED IS A SPACE
923 #03126 005007 007016 CLR CLINCT IFCLEAR COLUMN COUNT
924 #03132 012757 012000 000200 MOV #LPINTR,#200 ISET UP INTERRUPT SERVICE VECTOR
925 #03140 012757 000200 000202 MOV #200,#202 ISERVICE AT PRIORITY LEVEL 5
926 #03146 010377 175750 MOV R3,0,LPCSR ISET INTERRUPT ENABLE
927 #03152 030127 000400 ST81 BIT R1,#400 IIF SR1 BIT 8=1, DO NOT
928 #03156 001026 BNE ST9 INITIALIZE BUS TESTER
929 ISECTIONS 1 AND 2
930
931 IBUS TESTER SECTIONS 1 AND 2 INITIALIZATION
932
933 #03160 012777 000002 176310 MOV #2,0,ABWC ISET UP SECTION 1 FOR 2 BYTE TRANSFER
934 IDEVICE WILL SHIFT WORD FOUND
935 IAT BUS ADDRESS 1 PLACE LEFT
936 #03166 012777 014056 176300 MOV #REC1A,0,ABCA ISET UP BUS ADDRESS OF DATA
937 #03174 005007 010656 CLR REC1A IFCLEAR TEST LOCATION
    
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938 #03200 005007 010650 CLR SEND1A IFCLEAR PATTERN TO BE TRANSMITTED
939 #03204 005007 010650 CLR EXP1A IFCLEAR EXPECTED RESULT
940 #03210 012777 045511 176262 MOV #45511,0,ABCSR ISET UP SECTION 1 FOR
941 INPR, DATIP-DATA0,
942 INTERRUPT ON LEVEL 6
943 I1MS DELAY BETWEEN INTERRUPTS
944 #03216 012777 000173 176264 MOV #173,0,BBCSR ISET UP SECTION 2 FOR
945 INTERRUPT ON LEVEL 7
946 I100 US DELAY BETWEEN INTERRUPTS
947 #03224 005007 027314 CLR WATCAB IFCLEAR BUS TESTER SECTION
948 I1 INTERRUPT OCCURRED FLAG
949 #03230 005007 027324 CLR WATCBB IFCLEAR BUS TESTER SECTION 2
950 INTERRUPT OCCURED FLAG
951 #03234 030127 001000 ST91 BIT R1,#1000 IIF SR1 BIT 9=1, DO NOT
952 #03240 001020 BNE ST10 INITIALIZE BUS TESTER
953 ISECTIONS 3 AND 4
954
955 IBUS TESTER SECTIONS 3 AND 4 INITIALIZATION
956
957 #03242 012777 000200 176246 MOV #200,0,CBWC ISET UP SECTION 3
958 IFOR 200 WORD TRANSFER
959 #03250 012777 014240 176236 MOV #CBBUF,0,CBCA ISET UP BUS ADDRESS OF DATA
960 #03256 012777 052615 176234 MOV #52615,0,CBCSR ISET UP SECTION 3 FOR
961 INPR, DAT0,
962 INTERRUPT ON LEVEL 5
963 IDELAY BETWEEN TRANSFERS
964 #03264 012777 052645 176236 MOV #52645,0,DBC SR ISET UP SECTION 4 FOR
965 INPR, DAT0
966 INTERRUPT ON LEVEL 4,
967 INO DELAY BETWEEN TRANSFERS
968 #03272 005007 027304 CLR WATCCB IFCLEAR BUS TESTER SECTION 3
969 INTERRUPT OCCURED FLAG
970 #03276 005007 027314 CLR WATCDB IFCLEAR BUS TESTER SECTION 4
971 INTERRUPT OCCURED FLAG
972 #03302 032701 020000 ST101 BIT #20000,R1 IIF SR1 BIT 13=1, DO NOT
973 #03306 001011 BNE ST11 INITIALIZE TC11 DECTAPE
974
975 ITC11 DECTAPE CONTROLLER INITIALIZATION
976
977 #03310 012767 012104 174676 MOV #TC11,TCIV ISET UP INTERRUPT VECTOR
978 IFOR FORWARD ENDZONE DETECTED
979 ISERVICE ROUTINE
980 #03316 016777 175736 175722 MOV TCDRV,@TCOM ISELECT DRIVE TO BE TESTED
981 #03324 052777 004103 175714 BIS #R+IE+RB+DO,@TCOM ISET DECTAPE INTERRUPT ENABLE
982 ISET READ BLOCK NUMBER AND
983 IREVERSE FUNCTIONS
984 #03332 032701 010000 ST111 BIT #10000,R1 ISTART TRANSPORT
985 #03336 001011 BNE ST17 IIF SR1 BIT 12=1, DO NOT
986 INITIALIZE RC11 DISK
987
988 IRC11 DISK CONTROLLER INITIALIZATION
989
990 #03340 012767 043503 004046 MOV #43503,RCFUNCTION ISET UP DISK FUNCTION
991 IWRITE IN LOW BYTE
    
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092
093 003346 005077 175614 CLR @RCRAR WRITE CHECK IN HIGH BYTE
094 003352 010377 175610 MOV R3,@RCCSR INITIALIZE DISK ADDRESS REGISTER
095 003356 005067 027336 CLR WATCRC ISET DISK INTERRUPT ENABLE
096 IFCLEAR RC11 INTERRUPT
097 003362 005067 005246 STI7I CLR DCDAT1 IACCURED FLAG
098 IFCLEAR TRANSMIT DATA FOR
099 003366 005067 005330 CLR DCDAT2 IDC11 #1
1000 IFCLEAR EXPECTED RECEIVE
1001 003372 005067 005364 CLR DCDAT3 IDATA FOR DC11 #1
1002 IFCLEAR TRANSMIT DATA FOR
1003 003376 005067 005446 CLR DCDAT4 IDC11 #2
1004 IFCLEAR EXPECTED RECEIVE
1005 003402 030227 000001 BIT R2,#1 IFCLEAR TRANSMIT DATA FOR DC11 #2
1006 003406 001012 BNE ST18 IFCLEAR EXPECTED RECEIVE
1007 IFCLEAR TRANSMIT DATA FOR DC11 #2
1008 IFCLEAR TRANSMIT DATA FOR DC11 #2
1009 IFCLEAR TRANSMIT DATA FOR DC11 #2
1010 003410 005077 175772 CLR @DCTDBR IFCLEAR DC11 #1 TRANSMITTER
1011 IFCLEAR DC11 #1 TRANSMITTER
1012 IFCLEAR DC11 #1 TRANSMITTER
1013 003414 056777 005324 175762 BIS DCOUTF,@DCTCSR IFCLEAR DC11 #1 TRANSMITTER
1014 IFCLEAR DC11 #1 TRANSMITTER
1015 IFCLEAR DC11 #1 TRANSMITTER
1016 IFCLEAR DC11 #1 TRANSMITTER
1017 003422 056777 005320 175760 BIS DCINF,@DCRCSR IFCLEAR DC11 #1 TRANSMITTER
1018 IFCLEAR DC11 #1 TRANSMITTER
1019 IFCLEAR DC11 #1 TRANSMITTER
1020 003430 005067 027306 CLR WATDC1 IFCLEAR DC11 #1 TRANSMITTER
1021 IFCLEAR DC11 #1 TRANSMITTER
1022 003434 030227 000002 STI8I BIT R2,#2 IFCLEAR DC11 #1 TRANSMITTER
1023 003440 001012 BNE ST1C IFCLEAR DC11 #1 TRANSMITTER
1024 IFCLEAR DC11 #1 TRANSMITTER
1025 IFCLEAR DC11 #1 TRANSMITTER
1026 IFCLEAR DC11 #1 TRANSMITTER
1027 003442 056777 005276 175750 BIS DCOUTF,@DCTCSA IFCLEAR DC11 #2 TRANSMITTER
1028 IFCLEAR DC11 #2 TRANSMITTER
1029 IFCLEAR DC11 #2 TRANSMITTER
1030 IFCLEAR DC11 #2 TRANSMITTER
1031 003450 005077 175746 CLR @DCTDBA IFCLEAR DC11 #2 TRANSMITTER
1032 IFCLEAR DC11 #2 TRANSMITTER
1033 003454 056777 005266 175732 BIS DCINF,@DCRSR IFCLEAR DC11 #2 TRANSMITTER
1034 IFCLEAR DC11 #2 TRANSMITTER
1035 IFCLEAR DC11 #2 TRANSMITTER
1036 003462 005067 027276 CLR WATDC2 IFCLEAR DC11 #2 TRANSMITTER
1037 IFCLEAR DC11 #2 TRANSMITTER
1038 003466 030227 000004 STI0I BIT R2,#4 IFCLEAR DC11 #2 TRANSMITTER
1039 003472 001404 BEO ST1C1 IFCLEAR DC11 #2 TRANSMITTER
1040 003474 032767 000020 175346 BIT #20,SR3 IFCLEAR DC11 #2 TRANSMITTER
1041 003502 001005 BNE ST1D IFCLEAR DC11 #2 TRANSMITTER
1042 IFCLEAR DC11 #2 TRANSMITTER
1043 IFCLEAR DC11 #2 TRANSMITTER
1044 IFCLEAR DC11 #2 TRANSMITTER
1045 003504 012767 006566 174426 STI01I MOV #AA11,AA11V IFCLEAR DC11 #2 TRANSMITTER
  
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1046 003512 010377 175606 MOV R3,@SCSR IFCLEAR DC11 #2 TRANSMITTER
1047 IFCLEAR DC11 #2 TRANSMITTER
1048 003516 030227 000010 STI0I BIT R2,#10 IFCLEAR DC11 #2 TRANSMITTER
1049 003522 001043 BNE ST3B IFCLEAR DC11 #2 TRANSMITTER
1050 IFCLEAR DC11 #2 TRANSMITTER
1051 IFCLEAR DC11 #2 TRANSMITTER
1052 IFCLEAR DC11 #2 TRANSMITTER
1053 IFCLEAR DC11 #2 TRANSMITTER
1054 003524 112767 177760 002504 MOVB #20,AFCTR1 IFCLEAR DC11 #2 TRANSMITTER
1055 003532 012767 006244 002472 MOV #AFTAB1,AFPTR IFCLEAR DC11 #2 TRANSMITTER
1056 003540 005077 002466 STI01I CLR @AFPTR IFCLEAR DC11 #2 TRANSMITTER
1057 003544 062767 000002 002460 ADD #2,AFPTR IFCLEAR DC11 #2 TRANSMITTER
1058 003552 109267 002460 INCB AFCTR1 IFCLEAR DC11 #2 TRANSMITTER
1059 003556 001370 BNE ST1D1 IFCLEAR DC11 #2 TRANSMITTER
1060 003560 012767 006244 002444 MOV #AFTAB1,AFPTR IFCLEAR DC11 #2 TRANSMITTER
1061 003566 112767 177770 002442 MOVB #10,AFCTR1 IFCLEAR DC11 #2 TRANSMITTER
1062 003574 116767 002436 002435 MOVB AFCTR1,AFCTR2 IFCLEAR DC11 #2 TRANSMITTER
1063 IFCLEAR DC11 #2 TRANSMITTER
1064 IFCLEAR DC11 #2 TRANSMITTER
1065 IFCLEAR DC11 #2 TRANSMITTER
1066 003602 005067 002434 CLR AFPFLG IFCLEAR DC11 #2 TRANSMITTER
1067 IFCLEAR DC11 #2 TRANSMITTER
1068 IFCLEAR DC11 #2 TRANSMITTER
1069 003606 012767 000000 002424 MOV #0,AFSEL IFCLEAR DC11 #2 TRANSMITTER
1070 IFCLEAR DC11 #2 TRANSMITTER
1071 003614 010377 175604 MOV R3,@AFCSR IFCLEAR DC11 #2 TRANSMITTER
1072 003620 016777 002414 175602 MOV AFSEL,@AFCAR IFCLEAR DC11 #2 TRANSMITTER
1073 003626 005067 027154 CLR WATCAF IFCLEAR DC11 #2 TRANSMITTER
1074 003632 030227 000200 ST3BI BIT R2,#200 IFCLEAR DC11 #2 TRANSMITTER
1075 003636 001016 BNE STMT IFCLEAR DC11 #2 TRANSMITTER
1076 IFCLEAR DC11 #2 TRANSMITTER
1077 IFCLEAR DC11 #2 TRANSMITTER
1078 IFCLEAR DC11 #2 TRANSMITTER
1079 IFCLEAR DC11 #2 TRANSMITTER
1080 IFCLEAR DC11 #2 TRANSMITTER
1081 003640 012767 006546 002666 MOV #ADTB1A,TBPTR IFCLEAR DC11 #2 TRANSMITTER
1082 003646 005267 002664 INC ADTEMP IFCLEAR DC11 #2 TRANSMITTER
1083 003652 112777 000134 175420 MOVB #134,ADCSR IFCLEAR DC11 #2 TRANSMITTER
1084 IFCLEAR DC11 #2 TRANSMITTER
1085 003660 109077 175416 CLR @ADCSRO IFCLEAR DC11 #2 TRANSMITTER
1086 003664 005067 002650 CLR CHOUT IFCLEAR DC11 #2 TRANSMITTER
1087 003670 005067 027156 CLR WATCAD IFCLEAR DC11 #2 TRANSMITTER
1088 003674 032702 004000 STMTI BIT #4000,R2 IFCLEAR DC11 #2 TRANSMITTER
1089 003700 001005 BNE DP11A IFCLEAR DC11 #2 TRANSMITTER
1090 IFCLEAR DC11 #2 TRANSMITTER
1091 IFCLEAR DC11 #2 TRANSMITTER
1092 IFCLEAR DC11 #2 TRANSMITTER
1093 003702 012767 007546 174314 MOV #TM11,MTIV IFCLEAR DC11 #2 TRANSMITTER
1094 IFCLEAR DC11 #2 TRANSMITTER
1095 003710 010377 175920 MOV R3,@MTC IFCLEAR DC11 #2 TRANSMITTER
1096 003714 032702 040000 DP11AI BIT #4000,R2 IFCLEAR DC11 #2 TRANSMITTER
1097 003720 001040 BNE DMPRIME IFCLEAR DC11 #2 TRANSMITTER
1098 IFCLEAR DC11 #2 TRANSMITTER
1099 IFCLEAR DC11 #2 TRANSMITTER
  
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I100 JDP11=A SYNCHRONOUS INTERFACE INITIALIZATION
 I101
 I102 #03722 #05067 #04670 CLR DPRDATA ICLEAR EXPECTED RECEIVER DATA
 I103 #03726 #05067 #04666 CLR DPTDATA ICLEAR TRANSMITTER DATA
 I104 #03732 #12777 #00300 MOV #300,#DPRP ISET UP TO SERVICE
 I105 IRECEIVER INTERRUPTS
 I106 IAT LEVEL 6
 I107 #03740 #12777 #00240 MOV #240,#DPTP ISET UP TO SERVICE
 I108 ITRANSMITTER INTERRUPTS
 I109 IAT LEVEL 5
 I110 #03746 #12777 #10374 MOV #DP11T,#DPT1V ISET UP TRANSMITTER
 I111 IINTERRUPT SERVICE VECTOR
 I112 #03754 #12777 #10462 MOV #DP11R,#DPR1V ISET UP RECEIVER INTERRUPT
 I113 ISERVICE VECTOR
 I114 #03762 #12767 #00004 #04624 MOV #4,#DCCNT ISET UP TO TRANSMIT 4
 I115 ISYNC CHARACTERS
 I116 #03770 #16777 #04616 MOV#B DPTSYNC,#DPSYNC ILOAD TRANSMITTER
 I117 ISYNC BUFFER
 I118 #03776 #05077 #175370 CLR#B #0PESYN ICLEAR EXTENDED SYNC BUFFER
 I119 #04002 #052777 #00105 BIS #105,#DPRS ISET RECEIVER INTERRUPT
 I120 IENABLE, MAINTENANCE MODE
 I121 #04010 #052777 #00302 #175346 BIS #302,#DPTS ISTRIP SYNC MODE
 I122 ISET TRANSMITTER STATUS
 I123 IINTERRUPT ENABLE, TRANSMIT
 I124 IDONE INTERRUPT ENABLE
 I125 IIDLE SYNC MODE
 I126 #04016 #05067 #027052 CLR WATCDP ICLEAR INTERRUPT OCCURED FLAG
 I127 #04022 #032702 #00000 DMPRI#I BIT #100000,R2 IIF SR2 BIT 15=1, DO NOT
 I128 #04026 #001121 BNE ST13 IINITIALIZE DM11
 I129
 I130 JDM11 16 LINE ASYNCHRONOUS MULTIPLEXER INITIALIZATION
 I131
 I132 #04030 #12777 #011400 #175310 MOV #DMCAT,#DMBAS IINITIALIZE DM BASE REGISTER
 I133 #04036 #05077 #175276 CLR #DMCSR ICLEAR DM CONTROL STATUS REGISTER
 I134 #04042 #05067 #05532 CLR TUMTAB ICLEAR FIRST TUMBLE TABLE ENTRY
 I135 #04046 #12767 #17777 #00364 MOV #1,#DMWCT ISET UP TO TRANSMIT 1 CHARACTER
 I136 #04054 #12767 #17777 #005456 MOV #1,#DMMSK IPRESET THE CHARACTER MASK
 I137 #04062 #12767 #011340 #00310 MOV #DMMSK,DMCAT ILOAD CURRENT ADDRESS(LINE 0)
 I138 #04070 #12777 #000005 #175242 MOV #1,MAINT,#GO,#DMCSR ISET MAINT & GO BITS
 I139 #04076 #052777 #000001 #175236 BIS #1,#DMBAR IENABLE LINE 0 TO
 I140 ITRANSMIT 1 CHARACTER
 I141 IWHICH IS ALL 1S
 I142 #04104 #05777 #175230 TST #DMCSR IWAIT FOR TRANSMITTER
 I143 #04110 #00375 BPL #4 ITO FINISH
 I144 #04112 #05777 #175222 TST#B #DMCSR IWAIT FOR RECEIVER
 I145 #04116 #00375 BPL #4 ITO FINISH
 I146 #04120 #146767 #005454 #005412 BIC#B TUMTAB,DMMSK IUSE RECEIVED CHARACTER
 I147 ITO GENERATE CHARACTER AMSK
 I148 #04126 #05077 #175206 CLR #DMCSR ICLEAR CONTROL REGISTER
 I149
 I150 #04132 #12700 #011400 MOV #DMCAT,R0 ISET UP TO LOAD CURRENT
 I151 #04136 #12701 #000020 MOV #16,#R1 IADDRESS TABLE FOR TRANSMITTER
 I152 #04142 #12720 #014600 DMPRI#I MOV #PROCTS,(R0)+ IEACH LINE WILL USE
 I153 IPROCESSOR TEST CODE AS

I154 IITS TRANSMIT BUFFER
 I155 #04146 #005301 DEC R1
 I156 #04150 #001374 BNE DMPRIA
 I157 #04152 #12700 #011440 MOV #DMWCT,R0 ISET UP TO LOAD
 I158 #04156 #12701 #000020 MOV #16,#R1 ICURRENT ADDRESS TABLE
 I159 #04162 #12720 #177400 DMPRI#I MOV #400,(R0)+ ITRANSMIT 400(OCTAL)
 I160 IBYTES ON EACH LINE
 I161 #04166 #005301 DEC R1
 I162 #04170 #001374 BNE DMPRI#I
 I163 #04172 #12700 #011600 MOV #TUMTAB,R0
 I164 #04176 #12701 #00100 MOV #64,#R1
 I165 #04202 #005020 DMPRI#I CLR (R0)+ ICLEAR TUMBLE TABLE
 I166 #04204 #005301 DEC R1
 I167 #04206 #001375 BNE DMPRI#I
 I168 #04210 #005067 #005326 CLR DMTDAT ICLEAR RECEIVED DATA POINTER
 I169 #04214 #12767 #011600 #005322 MOV #TUMTAB,DMPTR ISET UP POINTER TO TUMBLE TABLE
 I170 #04222 #12777 #011220 #175120 MOV #DM11R,#DMRVEC ISET UP RECEIVER
 I171 IINTERRUPT SERVICE VECTOR
 I172 #04230 #12777 #00240 #175114 MOV #,DMPRTY,#DMRPRTY ISET UP TO SERVICE
 I173 IINTERRUPT AT LEVEL 5
 I174 #04236 #12777 #011072 #175110 MOV #DM11T,#DMTVEC ISET TRANSMITTER
 I175 IINTERRUPT SERVICE VECTOR
 I176 #04244 #12777 #00240 #175104 MOV #,DMPRTY,#DMTPRTY ISET UP TO SERVICE TRANSMITTER
 I177 IINTERRUPT AT LEVEL 5
 I178 #04252 #12777 #010105 #175060 MOV #,GO+,#MAINT+,#RTIE+,#IE,#DMCSR
 I179 ISET RECEIVER INTERRUPT ENABLE
 I180 ITRANSMITTER INTERRUPT ENABLE
 I181 IMAINTENANCE MOD AND GO
 I182 #04260 #016777 #005262 #175054 MOV DMBARIM,#DMBAR IENABLE ALL LINES FOR
 I183 ITRANSMISSION
 I184 #04266 #005067 #026022 CLR WATCDM ICLEAR INTERRUPT OCCURED FLAG
 I185 #04272 STI31
 I186 #04272 #032767 #000002 #174550 ST021 BIT #2,SR3 IIF SR3 BIT 1=1, DO NOT
 I187 #04300 #001027 BNE ST4 IINITIALIZE CD11 CARD READER
 I188
 I189 JCD11 CARD READER INITIALIZATION
 I190
 I191 #04302 #12767 #005100 #173720 MOV #CDISR,CRDRIV ISET UP VECTOR FOR CD11
 I192 ISERVICE ROUTINE
 I193 #04310 #12767 #00200 #173714 MOV #200,CRDRPS ISERVICE AT LEVEL 4
 I194 #04316 #12777 #000400 #174744 MOV #400,#CDST IPOWER CLEAR CD11
 I195 #04324 #12777 #00100 #174736 MOV #100,#CDST ISET CD11 INTERRUPT ENABLE
 I196 #04332 #032777 #010000 #174730 BIT #100000,#CDST IIS READER OFF LINE
 I197 #04340 #12777 #177660 #174724 MOV #120,#CDCC ISET UP FOR 80 COLUMN CARDS
 I198 #04346 #12777 #005426 #174720 MOV #CDBUFF,#CDBA ISET UP BUS ADDRESS REGISTER
 I199 #04354 #005277 #174710 INC #COST ISTART CARD READER
 I200 #04360 ST031
 I201 #04360 #036727 #174460 #000040 ST41 BIT SR1,#40 IIF SR1 BIT 5=1, DO NOT
 I202 #04366 #001016 BNE ST10B IINITIALIZE CR11/CM11 CARD READER
 I203
 I204 JCR11, CM11 CARD READER INITIALIZATION
 I205
 I206 #04370 #12767 #004714 #173632 MOV #CRCM11,CRDRIV ISET UP VECTOR FOR CR11/CM11
 I207 IINTERRUPT SERVICE ROUTINE

I208	004376	012767	000300	173026	MOV	#300,CRDRPS	ISERVICE AT LEVEL 6
I209	004404	005067	000942		CLR	CRCK1	ICLEAR CHECKSUM 1
I210	004410	005067	000940		CLR	CRCK2	ICLEAR CHECKSUM 2
I211	004414	005067	000936		CLR	CRCLCT	ICLEAR CARD READER COLUMN COUNT
I212	004420	018477	174036		MOV	R4,#CRS	ISTART READING AND ENABLE INTERRUPTS
I213	004424	004777	174372	STI001	JSR	PC,#PRIME	ICALL TO USER DEVICE PRIMING CODE
I214	004430	042767	000340	173340	BIC	#340,PS	IALLOW INTERRUPTS
I215	004436	000401			BR	,+4	
I216	004440	000001			MAINLI	WAIT	IWAIT HERE FOR INTERRUPTS
I217							IIF PROCESSOR TEST IS INHIBITED
I218	004448	036727	173122	002000	MAINSI	BIT	IIF SR BIT 10=1,
I219	004450	001373			BNE	MAINLI	IINHIBIT PROCESSOR TEST
I220	004452	000167	010130		JMP	PROCTS	

I221					,SBTTL TELETYPE RECEIVER INTERRUPT SERVICE		
I222							
I223	004456	105777	174416	TTYINR1	TSTB	#TRCSR	IIS DONE SET
I224	004462	100401			BMI	,+4	
I225	004464	104000			HLT		IFALSE RETURN FROM MAINLINE
I226	004466	105777	174410		TSTB	#TRDR	IEST DATA FOR LEADER
I227	004472	001412			BEG	TTYIN2	IIF LEADER GO BACK
I228	004474	127767	174402	000006	CMPB	#TRDR,#DATA1	I NOT LEADER TEST FOR DATA
I229	004502	001401			BEG	TTYIN3	
I230	004504	104000			HLT		IDATA COMPARISON ERROR
I231	004506	105227		TTYIN3I	INCB	(PC)+	IINCREMENT DATA
I232	004510	000000		BDATA1	0		
I233	004512	001002			BNE	TTYIN2	
I234	004514	005267	177770	TTYIN1	INC	BDATA1	I BASE DATA
I235	004520	005277	174354	TTYIN2	INC	#TRCSR	I START READER
I236	004524	000002			RTI		I RETURN TO MAINLINE
I237							
I238							
I239							
I240					,SBTTL TELETYPE TRANSMITTER INTERRUPT SERVICE		
I241	004526	105777	174352	TYOUTR1	TSTB	#TTCSR	I TEST FOR DONE
I242	004532	100401			BMI	,+4	I BRANCH IF FLAG POUNO
I243	004534	104000			HLT		IFALSE INTERRUPT RETURN
I244	004536	105227			INCB	(PC)+	IINCREMENT DATA
I245	004540	000000		BDATA2	0		
I246	004542	016777	177772	174336	TYOUT1	MOV	BDATA2,#TTDBR
I247	004550	000002		TYOUT2	RTI		I RETURN TO MAINLINE
I248					IHSR SECTION VALUES 0 TO 377		
I249							
I250					,SBTTL HIGH SPEED READER INTERRUPT SERVICE		
I251							
I252	004552	105777	174332	HSRINR1	TSTB	#HRCSR	
I253	004556	100401			BMI	,+4	
I254	004560	104000			HLT		IFALSE RETURN FROM MAINLINE
I255	004562	105777	174324		TSTB	#HRDBR	IEST DATA FOR LEADER
I256	004566	001412			BEG	HSRIN2	IIF LEADER GO BACK
I257	004570	127767	174316	000006	CMPB	#HRDBR,#DATA3	I NOT LEADER TEST FOR DATA
I258	004576	001401			BEG	,+4	
I259	004600	104000			HLT		IDATA COMPARISON ERROR
I260	004602	105227			INCB	(PC)+	IINCREMENT DATA
I261	004604	000000		DATAS1	0		
I262	004606	001002			BNE	HSRIN2	
I263	004610	005267	177770	HSRIN1	INC	DATAS	I BASE DATA
I264	004614	005277	174270	HSRIN2	INC	#HRCSR	I START READER
I265	004620	000002			RTI		I RETURN TO MAINLINE
I266							
I267							
I268							
I269					,SBTTL HIGH SPEED PUNCH INTERRUPT SERVICE		
I270	004622	105777	174266	HPOUTR1	TSTB	#HPCSR	I TEST FOR DONE
I271	004626	100401			BMI	,+4	I BRANCH IF FLAG POUNO
I272	004630	104000			HLT		IFALSE INTERRUPT RETURN
I273	004632	032767	000010	174204	BIT	#10,SR1	IIF HIGH SPEED READER WAS
I274	004640	001016			BNE	HPOUT2	I NOT SELECTED, DO NOT ENABLE

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1275 #04642 #042777 #00100 174240 BIC #100,#HRC5R JCLEAR HSR INTERRUPT ENABLE
1276 #04650 #05267 #00036 INC INTCNT JCOUNT INTERRUPTS
1277 #04654 #226727 #00032 #00006 CMP INTCNT,#6 JSAVE TO TURN READER ON?
1278 #04662 #01005 BNE HPOUT2 JNO-NEED MORE TIME
1279 #04664 #05067 #00022 CLR INTCNT JYES RESET COUNTER
1280 #04670 #052777 #00100 174212 RIS #100,#HRC5R JSET READER INT ENABLE
1281 #04676 #052277 #00100 HPOUT2 INCB (PC)* JINCREMENT DATA
1282 #04700 #00000 DATA4 0 JOUTPUT TO DEVICE
1283 #04702 #016777 177772 174206 HPOUT1 MOV DATA4,#HPD5R JRETURN TO MAINLINE
1284 #04710 #00002 RTI
1285 #04712 #00000 INTCNT 0
1286
1287
1288 ,SBTTL CR11,CM11 CARD READER INTERRUPT SERVICE
1289
1290 #04714 #05777 174342 CRCHK11 TSTB #CRS JCHECK COLUMN READY
1291 #04720 #00015 BPL CRCHK1 JBRANCH IF NOT SET
1292 #04722 #05267 #00230 INC CRCLCT JCOUNT NUMBER OF COLUMNS
1293 #04726 #067767 174332 #00216 ADD #CRB1,CRCK1 JADD DATA TO CHECKSUM 1
1294 #04734 #067767 174320 #00212 ADD #CRB2,CRCK2 JADD ENCODED DATA TO CHECKSUM 2
1295 #04742 #05777 174314 TSTB #CRS JCHECK COLUMN READY
1296 #04746 #00001 BPL ,+4 JBRANCH IF CLEARED
1297 #04750 #04000 HLT JREADING DATA DIDN'T CLEAR COLUMN READY
1298 #04752 #00002 RTI JRETURN
1299 #04754 #032777 #04000 174300 CRCHK11 BIT #40000,#CRS JCHECK FOR CARD NONE
1300 #04762 #001447 BEQ CRCHK2 JBRANCH IF NOT SET
1301 #04764 #022767 #00120 #00164 CMP #80,CRCLCT JCHECK FOR EIGHTY COLUMNS
1302 #04772 #001406 BEQ CR1 JBRANCH IF OK
1303 #04774 #022767 #00050 #00154 CMP #40,CRCLCT J40 COLUMNS
1304 #05002 #001433 BEQ CRCHK6
1305 #05004 #04000 HLT JTOTAL NUMBER OF COLUMNS READ NOT 80 OR 40
1306 #05006 #000423 BR CRCHK4
1307 #05010 #026767 #00132 #00134 CR11 CMP CRSUM1,CRCK1 JCHECK FOR CORRECT ALPHA CARD IMAGE SUM
1308 #05016 #001401 BEQ CRCONY JBRANCH IF CORRECT
1309 #05020 #04000 HLT JCARD IMAGE CHECKSUM INCORRECT
1310 #05022 #026767 #00122 #00124 CRCONY CMP CRSUM2,CRCK2 JCHECK FOR CORRECT ALPHA ENCODED SUM
1311 #05030 #001401 BEQ CRCONY JBRANCH IF CORRECT
1312 #05032 #04000 HLT JENCODED CHECKSUM INCORRECT
1313 #05034 #05777 174222 CRCONY TST #CRS JCHECK FOR ERROR
1314 #05040 #00001 BPL ,+4 JBRANCH IF NOT SET
1315 #05042 #04000 HLT JERROR BIT WAS SET
1316 #05044 #032777 #00040 174210 BIT #400,#CRS JCHECK OFF-LINE (BIT 8)
1317 #05052 #001401 BEQ ,+4 JBRANCH IF NOT SET
1318 #05054 #00002 RTI JIF READER OFF-LINE, DON'T START UP AGAIN
1319 #05056 #05067 #00074 CRCHK4 CLR CRCLCT JCLEAR COLUMN COUNT
1320 #05062 #05067 #00064 CLR CRCK1 JCHECKSUMS
1321 #05066 #05067 #00062 CLR CRCK2
1322 #05072 #012777 #00101 174162 CRCHK6 MOV #101,#CRS JCLEAR INTERRUPTING CONDITION, RESTART READER
1323 #05100 #00002 RTI JRETURN
1324 #05102 #05777 174154 CRCHK2 TST #CRS JCHECK BIT 15
1325 #05106 #00006 BPL CRCHK3 JBRANCH IF NOT SET
1326 #05110 #032777 #00040 174144 BIT #400,#CRS JCHECK OFF-LINE (BIT 8)
1327 #05116 #001007 BNE CRCHK5 JBRANCH IF SET TO WAIT FOR ON-LINE
1328 #05120 #04000 HLT JERROR BIT WAS SET, OTHERS WEREN'T
  
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1329 #05122 #000405 BR CRCHK5
1330 #05124 #032777 #00200 174130 CRCHK3 BIT #2000,#CRS JCHECK BIT 10
1331 #05132 #001351 BNE CRCHK4 JBRANCH IF SET
1332 #05134 #04000 HLT JNO INTERRUPTING BITS WERE SET
1333 #05136 #042777 100000 174116 CRCHK5 BIC #100000,#CRS JCLEAR ERROR BIT
1334 #05144 #00002 RTI JRETURN
1335 #05146 #067443 CRSUM1 67443 JDESIRED TOTAL FOR ALPHANUMERIC CARD-IMAGE DATA
1336 #05150 #014173 CRSUM2 14173 JDESIRED TOTAL FOR ALPHANUMERIC ENCODED DATA
1337 #05152 #00000 CRCK1 0 JRUNNING CHECKSUM FOR CARD IMAGE
1338 #05154 #00000 CRCK2 0 JRUNNING CHECKSUM FOR ENCODED DATA
1339 #05156 #00000 CRCLCT 0 JCARD READER COLUMN COUNT
1340
1341
1342 ,SBTTL CD11 CARD READER INTERRUPT SERVICE
1343
1343 #05426 CDTOP=CDRUFF JCD11 DATA BUFFER
1344 #05546 CDENDP=CDRUFF+120 JEND OF BUFFER IN PACKED MODE
1345 #05666 CDENDI=CDRUFF+240 JEND OF BUFFER IN IMAGE MODE
1346 #05160 #032777 #00010 174102 CDISR1 BIT #10,#CDST JCHECK TRANSITION TO ON-LINE
1347 #05166 #001071 BNE CDRET1 JBRANCH IF SET
1348 #05170 #05777 174074 TSTB #CDST JCHECK FOR CONTROLLER READY
1349 #05174 #000401 BMT CDISR1 JBRANCH IF CONTROLLER READY
1350 #05176 #04000 HLT JCONTROLLER READY NOT SET
1351
1352 #05200 #05777 174064 CDISR1 TST #CDST JCHECK ERROR FLAG
1353 #05204 #000473 BMT CDCHK1 JBRANCH IF SET
1354 #05206 #010146 MOV R1,#(SP) JSAVE R1
1355 #05210 #010246 MOV R2,#(SP) JSAVE R2
1356 #05212 #005002 CLR R2 JCLEAR R2
1357 #05214 #012701 #05426 MOV #CDTOP,R1 JSET R1 AS POINTER
1358 #05220 #012767 177660 MOV #120,CRCLCT JSET UP COUNTER
1359 #05226 #05777 174060 TST #CDCC JCHECK COLUMN COUNT REGISTER
1360 #05232 #001401 BEQ ,+4 JBRANCH IF OK
1361 #05234 #04000 HLT JCOLUMN COUNT REGISTER ERROR
1362
1363 #05236 #027727 174032 #05546 CMP #CDBA,#CDENDP JCHECK BUS ADDRESS FOR PACK MODE
1364 #05244 #001422 BEQ CDLOP2 JBRANCH IF PACK MODE
1365 #05246 #027727 174022 #05666 CMP #CDBA,#CDENDI JCHECK BUS ADDRESS FOR IMAGE MODE
1366 #05254 #001402 BEQ CDLOP1 JBRANCH IF IMAGE MODE
1367 #05256 #04000 HLT JBUS ADDRESS REGISTER ERROR
1368
1369 #05260 #000432 BR CDRET JSKIP DATA CHECKING
1370
1371 #05262 #062102 CDLOP1 ADD (R1)+,R2 JADD UP THE BUFFER
1372 #05264 #05267 177666 INC CRCLCT JCOUNT
1373 #05270 #001374 BNE CDLOP1 JBRANCH IF NOT DONE
1374 #05272 #020267 177650 CMP R2,CRSUM1 JCHECK THE SUM
1375 #05276 #001401 BEQ ,+4 JBRANCH IF OK
1376 #05300 #04000 HLT JCHECKSUM ERROR, IMAGE MODE
1377
1378 #05302 #012777 #00102 173760 MOV #102,#CDST JSET PACKING MODE
1379 #05310 #000416 BR CDRET JCONTINUE
1380
1381 #05312 #112107 177634 CDLOP2 MOVB (R1)+,CRCK1 JMOVE BYTE INTO WORD
1382 #05316 #066702 177630 ADD CRCK1,R2 JADD UP THE BUFFER
  
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I383	005322	005207	177630		INC	CRCLCT		ICOUNT
I384	005326	001371			BNE	CDLDP2		IBRANCH IF NOT DONE
I385	005330	020207	177614		CMP	R2,CRSUM2		ICHECK THE SUM
I386	005334	001401			BEQ	,+4		IBRANCH IF OK
I387	005336	104000			HLT			ICHECKSUM ERROR, PACKING MODE
I388	005340	012777	000100	173722	MOV	#100,@CDST		ICLEAR PACKING MODE BIT
I389	005346	012602			CDRET1	(SP)+,R2		IRESTORE R2
I390	005350	012601			MOV	(SP)+,R1		IRESTORE R1
I391	005352	012777	177600	173712	CDRET1	#=121,@CDCC		ISET UP COLUMN COUNT
I392	005360	012777	005426	173706	MOV	#CDBUFF,@CDBA		ISET UP BUS ADDRESS
I393	005366	005277	173676		INC	@CDST		IREAD
I394	005372	000002			RTI			
I395	005374	032777	010000	173666	CDCHK1	BIT	#10000,@CDST	ICHECK FOR OFF-LINE
I396	005402	001402			BEQ	,+6		IBRANCH IF NOT
I397	005404	000002			RTI			IRETURN AND WAIT FOR ON-LINE
I398								
I399	005406	032777	027000	173654	BIT	#027000,@CDST		ICHECK FOR OTHER ERROR BITS
I400	005414	001402			BEQ	,+6		IBRANCH IF NONE SET
I401	005416	104000			HLT			IEND OF FILE ERROR (M1200 ONLY),
I402								IDATA ERROR, DATA LATE ERROR, OR
I403								INON-EXISTANT MEMORY ERROR,
I404	005420	000754			BR	CDRET1		IGO ON TO NEXT CARD
I405	005422	104000			HLT			ICARD READER STATUS ERROR
I406								
I407	005424	000752			BR	CDRET1		IGO ON TO NEXT CARD
I408	005426	000000			CDBUFF1	0		
I409		005670			,#1,+240			
I410								
I411					,S6TTL	AF011	ANALOG MULTIPLEXER INTFRUPT SERVICE	
I412								
I413	005670	105777	173530		AF011	TSTB	@AFCSR	IAFC11 DONE BIT SET?
I414	005674	100401			BMI	,+4		
I415	005676	104000			HLT			INO, ERROR
I416	005700	067777	173522	000324	AFADD1	ADD	@AFDPR,@AFPTR	IGENERATE TOTAL
I417	005706	105207	000324		INCB	AFCTR1		IALL SAMPLES IN
I418	005712	001052			BNE	AFEX1		INO
I419	005714	004277	000312		ASR	@AFPTR		IDIVIDE TOTAL BY 10 (OCTAL)
I420	005720	004277	000306		ASR	@AFPTR		
I421	005724	004277	000302		ASR	@AFPTR		
I422	005730	062707	000022	000274	ADD	#2,AFPTR		IUPDATE POINTER
I423	005736	005207	000276		INC	AFSEL		IADVANCE CHANNEL
I424	005742	105207	000271		INCB	AFCTR2		IALL CHANNELS DONE?
I425	005746	001026			BNE	AFEXA		INO
I426	005750	005707	000206		TST	AFPLG		IYES, PASS1?
I427	005754	001040			BNE	AFCDM		INO, COMPARE RESULTS
I428	005756	005107	000200		COM	AFPLG		IPASS1, CHANGE FOR PASS2
I429	005762	012707	006204	000242	AFSP2	MOV	#AFTAB2,AFPTR	
I430	005770	012707	174370	000240	MOV	#174370,AFCTR1		
I431	005776	005077	000230		AFCLR1	CLR	@AFPTR	ICLEAR TABLE FOR PASS2
I432	006002	062707	000002	000222	ADD	#2,AFPTR		
I433	006010	105207	000222		INCB	AFCTR1		
I434	006014	001370			BNE	AFCLR		
I435	006016	012707	006204	000206	MOV	#AFTAB2,AFPTR		ISET UP POINTER FOR DATA STORAGE
I436	006024	112707	177770	000204	AFEXA1	MOV	#=10,AFCTR1	ISET UP TO TAKE 10(OCTAL)SAMPLES PER LINE

I437	006032	012707	000000	000200	MOV	#0,AFSEL		IFIRST CHANNEL IS0
I438	006040	016777	000174	173362	AFEXIT1	MOV	AFSEL,@AFCAR	ISTART MULTIPLEXER
I439	006046	012707	000001	024732	MOV	#1,WATCAF		ISET INTERRUPT OCCURED FLAG
I440	006054	000002			RTI			IRETURN TO MAINLINE
I441	006056	012707	006244	000146	AF001	MOV	#AFTAB1,AFPTR	ISET UP TO COMPARE DATA TABLES
I442	006064	112707	177770	000144	MOV	#=10,AFCTR1		I10 (OCTAL) CHANNEL'S
I443	006072	012707	006204	000134	MOV	#AFTAB2,AFPTR		IWILL BE COMPARED
I444	006100	017707	000126	000132	AF001	MOV	@AFPTR,AFTEMP	IGET DATA
I445	006106	167707	000122	000124	SUB	@AFPTR,AFTEMP		ICOMPARE
I446	006114	100402			BMI	,+6		IGET ABSOLUTE VALUE OF DIFFERENCE
I447	006116	005407	000116		NEG	AFTEMP		
I448	006122	062707	000020	000110	ADD	#20,AFTEMP		ICOMPARE TO ERROR LIMIT
I449	006130	002001			BGE	,+4		
I450	006132	104000			HLT			IDIFFERENCE NOT WITHIN LIMIT, ERROR
I451	006134	062707	000002	000070	ADD	#2,AFPTR		IUPDATE POINTERS
I452	006142	062707	000002	000064	ADD	#2,AFPTR		
I453	006150	105207	000002		INCB	AFCTR1		IUPDATE COUNTER
I454	006154	001331			BNE	AFCDM1		ICONTINUE IF NOT DONE
I455	006156	012707	006244	000046	AFMOV1	MOV	#AFTAB1,AFPTR	I REPLACE OLD TABLE
I456	006164	012707	006204	000042	MOV	#AFTAB2,AFPTR		I OF DATA WITH NEW DATA
I457	006172	112707	177770	000036	MOV	#=10,AFCTR1		
I458	006200	017707	000030	000024	AFMOV1	MOV	@AFPTR,@AFPTR	
I459	006206	062707	000002	000016	ADD	#2,AFPTR		
I460	006214	062707	000002	000012	ADD	#2,AFPTR		
I461	006222	105207	000010		INCB	AFCTR1		
I462	006226	001364			BNE	AFMOV1		
I463	006230	000654			BR	AFSP2		IGET NEW DATA
I464	006232	000000			AFPTR1	0		
I465	006234	000000			AFPTR1	0		
I466	006236	000			AFCTR1	,BYTE	0	
I467	006237	000			AFCTR2	,BYTE	0	
I468					,EVEN			
I469	006240	000000			AFTEMP1	0		
I470	006240	000000			AFSEL1	0		
I471	006242	000000			AFPLG1	0		
I472	006244	000000			AFTAB1	0		
I473		006204			,#1,+16			
I474	006204	000000			AFAB2	0		
I475		006304			,#1,+16			
I476								
I477					,S6TTL	AD01	A/D CONVERTER INTERRUPT SERVICE	
I478								
I479	006304	005777	172770		AD01	TST	@ADCSR	ICHECK FOR ERROR
I480	006310	100001			BPL	,+4		IBRANCH IF NOT SET
I481	006312	104000			HLT			IERROR BIT WAS SET
I482	006314	017777	172756	000212	MOV	@ADBR,@TBPTR		ILOAD DATA IN TABLE
I483	006322	026727	000206	006554	CMP	TBPTR,#ADTBLA+6		ICHECK FOR TABLE FILLED
I484	006330	001004			BNE	AD1		IBRANCH IF NOT AT END OF TABLE A
I485	006332	012707	006556	000174	MOV	#ADTBLB,TBPTR		
I486	006340	000424			BR	ADCK		
I487	006342	026727	000166	006564	AD1	CMP	TBPTR,#ADTBLB+6	
I488	006350	001004			BNE	AD2		IBRANCH IF NOT AT END OF TABLE B
I489	006352	012707	006546	000154	MOV	#ADTBLA,TBPTR		
I490	006360	000414			BR	ADCK		

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1491 006362 062767 000002 000144 AD2: ADD #2,TBPTR ;MOVE POINTER
1492 006370 005267 000144 CHOUT INC ;ERROR MAY BE SET, SO
1493 006374 116777 000140 172700 MOVB CHOUT,@ADCSRO ;USE A MOVE TO CLEAR IT AND START CONVERSION
1494 006402 012767 000001 024442 MOV #1,WATCAD
1495 006410 000002 RTI
1496 006412 005767 000120 ADCKI TST ;TEST FOR FIRST PASS
1497 006416 001037 BNE ADCONT ;IF SO, FILL OTHER TABLE
1498
1499 006420 012767 006546 000114 MOV #ADYBLA,POINTA ;LOAD POINTER TO TABLE A IN POINTA
1500 006426 012767 006556 000110 MOV #ADTBLB,POINTB ;LOAD POINTER TO TABLE B IN POINTB
1501 006434 017767 000102 000074 ADLOOP: MOV #POINTA,ADTEMP ;INPUT DATA IN ADTEMP
1502 006442 167767 000076 000066 SUB #POINTB,ADTEMP ;SUBTRACT SECOND READING ON SAME CHANNEL
1503 006450 005267 000062 INC ADTEMP ;CHECK FOR A-B<=1
1504 006454 100001 BPL ;+4 ;BRANCH IF OK
1505 006456 104000 HLT ;DATA NOT EQUAL TO + OR = 1 LSB
1506 006460 162767 000003 000050 SUB #3,ADTEMP ;CHECK FOR A-B>+1
1507 006466 100401 BMI ;+4 ;BRANCH IF OK
1508 006470 104000 HLT ;DATA NOT WITHIN + OR = 1 LSB
1509 006472 062767 000002 000042 ADD #2,POINTA ;MOVE POINTA
1510 006500 062767 000002 000036 ADD #2,POINTB ;MOVE POINTB
1511 006506 026767 000030 006556 CMP POINTA,#ADTBLA+10 ;CHECK FOR END OF TABLE
1512 006514 001347 BNE ADLOOP ;LOOP IF NOT DONE
1513 006516 005067 000014 ADCONT: CLR ADTEMP ;FIRST PASS COMPLETE
1514 006522 005067 000012 CLR CHOUT ;INITIALIZE CHANNEL TO CONVERT ON
1515 006526 105077 172550 CLR @ADCSRO ;START CONVERSION
1516 006532 000002 RTI
1517
1518 006534 000000 TBPTR: 0
1519 006536 000000 ADTEMP: 0
1520 006540 000000 CHOUT: 0 ;CURRENT CONVERSION CHANNEL
1521 006542 000000 POINTA: 0 ;WHERE IN A
1522 006544 000000 POINTB: 0 ;WHERE IN B
1523 006546 000000 ADYBLA: 0 ;TABLE A
1524 006556 ;+6
1525 006556 000000 ADTBLB: 0 ;TABLE B
1526 006566 ;+6
1527
1528 ;SBTTL AA11 WITH SCOPE INTERRUPT SERVICE
1529
1530
1531
1532 006566 105777 172532 AA11: TSTB @SCSR ;IS DONE SET
1533 006572 100402 BMI ;+6 ;IDONE NOT SET
1534 006574 104000 HLT
1535 006576 000002 RTI
1536 006600 012767 000000 027766 MOV #0,XPOS ;SHOULD WORK FOR ALL SCOPES
1537 006606 005067 027760 CLR YPOS
1538 006612 012767 000006 027762 MOV #6,CNTR ;16 CHARACTER COUNT
1539 006620 012767 036522 027752 MOV #TEXT,PNTR ;TEXT "PDP-11"
1540 006626 012767 006730 171304 MOV #CHAR3,140 ;INTERRUPT VECTORS
1541 006634 017767 027740 027724 TXT1: MOV #PNTR,AAR2
1542 ;PLOT CHARACTER
1543 006642 016767 027724 027726 CHAR: MOV YPOS,YPT ;INIT ENTER WITH SCOPE INTERRUPT
1544 006650 052777 000024 172446 BIS #24,@SCSR ;ENABLE INTENSIFY OF LOADING Y
  
```

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1545 006656 012767 177773 027676 MOV #5,AAR0 ;MATRIX COUNT (ROW)
1546 006664 012767 177771 027672 CHAR1: MOV #7,AAR1 ;MATRIX COUNT (COLUMN)
1547 006672 117767 027670 027670 MOVB @AAR2,AAR3 ;GET CHARACTER
1548 006700 005267 027662 INC AAR2
1549 006704 106167 027660 CHAR2: ROLB AAR3 ;INTENSIFY POINT?
1550 006710 100007 BPL CHAR3 ;NO
1551 006712 016777 027656 172486 MOV XPOS,@DAC0 ;LOAD X
1552 006720 016777 027646 172402 MOV YPOS,@DAC1 ;LOAD Y AND INTENSIFY
1553 006726 000002 RTI ;RETURN TO MAINLINE
1554 006730 105777 172370 CHAR3: TSTB @SCSR ;IS DONE SET
1555 006734 100401 BMI ;+4
1556 006736 104000 HLT
1557 006740 062767 000070 027624 ADD #70,YPOS ;NEXT POINT
1558 006746 005267 027612 INC AAR1 ;DONE ALL POINTS IN A COLUMN?
1559 006752 001354 BNE CHAR2 ;NO
1560 006754 016767 027610 MOV YPT,YPOS ;NEXT COLUMN
1561 006762 062767 000070 027604 ADD #70,XPOS ;ADD SCALE
1562 006770 005267 027566 INC AAR0 ;DONE ALL COLUMNS?
1563 006774 001333 BNE CHAR1 ;NO
1564 006776 062767 000070 027570 ADD #70,XPOS ;YES, POSITION FOR NEXT CHARACTER
1565 006784 062767 000002 027566 ADD #2,PNTR ;NEXT CHARACTER
1566 006786 032767 000020 172030 BIT #20,SR3
1567 006790 001016 BNE CHAR4
1568 006792 032777 001000 172274 BIT #1000,@SCSR ;IS GREEN BIT SET
1569 006796 001004 BNE ;+12 ;YES, CLEAR FOR RED
1570 006800 052777 001000 172264 BIS #1000,@SCSR ;NO, SET FOR GREEN
1571 006804 001016 BR ;+10
1572 006806 042777 001000 172254 BIC #1000,@SCSR ;DISPLAY IN RED
1573 006810 105777 172250 TSTB @SCSR ;WAIT FOR COLOR CHANGE
1574 006814 001375 BNE ;+4
1575 006816 005367 027520 CHAR4: DEC CNTR ;DONE ALL?
1576 006820 001284 BNE TXT1 ;NO
1577 006824 042777 000002 172232 BIC #2,@SCSR ;INIT AND ERASE
1578 006826 000635 BR AA11 ;LOOP
1579
1580 ;SBTTL RK11 DISK INTERRUPT SERVICE
1581
1582 006874 105777 172114 RK11: TSTB @RKCSR ;INTERRUPT VECTOR POINTS HERE
1583 006880 100402 BMI ;+6
1584 006884 104000 HLT ;RK11 READY NOT UP
1585 006886 000417 BR RKSTART
1586 006890 005777 172102 TST @RKCSR
1587 006894 100002 BPL ;+6
1588 006896 104000 HLT ;RK11 ERROR FLAG UP
1589 006898 000412 BR RKSTART
1590 006902 032777 000037 172056 BIT #37,@RKDAR ;DISK AT UPPER LIMIT?
1591 006906 001011 BNE RK1 ;NO
1592 006910 122777 000031 172050 CMPB #31,@RKDAH
1593 006914 001005 BNE RK1 ;NO
1594 006918 000367 000040 SWAB RKFUNCTION ;CHANGE COMMAND
1595 006922 016777 172052 172032 RKSTART: MOV RKDRV,@RKDAR ;INITIALIZE DISK=DRV,DAE
1596 006926 016777 000364 172032 RK1: MOV LLIMIT,@RKBAR ;CORE BASE
1597 006930 016777 000022 172022 MOV RKWORDCT,@RKWC ;LENGTH OF TRANSFER
1598 006934 116777 000012 172020 MOVB RKFUNCTION,@RKCSR ;WRITE OR WRITE CHECK TO DISK
  
```

```

1599 007174 012767 000001 023626 MOV #1,WATCRK
1600 007202 000002 RTI ;RETURN TO MAINLINE CODE
1601
1602 007204 000000 RKFUNCTIOI 0 ;DISK COMMAND
1603 007206 176000 RKWORDCTI =2000 ;LENGTH OF TRANSFER
1604
1605 ;SBTTL RP11 DISK INTERRUPT SERVICE
1606
1607 007210 105777 172104 RPI11 TSTB @RPCSR ;INTERRUPT VECTOR POINTS HERE
1608 007214 100402 BMI ,+6 ;+6
1609 007216 104000 HLT ;RP11 READY NOT UP
1610 007220 000413 BR RFSTART
1611 007222 005777 172072 TST @RPCSR
1612 007226 100002 BPL ,+6 ;RP11 ERROR FLAG UP
1613 007230 104000 HLT
1614 007232 000406 BR RFSTART
1615 007234 122777 000312 172042 CNPB #312,@RPCA ;CYLINDER NO, 312
1616 007242 001010 RFI JNO
1617 007244 000367 000042 SWAB RPFUNCTIOI ;CHANGE COMMAND
1618 007290 012777 000001 172042 RPSTARTI MOV #00001,@RPCSR ;INITIALIZE DISK = DIR+DAE
1619 007296 105777 172036 TSTB @RPCSR ;WAIT FOR CONTROL READY
1620 007292 100375 BPL ,+4
1621 007284 016777 000292 172024 RPII LLIMIT,@RPBAR ;INITIAL CORE ADDRESS
1622 007272 016777 000012 172014 MOV RPWORDCT,@RPWC ;LENGTH OF TRANSFER
1623 007300 116777 000006 172012 MOVB RPFUNCTIOI,@RPCSR ;WRITE OR WRITE CHECK TO DISK
1624 007306 000002 RTI ;RETURN TO MAINLINE CODE
1625 007310 176000 RPWORDI =2000
1626 007312 000000 RPFUNCTI 0
1627
1628 ;SBTTL RC11 DISK INTERRUPT SERVICE
1629
1630 007314 105777 171694 RCI11 TSTB @RCCSR ;INTERRUPT VECTOR POINTS HERE
1631 007320 100402 BMI ,+6 ;+6
1632 007322 104000 HLT ;RC11 READY NOT UP
1633 007324 000413 BR RCSTART
1634 007326 005777 171642 TST @RCCSR
1635 007332 100002 BPL ,+6 ;RC11 ERROR FLAG UP
1636 007334 104000 HLT
1637 007336 000406 BR RCSTART
1638 007340 022777 003740 171620 CNP #3740,@RCDA ;DISK AT UPPER LIMIT, 7740=2, 13740=3, 17740=4
1639 007346 001005 RCI JNO
1640 007350 000367 000040 SWAB RCFUNCTIOI ;CHANGE COMMAND
1641 007354 012777 000000 171604 RCSTARTI MOV #0000,@RCDA ;INITIALIZE DISK = DIR+DAE
1642 007362 016777 000194 171602 RC2I MOV LLIMIT,@RCBAR ;CORE BASE
1643 007370 016777 000022 171572 MOV RCWORDCT,@RCWC ;LENGTH OF TRANSFER
1644 007376 116777 000012 171570 MOVB RCFUNCTIOI,@RCCSR ;WRITE OR WRITE CHECK TO DISK
1645 007404 012767 000001 023306 MOV #1,WATCRK
1646 007412 000002 RTI ;RETURN TO MAINLINE CODE
1647
1648 007414 000000 RCFUNCTIOI 0 ;DISK COMMAND
1649 007416 176000 RCWORDCTI =2000 ;LENGTH OF TRANSFER
1650
1651 ;SBTTL RF11 DISK INTERRUPT SERVICE
1652
  
```

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1653 007420 105777 171532 RFI11 TSTB @RPCSR ;INTERRUPT VECTOR POINTS HERE
1654 007424 100402 BMI ,+6 ;+6
1655 007426 104000 HLT ;RF11 READY NOT UP
1656 007430 000424 BR RFSTART
1657 007432 005777 171520 TST @RPCSR
1658 007436 100002 BPL ,+6 ;RF11 ERROR FLAG UP
1659 007440 104000 HLT
1660 007442 000417 BR RFSTART
1661 007444 005777 171502 TST @RFWC
1662 007450 100002 BPL ,+6 ;RF11 WORD COUNT NOT ZERO
1663 007452 104000 HLT
1664 007454 000412 BR RFSTART
1665 007456 122777 000003 171460 CNPB #3,@RFDAE ;DISK AT UPPER LIMIT?(#7=2,#17=4,#37=8 DISKS)
1666 007464 001010 RFI JNO
1667 007466 027727 171496 174000 CNP @RFDAR,#174000 ;AS FAR ON DISK AS WE CAN GO
1668 007474 101404 RLOS RFI JNO
1669 007476 000367 000036 SWAB FUNCTION ;CHANGE COMMAND
1670 007502 105277 171492 RPSTARTI INCB @RFSRR ;INITIALIZE DISK = DIR+DAE
1671 007506 016777 000030 171440 RFII MOV LLIMIT,@RFCAR ;CORE BASE
1672 007514 016777 000024 171430 MOV WORDCT,@RFWC ;LENGTH OF TRANSFER
1673 007522 116777 000012 171426 MOVB FUNCTION,@RFCSR ;WRITE OR WRITE CHECK TO DISK
1674 007530 012767 000001 023102 MOV #1,WATCRK
1675 007536 000002 RTI ;RETURN TO MAINLINE CODE
1676 007540 000000 FUNCTIONI 0 ;DISK COMMAND
1677 007542 014606 LLIMITI PROCTS ;FIRST CORE ADDRESS OF TRANSFER
1678 007544 175777 WORDCTI =2001 ;LENGTH OF TRANSFER
1679
1680 ;SBTTL MAG TAPE INTERRUPT SERVICE
1681
1682 ;REWIND TAPE UNIT
1683
1684 007546 012767 007564 170450 TH11 MOV #MTRWX,MTIV ;VECTOR SETUP
1685 007554 012777 000117 171692 MOV #00117,@MTC ;REWIND
1686 007562 000002 RTI ;BACK TO MAINLINE
1687 007564 000400 MTRWXI BR MTWRITE
1688
1689 ;WRITE A RECORD 800 PBI, 9TRACK, ODD PARITY
1690 007566 012767 007620 170430 MTWRITEI MOV #MTWRTX,MTIV ;VECTOR
1691 007574 016777 000412 171634 MOV MLENGTH,@MTRC ;BYTE COUNT
1692 007602 016777 000336 171630 MOV MTWBUF,@MTC ;CORE ADDRESS
1693 007610 112777 000105 171616 MOVB #00105,@MTC ;WRITE A RECORD
1694 007616 000002 RTI ;BACK TO MAIN LINE
1695 007620 105777 171610 MTWRTXI TSTB @MTC ;TEST FOR CU READY
1696 007624 100401 BMI ,+4
1697 007626 104000 HLT
1698 007630 005777 171600 TST @MTC ;READY NOT UP ON INTERRUPT
1699 007634 100005 BPL MTBSP ;ANY ERROR?
1700 007636 032777 002000 171566 BIT #2000,@MTC ;NO ERRORS = BACK SPACE
1701 007644 001001 BNE MTBSP ;IS ERROR EOT?
1702 007646 104000 HLT ;HAVE EOT, CONTINUE TEST
1703 ;ERROR WAS NOT EOT
1704
1705 007650 012767 007672 170346 ;BACK SPACE ONE RECORD
1706 007656 005177 171594 MTBKSPI MOV #MTBKX,MTIV
  
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I707 007662 012777 000113 171544 MOV #00113,0MTC IBACK SPACE
I708 007670 000002 RTI
I709 007672 103777 171536 MTRKX1 TSTB 0MTC ITEST FOR READY
I710 007676 100401 BMI ,+4
I711 007700 104000 HLT
I712 007702 003777 171526 TST 0MTC ICU READY NOT UP
I713 007706 100001 BPL ,+4 ITEST FOR ERRORS = BACK SPACE
I714 007710 104000 HLT IBACK SPACE ERROR
I715
I716
I717 007712 012767 007744 170304 IREAD PREVIOUSLY WRITTEN RECORD
I718 007720 016777 000206 171510 MTRDRI MOV #MTRDX,MTIV IVECTOR
I719 007726 016777 000142 171504 MOV #MLENGTH,0MTRC IBYTE COUNT
I720 007734 012777 000103 171472 MOV #MTRBUF,0MTC IBUSS ADDRESS
I721 007742 000002 RTI IREAD COMMAND
I722 007744 103777 171464 MTRDX1 TSTB 0MTC IRETURN TO MAINLINE
I723 007750 100401 BMI ,+4 IREAD UP
I724 007752 104000 HLT
I725 007754 003777 171454 TST 0MTC IREADY NOT UP ON READ INTERRUPT
I726 007760 100005 BPL MTR1
I727 007762 032777 002000 171442 BIT #2000,0MTC IIS ERROR EOT
I728 007770 001266 BNE TM11 IYES REWIND TAPE
I729 007772 104000 HLT IERROR ON READ RECORD
I730 007774 000401 MTR11 BR MTCK ICHECK DATA
I731 007776 000673 MTR21 BR MTWRITE IWRITE NEXT RECORD
I732
I733
I734 010000 016767 000070 000062 ICHECK MAG TAPE DATA BUFFERS
I735 010006 026777 000000 000054 MTKK11 MOV #MTRBUF,MTR0 ISET UP COUNTER
I736 010014 001401 CMP #MTR0,MTR0 ITEST THE DATA
I737 010016 104000 BEQ ,+4
I738 010020 062767 000002 000042 HLT IIMAG TAPE DATA ERROR
I739 010026 026767 000036 000106 ADD #2,MTR0 IINCREMENT COUNTER
I740 010034 001304 CMP #MTR0,ENDBUF IXXXXXX CHECK
I741 BNE MTCK1 ILOOP TILL DONE
I742
I743 010036 016767 000032 000024 ICLEAR THE BUFFER
I744 010044 005077 000020 MOV #MTRBUF,MTR0 ISETUP COUNTER
I745 010050 062767 000002 000012 MTKK21 CLR #MTR0 ICLEAR THE BUFFER
I746 010056 026767 000006 000056 ADD #2,MTR0 IINCREMENT BEFORE WORD
I747 010064 001307 CMP #MTR0,ENDBUF IAT UPPER LIMIT
I748 010066 000743 BNE MTKK2 INO = BRANCH TILL DONE
I749 010070 000000 BR MTR2 IEXIT READ TO DO NEXT WRITE
I750 010072 052525 MTR01 0 IIMAGTAPE COUNTER
I751 010074 010076 MTRDATA1 52525 IDATA TO BE TESTED FOR
I752 010142 010142 MTRBUF1 ,+2
I753 010144 010142 ENDBUF1 ,+2
I754 010146 010146 MTRWBUF1 ,+2
I755 010146 052525 52525 IMAG TAPE WRITE BUFFER
I756 010150 052525 52525 IMAG TAPE WRITE BUFFER
I757 010152 052525 52525 IMAG TAPE WRITE BUFFER
I758 010154 052525 52525 IMAG TAPE WRITE BUFFER
I759 010156 052525 52525 IMAG TAPE WRITE BUFFER
I760 010160 052525 52525 IMAG TAPE WRITE BUFFER
  
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I761 010162 052525 52525 IMAG TAPE WRITE BUFFER
I762 010164 052525 52525 IMAG TAPE WRITE BUFFER
I763 010166 052525 52525 IMAG TAPE WRITE BUFFER
I764 010170 052525 52525 IMAG TAPE WRITE BUFFER
I765 010172 052525 52525 IMAG TAPE WRITE BUFFER
I766 010174 052525 52525 IMAG TAPE WRITE BUFFER
I767 010176 052525 52525 IMAG TAPE WRITE BUFFER
I768 010200 052525 52525 IMAG TAPE WRITE BUFFER
I769 010202 052525 52525 IMAG TAPE WRITE BUFFER
I770 010204 052525 52525 IMAG TAPE WRITE BUFFER
I771 010206 052525 52525 IMAG TAPE WRITE BUFFER
I772 010210 052525 52525 IMAG TAPE WRITE BUFFER
I773 010212 177734 MTRLENG1 =44
I774
I775 ,SBTTL KW11-P PROGRAMMABLE CLOCK INTERRUPT SERVICE
I776
I777 010214 012767 000001 022300 KW11P1 MOV #1,WATCKP ISET WATCHDOG BIT
I778 010222 103777 171214 TSTB #KWCSR ICHECK FOR DONE BIT
I779 010226 001001 BNE ,+4 ISET ON INTERRUPT
I780 010230 104000 HLT IDONE NOT SET, ERROR
I781 010232 003777 171206 TST #KWCSB IAS COUNT SET BUFFER
I782 010236 001401 BEQ ,+4 ICLEARED BY UNDERFLOW
I783 010240 104000 HLT INO, ERROR
I784 010242 003777 171200 TST #KWCTR IAS COUNTER CLEARED
I785 010246 001401 BEQ ,+4 IBY UNDERFLOW
I786 010250 104000 HLT INO, ERROR
I787 010252 003767 000072 WRRATE MOV #WRRATE,SET UP FOR
I788 010256 100423 BMI KW11PC IIF WRRATE=0, SET UP FOR
I789 010260 001011 BNE KW11PB I100KHZ, IF NEGATIVE, LINE
I790 010262 012777 001750 171154 KW11PA1 MOV #1000,0KWCSB ISET UP FOR 1000 (DECIMAL) COUNTS
I791 010270 103107 000054 COMB WRRATE INEXT CLOCK RATE IS 100KHZ
I792 010274 012777 000101 171140 MOV #101,0KWCSR ITHIS CLOCK RATE IS 100KHZ
I793 ICLOCK WILL INTERRUPT IN 10 MS
I794 010302 000002 RTI
I795 010304 012777 000144 171132 KW11PB1 MOV #100,0KWCSB ISET UP FOR 100 (DECIMAL) COUNTS
I796 010312 103107 000033 COMB WRRATE=1 INEXT CLOCK RATE IS 60 HZ
I797 010316 012777 000103 171116 MOV #103,0KWCSR ITHIS CLOCK RATE IS 100KHZ
I798 ICLOCK WILL INTERRUPT IN 10 MS
I799 010324 000002 RTI
I800 010326 012777 000012 171110 KW11PC1 MOV #10,0KWCSB ISET UP FOR 10 (DECIMAL) COUNTS
I801 010334 005067 000010 CLR WRRATE INEXT CLOCK RATE IS 100 KHZ
I802 010340 012777 000105 171074 MOV #105,0KWCSR ITHIS CLOCK RATE IS 60 HZ
I803 ICLOCK WILL INTERRUPT IN 100 MS
I804 010346 000002 RTI
I805 010350 000000 WRRATE1 0
I806
I807 ,SBTTL KW11-L REAL TIME CLOCK INTERRUPT SERVICE
I808
I809 010352 103777 170542 KW11L1 TSTB #KWCSR ITEST FOR DONE
I810 010356 100402 BMI ,+6
I811 010360 104000 HLT IFALSE INTERRUPT
I812 010362 000403 BR IDO NOT SET WATCHDOG
I813 010364 012767 000001 022104 MOV #1,WATCKL ISET WATCHDOG
I814 010372 000002 RTI IRETURN
  
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1815
1816          ,SBTTL DP11 SYNCHRONOUS LINE UNIT INTERRUPT SERVICE
1817
1818          JSYNCHRONIZATION
1819
1820 010374 014777 000212 170764 DP11T1 MOV   DPTS,DCDPTR      JXMIT SYNC
1821 010402 009367 000206          DEC   DCCCNT      JHAVE 2 SYNC/S BEEN XMITED
1822 010406 001003          BNE   T18        JNO
1823 010410 012777 010420 170762          MOV   #TV19,@DPTV  JYES CHANGE VECTOR
1824 010416 000002          RTI
1825
1826          ISEQUENTIAL DATA TRANSMISSION ROUTINE
1827
1828 010420 105777 170740          TV19I TSTB   @DPTS      JTRANSMITTER READY
1829 010424 001001          BNE   ,+4        JYES
1830 010426 104000          HLT
1831 010430 116777 000104 170730          MOV   DPTDATA,@DPTB JLOAD BUFFER
1832 010436 105267 000150          INCB  DPTDATA      JNEXT CHARACTER
1833 010442 001006          BNE   T19        JNO
1834 010444 012777 010374 170726          RESYNC MOV   #DP11T,@DPTV JSET UP TRANSMITTER
1835
1836          JINTERRUPT VECTOR
1837 010492 012707 000004 000134          MOV   #4,DCCCNT    JFOR SYNC ROUTINE
1838
1839          JSET UP TO TRANSMIT
1840 010400 000002          T19I RTI          J4 SYNC CHARACTERS
1841
1842          JTO RE-SYNCHRONIZE RECEIVERS
1843
1844          JRECEIVE SEQUENTIAL DATA
1845
1846 010462 012767 000001 022404          DP11R1 MOV   #1,WATCDP    JSET INTERRUPT OCCURED FLAG
1847 010470 010446          MOV   R4,@(SP)    JSAVE R4 ON STACK
1848 010472 105777 170602          TSTB  @DPRS       JIS RECEIVER DONE BIT SET
1849 010476 001001          BNE   ,+4
1850 010500 104000          HLT
1851 010502 017704 170654          MOV   @DPRB,R4    JDONE NOT SET, ERROR
1852 010506 120467 000104          CMPB  R4,DPRDATA  JSAVE RECEIVED CHARACTER
1853 010512 001413          BEQ   DP11RB      JHAS CORRECT CHARACTER RECEIVED
1854 010514 032777 040000 170642          BIT   #40000,@DPTS JIF YES, EXIT
1855 010522 001002          BNE   DP11RA      JIS RECEIVER OVER RUN SET
1856 010524 104000          HLT
1857 010526 000420          BR     DP11RRS    JDATA ERROR
1858 010530 104000          DP11RAI HLT       JRESTART AND RESYNC
1859
1860          JOVER RUN ERROR,
1861          JCHANGE TO NOP TO SUPPRESS
1862          JOVERRUN ERROR ERRPTS
1863          JCLEAR OVER RUN
1864 010532 042777 040000 170624          RIC   #40000,@DPTS JRESTART TRANSMISSION
1865 010540 000413          BR     DP11RRS    JUPDATA EXPECTED DATA
1866 010542 105267 000050          DP11RB INCB  DPRDATA JIF END OF DATA, RESTART
1867 010546 001410          BEQ   DP11RRS    JIS CHARACTER TO BE TRANSMITTED SYNC
1868 010550 024767 000042 000034          CMP   DPRDATA,DPTSYNB JIF NOT ,EXIT
1869 010556 001002          BNE   DP11RC      JDONE NOT RECEIVE SYNC
1870 010560 105267 000032          INCB  DPRDATA    JRESTORE R4
1871 010564 012604          DP11RC MOV   (SP)+,R4  JRETURN TO MAINLINE CODE
1872 010566 000002          RTI
1873 010570 042777 004000 170562          DP11RRS1 BIC   #4000,@DPRS JCLEAR RECEIVER ACTIVE
  
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1869 010576 012604          MOV   (SP)+,R4    JRESTORE R4
1870 010600 005067 000012          CLR   DPRDATA    JCLEAR EXPECTED RECEIVE DATA
1871 010604 005067 000010          CLR   DPTDATA    JCLEAR TRANSMIT DATA
1872 010610 000715          BR     RESYNC     JRESYNCHRONIZE RECEIVER
1873 010612 000026          DPTSYNB DCCCNT) 0 JTEST SYNC CHARACTER
1874 010614 000000          DPTSYNB DCCCNT) 0 JSYNC COUNT
1875 010616 000000          DPRDATAI 0       JRECEIVER DATA
1876 010620 000000          DPTDATAI 0       JTRANSMITTER DATA
1877
1878          ,SBTTL DC11 ASYNCHRONOUS LINE UNIT #1 INTERRUPT SERVICE
1879
1880 010622 105777 170556          DC11T1 TSTB   @DCTCSR    JTEST FOR DONE ON INTERRUPT
1881 010626 100401          BMI   ,+4
1882 010630 104000          HLT
1883 010632 105227          INCB  (PC)+      JFALSE INTERRUPT
1884 010634 000000          DCDAT1I 0       JINCREMENT DATA
1885 010636 001002          BNE   DCDOUT1    JDONE=START OVER
1886 010640 005067 177770          DCDOUTI CLR   DCDAT1 JINITILIZE DATA
1887 010644 016777 177764 170534          DCDOUTI MOV   DCDAT1,@DCTDDBR JTRANSMIT DATA
1888 010652 000002          RTI
1889
1890          JRETURN TO MAINLINE
1891
1892          JDC11 RECEIVER ROUTINE VALUES I # TO 377
1893 010654 017767 170530 000000          DC11R1I MOV   @DCRCR,DPRSSR JSAVE CSR, CLEARED WHEN READ
1894 010662 100005          SPL   DCIN5      JBRANCH ON NO ERROR
1895 010664 104000          HLT
1896 010666 005067 177742          CLR   DCDAT1    JDATA SET NOT READY
1897 010672 005067 000024          CLR   DCDAT2    JREINITILIZE DATA
1898 010676 105767 000000          DCIN5I TSTB   DPCSSR  JREINITILIZE DATA
1899 010702 100401          BMI   ,+4        JON INTERRUPT TEST FOR DONE
1900 010704 104000          HLT
1901 010706 127747 170500 000006          CMPB  @DCROBR,DCDAT2 JFALSE INTERRUPT, DONE NOT SET
1902 010714 001401          BEQ   DCIN3      JIS DATA CORRECT;
1903 010716 104000          HLT
1904 010720 105227          DCIN3I INCB  (PC)+  JDC 11 RECEIVER DATA ERROR
1905 010722 000000          DCDAT2I 0       JUPDATE EXPECTED DATA PATTERN
1906 010724 001002          BNE   DCIN2      JNO-LOOK FOR THE REST
1907 010726 005067 177770          DCIN1I CLR   DCDAT2 JSET UP BASIC DATA
1908 010732 012707 000001 022002          DCIN2I MOV   #1,WATDC1 JRETURN TO MAINLINE
1909 010740 000002          DSSRI 0
1910 010742 000000          DCDOUTI 134     JSAVE PS OF CSR
1911 010744 000134          DCDOUTI 130     JCHANGE TO 134 FOR MAINTENANCE MODE
1912 010746 000130          DCINFI 130      JCHANGE 130 TO 100 FOR SLOWER SPEED(TTY)
1913
1914          ,SBTTL DC11 ASYNCHRONOUS LINE UNIT #2 INTERRUPT SERVICE
1915
1916          JDC11 TRANSMITTER #1 INTERRUPT SERVICE
1917 010750 105777 170444          DC11T2I TSTB   @DCTCSA  JTEST FOR DONE ON INTERRUPT
1918 010754 100401          BMI   ,+4
1919 010756 104000          HLT
1920 010760 105227          INCB  (PC)+      JFALSE INTERRUPT
1921 010762 000000          DCDAT3I 0       JINCREMENT DATA
1922 010764 001002          BNE   DCDOUT3    JDONE=START OVER
  
```

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1923 M10766 005007 177770 DCOUTAI CLR DCDAT3 INITIALIZE DATA
1924 M10772 016777 177764 170422 DCOUT3I MOV DCDAT3,DCDTRA TRANSMIT DATA
1925 M11000 000002 RTI RETURN TO MAINLINE
1926
1927
1928 M11002 017767 170406 000060 DC11R2I MOV ID11 RECEIVER ROUTINE VALUES 0 TO 377
1929 M11010 100005 BPL @DCRSR,DPSSRI ;SAVE CSR, CLEARED WHEN READ
1930 M11012 104000 HLT DCIN5A ;BRANCH ON NO ERROR
1931 M11014 005007 CLR DCDAT3 ;DATA SET NOT READY
1932 M11020 005007 000024 CLR DCDAT4 ;REINITIALIZE DATA
1933 M11024 105707 000040 DCIN5AI TSTB DPSSRI ;ON INTERRUPT TEST FOR DONE
1934 M11030 100401 BHI ;*4
1935 M11032 104000 HLT ;FALSE INTERRUPT, DONE NOT SET
1936 M11034 127707 170356 000006 CHPB @DCRSR,DCDAT4 ;IS DATA CORRECT?
1937 M11042 001401 BEQ DCIN3B
1938 M11044 104000 HLT ;IDC 11 RECEIVER DATA ERROR
1939 M11046 105227 DCIN3BI INCB (PC)+ ;UPDATE EXPECTED DATA PATTERN
1940 M11050 000000 DC0AT4I 0
1941 M11052 001002 BNE DCIN4A ;NO-LOOK FOR THE REST
1942 M11054 005007 177770 DCIN3AI CLR DCDAT4 ;SET UP BASIC DATA
1943 M11060 012707 000001 021676 DCIN4AI MOV #1,WATDC2
1944 M11066 000002 RTI ;RETURN TO MAINLINE
1945 M11070 000000 DPSSRII 0 ;SAVE PS OF CSR
1946
1947 ,SBTTL DM11 ASYNCHRONOUS MULTIPLEXER INTERRUPT SERVICE
1948
1949 ;DM11 TRANSMITTER INTERRUPT SERVICE ROUTINE
1950 M11072 010046 DM11TI MOV R0,=(SP) ;SAVE R0 & R1 ON
1951 M11074 010146 MOV R1,=(SP) ;THE STACK
1952 M11076 005000 CLR R0 ;CLEAR INT ERROR INDICATOR
1953 M11100 032777 060000 170232 BIT #,NEX+,OVRUN,@DMCSR ;ERROR FLAGS ?
1954 M11106 001405 BEQ DMTIN ;BRANCH IS NO ERROR FLAGS
1955 M11110 104000 HLT ;ERROR FLAG
1956 M11112 042777 060000 170220 BIC #,NEX+,OVRUN,@DMCSR ;CLEAR ERROR FLAG
1957 M11120 005100 COM R0 ;SET INT ERROR INDICATOR
1958 M11122 005777 170212 DM11INI TST @DMCSR ;READY FLAG?
1959 M11126 100404 BHI DMTINI
1960 M11130 005700 TST R0 ;INT BECAUSE OF ERROR?
1961 M11132 001032 BNE DMTINX ;YES, BUT NO READY, EXIT
1962 M11134 104000 HLT ;NO ERROR, NO READY
1963 M11136 000430 BR DMTINX ;EXIT
1964 M11140 042777 100000 170172 DM11INI BIC #,READY,@DMCSR ;CLEAR READY
1965 M11146 005000 CLR R0
1966 M11150 012701 000001 MOV #1,R1
1967 M11154 030177 170102 DM11INA BIT R1,@DMBAR ;WHICH LINE FINISHED?
1968 M11160 001013 BNE DMTINB
1969 M11162 030107 000300 BIT R1,DMBARIM ;SHOULD THIS LINE BE RESTARTED
1970 M11166 001410 BEQ DMTINB ;BRANCH IF NOT
1971 M11170 012700 014606 011400 MOV #PROCTS,DMCAT(R0) ;INITIALIZE WORD COUNT
1972 M11176 012700 177400 011440 MOV #400,DMWCT(R0) ;CURRENT ADDRESS
1973 M11204 030177 170132 BIS R1,@DMBAR ;AND RESTART LINE THAT FINISHED
1974 M11210 002700 DM11INB ADD #2,R0
1975 M11214 004301 ASL R1
1976 M11216 103396 BCC DMTINA
  
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1977 M11220 012601 DM11INX MOV (SP)+,R1
1978 M11222 012600 MOV (SP)+,R0
1979 M11224 000002 RTI ;EXIT
1980 ;DM11 RECEIVER INTERRUPT SERVICE ROUTINE
1981
1982 M11226 010046 DM11RI MOV R0,=(SP)
1983 M11230 010146 MOV R1,=(SP) ;SAVE R1
1984 M11232 010246 MOV R2,=(SP) ;SAVE R2
1985 M11234 016701 000302 MOV DMTDAT,R1 ;GET POINTER TO DATA
1986 M11240 016700 000300 MOV DMPTR,R0
1987 M11244 105777 170070 TSTB @DMCSR ;IDONE SET?
1988 M11250 100402 BHI DMRINA ;BRANCH IF SET
1989 M11252 104000 HLT ;FALSE INTERRUPT
1990 M11254 000434 BR DMRINX ;GO TO EXIT
1991 M11256 005710 DMRINA TST (R0) ;TEST FOR VALID DATA ENTRY
1992 M11260 100404 BHI DMRINC ;BRANCH IF VALID DATA ENTRY
1993 M11262 104000 HLT ;NO VALID DATA ENTRY
1994 M11264 000430 BR DMRINX ;GO TO EXIT
1995 M11266 005710 DMRINB TST (R0) ;VALID DATA ENTRY?
1996 M11270 100026 BPL DMRINX ;EXIT IF NO MORE ENTRIES
1997 M11272 032710 017000 DMRINC BIT #17000,(R0) ;LINE ZERO
1998 M11276 001011 BNE DMRIND
1999 M11300 116102 014606 MOVB PROCTS(R1),R2 ;GET DATA
2000 M11304 046702 000230 BIC DMMSK,R2 ;CLEAR NON TRANSMITTED BITS
2001 M11310 121002 CHPB (R0),R2 ;COMPARE RECEIVED & TRANSMITTED DATA
2002 M11312 001401 BEQ ;*4
2003 M11314 104000 HLT ;ERROR! INCORRECT DATA
2004 M11316 105207 000220 DMRINDI INCB DMTDAT ;FORM WHAT NEXT RECEIVED CHAR, SHOULD BE
2005 M11322 005010 CLR (R0) ;CLR TUMBLER TABLE ENTRY
2006 M11324 020027 011776 CMP R0,#TUMTAB+176 ;IS POINTER AT THE END OF THE TABLE
2007 M11330 001002 BNE ;*6
2008 M11332 012700 011576 MOV #TUMTAB+2,R0
2009 M11336 005720 TST (R0)+ ;CLEAR ENTRY AND INCREMENT POINTER
2010 M11340 010007 000200 MOV R0,DMPTR ;RESTORE POINTER
2011 M11344 000790 BR DMRINB ;LOOK AT NEXT ENTRY
2012 M11346 012602 DMRINX MOV (SP)+,R2 ;RESTORE R2
2013 M11350 012601 MOV (SP)+,R1 ;RESTORE R1
2014 M11352 012600 MOV (SP)+,R0 ;RESTORE R0
2015 M11354 042777 000200 167756 BIC #,DONE,@DMCSR ;CLEAR DONE FLAG
2016 M11362 012707 000001 021524 MOV #1,WATCOM
2017 M11370 000002 RTI
2018 ;DM11 TAGS AND CORE TABLE
2019
2020 M11400 ,=,1377+1
2021 ;SET ASSEMBLER LOCATION COUNTER
2022 ;TO X XXX XXX X00 000 000
2023 M11400 000000 DMCATI 0 ;RESERVE 16, WORDS FOR
2024 M11440 011440 ,=DMCAT+32; ;CURRENT ADDRESS TABLE
2025
2026 M11440 000000 DMWCTI 0 ;RESERVE 16, WORDS FOR
2027 M11500 011500 ,=DMWCT+32; ;WORD COUNT TABLE
2028
2029 M11500 000000 DMBATI 0 ;RESERVE 16, WORDS FOR
2030 M11540 011540 ,=DMBAT+32; ;BIT ASSEMBLY TABLE
  
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2031 M11540 177400 DMMSK1 177400 ICHARACTER MASK (8 BIT)
2032 M11542 000000 DMTDAT1 0 IBYTE COUNTER
2033 M11544 000000 DMSTR1 0 ISOFTWARE TUMBLE TABLE POINTER
2034 M11546 177777 DMBARIM1=1 INITIALIZE TO TRANSMIT ALL LINES
2035 011600 ,=DMBAT+64;
2036
2037 M11600 000000 TUMTAB1 0 IRESERVE 64, WORDS
2038 012000 ,=TUMTAB+128, IFOR TUMBLE TABLE
2039
2040 IEQUATES
2041
2042 000001 ,GO=1
2043 000004 ,MAINT=4
2044 000100 ,RIE=100
2045 000200 ,DONE=200
2046 010000 ,TIE=10000
2047 020000 ,OVRUN=20000
2048 040000 ,NEX=40000
2049 100000 ,READY=100000
2050 000240 ,DMPRTY=240
2051
2052 ,SBTTL LINE PRINTER INTERRUPT SERVICE
2053
2054 M12000 105777 167110 LPINTR1 TSTB 0LPCSR ITTEST FOR FLAG
2055 M12004 100401 BMI ,+4
2056 M12006 104000 HLT IFALSE RETURN FROM MAIN LINE
2057 M12010 026727 000134 000117 CMP CLINCT,#79; ITTEST FOR END OF LINE
2058 M12016 001415 BEQ LP4 IGO GENERATE CR/LF
2059 M12020 005267 000124 000137 INC CLINCT IINCREMENT LINE POSITION COUNT
2060 M12024 026727 000114 000137 CMP CURPAT,#137 ITTEST FOR MAXIMUM PATTERN
2061 M12032 001403 BEQ LP3 IYES = GO TO LP3 AND RESET
2062 M12034 005267 000104 000104 INC CURPAT INO = INCREMENT TO NEXT PATTERN
2063 M12040 000435 BR LP2 IGO SEND IT TO LINE PRINTER
2064 M12042 012767 000040 000074 LP31 MOV #40,CURPAT IRESET PATTERN AND SEND TO PRINTER
2065 M12050 000431 BR LP2 ISENT TO LINE PRINTER
2066 M12052 000072 000072 LP41 CLR CLINCT IRESET LINE COUNT
2067 M12056 012737 012074 000200 MOV #LPIN2,#200
2068 M12064 012777 000012 167032 MOV #12,@LPDBR ILINE FEED
2069 M12072 000002 RTI
2070 M12074 012737 012000 000200 LPIN21 MOV #LPINTR,#200 ISTART OF LINE PATTERN
2071 M12102 026727 000040 000137 CMP CLINCT,#137
2072 M12110 001403 BEQ LP5 IINCREMENT START OF LINE
2073 M12112 005267 000030 000030 INC SOLPAT
2074 M12116 000403 BR LP1
2075 M12120 012767 000040 000020 LP51 MOV #40,SOLPAT IRESET START OF LINE
2076 M12126 016767 000014 000010 LP31 MOV SOLPAT,CURPAT ISTART OF LINE TO CURRENT
2077 M12134 016777 000004 166762 LP21 MOV CURPAT,@LPDBR ICURRENT PATTERN TO LINE PRINTER
2078 M12142 000002 RTI IRETURN TO MAIN LINE
2079 M12144 000000 CURPAT1 0 ICURRENT CHARACTER BEING PRINTED
2080 M12146 000000 SOLPAT1 0 ISTART OF LINE CHARACTER
2081 M12150 000000 CLINCT1 0 IPOSITION OF LINE
2082
2083 ,SBTTL DECTAPE INTERRUPT SERVICE
2084

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2085 000004 RD#4 IREAD DATA
2086 000014 WD#14 IWRITE DATA
2087 000002 RB#2
2088 000002 BR#2 IREAD BLOCK
2089 000000 F#0 IFORWARD
2090 000100 IE#100 IINTERUPT ENABLE
2091 000001 DO#1 IDO = THE FUNCTION
2092 004000 R#4000 IREVERSE
2093 M12152 000000 TCFLAG1 0 IFLAG IS TESTED IN SCOPE
2094 M12154 000000 TCSTAT1 0 IDECTAPE PS
2095
2096 M12156 000000 TCFIRST1 0 IFIRST BLOCK TO BE SEARCHED FOR
2097 M12160 001101 TCLAST1 577, ILAST BLOCK TO BE SEARCHED FOR
2098 M12162 000000 TCXPE1 0 ITHE BLOCK THAT AS EXPECTED
2099
2100 M12164 012767 012164 166022 TC111 MOV #TC11,TC1V IEND ZONE VECTOR SETUP
2101 M12172 005777 167092 TST @TCST ITEST FOR END ZONE
2102 M12176 100403 BMI FEND1 IAT END ZONE?
2103 M12200 105277 167042 INCB @TCCM ISET DO = NO DELAY
2104 M12204 000002 RTI INO = WAIT SOME MORE
2105 M12206 012767 012236 166000 FEND11 MOV #TCF1,TC1V IYES = NEW VECTOR
2106 M12214 042777 104000 167024 BIC #104000,@TCCM ISEARCH BLOCK FORWARD
2107 M12222 016767 177730 177732 MOV TCFIRST,TCXPE ICOUNT WHEN THIS BLOCK IS FOUND
2108 M12230 105277 167012 TCF1A1 INCB @TCCM ISET DO
2109 M12234 000002 RTI IRETURN ON NEXT BLOCK
2110 M12236
2111 M12236 032777 100200 167002 BIT #100200,@TCCM IANY ERROR ON READ?
2112 M12244 100001 BPL ,+4
2113 M12246 104000 HLT ITC ERROR SET = FORWARD READ BLOCK
2114 M12250 001001 BNE ,+4 IDONE FLAG UP?
2115 M12252 104000 HLT IFALSE INTERRUPT
2116 M12254 027767 166772 177700 CMP @TCDT,TCXPE IIS THIS OUR BLOCK FOR SYNC
2117 M12262 002767 RLT TCF1A INO-READ SOME MORE BLOCKS
2118 M12264 001401 BEQ TCF2 IYES
2119 M12266 104000 HLT IWE PASSED THE BLOCK
2120 M12270 012767 012304 165716 TCF21 MOV #TCF3,TC1V IVECTOR FOR SEQUENTIAL READS
2121 M12276 105277 166744 INCB @TCCM ISET DO
2122 M12302 000002 RTI IRETURN AND TEST SEQUENTIAL BLOCKS
2123
2124 IFIND SEQUENTIAL BLOCK AT FORWARD DIRECTION
2125 M12304 TCF31
2126 M12304 032777 100200 166734 BIT #100200,@TCCM ITEST ERROR AND READY
2127 M12312 100001 BPL ,+4
2128 M12314 104000 HLT IFORWARD READ ERROR TC#11
2129 M12316 001001 BNE ,+4
2130 M12320 104000 HLT IFALSE INTERRUPT ON TC#11
2131 M12322 027767 166724 177630 CMP @TCDT,TCLAST IHAVE WE TESTED ALL BLOCKS
2132 M12330 001414 BEQ RENDZ IYES DRIVE UNIT IN END ZONE TO START OVER
2133 M12332 005267 177624 177616 INC TCXPE INO-INCREMENT EXPECTED COUNT
2134 M12336 027767 166710 177616 CMP @TCDT,TCXPE IIS CURRENT BLOCK CORRECT
2135 M12344 001401 BEQ ,+4
2136 M12346 104000 HLT IFAILED IN FORWARD READ TO FIND NEXT BLOCK
2137 M12350 000432 BR TCWBK ITHIS ROUTINE WRITES A BLOCK
2138 M12352 105277 166670 TCF41 INCB @TCCM ISET DO

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2139	#12396	000002				RTI			
2140	#12308	000701				XTC11	BR	TC11	IINDIRECT LINK
2141									
2142									
2143	#12362	012767	012362	165624		IMOVE TAPE TO REVERSE END ZONE			
2144	#12370	016767	177504	177564		RENDE1	MOV	#RENDE,TCIV	IEND ZONE VECTOR SETUP
2145	#12376	005777	166646				MOV	TCLAST,TCXPE	ISET UP FOR REVERSE SEARCH
2146	#12402	100403					TST	@TCST	IIN END ZONE
2147	#12404	105277	166636				RMI	RENDE1	IYES = START TO TURN UNIT AROUND
2148	#12410	000002					INCB	@TCCM	ISET DO
2149	#12412	016777	166642	166626		RENDE1	MOV	TCORV,@TCCM	IIN = WAIT TILL WE ARE
2150	#12420	032777	004103	166620			BIS	#R+IE+RB+DO,@TCCM	ISELECT DRIVE TO BE TESTED
2151	#12426	012767	012924	165560			MOV	#TCR1,TCIV	IFUNCTION = READ BLOCK, REVERSE AND GO
2152	#12434	000002					RTI		ISET UP NEW INTERRUPT VECTOR
2153									
2154									
2155	#12436	012767	012470	165550		IWRITE FORWARD ALL BLOCKS EXCEPT 0			
2156	#12444	012777	177400	166602		TCWBK1	MOV	#TCWB1,TCIV	IINTERRUPT VECTOR FOR WRITE
2157	#12432	012777	012790	166576			MOV	#*400,@TWC	IONE BLOCK
2158	#12400	112777	000115	166560			MOV	#TCWBUF,@TCBA	IWRITE BUFFER ADDRESS
2159	#12406	000002					MOV	#IE+RD+DO,@TCCM	IWRITE THE BLOCK
2160	#12470	017767	166554	177456		TCWB1	MOV	@TCST,TCSTAT	IRETURN WHEN BLOCK IS WRITTEN
2161	#12476	005777	166544				TST	@TCCM	
2162	#12502	100001					BPL	,+4	IANY ERRORS
2163	#12504	104000					HLT		
2164	#12506	012767	012304	165500			MOV	#TCF3,TCIV	ISEARCH BLOCK VECTOR
2165	#12514	112777	000102	166524			MOV	#IE+RB,@TCCM	IREAD BLOCK
2166	#12522	000713					BR	TCF4	IEND BLOCK
2167	#12524	017767	166520	177422		TCR1	MOV	@TCST,TCSTAT	IEND THE NEXT BLOCK
2168	#12532	032777	100200	166506			BIS	#100200,@TCCM	
2169	#12540	100001					BPL	,+4	IATEST FOR ERROR AND READY
2170	#12542	104000					HLT		
2171	#12544	001001					BNE	,+4	IDECTAPE ERROR ON READ BLOCK REVERSE
2172	#12546	104000					HLT		
2173	#12550	027767	166476	177404			CMF	@TCST,TCXPE	IFALSE INTERRUPT FROM DECTAPE
2174	#12556	001406					BEQ	TCR2	IIS IT OUR FIRST BLOCK
2175	#12560	002002					BGE	TCR1A	IYES = GO TEST THE REST
2176	#12562	104000					HLT		IIN = HAVE WE PASSED THE BLOCK
2177	#12564	000676					BR	RENDE2	IWE PASS OUR BLOCK
2178	#12566	105277	166454			TCR1A	INCB	@TCCM	IEND TO END ZONE AND TRY AGAIN
2179	#12572	000002					RTI		ISET DO
2180	#12574	012767	012610	165412		TCR2	MOV	#TCR3,TCIV	IWE FOUND OUR FIRST BLOCK
2181	#12602	105277	166440				INCB	@TCCM	ISET UP INTERRUPT TO TEST ALL BLOCKS
2182	#12606	000002					RTI		ISET DO
2183									IWAIT FOR NEXT BLOCK TO INTERRUPT
2184									
2185	#12610								
2186	#12610	032777	100200	166430		IFIND SEQUENTIAL BLOCK IN REVERSE DIRECTION			
2187	#12616	100001				TCR3	BIS	#100200,@TCCM	
2188	#12620	104000					BPL	,+4	IATEST FOR READ AND ERROR
2189	#12622	001001					HLT		
2190	#12624	104000					BNE	,+4	IERROR READING SEQUENTIAL BLOCK IN REVERSE
2191	#12626	026777	177324	166416			HLT		
2192	#12634	001651					CMF	TCFIRST,@TCST	IFALSE DECTAPE INTERRUPT
							BEQ	XTC11	IDID WE DO ALL THE BLOCKS
									IYES - GO TO END ZONE TO RESTART

2193	#12636	005367	177320			DEC	TCXPE		IIN = DECREMENT BLOCK NUMBER
2194	#12642	027767	166404	177312		CMF	@TCST,TCXPE		IATEST SEQUENTIAL BLOCK IN REVERSE
2195	#12650	001401				BEQ	,+4		
2196	#12652	104000				HLT			
2197	#12654	000403				BR	TCRBK		IATEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
2198	#12656	105277	166304			TCR4	INCB	@TCCM	ITHIS ROUTINE READ A BLOCK
2199	#12662	000002					RTI		ISET DO
2200									ISETS TRY A NEW BLOCK
2201									
2202	#12664	012767	012722	165322		IREAD REVERSE ALL BLOCKS EXCEPT BLOCK 1101			
2203	#12672	012777	177400	166394		TCRBK1	MOV	#TCRB1,TCIV	ISET UP INTERRUPT VECTOR
2204	#12700	012777	012790	166390			MOV	#*400,@TWC	IREAD ONE BLOCK
2205	#12706	112777	000105	166332			MOV	#TCWBUF,@TCBA	IWHERE BUFFER IS
2206	#12714	005267	177232				MOV	#IE+RD+DO,@TCCM	IREAD THE BLOCK
2207	#12720	000002					INC	TCFLAG	IATESTED IN SCOPE ROUTINE
2208	#12722					TCRB1	RTI		IEXIT = RETURN WHEN BLOCK IS READ
2209	#12722	005777	166320				TST	@TCCM	
2210	#12726	100001					BPL	,+4	IAND ERRORS
2211	#12730	104000					HLT		
2212	#12732	012767	012610	165254			MOV	#TCR3,TCIV	IDECTAPE ERROR
2213	#12740	112777	000102	166300			MOV	#IE+RB,@TCCM	ISET VECTOR FOR BLOCK SEARCH
2214	#12746	000743					BR	TCR4	IREAD BLOCK FUNCTION
2215									IRETURN TO BLOCK SEARCH
2216									
2217	#12750								
2218	#12750								
2219	#12750	000001	177777						
2220	#12754	000002	177776						
2221	#12760	000003	177775						
2222	#12764	000004	177774						
2223	#12770	000005	177773						
2224	#12774	000006	177772						
2225	#13000	000007	177771						
2226	#13004	000010	177770						
2227	#13010	000011	177769						
2228	#13014	000012	177768						
2229	#13020	000013	177767						
2230	#13024	000014	177766						
2231	#13030	000015	177765						
2232	#13034	000016	177764						
2233	#13040	000017	177763						
2234	#13044	000020	177762						
2235	#13050	000021	177761						
2236	#13054	000022	177760						
2237	#13060	000023	177759						
2238	#13064	000024	177758						
2239	#13070	000025	177757						
2240	#13074	000026	177756						
2241	#13100	000027	177755						
2242	#13104	000030	177754						
2243	#13110	000031	177753						
2244	#13114	000032	177752						
2245	#13120	000033	177751						
2246	#13124	000034	177750						

2247	#13130	000035	177743	35, #35
2248	#13134	000036	177742	36, #36
2249	#13140	000037	177741	37, #37
2250	#13144	000040	177740	40, #40
2251	#13150	000041	177737	41, #41
2252	#13154	000042	177736	42, #42
2253	#13160	000043	177735	43, #43
2254	#13164	000044	177734	44, #44
2255	#13170	000045	177733	45, #45
2256	#13174	000046	177732	46, #46
2257	#13200	000047	177731	47, #47
2258	#13204	000050	177730	50, #50
2259	#13210	000051	177727	51, #51
2260	#13214	000052	177726	52, #52
2261	#13220	000053	177725	53, #53
2262	#13224	000054	177724	54, #54
2263	#13230	000055	177723	55, #55
2264	#13234	000056	177722	56, #56
2265	#13240	000057	177721	57, #57
2266	#13244	000060	177720	60, #60
2267	#13250	000061	177717	61, #61
2268	#13254	000062	177716	62, #62
2269	#13260	000063	177715	63, #63
2270	#13264	000064	177714	64, #64
2271	#13270	000065	177713	65, #65
2272	#13274	000066	177712	66, #66
2273	#13300	000067	177711	67, #67
2274	#13304	000070	177710	70, #70
2275	#13310	000071	177707	71, #71
2276	#13314	000072	177706	72, #72
2277	#13320	000073	177705	73, #73
2278	#13324	000074	177704	74, #74
2279	#13330	000075	177703	75, #75
2280	#13334	000076	177702	76, #76
2281	#13340	000077	177701	77, #77
2282	#13344	000100	177700	100, #100
2283	#13350	177700	000100	=100, 100
2284	#13354	177701	000077	=77, 77
2285	#13360	177702	000076	=76, 76
2286	#13364	177703	000075	=75, 75
2287	#13370	177704	000074	=74, 74
2288	#13374	177705	000073	=73, 73
2289	#13400	177706	000072	=72, 72
2290	#13404	177707	000071	=71, 71
2291	#13410	177710	000070	=70, 70
2292	#13414	177711	000067	=67, 67
2293	#13420	177712	000066	=66, 66
2294	#13424	177713	000065	=65, 65
2295	#13430	177714	000064	=64, 64
2296	#13434	177715	000063	=63, 63
2297	#13440	177716	000062	=62, 62
2298	#13444	177717	000061	=61, 61
2299	#13450	177720	000060	=60, 60
2300	#13454	177721	000057	=57, 57

2301	#13460	177722	000056	=56, 56
2302	#13464	177723	000055	=55, 55
2303	#13470	177724	000054	=54, 54
2304	#13474	177725	000053	=53, 53
2305	#13500	177726	000052	=52, 52
2306	#13504	177727	000051	=51, 51
2307	#13510	177730	000050	=50, 50
2308	#13514	177731	000047	=47, 47
2309	#13520	177732	000046	=46, 46
2310	#13524	177733	000045	=45, 45
2311	#13530	177734	000044	=44, 44
2312	#13534	177735	000043	=43, 43
2313	#13540	177736	000042	=42, 42
2314	#13544	177737	000041	=41, 41
2315	#13550	177740	000040	=40, 40
2316	#13554	177741	000037	=37, 37
2317	#13560	177742	000036	=36, 36
2318	#13564	177743	000035	=35, 35
2319	#13570	177744	000034	=34, 34
2320	#13574	177745	000033	=33, 33
2321	#13600	177746	000032	=32, 32
2322	#13604	177747	000031	=31, 31
2323	#13610	177750	000030	=30, 30
2324	#13614	177751	000027	=27, 27
2325	#13620	177752	000026	=26, 26
2326	#13624	177753	000025	=25, 25
2327	#13630	177754	000024	=24, 24
2328	#13634	177755	000023	=23, 23
2329	#13640	177756	000022	=22, 22
2330	#13644	177757	000021	=21, 21
2331	#13650	177760	000020	=20, 20
2332	#13654	177761	000017	=17, 17
2333	#13660	177762	000016	=16, 16
2334	#13664	177763	000015	=15, 15
2335	#13670	177764	000014	=14, 14
2336	#13674	177765	000013	=13, 13
2337	#13700	177766	000012	=12, 12
2338	#13704	177767	000011	=11, 11
2339	#13710	177770	000010	=10, 10
2340	#13714	177771	000007	=7, 7
2341	#13720	177772	000006	=6, 6
2342	#13724	177773	000005	=5, 5
2343	#13730	177774	000004	=4, 4
2344	#13734	177775	000003	=3, 3
2345	#13740	177776	000002	=2, 2
2346	#13744	177777	000001	=1, 1
2347				
2348				
2349				
2350				
2351	#13750	005777	165524	
2352	#13754	100001		
2353	#13756	104000		
2354	#13760	026767	000072 000072	

.S0TTL BUS TESTER SECTION 1 INTERRUPT SERVICE

IDEVICE ONE NPR,DATIP,DATO,INTSP, DLY=I MS
 BUST11 TST @ABCSR ITEST FOR BUSY DOWN
 BPL ,*4
 HLT
 CMP REC1A,EXP1A IJBUSY NOT DOWN
 JTRANSFER DONE CORRECTLY

```

2355 #13766 001401 BEQ ,*4
2356 #13770 104000 HLT
2357 #13772 005267 000056 INC SEND1A I DATIP = DATA ERROR
2358 #13776 016767 000052 000052 MOV SEND1A,REC1A I NEW DATA SENT
2359 #14004 016767 000044 000046 MOV SEND1A,EXPIA I SET UP DATA
2360 #14012 006367 000042 ASL EXPIA I EXPECTED BACK
2361 #14016 012777 000002 165452 MOV #2,#ABWC I SET UP TESTER
2362 #14024 012777 014056 165442 MOV #REC1A,#ABCA
2363 #14032 005077 165442 CLR #ABCSR
2364 #14036 012777 045511 165434 MOV #45511,#ABCSR I LEVEL SIX
2365 #14044 012767 000001 016472 MOV #1,WATCAB
2366 #14052 000002 RTI
2367 #14054 000000 SEND1A I 0 I SENT
2368 #14056 000000 REC1A I 0 I RECEIVED
2369 #14060 000000 EXPIA I 0 I EXPECTED
2370
2371 ,SBTTL BUS TESTER SECTION 2 INTERRUPT SERVICE
2372
2373
2374 #14062 012767 000001 016470 I DEVICE TWO, INTR 7, DLY=100 US
2375 #14070 000002 BUST2 I MOV #1,WATCBB
2376 RTI I EXIT ON INTERRUPT
2377
2378 ,SBTTL BUS TESTER SECTION 3 INTERRUPT SERVICE
2379
2380 I 200 WORD TRANSFER USING THE BUS TESTER
2381 I SECTION THREE A DELAYED
2381 #14072 005777 165432 CBUS1 I TST #DBCSR
2382 #14076 100775 BMI CBUS1
2383 #14100 012777 000200 165410 MOV #200,#CBWC I WORD COUNT
2384 #14106 012777 014240 165400 MOV #CBBUF,#CBCA I CURRENT ADDRESS
2385 #14114 005077 165400 CLR #BCSR
2386 #14120 052767 000040 163650 BIS #40,PS I RAISE PROCESSOR TO LEVEL 5
2387 #14126 012777 052615 165364 MOV #52615,#CBCSR I INPR, DATA, P5
2388 #14134 012767 000001 016440 MOV #1,WATCBB
2389 #14142 000002 RTI I RETURN TO MAIN LINE CODE
2390 #14144 005777 165350 BUST3 I TST #CBCSR I BUSY SHOULD BE DOWN
2391 #14150 100001 BPL ,*4
2392 #14152 104000 HLT
2393 #14154 012767 014240 000052 MOV #CBBUF,CBCTA I FALSE INTERRUPT OF BUSY NOT DOWN
2394 #14162 012767 000200 000046 MOV #200,CBCTB I BUFFER ADDRESS
2395 #14170 042767 000040 163600 BIC #40,PS I LENGTH OF BUFFER
2396 #14176 027767 000032 000032 CBUS3 I CMP #CBCTA,CBCTB I LOWER PRIORITY TO LEVEL 4
2397 #14204 001401 BEQ ,*4 I COMPARE THE DATA
2398 #14206 104000 HLT I DATA ERROR
2399 #14210 005177 000020 COM #CBCTA I MIX UP OLD DATA
2400 #14214 062767 000002 000012 ADD #2,CBCTA I BUFFER POSITION
2401 #14222 162767 000002 000006 SUB #2,CBCTB I DATA COUNTER
2402 #14230 001720 BEQ CBUS1 I RESTART WHEN BC=0
2403 #14232 000761 BR CBUS3 I FINISH THE REST
2404 #14234 000000 CBCTA I 0 I BUFFER POSITION
2405 #14236 000000 CBCTB I 0 I DATA
2406 #14240 000000 CBBUF I 0
2407 #14240 014240 DBBUF=CBBUF
2408 #14452 ,=I,+210
  
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2409
2410 ,SBTTL BUS TESTER SECTION 4 INTERRUPT SERVICE
2411 I 200 WORD TRANSFER USING THE BUS TESTER
2412 I SECTION FOUR A NO DELAY
2413 #14452 005777 165042 DBUS1 I TST #CBCSR
2414 #14456 100775 BMI DBUS1
2415 #14460 012777 000200 165040 MOV #200,#DBWC I WORD COUNT
2416 #14466 012777 014240 165030 MOV #DBBUF,#DBCA I CURRENT ADDRESS
2417 #14474 005077 165030 CLR #DBCSR
2418 #14500 012777 052645 165022 MOV #52645,#DBCSR I INPR, DATA, P4
2419 #14506 012767 000001 016102 MOV #1,WATCBB
2420 #14514 000002 RTI I RETURN TO MAIN LINE CODE
2421 #14516 005777 165006 BUST4 I TST #DBCSR I BUSY SHOULD BE DOWN
2422 #14522 100001 BPL ,*4
2423 #14524 104000 HLT
2424 #14526 000751 BR DBUS1 I FALSE INTERRUPT OR BUSY NOT DOWN
2425 #14530 012767 014240 000044 MOV #DBBUF,DBCTA I NOP FOR COMPARE
2426 #14536 012767 000200 000040 MOV #200,DBCTB I LENGTH OF BUFFER
2427 #14544 027767 000032 000032 DBUS3 I CMP #DBCTA,DBCTB I LENGTH OF BUFFER
2428 #14552 001401 BEQ ,*4 I COMPARE THE DATA
2429 #14554 104000 HLT
2430 #14556 005177 000020 COM #DBCTA I DATA ERROR
2431 #14562 062767 000002 000012 ADD #2,DBCTA I MIX UP OLD DATA
2432 #14570 162767 000002 000006 SUB #2,DBCTB I BUFFER POSITION
2433 #14576 001725 BEQ DBUS1 I DATA COUNTER
2434 #14600 000761 BR DBUS3 I RESTART WHEN BC=0
2435 #14602 000000 DBCTA I 0 I FINISH THE REST
2436 #14604 000000 DBCTB I 0 I BUFFER POSITION
2437
  
```

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2438 .SBTTL BASIC INSTRUCTION TEST
2439
2440 *14606 012706 036520 PROCTS: MOV #STACK,SP ISET UP STACK FOR CURRENT MODE
2441 *14612 012707 014626 164244 MOV #TEST0,RETURN IFOR SCOPING
2442 *14620 012707 004000 164210 MOV #4000,ICOUNT ITERATION COUNT
2443
2444 .SBTTL TEST COMPARE INSTRUCTION INDEXED
2445
2446 *14626 012700 177770 TEST0: MOV #10,R0
2447 *14632 026027 035602 125252 CMP A(R0),#125252
2448 *14640 001401 BEQ ,+4
2449 *14642 104000 HLT
2450 *14644 104400 SCOPE
2451
2452 *14646 012700 177770 MOV #10,R0
2453 *14652 022700 125252 035602 CMP #125252,A(R0)
2454 *14660 001401 BEQ ,+4
2455 *14662 104000 HLT
2456 *14664 104400 SCOPE
2457
2458 *14666 012700 000010 MOV #10,R0
2459 *14672 026027 035602 052525 CMP A(R0),#052525
2460 *14700 001401 BEQ ,+4
2461 *14702 104000 HLT
2462 *14704 104400 SCOPE
2463
2464 *14706 012700 000010 MOV #10,R0
2465 *14712 022700 052525 035602 CMP #052525,A(R0)
2466 *14720 001401 BEQ ,+4
2467 *14722 104000 HLT
2468 *14724 104400 SCOPE
2469
2470 *14726 012700 177770 MOV #10,R0
2471 *14732 026027 035602 035602 CMP A(R0),A(R0)
2472 *14740 001401 BEQ ,+4
2473 *14742 104000 HLT
2474 *14744 012700 000010 MOV #10,R0
2475 *14750 026027 035602 035602 CMP A(R0),A(R0)
2476 *14756 001401 BEQ ,+4
2477 *14760 104000 HLT
2478 *14762 104400 SCOPE
2479
2480 *14764 012700 177770 MOV #10,R0
2481 *14770 012701 000004 MOV #4,R1
2482 *14774 026001 035602 035602 CMP A(R0),A(R1)
2483 *15002 001401 BEQ ,+4
2484 *15004 104000 HLT
2485 *15006 104400 SCOPE
2486
2487 *15010 026100 035602 035602 CMP A(R1),A(R0)
2488 *15016 001401 BEQ ,+4
2489 *15020 104000 HLT
2490 *15022 104400 SCOPE
2491 *15024 012700 177774 MOV #4,R0
  
```

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2492 *15030 012701 000010 MOV #10,R1
2493 *15034 026001 035602 035602 CMP A(R0),A(R1)
2494 *15042 001401 BEQ ,+4
2495 *15044 104000 HLT
2496 *15046 104400 SCOPE
2497 *15050 012700 177774 MOV #4,R0
2498 *15054 012701 000010 MOV #10,R1
2499 *15060 026100 035602 035602 CMP A(R1),A(R0)
2500 *15066 001401 BEQ ,+4
2501 *15070 104000 HLT
2502 *15072 104400 SCOPE
2503
2504 .SBTTL TEST MOVE INSTRUCTION POP INDEX
2505
2506 *15074 012700 177770 MOV #10,R0
2507 *15100 016007 035602 020516 MOV A(R0),TEMP
2508 *15106 026727 020512 125252 CMP TEMP,#125252
2509 *15114 001401 BEQ ,+4
2510 *15116 104000 HLT
2511 *15120 104400 SCOPE
2512
2513 *15122 012700 000010 MOV #10,R0
2514 *15126 016007 035602 020470 MOV A(R0),TEMP
2515 *15134 026727 020404 052525 CMP TEMP,#052525
2516 *15142 001401 BEQ ,+4
2517 *15144 104000 HLT
2518 *15146 104400 SCOPE
2519
2520 *15150 012700 177770 MOV #10,R0
2521 *15154 012700 125252 035624 MOV #125252,TEMP(R0)
2522 *15162 026727 020426 125252 CMP C,#125252
2523 *15170 001401 BEQ ,+4
2524 *15172 104000 HLT
2525 *15174 104400 SCOPE
2526
2527 *15176 012700 000010 MOV #10,R0
2528 *15202 012700 052525 035624 MOV #052525,TEMP(R0)
2529 *15210 026727 020420 052525 CMP TEMP+10,#052525
2530 *15216 001401 BEQ ,+4
2531 *15220 104000 HLT
2532 *15222 104400 SCOPE
2533
2534 .SBTTL TEST BIC INSTRUCTION FOR INDEXING
2535
2536 *15224 012707 177777 020372 MOV #1,TEMP
2537 *15232 042707 000000 020364 BIC #0,TEMP
2538 *15240 104401 BHI ,+4
2539 *15242 104000 HLT
2540 *15244 001001 BNE ,+4
2541 *15246 104000 HLT
2542 *15250 104400 SCOPE
2543 *15252 012707 177777 020344 MOV #1,TEMP
2544 *15260 012700 177770 MOV #10,R0
2545 *15264 046007 035602 020332 BIC A(R0),TEMP
  
```

2546	015272	026727	020326	052525	CMP	TEMP,#052525
2547	015300	001401			BEQ	,+4
2548	015302	104000			HLT	
2549	015304	104400			SCOPE	
2550						
2551	015306	012767	177777	020310	MOV	#=1,TEMP
2552	015314	012700	000010		MOV	#10,R0
2553	015320	046067	035602	020276	BIC	A(R0),TEMP
2554	015326	026727	020272	129252	CMP	TEMP,#129252
2555	015334	001401			BEQ	,+4
2556	015336	104000			HLT	
2557	015340	104400			SCOPE	
2558						
2559	015342	012767	177777	020264	MOV	#=1,TEMP+10
2560	015350	012700	000010		MOV	#10,R0
2561	015354	042760	129252	035624	BIC	#129252,TEMP(R0)
2562	015362	026727	020246	052525	CMP	TEMP+10,#52525
2563	015370	001401			BEQ	,+4
2564	015372	104000			HLT	
2565	015374	104400			SCOPE	
2566						
2567	015376	012700	177770		MOV	#=10,R0
2568	015402	012767	177777	020204	MOV	#=1,TEMP+10
2569	015410	042767	052525	020176	BIC	#052525,TEMP+10
2570	015416	026727	020172	129252	CMP	TEMP+10,#129252
2571	015424	001401			BEQ	,+4
2572	015426	104000			HLT	
2573	015430	104400			SCOPE	
2574						
2575						
2576						
2577	015432	012767	129252	020164	MOV	#129252,TEMP
2578	015440	012700	177770		MOV	#=10,R0
2579	015444	166067	035602	020152	SUB	A(R0),TEMP
2580	015452	001401			BEQ	,+4
2581	015454	104000			HLT	
2582	015456	104400			SCOPE	
2583						
2584	015460	012767	129252	020136	MOV	#129252,TEMP
2585	015466	012700	177770		MOV	#=10,R0
2586	015472	166760	020074	035634	SUB	B,TEMP+10(R0)
2587	015500	001401			BEQ	,+4
2588	015502	104000			HLT	
2589	015504	104400			SCOPE	
2590	015506	012767	052525	020110	MOV	#052525,TEMP
2591	015514	012700	000010		MOV	#10,R0
2592	015520	166067	035602	020076	SUB	A(R0),TEMP
2593	015526	001401			BEQ	,+4
2594	015530	104000			HLT	
2595	015532	104400			SCOPE	
2596	015534	012767	052525	020062	MOV	#052525,TEMP
2597	015542	012700	000010		MOV	#10,R0
2598	015546	166760	020040	035614	SUB	A+10,C(R0)
2599	015554	001401			BEQ	,+4

.SBTTL TEST SUBTRACT INSTRUCTION FOR INDEXING

2600	015556	104000			HLT	
2601	015560	104400			SCOPE	
2602						
2603						
2604						
2605	015562	012767	177777	020034	MOV	#=1,TEMP
2606	015570	012700	177770		MOV	#=10,R0
2607	015574	009060	035634		CLR	D(R0)
2608	015600	009767	020020		TST	TEMP
2609	015604	001401			BEQ	,+4
2610	015606	104000			HLT	
2611	015610	104400			SCOPE	
2612	015612	012767	177777	020004	MOV	#=1,TEMP
2613	015620	012700	000010		MOV	#+10,R0
2614	015624	009060	035614		CLR	C(R0)
2615	015630	009767	017770		TST	TEMP
2616	015634	001401			BEQ	,+4
2617	015636	104000			HLT	
2618	015640	104400			SCOPE	
2619	015642	012767	177777	017754	MOV	#=1,TEMP
2620	015650	012700	177770		MOV	#=10,R0
2621	015654	009160	035634		COM	D(R0)
2622	015660	009767	017740		TST	TEMP
2623	015664	001401			BEQ	,+4
2624	015666	104000			HLT	
2625	015670	104400			SCOPE	
2626	015672	012767	177777	017724	MOV	#=1,TEMP
2627	015700	012700	000010		MOV	#10,R0
2628	015704	009160	035614		COM	C(R0)
2629	015710	009767	017710		TST	TEMP
2630	015714	001401			BEQ	,+4
2631	015716	104000			HLT	
2632	015720	104400			SCOPE	
2633						
2634	015722	012767	177777	017674	MOV	#=1,TEMP
2635	015730	012700	177770		MOV	#=10,R0
2636	015734	009200	035634		INC	D(R0)
2637	015740	009767	017600		TST	TEMP
2638	015744	001401			BEQ	,+4
2639	015746	104000			HLT	
2640	015750	104400			SCOPE	
2641	015752	012767	177777	017644	MOV	#=1,TEMP
2642	015760	012700	000010		MOV	#+10,R0
2643	015764	009200	035614		INC	C(R0)
2644	015770	009767	017630		TST	TEMP
2645	015774	001401			BEQ	,+4
2646	015776	104000			HLT	
2647	016000	104400			SCOPE	
2648	016002	012767	000001	017614	MOV	#1,TEMP
2649	016010	012700	177770		MOV	#=10,R0
2650	016014	009360	035634		DEC	D(R0)
2651	016020	009767	017600		TST	TEMP
2652	016024	001401			BEQ	,+4
2653	016026	104000			HLT	

.SBTTL TEST UNARYS INDEXED

2654	R16030	104400			SCOPE
2655	R16032	012767	000001	017564	MOV #1,TEMP
2656	R16040	012700	000010		MOV #10,R0
2657	R16044	005360	035614		DEC C(R0)
2658	R16050	005767	017550		TST TEMP
2659	R16054	001401			BEQ ,+4
2660	R16056	104000			HLT
2661	R16060	104400			SCOPE
2662	R16062	012767	000001	017534	MOV #1,TEMP
2663	R16070	012700	177770		MOV #10,R0
2664	R16074	005460	035634		NEG D(R0)
2665	R16100	022767	177777	017516	CMP #1,TEMP
2666	R16106	001401			BEQ ,+4
2667	R16110	104000			HLT
2668	R16112	104400			SCOPE
2669					
2670	R16114	012767	000001	017502	MOV #1,TEMP
2671	R16122	012700	000010		MOV #10,R0
2672	R16126	005460	035614		NEG C(R0)
2673	R16132	022767	177777	017464	CMP #1,TEMP
2674	R16140	001401			BEQ ,+4
2675	R16142	104000			HLT
2676	R16144	104400			SCOPE
2677					
2678	R16146	012767	177777	017450	MOV #1,TEMP
2679	R16154	012700	177770		MOV #10,R0
2680	R16160	000261			SEC
2681	R16162	005560	035634		ADC D(R0)
2682	R16166	005767	017432		TST TEMP
2683	R16172	001401			BEQ ,+4
2684	R16174	104000			HLT
2685	R16176	104400			SCOPE
2686					
2687	R16200	012767	177777	017416	MOV #1,TEMP
2688	R16206	012700	000010		MOV #10,R0
2689	R16212	000261			SEC
2690	R16214	005560	035614		ADC C(R0)
2691	R16220	005767	017400		TST TEMP
2692	R16224	001401			BEQ ,+4
2693	R16226	104000			HLT
2694	R16230	104400			SCOPE
2695					
2696	R16232	012767	000001	017364	MOV #1,TEMP
2697	R16240	012700	177770		MOV #10,R0
2698	R16244	000261			SEC
2699	R16246	005660	035634		SBC D(R0)
2700	R16252	005767	017346		TST TEMP
2701	R16256	001401			BEQ ,+4
2702	R16260	104000			HLT
2703	R16262	104400			SCOPE
2704					
2705	R16264	012767	000001	017332	MOV #1,TEMP
2706	R16272	012700	000010		MOV #10,R0
2707	R16276	000261			SEC

2708	R16300	005660	035614		SBC C(R0)
2709	R16304	005767	017314		TST TEMP
2710	R16310	001401			BEQ ,+4
2711	R16312	104000			HLT
2712	R16314	104400			SCOPE
2713					
2714					.SBTTL TEST JMP INDEXED
2715					
2716	R16316	012700	000010		MOV #10,R0
2717	R16322	000160	016316		JMP RJMP1=10(R0)
2718	R16326	000240			RJMP1 NOP
2719	R16330	104400			SCOPE
2720					
2721	R16332	012700	177770		MOV #10,R0
2722	R16336	000160	016354		JMP RJMP2=10(R0)
2723	R16342	104000			HLT
2724	R16344	000240			RJMP2 NOP
2725	R16346	104400			SCOPE
2726					
2727					.SBTTL TEST COMPARE INSTRUCTION
2728					
2729	R16350	023727	035572	125252	CMP #B,#125252
2730	R16356	001401			BEQ ,+4
2731	R16360	104000			HLT
2732	R16362	104400			SCOPE
2733					
2734	R16364	022737	125252	035572	CMP #125252,#B
2735	R16372	001401			BEQ ,+4
2736	R16374	104000			HLT
2737	R16376	104400			SCOPE
2738					
2739	R16400	023737	035572	035572	CMP #B,#B
2740	R16406	001401			BEQ ,+4
2741	R16410	104000			HLT
2742	R16412	104400			SCOPE
2743					
2744					
2745					.SBTTL TEST MOVE INSTRUCTIONS
2746					
2747	R16414	013700	035572		MOV #B,R0
2748	R16420	022700	125252		CMP #125252,R0
2749	R16424	001401			BEQ ,+4
2750	R16426	104000			HLT
2751	R16430	104400			SCOPE
2752					
2753	R16432	012737	125252	035624	MOV #125252,#TEMP
2754	R16440	026767	017120	017156	CMP B,TEMP
2755	R16446	001401			BEQ ,+4
2756	R16450	104000			HLT
2757	R16452	104400			SCOPE
2758					
2759	R16454	013737	035572	035614	MOV #B,#C
2760	R16462	026767	017104	017124	CMP B,C
2761	R16470	001401			BEQ ,+4

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2762 *16472 104000 HLT
2763 *16474 104400 SCOPE
2764
2765 ,SBTTL TEST BIC INSTRUCTION INDIRECT
2766
2767 *16476 012700 177777 MOV #=1,R0
2768 *16502 043700 035572 BIC @#B,R0
2769 *16506 020027 052525 CMP R0,#052525
2770 *16512 001401 BEQ ,+4
2771 *16514 104000 HLT
2772 *16516 104400 SCOPE
2773
2774 *16520 012767 177777 017076 MOV #=1,TEMP
2775 *16526 042737 125252 035624 BIC #125252,@#TEMP
2776 *16534 022767 052525 017062 CMP #052525,TEMP
2777 *16542 001401 BEQ ,+4
2778 *16544 104000 HLT
2779 *16546 104400 SCOPE
2780
2781 *16550 012767 177777 017036 MOV #=1,C
2782 *16556 043737 035572 035614 BIC @#B,@#C
2783 *16564 026727 017024 052525 CMP C,#52525
2784 *16572 001401 BEQ ,+4
2785 *16574 104000 HLT
2786 *16576 104400 SCOPE
2787
2788 ,SBTTL TEST SUBTRACT INSTRUCTION
2789
2790 *16600 012700 125252 MOV #125252,R0
2791 *16604 163700 035572 SUR @#B,R0
2792 *16610 020027 000000 CMP R0,#0
2793 *16614 001401 BEQ ,+4
2794 *16616 104000 HLT
2795 *16620 104400 SCOPE
2796
2797 *16622 012767 125252 016774 MOV #125252,TEMP
2798 *16630 166737 016736 035624 SUR R,@#TEMP
2799 *16636 001401 BEQ ,+4
2800 *16640 104000 HLT
2801 *16642 104400 SCOPE
2802
2803 *16644 012767 125252 016752 MOV #125252,TEMP
2804 *16652 163757 035572 016744 SUB @#B,TEMP
2805 *16660 005767 016740 TST TEMP
2806 *16664 001401 BEQ ,+4
2807 *16666 104000 HLT
2808 *16670 104400 SCOPE
2809
2810 ,SBTTL TEST ADD INDIRECT
2811
2812 *16672 005000 CLR R0
2813 *16674 063700 035572 ADD @#B,R0
2814 *16700 022700 125252 CMP #125252,R0
2815 *16704 001401 BEQ ,+4
  
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2816 *16706 104000 HLT
2817 *16710 104400 SCOPE
2818
2819 *16712 005067 016706 CLR TEMP
2820 *16716 062737 125252 035624 ADD #125252,@#TEMP
2821 *16724 022767 125252 016672 CMP #125252,TEMP
2822 *16732 001401 BEQ ,+4
2823 *16734 104000 HLT
2824
2825 *16736 012767 125252 016660 MOV #125252,TEMP
2826 *16744 067737 016640 035624 ADD @#A+6,@#TEMP
2827 *16752 026727 016646 177777 CMP TEMP,#=1
2828 *16760 001401 BEQ ,+4
2829 *16762 104000 HLT
2830 *16764 104400 SCOPE
2831
2832 ,SBTTL TEST UNARYS INDIRECT
2833
2834 *16766 012767 177777 016630 MOV #=1,TEMP
2835 *16774 005037 035624 CLR @#TEMP
2836 *17000 005767 016620 TST TEMP
2837 *17004 001401 BEQ ,+4
2838 *17006 104000 HLT
2839 *17010 104400 SCOPE
2840
2841 *17012 012767 125252 016604 MOV #125252,TEMP
2842 *17020 005137 035624 COM @#TEMP
2843 *17024 022767 052525 016572 CMP #052525,TEMP
2844 *17032 001401 BEQ ,+4
2845 *17034 104000 HLT
2846 *17036 104400 SCOPE
2847
2848 *17040 005067 016560 CLR TEMP
2849 *17044 005237 035624 INC @#TEMP
2850 *17050 022767 000001 016546 CMP #1,TEMP
2851 *17056 001401 BEQ ,+4
2852 *17060 104000 HLT
2853 *17062 104400 SCOPE
2854
2855 *17064 005067 016534 CLR TEMP
2856 *17070 005377 016532 DEC @TEMP+2
2857 *17074 026727 016524 177777 CMP TEMP,#=1
2858 *17102 001401 BEQ ,+4
2859 *17104 104000 HLT
2860 *17106 104400 SCOPE
2861
2862 *17110 012767 000001 016506 MOV #1,TEMP
2863 *17116 005437 035624 NEG @#TEMP
2864 *17122 022767 177777 016474 CMP #=1,TEMP
2865 *17130 001401 BEQ ,+4
2866 *17132 104000 HLT
2867 *17134 104400 SCOPE
2868
2869 ,SBTTL TEST COMPARE INSTRUCTION INDEXED AND INDIRECT
  
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2870									
2871	R17136	027727	016432	125252	CMP	0B+2,#125252			
2872	R17144	001401			BEQ	,+4			
2873	R17146	104000			HLT				
2874	R17150	104400			SCOPE				
2875									
2876	R17152	022777	125252	016414	CMP	#125252,0B+2			
2877	R17160	001401			BEQ	,+4			
2878	R17162	104000			HLT				
2879	R17164	104400			SCOPE				
2880									
2881	R17166	027777	016402	016400	CMP	0B+2,0B+2			
2882	R17174	001401			BEQ	,+4			
2883	R17176	104000			HLT				
2884	R17200	104400			SCOPE				
2885									
2886									
2887									
2888	R17202	017700	016366		MOV	0B+2,R0			
2889	R17206	022700	125252		CMP	#125252,R0			
2890	R17212	001401			BEQ	,+4			
2891	R17214	104000			HLT				
2892	R17216	104400			SCOPE				
2893									
2894	R17220	012777	125252	016400	MOV	#125252,@TEMP+2			
2895	R17226	026767	016340	016370	CMP	B,TEMP			
2896	R17234	001401			BEQ	,+4			
2897	R17236	104000			HLT				
2898	R17240	104400			SCOPE				
2899									
2900	R17242	017777	016326	016346	MOV	0B+2,0C+2			
2901	R17250	026767	016316	016336	CMP	B,C			
2902	R17256	001401			BEQ	,+4			
2903	R17260	104000			HLT				
2904	R17262	104400			SCOPE				
2905									
2906									
2907									
2908	R17264	012700	177777		MOV	#=1,R0			
2909	R17270	047700	016300		BIC	0B+2,R0			
2910	R17274	020027	052525		CMP	R0,#52525			
2911	R17300	001401			BEQ	,+4			
2912	R17302	104000			HLT				
2913	R17304	104400			SCOPE				
2914									
2915	R17306	012767	177777	016310	MOV	#=1,TEMP			
2916	R17314	042777	125252	016304	BIC	#125252,@TEMP+2			
2917	R17322	022767	052525	016274	CMP	#52525,TEMP			
2918	R17330	001401			BEQ	,+4			
2919	R17332	104000			HLT				
2920	R17334	104400			SCOPE				
2921									
2922	R17336	012767	177777	016250	MOV	#=1,C			
2923	R17344	047777	016224	016244	BIC	0B+2,0C+2			

2924	R17352	026767	016234	016234	CMP	A*10,C			
2925	R17360	001401			BEQ	,+4			
2926	R17362	104000			HLT				
2927	R17364	104400			SCOPE				
2928									
2929	R17366	012700	125252		MOV	#125252,R0			
2930	R17372	167700	016176		SUB	0B+2,R0			
2931	R17376	020027	000000		CMP	R0,#0			
2932	R17402	001401			BEQ	,+4			
2933	R17404	104000			HLT				
2934	R17406	104400			SCOPE				
2935									
2936	R17410	012767	125252	016206	MOV	#125252,TEMP			
2937	R17416	166777	016150	016202	SUB	B,@TEMP+2			
2938	R17424	001401			BEQ	,+4			
2939	R17426	104000			HLT				
2940	R17430	104400			SCOPE				
2941									
2942	R17432	012767	125252	016164	MOV	#125252,TEMP			
2943	R17440	167777	016130	016160	SUB	0B+2,@TEMP+2			
2944	R17446	005767	016152		TST	TEMP			
2945	R17452	001401			BEQ	,+4			
2946	R17454	104000			HLT				
2947	R17456	104400			SCOPE				
2948									
2949									
2950									
2951	R17460	005000			CLR	R0			
2952	R17462	067700	016106		ADD	0B+2,R0			
2953	R17466	022700	125252		CMP	#125252,R0			
2954	R17472	001401			BEQ	,+4			
2955	R17474	104000			HLT				
2956	R17476	104400			SCOPE				
2957									
2958	R17500	005067	016120		CLR	TEMP			
2959	R17504	062777	125252	016114	ADD	#125252,@TEMP+2			
2960	R17512	022767	125252	016104	CMP	#125252,TEMP			
2961	R17520	001401			BEQ	,+4			
2962	R17522	104000			HLT				
2963									
2964	R17524	012767	125252	016072	MOV	#125252,TEMP			
2965	R17532	067777	016052	016066	ADD	0A+0,@TEMP+2			
2966	R17540	026727	016060	177777	CMP	TEMP,#=1			
2967	R17546	001401			BEQ	,+4			
2968	R17550	104000			HLT				
2969	R17552	104400			SCOPE				
2970									
2971									
2972									
2973	R17554	012767	177777	016042	MOV	#=1,TEMP			
2974	R17562	005077	016040		CLR	@TEMP+2			
2975	R17566	005767	016032		TST	TEMP			
2976	R17572	001401			BEQ	,+4			
2977	R17574	104000			HLT				

2978	017576	104400			SCOPE	
2979						
2980	017600	012707	125252	016016	MOV	#125252,TEMP
2981	017606	005177	016014		COM	@TEMP+2
2982	017612	022707	052525	016004	CMP	#052525,TEMP
2983	017620	001401			REQ	,+4
2984	017622	104000			HLT	
2985	017624	104400			SCOPE	
2986						
2987	017626	005007	015772		CLR	TEMP
2988	017632	005277	015770		INC	@TEMP+2
2989	017636	022707	000001	015760	CMP	#1,TEMP
2990	017644	001401			REQ	,+4
2991	017646	104000			HLT	
2992	017650	104400			SCOPE	
2993						
2994	017652	005007	015746		CLR	TEMP
2995	017656	005377	015744		DEC	@TEMP+2
2996	017662	026727	015736	177777	CMP	TEMP,#-1
2997	017670	001401			REQ	,+4
2998	017672	104000			HLT	
2999	017674	104400			SCOPE	
3000						
3001	017676	012707	000001	015720	MOV	#1,TEMP
3002	017704	005477	015716		NEG	@TEMP+2
3003	017710	022707	177777	015706	CMP	#-1,TEMP
3004	017716	001401			REQ	,+4
3005	017720	104000			HLT	
3006	017722	104400			SCOPE	
3007						
3008	017724	012707	177777	015672	MOV	#-1,TEMP
3009	017732	000201			SEC	
3010	017734	005577	015666		ADC	@TEMP+2
3011	017740	005707	015660		TST	TEMP
3012	017744	001401			REQ	,+4
3013	017746	104000			HLT	
3014	017750	104400			SCOPE	
3015						
3016	017752	012707	000001	015644	MOV	#1,TEMP
3017	017760	000201			SEC	
3018	017762	005677	015640		SBC	@TEMP+2
3019	017766	005707	015632		TST	TEMP
3020	017772	001401			REQ	,+4
3021	017774	104000			HLT	
3022	017776	104400			SCOPE	
3023						
3024						,SBTTL TEST OF COMBINED INDEXING AND INDIRECT
3025						
3026	020000	012700	177772		MOV	#-6,R0
3027	020004	027027	035602	125252	CMP	@A(R0),#125252
3028	020012	001401			REQ	,+4
3029	020014	104000			HLT	
3030	020016	104400			SCOPE	
3031						

3032	020020	012700	177772		MOV	#-6,R0
3033	020024	022700	125252	035602	CMP	#125252,@A(R0)
3034	020032	001401			REQ	,+4
3035	020034	104000			HLT	
3036	020036	104400			SCOPE	
3037						
3038	020040	012700	177772		MOV	#-6,R0
3039	020044	012701	000002		MOV	#+2,R1
3040	020050	027071	035602	035602	CMP	@A(R0),@A(R1)
3041	020056	001401			REQ	,+4
3042	020060	104000			HLT	
3043	020062	104400			SCOPE	
3044						
3045						,SBTTL TEST BIC INSTRUCTION INDEXED AND INDIRECT
3046						
3047	020064	012700	000006		MOV	#+6,R0
3048	020070	012707	177777	015926	MOV	#-1,TEMP
3049	020076	047067	035602	015920	BIC	@A(R0),TEMP
3050	020104	022707	125252	015912	CMP	#125252,TEMP
3051	020112	001401			REQ	,+4
3052	020114	104000			HLT	
3053	020116	104400			SCOPE	
3054						
3055	020120	012700	177772		MOV	#-6,R0
3056	020124	012707	177777	015462	MOV	#-1,C
3057	020132	042770	125252	035604	BIC	#125252,@TEMP(R0)
3058	020140	026727	015450	052525	CMP	C,#052525
3059	020146	001401			REQ	,+4
3060	020150	104000			HLT	
3061	020152	104400			SCOPE	
3062	020154	012707	177777	015432	MOV	#-1,C
3063	020162	012700	177772		MOV	#-6,R0
3064	020166	012701	177772		MOV	#-6,R1
3065	020172	047071	035602	035604	BIC	@A(R0),@TEMP(R1)
3066	020200	022707	052525	015406	CMP	#052525,C
3067	020206	001401			REQ	,+4
3068	020210	104000			HLT	
3069	020212	104400			SCOPE	
3070						
3071						,SBTTL TEST COMPARE (BYTE) INSTRUCTION INDEXED
3072						
3073	020214	012700	177772		MOV	#-10,R0
3074	020220	126027	035602	000252	CPMB	A(R0),#000252
3075	020226	001401			REQ	,+4
3076	020230	104000			HLT	
3077	020232	104400			SCOPE	
3078						
3079	020234	012700	177772		MOV	#-10,R0
3080	020240	122700	000252	035602	CPMB	#000252,A(R0)
3081	020246	001401			REQ	,+4
3082	020250	104000			HLT	
3083	020252	104400			SCOPE	
3084						
3085	020254	012700	000010		MOV	#10,R0

3086	*20260	126027	035602	000125	CMPB	A(R0),#000125
3087	*20266	001401			REQ	,+4
3088	*20270	104000			HLT	
3089	*20272	104400			SCOPE	
3090						
3091	*20274	*12700	000010		MOV	#10,R0
3092	*20300	122700	000125	035602	CMPB	#000125,A(R0)
3093	*20306	001401			REQ	,+4
3094	*20310	104000			HLT	
3095	*20312	104400			SCOPE	
3096						
3097	*20314	*12700	177770		MOV	#=10,R0
3098	*20320	126000	035602	035602	CMPB	A(R0),A(R0)
3099	*20326	001401			REQ	,+4
3100	*20330	104000			HLT	
3101	*20332	104400			SCOPE	
3102						
3103	*20334	*12700	000010		MOV	#+10,R0
3104	*20340	126000	035602	035602	CMPB	A(R0),A(R0)
3105	*20346	001401			REQ	,+4
3106	*20350	104000			HLT	
3107	*20352	104400			SCOPE	
3108						
3109	*20354	*12700	177770		MOV	#=10,R0
3110	*20360	*12701	000004		MOV	#+4,R1
3111	*20364	126001	035602	035602	CMPB	A(R0),A(R1)
3112	*20372	001401			REQ	,+4
3113	*20374	104000			HLT	
3114	*20376	104400			SCOPE	
3115						
3116	*20400	126100	035602	035602	CMPB	A(R1),A(R0)
3117	*20406	001401			REQ	,+4
3118	*20410	104000			HLT	
3119	*20412	104400			SCOPE	
3120						
3121	*20414	*12700	177774		MOV	#=4,R0
3122	*20420	*12701	000010		MOV	#+10,R1
3123	*20424	126001	035602	035602	CMPB	A(R0),A(R1)
3124	*20432	001401			REQ	,+4
3125	*20434	104000			HLT	
3126						
3127	*20436	*12700	177774		MOV	#=4,R0
3128	*20442	*12701	000010		MOV	#10,R1
3129	*20446	126100	035602	035602	CMPB	A(R1),A(R0)
3130	*20454	001401			REQ	,+4
3131	*20456	104000			HLT	
3132	*20460	104400			SCOPE	
3133						
3134						,SBTTL TEST MOVE (BYTE) INSTRUCTION FOR INDEX
3135						
3136	*20462	*12700	177770		MOV	#=10,R0
3137	*20466	116007	035602	015130	MOVB	A(R0),TEMP
3138	*20474	126727	015124	000252	CMPB	TEMP,#000252
3139	*20502	001401			REQ	,+4

3140	*20504	104000			HLT	
3141	*20506	104400			SCOPE	
3142						
3143	*20510	*12700	000010		MOV	#+10,R0
3144	*20514	116007	035602	015102	MOVB	A(R0),TEMP
3145	*20522	126727	015076	000125	CMPB	TEMP,#000125
3146	*20530	001401			REQ	,+4
3147	*20532	104000			HLT	
3148	*20534	104400			SCOPE	
3149						
3150	*20536	*12700	177770		MOV	#=10,R0
3151	*20542	112700	125252	035624	MOVB	#125252,TEMP(R0)
3152	*20550	126727	015000	125252	CMPB	C,#125252
3153	*20556	001401			REQ	,+4
3154	*20560	104000			HLT	
3155	*20562	104400			SCOPE	
3156						
3157	*20564	*12700	000010		MOV	#+10,R0
3158	*20570	112700	052525	035624	MOVB	#052525,TEMP(R0)
3159	*20576	126727	015032	052525	CMPB	TEMP+10,#052525
3160	*20604	001401			REQ	,+4
3161	*20606	104000			HLT	
3162	*20610	104400			SCOPE	
3163						
3164						,SBTTL TEST BIC (BYTE) INSTRUCTION FOR INDEXING
3165						
3166	*20612	*12700	177777	015004	MOV	#=1,TEMP
3167	*20620	*12700	177770		MOV	#=10,R0
3168	*20624	146007	035602	014772	BICB	A(R0),TEMP
3169	*20632	126727	014766	177525	CMPB	TEMP,#177525
3170	*20640	001401			REQ	,+4
3171	*20642	104000			HLT	
3172	*20644	104400			SCOPE	
3173						
3174	*20646	*12700	177777	014750	MOV	#=1,TEMP
3175	*20654	*12700	000010		MOV	#10,R0
3176	*20660	146007	035602	014736	BICB	A(R0),TEMP
3177	*20666	126727	014732	007652	CMPB	TEMP,#007652
3178	*20674	001401			REQ	,+4
3179	*20676	104000			HLT	
3180	*20700	104400			SCOPE	
3181						
3182	*20702	*12700	177777	014724	MOV	#=1,TEMP+10
3183	*20710	*12700	000010		MOV	#10,R0
3184	*20714	142700	125252	035624	BICB	#125252,TEMP(R0)
3185	*20722	126727	014706	002525	CMPB	TEMP+10,#2525
3186	*20730	001401			REQ	,+4
3187	*20732	104000			HLT	
3188	*20734	104400			SCOPE	
3189						
3190	*20736	*12700	177770		MOV	#=10,R0
3191	*20742	*12700	177777	014644	MOV	#=1,TEMP+10
3192	*20750	142700	052525	014636	BICB	#052525,TEMP+10
3193	*20756	126727	014632	125252	CMPB	TEMP+10,#125252

3194	020764	001401			BEQ	,+4
3195	020766	104000			HLT	
3196	020770	104400			SCOPE	
3197						
3198						
3199						
3200	020772	012767	177777	014624	MOV	#=1,TEMP
3201	021000	012700	177770		MOV	#=10,R0
3202	021004	105060	035634		CLRB	D(R0)
3203	021010	105767	014610		TSTB	TEMP
3204	021014	001401			BEQ	,+4
3205	021016	104000			HLT	
3206	021020	104400			SCOPE	
3207						
3208	021022	012767	177777	014574	MOV	#=1,TEMP
3209	021030	012700	177770		MOV	#=10,R0
3210	021034	105060	035634		CLRB	D(R0)
3211	021040	026727	014560	177400	CMP	TEMP,#177400
3212	021046	001401			BEQ	,+4
3213	021050	104000			HLT	
3214	021052	104400			SCOPE	
3215						
3216	021054	012767	177777	014542	MOV	#=1,TEMP
3217	021062	012700	177770		MOV	#=7,R0
3218	021066	105060	035634		CLRB	D(R0)
3219	021072	026727	014526	000377	CMP	TEMP,#000377
3220	021100	001401			BEQ	,+4
3221	021102	104000			HLT	
3222	021104	104400			SCOPE	
3223						
3224	021106	012767	177777	014510	MOV	#=1,TEMP
3225	021114	012700	000010		MOV	#=10,R0
3226	021120	105060	035614		CLRB	C(R0)
3227	021124	105767	014474		TSTB	TEMP
3228	021130	001401			BEQ	,+4
3229	021132	104000			HLT	
3230	021134	104400			SCOPE	
3231						
3232	021136	012767	177777	014460	MOV	#=1,TEMP
3233	021144	012700	177770		MOV	#=10,R0
3234	021150	105160	035634		COMB	D(R0)
3235	021154	105767	014444		TSTB	TEMP
3236	021160	001401			BEQ	,+4
3237	021162	104000			HLT	
3238	021164	104400			SCOPE	
3239						
3240	021166	012767	177777	014430	MOV	#=1,TEMP
3241	021174	012700	000010		MOV	#10,R0
3242	021200	105160	035614		COMB	C(R0)
3243	021204	105767	014414		TSTB	TEMP
3244	021210	001401			BEQ	,+4
3245	021212	104000			HLT	
3246	021214	104400			SCOPE	
3247	021216	012767	177777	014400	MOV	#=1,TEMP

3248	021224	012700	177770		MOV	#=10,R0
3249	021230	105260	035634		INCB	D(R0)
3250	021234	105767	014364		TSTB	TEMP
3251	021240	001401			BEQ	,+4
3252	021242	104000			HLT	
3253	021244	026727	014354	177400	CMP	TEMP,#177400
3254	021252	001401			BEQ	,+4
3255	021254	104000			HLT	
3256	021256	104400			SCOPE	
3257						
3258	021260	012767	177777	014336	MOV	#=1,TEMP
3259	021266	012700	000010		MOV	#=10,R0
3260	021272	105260	035614		INCB	C(R0)
3261	021276	105767	014322		TSTB	TEMP
3262	021302	001401			BEQ	,+4
3263	021304	104000			HLT	
3264	021306	104400			SCOPE	
3265						
3266	021310	012767	000001	014306	MOV	#1,TEMP
3267	021316	012700	177770		MOV	#=10,R0
3268	021322	105360	035634		DECB	D(R0)
3269	021326	105767	014272		TSTB	TEMP
3270	021332	001401			BEQ	,+4
3271	021334	104000			HLT	
3272	021336	104400			SCOPE	
3273						
3274	021340	012767	000001	014256	MOV	#1,TEMP
3275	021346	012700	000010		MOV	#10,R0
3276	021352	105360	035614		DECB	C(R0)
3277	021356	105767	014242		TSTB	TEMP
3278	021362	001401			BEQ	,+4
3279	021364	104000			HLT	
3280	021366	104400			SCOPE	
3281						
3282	021370	012767	000001	014226	MOV	#1,TEMP
3283	021376	012700	177770		MOV	#=10,R0
3284	021402	105460	035634		NEGB	D(R0)
3285	021406	026727	014212	000377	CMP	TEMP,#377
3286	021414	001401			BEQ	,+4
3287	021416	104000			HLT	
3288	021420	104400			SCOPE	
3289						
3290	021422	012767	000001	014174	MOV	#1,TEMP
3291	021430	012700	000010		MOV	#=10,R0
3292	021434	105460	035614		NEGB	C(R0)
3293	021440	026727	014160	000377	CMP	TEMP,#377
3294	021446	001401			BEQ	,+4
3295	021450	104000			HLT	
3296	021452	104400			SCOPE	
3297						
3298	021454	012767	177777	014142	MOV	#=1,TEMP
3299	021462	012700	177770		MOV	#=10,R0
3300	021466	000261			SEC	
3301	021470	105560	035634		ADCB	D(R0)

3302	*21474	026727	014124	177400	CMP	TEMP,#177400
3303	*21502	001401			REQ	,+4
3304	*21504	104000			HLT	
3305	*21506	104400			SCOPE	
3306						
3307	*21510	012767	177777	014106	MOV	#-1,TEMP
3308	*21516	012700	000010		MOV	#+10,R0
3309	*21522	000261			SEC	
3310	*21524	105560	035614		ADCB	C(R0)
3311	*21530	026727	014070	177400	CMP	TEMP,#177400
3312	*21536	001401			REQ	,+4
3313	*21540	104000			HLT	
3314	*21542	104400			SCOPE	
3315						
3316	*21544	012767	000401	014052	MOV	#001,TEMP
3317	*21552	012700	177771		MOV	#-7,R0
3318	*21556	000261			SEC	
3319	*21560	105660	035634		SBCB	D(R0)
3320	*21564	022767	000001	014032	CMP	#1,TEMP
3321	*21572	001401			REQ	,+4
3322	*21574	104000			HLT	
3323	*21576	104400			SCOPE	
3324						
3325	*21600	012767	000001	014016	MOV	#1,TEMP
3326	*21606	012700	000010		MOV	#+10,R0
3327	*21612	000261			SEC	
3328	*21614	105660	035614		SBCB	C(R0)
3329	*21620	005767	014000		TST	TEMP
3330	*21624	001401			REQ	,+4
3331	*21626	104000			HLT	
3332	*21630	104400			SCOPE	
3333						
3334					,SBTTL	TEST COMPARE (BYTE) INSTRUCTION INDIRECT
3335						
3336	*21632	123727	035572	000252	CMPB	@#B,#000252
3337	*21640	001401			REQ	,+4
3338	*21642	104000			HLT	
3339	*21644	104400			SCOPE	
3340						
3341	*21646	123727	035573	000252	CMPB	@#B+1,#252
3342	*21654	001401			REQ	,+4
3343	*21656	104000			HLT	
3344	*21660	104400			SCOPE	
3345						
3346						
3347	*21662	122737	125252	035572	CMPB	#125252,@#B
3348	*21670	001401			REQ	,+4
3349	*21672	104000			HLT	
3350	*21674	104400			SCOPE	
3351						
3352	*21676	123737	035572	035572	CMPB	@#B,@#B
3353	*21704	001401			REQ	,+4
3354	*21706	104000			HLT	
3355	*21710	104400			SCOPE	

3356						
3357					,SBTTL	TEST MOVE (BYTE) INSTRUCTION INDIRECT
3358						
3359	*21712	113700	035572		MOVB	@#B,R0
3360	*21716	122700	000252		CMPB	#000252,R0
3361	*21722	001401			REQ	,+4
3362	*21724	104000			HLT	
3363	*21726	104400			SCOPE	
3364						
3365	*21730	112737	125252	035624	MOVB	#125252,@#TEMP
3366	*21736	126767	013630	013660	CMPB	B,TEMP
3367	*21744	001401			REQ	,+4
3368	*21746	104000			HLT	
3369	*21750	104400			SCOPE	
3370						
3371	*21752	113737	035572	035614	MOVB	@#B,@#C
3372	*21760	126767	013606	013626	CMPB	R,C
3373	*21766	001401			REQ	,+4
3374	*21770	104000			HLT	
3375	*21772	104400			SCOPE	
3376						
3377					,SBTTL	TEST UNARY (BYTE) INSTRUCTIONS INDIRECT
3378						
3379	*21774	012767	177777	013622	MOV	#-1,TEMP
3380	*22002	105037	035624		CLRB	@#TEMP
3381	*22006	026727	013612	177400	CMP	TEMP,#177400
3382	*22014	001401			REQ	,+4
3383	*22016	104000			HLT	
3384	*22020	104400			SCOPE	
3385						
3386	*22022	012767	125252	013574	MOV	#125252,TEMP
3387	*22030	105137	035624		COMB	@#TEMP
3388	*22034	022767	125125	013562	CMP	#125125,TEMP
3389	*22042	001401			REQ	,+4
3390	*22044	104000			HLT	
3391	*22046	104400			SCOPE	
3392						
3393	*22050	012767	125252	013546	MOV	#125252,TEMP
3394	*22056	105137	035625		COMB	@#TEMP+1
3395	*22062	022767	052652	013534	CMP	#052652,TEMP
3396	*22070	001401			REQ	,+4
3397	*22072	104000			HLT	
3398	*22074	104400			SCOPE	
3399						
3400	*22076	005067	013522		CLR	TEMP
3401	*22102	105237	035625		INCB	@#TEMP+1
3402	*22106	022767	000400	013510	CMP	#400,TEMP
3403	*22114	001401			REQ	,+4
3404	*22116	104000			HLT	
3405	*22120	104400			SCOPE	
3406						
3407	*22122	005067	013476		CLR	TEMP
3408	*22126	105377	013474		DECB	@TEMP+2
3409	*22132	026727	013466	000377	CMP	TEMP,#377

3410	*22140	001401			BEQ	,+4
3411	*22142	104000			HLT	
3412	*22144	104400			SCOPE	
3413						
3414	*22146	005007	013492		CLR	TEMP
3415	*22192	112767	000001	013445	MOVW	#1,TEMP+1
3416	*22100	105437	035025		NEGB	@TEMP+1
3417	*22164	022767	177400	013432	CMPL	#177400,TEMP
3418	*22172	001401			BEQ	,+4
3419	*22174	104000			HLT	
3420	*22176	104400			SCOPE	
3421						
3422					.SBTTL	TEST COMPARE (BYTE) INSTRUCTION INDEXED AND INDIRECT
3423						
3424	*22200	127727	013370	125252	CMPL	@B+2,#125252
3425	*22206	001401			BEQ	,+4
3426	*22210	104000			HLT	
3427	*22212	104400			SCOPE	
3428						
3429	*22214	122777	125252	013352	CMPL	#125252,@B+2
3430	*22222	001401			BEQ	,+4
3431	*22224	104000			HLT	
3432	*22226	104400			SCOPE	
3433						
3434	*22230	127777	013340	013336	CMPL	@B+2,@B+2
3435	*22236	001401			BEQ	,+4
3436	*22240	104000			HLT	
3437	*22242	104400			SCOPE	
3438						
3439					.SBTTL	TEST MOVE (BYTE) INSTRUCTION INDEXED AND INDIRECT
3440						
3441	*22244	117700	013324		MOVW	@B+2,R0
3442	*22250	122700	125252		CMPL	#125252,R0
3443	*22254	001401			BEQ	,+4
3444	*22256	104000			HLT	
3445	*22260	104400			SCOPE	
3446						
3447	*22262	112777	125252	013336	MOVW	#125252,@TEMP+2
3448	*22270	126767	013276	013326	CMPL	B,TEMP
3449	*22276	001401			BEQ	,+4
3450	*22300	104000			HLT	
3451	*22302	104400			SCOPE	
3452						
3453	*22304	117777	013204	013304	MOVW	@B+2,@C+2
3454	*22312	126767	013254	013274	CMPL	B,C
3455	*22320	001401			BEQ	,+4
3456	*22322	104000			HLT	
3457	*22324	104400			SCOPE	
3458						
3459					.SBTTL	TEST BIC (BYTE) INSTRUCTION INDIRECT WITH INDEXING
3460						
3461	*22326	012700	177777		MOV	#=1,R0
3462	*22332	147700	013236		BICB	@B+2,R0
3463	*22336	120027	052525		CMPL	R0,#52525

3464	*22342	001401			BEQ	,+4
3465	*22344	104000			HLT	
3466	*22346	104400			SCOPE	
3467						
3468	*22350	012767	177777	013246	MOV	#=1,TEMP
3469	*22356	142777	125252	013242	BICB	#125252,@TEMP+2
3470	*22364	122767	052525	013232	CMPL	#52525,TEMP
3471	*22372	001401			BEQ	,+4
3472	*22374	104000			HLT	
3473	*22376	104400			SCOPE	
3474						
3475	*22400	012767	177777	013206	MOV	#=1,C
3476	*22406	147777	013162	013202	BICB	@B+2,@C+2
3477	*22414	126767	013172	013172	CMPL	A+10,C
3478	*22422	001401			BEQ	,+4
3479	*22424	104000			HLT	
3480	*22426	104400			SCOPE	
3481						
3482					.SBTTL	TEST UNARYS (BYTE) INDIRECT WITH INDEXING
3483						
3484	*22430	012767	177777	013166	MOV	#=1,TEMP
3485	*22436	105077	013104		CLRB	@TEMP+2
3486	*22442	105767	013156		TSTB	TEMP
3487	*22446	001401			BEQ	,+4
3488	*22450	104000			HLT	
3489	*22452	104400			SCOPE	
3490						
3491	*22454	012767	125252	013142	MOV	#125252,TEMP
3492	*22462	105177	013140		COMB	@TEMP+2
3493	*22466	122767	052525	013130	CMPL	#052525,TEMP
3494	*22474	001401			BEQ	,+4
3495	*22476	104000			HLT	
3496	*22500	104400			SCOPE	
3497						
3498	*22502	005007	013116		CLR	TEMP
3499	*22506	105277	013114		INCB	@TEMP+2
3500	*22512	122767	000001	013104	CMPL	#1,TEMP
3501	*22520	001401			BEQ	,+4
3502	*22522	104000			HLT	
3503	*22524	104400			SCOPE	
3504						
3505	*22526	005007	013072		CLR	TEMP
3506	*22532	105377	013070		DECB	@TEMP+2
3507	*22536	126727	013002	177777	CMPL	TEMP,#=1
3508	*22544	001401			BEQ	,+4
3509	*22546	104000			HLT	
3510	*22550	104400			SCOPE	
3511						
3512	*22552	012767	000001	013044	MOV	#1,TEMP
3513	*22560	105477	013042		NEGB	@TEMP+2
3514	*22564	122767	177777	013032	CMPL	#=1,TEMP
3515	*22572	001401			BEQ	,+4
3516	*22574	104000			HLT	
3517	*22576	104400			SCOPE	

3518									
3519	*22600	012767	177777	013016	MOV	#=1,TEMP			
3520	*22606	000261			SEC				
3521	*22610	105577	013012		ADCB	@TEMP+2			
3522	*22614	022767	177400	013002	CHP	#177400,TEMP			
3523	*22622	001401			REQ	,+4			
3524	*22624	104000			HLT				
3525	*22626	105767	012772		TSTB	TEMP			
3526	*22632	001401			REQ	,+4			
3527	*22634	104000			HLT				
3528	*22636	104400			SCOPE				
3529									
3530	*22640	012767	000001	012756	MOV	#1,TEMP			
3531	*22646	000261			SEC				
3532	*22650	105377	012792		DECB	@TEMP+2			
3533	*22654	005767	012744		TST	TEMP			
3534	*22660	001401			REQ	,+4			
3535	*22662	104000			HLT				
3536	*22664	104400			SCOPE				
3537									
3538	*22666	012700	177772		MOV	#=6,R0			
3539	*22672	127027	035602	125252	CHPB	@A(R0),#125252			
3540	*22700	001401			REQ	,+4			
3541	*22702	104000			HLT				
3542	*22704	104400			SCOPE				
3543									
3544	*22706	012700	177772		MOV	#=6,R0			
3545	*22712	122770	125292	035602	CHPB	#125252,@A(R0)			
3546	*22720	001401			REQ	,+4			
3547	*22722	104000			HLT				
3548	*22724	104400			SCOPE				
3549									
3550	*22726	012700	177772		MOV	#=6,R0			
3551	*22732	012701	000002		MOV	#+2,R1			
3552	*22736	127071	035602	035602	CHPB	@A(R0),@A(R1)			
3553	*22744	001401			REQ	,+4			
3554	*22746	104000			HLT				
3555	*22750	104400			SCOPE				
3556									
3557	*22792	012700	000006		MOV	#+6,R0			
3558	*22796	012767	177777	012640	MOV	#=1,TEMP			
3559	*22764	147067	035602	012632	RICB	@A(R0),TEMP			
3560	*22772	122767	125292	012624	CHPB	#125252,TEMP			
3561	*23000	001401			REQ	,+4			
3562	*23002	104000			HLT				
3563	*23004	104400			SCOPE				
3564									
3565	*23006	012700	177772		MOV	#=6,R0			
3566	*23012	012767	177777	012574	MOV	#=1,C			
3567	*23020	142770	125292	035624	RICB	#125252,@TEMP(R0)			
3568	*23026	126727	012502	000125	CHPB	C,#000125			
3569	*23034	001401			REQ	,+4			
3570	*23036	104000			HLT				
3571	*23040	104400			SCOPE				

3572									
3573	*23042	012700	035574		MOV	#B+2,R0			
3574	*23046	023067	012520		CHP	@(R0),#B			
3575	*23052	001401			REQ	,+4			
3576	*23054	104000			HLT				
3577	*23056	104400			SCOPE				
3578									
3579	*23060	012700	035576		MOV	#B+4,R0			
3580	*23064	025067	012502		CHP	@=(R0),B			
3581	*23070	001401			REQ	,+4			
3582	*23072	104000			HLT				
3583	*23074	104400			SCOPE				
3584									
3585	*23076	012700	035576		MOV	#B+4,R0			
3586	*23102	125067	012404		CHPB	@=(R0),B			
3587	*23106	001401			REQ	,+4			
3588	*23110	104000			HLT				
3589	*23112	104400			SCOPE				
3590									
3591	*23114	012700	035620		MOV	#C+4,R0			
3592	*23120	012767	177777	012466	MOV	#=1,C			
3593	*23126	105090			CLRB	@=(R0)			
3594	*23130	026727	012400	177400	CHP	C,#177400			
3595	*23136	001401			REQ	,+4			
3596	*23140	104000			HLT				
3597	*23142	104400			SCOPE				
3598									
3599	*23144	012767	177777	012442	MOV	#=1,C			
3600	*23152	012700	177772		MOV	#=6,R0			
3601	*23156	012701	177772		MOV	#=6,R1			
3602	*23162	147071	035602	035624	RICB	@A(R0),@TEMP(R1)			
3603	*23170	022767	177525	012416	CHP	#177525,C			
3604	*23176	001401			REQ	,+4			
3605	*23200	104000			HLT				
3606	*23202	104400			SCOPE				
3607	*23204	012700	052525		MOV	#52525,R0			
3608	*23210	104400			SCOPE				
3609									
3610					.SBTTL	TEST JSR INSTRUCTION			
3611									
3612	*23212	004767	000002		JSR	PC, TJSR2		IPLACE PC ON STACK	
3613	*23216	000405			BR	TJSR3		RETURN HERE ON RTS R19	
3614	*23220	021627	023216		CHP	@SP,#TJSR1		CHECK FOR CORRECT PC ON STACK	
3615	*23224	001401			REQ	,+4			
3616	*23226	104000			HLT			INCORRECT PC ON STACK	
3617	*23230	000207			RTS	PC		RETURN TO IMST AFTER JSR	
3618	*23232	104400			SCOPE				
3619									
3620	*23234	000297			CCC				
3621	*23236	004717			JSR	PC,@PC		INSTRUCTION UNDER TEST	
3622	*23240	021627	023240		CHP	@SP,#'		TEST THE STACK	
3623	*23244	001401			REQ	,+4			
3624	*23246	104000			HLT			IPC OF JSR DID NOT GO TO STACK	
3625	*23250	005726			TST	(SP)+		REPOSITION THE STACK	

8626	*23252	104400			SCOPE	
8627						
8628						
8629						
8630	*23254	000257			CCC	JCLEAR CONDITION CODES
8631	*23256	004767	012030		JSR	PG,SUBSPA
8632	*23242	104001			RMI	,+4
8633	*23244	104000			HLT	
8634	*23246	001401			REQ	,+4
8635	*23270	104000			HLT	JJSR OR RTS FAILED
8636	*23272	102401			RVS	,+4
8637	*23274	104000			HLT	JJSR OR RTS FAILED
8638	*23276	103401			RCS	,+4
8639	*23300	104000			HLT	JJSR OR RTS FAILED
8640	*23302	104400			SCOPE	
8641						
8642						
8643						
8644	*23304	104400			SCOPE	
8645	*23306	000257			CCC	JCLEAR "C"
8646	*23310	012767	123456	012306	MOV	#123456,TEMP
8647	*23316	106067	012303		RORB	TEMP+1
8648	*23322	103401			RCS	,+4
8649	*23324	104000			HLT	JC NOT SET
8650	*23326	102401			RVS	,+4
8651	*23330	104000			HLT	JV NOT SET
8652	*23332	022767	051456	012264	CMP	#051456,TEMP
8653	*23340	001401			REQ	,+4
8654	*23342	104000			HLT	JROTATE FAILED
8655	*23344	104400			SCOPE	
8656						
8657	*23346	000277			SCC	JSET C
8658	*23350	012767	123456	012246	MOV	#123456,TEMP
8659	*23356	106067	012243		RORB	TEMP+1
8660	*23362	103401			RCS	,+4
8661	*23344	104000			HLT	JC NOT SET
8662	*23346	102001			BVC	,+4
8663	*23370	104000			HLT	JV NOT CLEARED
8664	*23372	022767	151456	012224	CMP	#151456,TEMP
8665	*23400	001401			REQ	,+4
8666	*23402	104000			HLT	JROTATE FAILED
8667	*23404	104400			SCOPE	
8668						
8669	*23406	000257			CCC	
8670	*23410	012767	123456	012206	MOV	#123456,TEMP
8671	*23416	106167	012203		ROLB	TEMP+1
8672	*23422	103401			RCS	,+4
8673	*23424	104000			HLT	JC NOT SET
8674	*23426	102401			RVS	,+4
8675	*23430	104000			HLT	JV NOT SET
8676	*23432	022767	047056	012164	CMP	#047056,TEMP
8677	*23440	001401			REQ	,+4
8678	*23442	104000			HLT	JROTATE BYTE FAILED
8679	*23444	104400			SCOPE	

8680						
8681	*23446	000277			SCC	JSET C
8682	*23450	012767	123456	012146	MOV	#123456,TEMP
8683	*23456	106167	012143		ROLB	TEMP+1
8684	*23462	103401			RCS	,+4
8685	*23464	104000			HLT	JC NOT SET
8686	*23466	102401			RVS	,+4
8687	*23470	104000			HLT	JV NOT SET
8688	*23472	022767	047456	012124	CMP	#047456,TEMP
8689	*23500	001401			REQ	,+4
8690	*23502	104000			HLT	JROTATE ODD BYTE FAILED
8691	*23504	104400			SCOPE	
8692						
8693	*23506	000257			CCC	JCLEAR C
8694	*23510	012767	177777	012106	MOV	#=1,TEMP
8695	*23516	106267	012103		ASRB	TEMP+1
8696	*23522	103401			RCS	,+4
8697	*23524	104000			HLT	JC NOT SET
8698	*23526	102001			BVC	,+4
8699	*23530	104000			HLT	JV NOT CLEARED
8700	*23532	026727	012066	177777	CMP	TEMP,#=1
8701	*23540	001401			REQ	,+4
8702	*23542	104000			HLT	JSHIFT FAILED
8703	*23544	104400			SCOPE	
8704						
8705	*23546	000277			SCC	
8706	*23550	012767	177777	012046	MOV	#=1,TEMP
8707	*23556	106367	012043		ASLB	TEMP+1
8708	*23562	103401			RCS	,+4
8709	*23564	104000			HLT	JC NOT SET
8710	*23566	102001			BVC	,+4
8711	*23570	104000			HLT	JV NOT CLEARED
8712	*23572	026727	012026	177377	CMP	TEMP,#177377
8713	*23600	001401			REQ	,+4
8714	*23602	104000			HLT	JSHIFT BYTE FAILED
8715	*23604	104400			SCOPE	
8716	*23606	005067	155224		CLR	ICOUNT
8717	*23612	032767	004000	153750	BIT	#4000,SR
8718	*23620	001402			REQ	COMP2
8719	*23622	000167	001200		JMP	TS45
8720						
8721						
8722						
8723	*23626	005003			COMPARI	CLR R3
8724	*23630	005001			CLR	R1
8725	*23632	020301			CMP1	R3,R1
8726	*23634	001401			REQ	,+4
8727	*23636	104000			HLT	
8728	*23640	020327	177777		CMP	R3,#=1
8729	*23644	001403			REQ	COMP2
8730	*23646	005203			INC	R3
8731	*23650	005201			INC	R1
8732	*23652	000767			RR	COMP1
8733	*23654	104400			COMP2	SCOPE
8734						
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3734	#2366	00297			CCC		
3735	#2366	012757	020001	011736	MOV	#20001,TEMP	
3736	#2366	006067	011732		ROR	TEMP	
3737	#23672	103401			RCS	,+4	
3738	#23674	104000			HLT		
3739	#23676	00297			CCC		
3740	#23700	006167	011720		ROL	TEMP	
3741	#23704	022767	020000	011712	CMP	#20000,TEMP	
3742	#23712	001401			BEQ	,+4	
3743	#23714	104000			HLT		
3744	#23716	104400			SCOPE		
3745							
3746							
3747					,SBTTL	TEST ROTATING ALL NUMBERS	
3748	#23720	012767	023732	155136	MOV	#ROTALL,RETURN	ISET UP SCOPE LOOP RETURN
3749	#23726	005067	000124		CLR	REF	ICLEAR TEST DATA
3750	#23732	016767	000120	000120	ROTALL	MOV	REFF,TEST
3751	#23740	006067	000114		ROR	TEST	
3752	#23744	006067	000110		ROR	TEST	
3753	#23750	006067	000104		ROR	TEST	
3754	#23754	006167	000100		ROL	TEST	
3755	#23760	006167	000074		ROL	TEST	
3756	#23764	006167	000070		ROL	TEST	
3757	#23770	102004			BPL	,+12	
3758	#23772	103007			BCC	,+20	IZ=1
3759	#23774	102013			BVC	,+30	IZ=1, C=1
3760	#23776	104000			HLT		IZ=C, BUT V=1
3761	#24000	000411			BR	,+24	
3762	#24002	103006			BCC	,+16	IZ=0
3763	#24004	102407			BVS	,+20	IZ=0, C=1
3764	#24006	104000			HLT		IZ NOT EQUAL C, V=1
3765	#24010	000405			BR	,+14	
3766	#24012	102404			BVS	,+12	IZ=1, C=0
3767	#24014	104000			HLT		IZ NOT EQUAL C, V=1
3768	#24016	000402			BR	,+6	
3769	#24020	102001			BVC	,+4	IZ=0, C=0
3770	#24022	104000			HLT		IZ=C, BUT V=1
3771	#24024	026767	000030	000024	CMP	TEST,REFF	
3772	#24032	001401			BEQ	,+4	
3773	#24034	104000			HLT		INITIAL NOT EQUAL TO STACKAL
3774	#24036	104400			SCOPE		
3775	#24040	012767	023732	155016	MOV	#ROTALL,RETURN	
3776	#24046	005267	000004		INC	REFF	
3777	#24052	001327			BNE	ROTALL	
3778	#24054	000402			BR	TSRT2A	
3779	#24056	000000			REFF	?	
3780	#24060	000000			TEST	?	
3781		024056			REF=REFF		
3782							
3783					,SBTTL	TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS	
3784							
3785	#24062	005067	177770		TSRT2A	CLR	REFF
3786	#24066	012767	024074	154770	MOV	#ROTBE,RETURN	
3787	#24074	016767	177756	177756	ROTBE	MOV	REFF,TEST

3788	#24102	106067	177792		RORB	TEST	IROTATE BYTE EVEN
3789	#24106	106067	177746		RORB	TEST	
3790	#24112	106067	177742		RORB	TEST	
3791	#24116	106167	177736		ROLB	TEST	
3792	#24122	106167	177732		ROLB	TEST	
3793	#24126	106167	177726		ROLB	TEST	
3794	#24132	100004			BPL	,+12	
3795	#24134	103007			BCC	,+20	IZ=1
3796	#24136	102013			BVC	,+30	IZ=1, C=1
3797	#24140	104000			HLT		IZ=C, BUT V=1
3798	#24142	000411			BR	,+24	
3799	#24144	103006			BCC	,+16	IZ=0
3800	#24146	102407			BVS	,+20	IZ=0, C=1
3801	#24150	104000			HLT		IZ NOT EQUAL C, V=1
3802	#24152	000405			BR	,+14	
3803	#24154	102404			BVS	,+12	IZ=1, C=0
3804	#24156	104000			HLT		IZ NOT EQUAL C, V=1
3805	#24160	000402			BR	,+6	
3806	#24162	102001			BVC	,+4	IZ=0, C=0
3807	#24164	104000			HLT		IZ=C, BUT V=1
3808	#24166	026767	177666	177662	CMP	TEST,REFF	
3809	#24174	001401			BEQ	,+4	
3810	#24176	104000			HLT		
3811	#24200	106067	177655		ROTBO	RORB	TEST+1
3812	#24204	106067	177651		RORB	TEST+1	IROTATE BYTE ODD
3813	#24210	106067	177645		RORB	TEST+1	
3814	#24214	106167	177641		ROLB	TEST+1	
3815	#24220	106167	177635		ROLB	TEST+1	
3816	#24224	106167	177631		ROLB	TEST+1	
3817	#24230	100004			BPL	,+12	
3818	#24232	103007			BCC	,+20	IZ=1
3819	#24234	102013			BVC	,+30	IZ=1, C=1
3820	#24236	104000			HLT		IZ=C, BUT V=1
3821	#24240	000411			BR	,+24	
3822	#24242	103006			BCC	,+16	IZ=0
3823	#24244	102407			BVS	,+20	IZ=0, C=1
3824	#24246	104000			HLT		IZ NOT EQUAL C, V=1
3825	#24250	000405			BR	,+14	
3826	#24252	102404			BVS	,+12	IZ=1, C=0
3827	#24254	104000			HLT		IZ NOT EQUAL C, V=1
3828	#24256	000402			BR	,+6	
3829	#24260	102001			BVC	,+4	IZ=0, C=0
3830	#24262	104000			HLT		IZ=C, BUT V=1
3831	#24264	026767	177570	177564	CMP	TEST,REFF	
3832	#24272	001401			BEQ	,+4	
3833	#24274	104000			HLT		
3834	#24276	104400			SCOPE		
3835	#24300	012767	024074	154556	MOV	#ROTBE,RETURN	
3836	#24306	005267	177544		INC	REF	
3837	#24312	001270			BNE	ROTBE	
3838							
3839					,SBTTL	TEST ADD AND SUBTRACT ALL NUMBERS AGAINST FIXED NUMBERS	
3840							
3841					IA+B=C, C=A+B, BF SHOULD EQUAL BI		

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3842
3843 *24314 011607 000066 TSTAR11 MOV #SP,NUMA
3844 *24320 012767 024332 154536 MOV #ADSUB,RETURN
3845 *24326 005067 177524 CLR REFF
3846 *24332 016767 177520 ADSUB1 MOV REF,TEST
3847 *24340 066767 000042 177512 ADD NUMA,TEST
3848 *24346 166767 000034 177504 SUB NUMA,TEST
3849 *24354 026767 177476 CMP REF,TEST
3850 *24302 001401 BEQ ,+4
3851 *24304 104000 HLT
3852 *24306 104400 SCOPE
3853 *24370 012767 024332 154466 MOV #ADSUB,RETURN
3854 *24376 005267 177494 INC REFF
3855 *24402 001353 BNE ADSUB
3856 *24404 000402 RR TCOMA
3857 *24406 000000 NUMA1 0
3858 *24410 104400 ARIEND1 SCOPE
3859
3860 ,SBTTL TEST COMPLIMENTING ALL NUMREPS
3861
3862 *24412 012767 024430 154444 TCOMA1 MOV #TCOM,RETURN
3863 *24420 005067 011200 CLR TEMP
3864 *24424 005067 011200 CLR TEMP+4
3865 *24430 005167 011170 TCOM1 COM TEMP
3866 *24434 005367 011170 DEC TEMP+4
3867 *24440 026767 011100 011102 CMP TEMP,TEMP+4
3868 *24446 001401 BEQ ,+4
3869 *24450 104000 HLT
3870 *24452 104400 SCOPE
3871 *24454 012767 024430 154402 MOV #TCOM,RETURN
3872 *24462 005167 011136 COM TEMP
3873 *24466 005267 011132 INC TEMP
3874 *24472 001356 BNE TCOM
3875
3876 ,SBTTL TEST COMB (EVEN BYTE)
3877
3878 *24474 005067 011124 CLR TEMP
3879 *24480 005067 011124 CLR TEMP+4
3880 *24504 012767 024512 154352 TCOM2 MOV #TCOM2,RETURN
3881 *24512 105167 011106 TCOM2 COMB TEMP
3882 *24516 005367 011106 DEC TEMP+4
3883 *24522 126767 011076 011100 CMPB TEMP,TEMP+4
3884 *24530 001401 BEQ ,+4
3885 *24532 104000 HLT
3886 *24534 104400 SCOPE
3887 *24536 012767 024512 154320 MOV #TCOM2,RETURN
3888 *24544 105167 011094 COMB TEMP
3889 *24550 105267 011090 INCB TEMP
3890 *24554 001356 BNE TCOM2
3891
3892 ,SBTTL TEST COMB (ODD BYTE)
3893
3894 *24556 005067 011042 CLR TEMP
3895 *24562 005067 011042 CLR TEMP+4
  
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3896 *24566 012767 024574 154270 TCOM3 MOV #TCOM3,RETURN
3897 *24574 105167 011025 COMB TEMP+1
3898 *24600 005367 011024 DEC TEMP+4
3899 *24604 126767 011015 011016 CMPB TEMP+1,TEMP+4
3900 *24612 001401 BEQ ,+4
3901 *24614 104000 HLT
3902 *24616 104400 SCOPE
3903 *24620 012767 024574 154236 MOV #TCOM3,RETURN
3904 *24626 105167 010773 COMB TEMP+1
3905 *24632 105267 010767 INCB TEMP+1
3906 *24636 001356 BNE TCOM3
3907 *24640 012767 024646 154216 MOV #TSCOM1,RETURN
3908
3909 ,SBTTL TEST COMPARE ALL VALUE EVEN BYTE WITH ODD
3910
3911 *24646 005067 010752 TSCOM1 CLR TEMP
3912 *24652 126767 010746 010745 TSCOMB1 CMPB TEMP,TEMP+1
3913 *24660 001401 BEQ ,+4
3914 *24662 104000 HLT
3915 *24664 002001 BGE ,+4
3916 *24666 104000 HLT
3917 *24670 003401 BLE ,+4
3918 *24672 104000 HLT
3919 *24674 062767 000401 010722 ADD #401,TEMP
3920 *24702 022767 177777 010714 CMP #=1,TEMP
3921 *24710 001350 BNE TSCOMB
3922 *24712 104400 SCOPE
3923
3924 ,SBTTL TEST SWAB
3925
3926 *24714 012767 000200 177136 MOV #0200,TEST
3927 *24722 000367 177132 SWAB TEST
3928 *24726 100001 RPL ,+4
3929 *24730 104000 HLT
3930 *24732 001401 BEQ ,+4
3931 *24734 104000 HLT
3932 *24736 000367 177116 SWAB TEST
3933 *24742 100401 BMI ,+4
3934 *24744 104000 HLT
3935 *24746 001001 BNE ,+4
3936 *24750 104000 HLT
3937 *24752 104400 SCOPE
3938 *24754 005037 001036 CLR #ICOUNT
3939
3940 ,SBTTL TEST ALL COMBINATIONS OF SWAB
3941
3942 *24760 005067 177074 CLR TEST
3943 *24764 005067 177066 CLR REF
3944 *24770 000367 177064 SWABA1 SWAB TEST
3945 *24774 026767 177060 177054 CMP TEST,REF
3946 *25002 001401 BEQ ,+4
3947 *25004 104000 HLT
3948 *25006 000367 177046 SWAB TEST
3949 *25012 005267 177040 INC REF
  
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3950 *25016 105267 177037 INCB TEST*1 JINC TEST NUMBER
3951 *25022 101362 RNE SWABA LOOP TILL DONE
3952 *25024 104400 SCOPE
3953
3954 *25026 032767 000002 154026 TS451 RIT #2,CONFIG JIF PROCESSOR IS NOT
3955 *25034 001002 RNE XOR1 JPDOP-11/40 OR 45
3956 *25036 000167 002922 JMP ENDPRO JEXIT PROCESSOR TEST
3957
3958 ,SBTTL PDP-11/40,45 INSTRUCTION TESTS
3959
3960 ,SBTTL TEST XOR INSTRUCTION
3961
3962 *25042 012702 000010 XOR11 MOV #10,R2 ISET UP INDEX REGISTER
3963 *25046 012701 052525 MOV #52525,R1 ILOAD SOURCE OPERAND
3964 *25052 012767 177777 010544 MOV #=-1,TEMP ILOAD DESTINATION OPERAND
3965 *25060 074162 035614 XOR R1,C(R2) IXOR SOURCE,DEST,
3966 *25064 022767 125252 010532 CMP #125252,TEMP
3967 *25072 001401 BEQ ,+4
3968 *25074 104000 HLT
3969 *25076 104400 SCOPE
3970
3971 ,SBTTL TEST XOR USING INDEX DEFERRED
3972
3973 *25100 012701 125252 MOV #125252,R1 ILOAD SOURCE OPERAND
3974 *25104 012702 000010 MOV #10,R2 ILOAD INDEX REGISTER
3975 *25110 012767 035624 010476 MOV #TEMP,C ISET UP DEFERRED ADDRESS
3976 *25116 012767 035634 010500 MOV #0,TEMP ISET UP FINAL ADDRESS (D)
3977 *25124 012767 177777 010502 MOV #=-1,D ILOAD DESTINATION OPERAND
3978 *25132 074172 035614 XOR R1,C(R2)
3979 *25136 022767 052525 010470 CMP #52525,D ICORRECT RESULT?
3980 *25144 001401 BEQ ,+4
3981 *25146 104000 HLT IXOR =-1,125252 FAILED
3982 *25150 104400 SCOPE
3983
3984 ,SBTTL TEST SOB FOR BRANCH
3985
3986 *25152 000401 SOB21 BR SOB1
3987 *25154 000404 SOB21 BR SOB3
3988 *25156 012701 000010 SOB11 MOV #10,R1
3989 *25162 077104 SOB SOB R1,SOB2
3990 *25164 104000 HLT
3991 *25166 104400 SOB31 SCOPE
3992
3993 ,SBTTL TEST SOB FOR NO BRANCH
3994
3995 *25170 000402 SOB51 BR SOB4
3996 *25172 104000 HLT
3997 *25174 000403 SOB51 BR SOB6
3998 *25176 012701 000001 SOB41 MOV #1,R1
3999 *25202 077105 SOB SOB R1,SOB5
4000 *25204 104400 SOB61 SCOPE
4001
4002 ,SBTTL TEST MARK INSTRUCTION
4003
  
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4004
4005 *25206 012706 036920 MOV #STACK,SP JINITIALIZE STACK POINTER
4006 *25212 005001 CLR R1
4007 *25214 012746 000007 MOV #7,=(SP)
4008 *25220 012746 000001 MOV #1,=(SP) JPUSH A PARAMETER ON THE STACK
4009 *25224 012746 006401 MOV #MARK1,=(SP) JPUSH MARK1 ON THE STACK
4010 *25230 010605 MOV SP,R5 ILOAD PARAMETER POINTER
4011 *25232 004767 000002 JSR MARK0 IGO TO SUBROUTINE
4012 *25236 000403 BR MARK0A
4013 *25240 016501 000002 MARK01 MOV 2(R5),R1 IGET THE PARAMETER
4014 *25244 000205 RTS R5 IEXIT SUBROUTINE
4015 *25246 022701 000001 MARK0A1 CMP #1,R1 IIDID SUBROUTINE GET THE PARAMETER
4016 *25252 001401 BEQ ,+4
4017 *25254 104000 HLT JERROR! SUBROUTINE DID NOT GET PUSHED PARAMETER
4018 *25256 022706 036920 CMP #STACK,SP IIS STACK POINTER CORRECT?
4019 *25262 001401 BEQ ,+4
4020 *25264 104000 HLT
4021 *25266 022705 000007 CMP #7,R5 IIS R5 CORRECT?
4022 *25272 001401 BEQ ,+4
4023 *25274 104000 HLT JERROR! MARK DID NOT LOAD R5
4024 *25276 104400 SCOPE
4025
4026 ,SBTTL TEST THE SXT INSTRUCTION
4027
4028 *25300 012702 000010 MOV #10,R2 ISET UP INDEX REGISTER
4029 *25304 012767 177777 010312 MOV #=-1,TEMP
4030 *25312 000297 CCC ICLEAR ALL CONDITION CODES
4031 *25314 006762 035614 SXT C(R2) IEXTEND 0'S INTO TEMP [C(R2)]
4032 *25320 005767 010300 TST TEMP
4033 *25324 001401 BEQ ,+4
4034 *25326 104000 HLT JERROR! 0'S DID NOT EXTEND INTO TEMP
4035 *25330 104400 SCOPE
4036
4037 *25332 005007 010266 CLR TEMP
4038 *25336 000277 SCC
4039 *25340 006767 010260 SXT TEMP ISET ALL CONDITION CODES
4040 *25344 022767 177777 010252 CMP #=-1,TEMP IEXTEND 1'S INTO TEMP
4041 *25352 001401 BEQ ,+4
4042 *25354 104000 HLT
4043 *25356 104400 SCOPE
4044
4045 ,SBTTL TEST THE RTT INSTRUCTION
4046
4047 *25360 012706 036920 MOV #STACK,SP IRESET THE STACK POINTER
4048 *25364 016702 152406 MOV PS,R2 ISET UP THE STACK
4049 *25370 010246 MOV R2,=(SP)
4050 *25372 012746 025404 MOV #RTTA,=(SP)
4051 *25376 000006 RTT
4052 *25400 104000 HLT JERROR! RTT FAILED
4053 *25402 000405 RR RTTB IGO TO SCOPE
4054 *25404 016701 152366 RTTA1 MOV PS,R1 IGET STATUS WORD
4055 *25410 020201 CMP R2,R1 ICORRECT STATUS?
4056 *25412 001401 BEQ RTTB
4057 *25414 104000 HLT JERROR! INCORRECT STATUS
  
```

4058	*25416	104400		RTTB1	SCOPE	
4059						
4060						
4061	*25420	132757	000001	153435	BITB	#1,CONFIG+1
4062	*25426	001002			BNE	MUL1
4063	*25430	000167	001374		JMP	MANAG1
4064						
4065						
4066						
4067	*25434	005003			MUL11	CLR R3
4068	*25436	012702	000005		MOV	#5,R2
4069	*25442	012704	000010		MOV	#10,R4
4070	*25446	012767	000002	*10150	MOV	#2,TEMP
4071	*25454	000277			SCC	
4072	*25456	070274	035616		MUL	@C+2(R4),R2
4073	*25462	016701	152310		MOV	PS,R1
4074	*25466	032701	000017		BIT	#17,R1
4075	*25472	001401			BEQ	,+4
4076	*25474	104000			HLT	
4077	*25476	022703	000012		CHP	#12,R3
4078	*25502	001401			BEQ	,+4
4079	*25504	104000			HLT	
4080	*25506	005702			TST	R2
4081	*25510	001401			REQ	,+4
4082	*25512	104000			HLT	
4083	*25514	104400			SCOPE	
4084						
4085						
4086	*25516	005003			MUL21	CLR R3
4087	*25520	012702	125252		MOV	#125252,R2
4088	*25524	012701	000010		MOV	#10,R1
4089	*25530	012767	000002	*10066	MOV	#2,TEMP
4090	*25536	070271	035616		MUL	@C+2(R1),R2
4091						
4092	*25542	016704	152230		MOV	PS,R4
4093	*25546	042704	177760		BIC	#177760,R4
4094	*25552	022704	000011		CMP	#11,R4
4095	*25556	001401			REQ	,+4
4096	*25560	104000			HLT	
4097	*25562	022702	177777		CMP	#+1,R2
4098	*25566	001401			REQ	,+4
4099	*25570	104000			HLT	
4100	*25572	022703	052524		CMP	#52524,R3
4101	*25576	001401			BEQ	,+4
4102	*25600	104000			HLT	
4103	*25602	104400			SCOPE	
4104						
4105						
4106						
4107	*25604	012767	000001	*10012	ASH11	MOV #1,TEMP
4108	*25612	012705	000010		MOV	#10,R5
4109	*25616	016702	007750		MOV	B,R2
4110	*25622	052767	000014	152146	BIS	#14,PS
4111	*25630	072275	035616		ASH	@C+2(R5),R2

4112						
4113	*25634	016701	152136		MOV	PS,R1
4114	*25640	042701	177760		BIC	#177760,R1
4115	*25644	022701	000003		CMP	#3,R1
4116	*25650	001401			BEQ	,+4
4117	*25652	104000			HLT	
4118	*25654	022702	052524		CMP	#52524,R2
4119	*25660	001401			BEQ	,+4
4120	*25662	104000			HLT	
4121	*25664	104400			SCOPE	
4122						
4123	*25666	012767	177777	*007730	ASH21	MOV #+1,TEMP
4124	*25674	012703	000010		MOV	#10,R3
4125	*25700	016701	007072		MOV	B+4,R1
4126	*25704	072173	035616		ASH	@C+2(R3),R1
4127	*25710	020127	025252		CMP	R1,#25252
4128	*25714	001401			BEQ	,+4
4129	*25716	104000			HLT	
4130	*25720	104400			SCOPE	
4131						
4132						
4133						
4134	*25722	005002			ASHC11	CLR R2
4135	*25724	012767	000070	*007672	MOV	#16,,TEMP
4136	*25732	012704	000010		MOV	#10,R4
4137	*25736	016703	007030		MOV	B,R3
4138	*25742	112767	000005	152026	MOVVB	#5,PS
4139	*25750	073274	035616		ASHC	@C+2(R4),R2
4140	*25754	016701	152016		MOV	PS,R1
4141	*25760	042701	177760		BIC	#177760,R1
4142	*25764	022701	000012		CMP	#12,R1
4143	*25770	001401			BEQ	,+4
4144	*25772	104000			HLT	
4145	*25774	022702	125252		CMP	#125252,R2
4146	*26000	001401			BEQ	,+4
4147	*26002	104000			HLT	
4148	*26004	005703			TST	R3
4149	*26006	001401			BEQ	,+4
4150	*26010	104000			HLT	
4151	*26012	104400			SCOPE	
4152						
4153	*26014	005003			ASHC21	CLR R3
4154	*26016	012767	177760	*007600	MOV	#+16,,TEMP
4155	*26024	012701	000010		MOV	#10,R1
4156	*26030	016702	007536		MOV	B,R2
4157	*26034	112767	000007	151734	MOVVB	#7,PS
4158	*26042	073271	035616		ASHC	@C+2(R1),R2
4159	*26046	016704	151724		MOV	PS,R4
4160	*26052	042704	177760		BIC	#177760,R4
4161	*26056	022704	000010		CMP	#10,R4
4162	*26062	001401			BEQ	,+4
4163	*26064	104000			HLT	
4164	*26066	022702	177777		CMP	#+1,R2
4165	*26072	001401			REQ	,+4

4166	*26074	104000		HLT			ERROR! SIGN FAILED TO EXTEND
4167	*26076	022703	125252	CMP	#125252,R3		IDID R2 SHIFT TO R3
4168	*26102	001401		REG	,+4		
4169	*26104	104000		HLT			ERROR! R2 DID NOT SWIFT INTO R3
4170	*26106	104400		SCOPE			
4171							
4172							
4173							
4174	*26110	012701	000004	DIV11	MOV #4,R1		LOAD INDEX REGISTER
4175	*26114	005032		CLR	R2		ICLEAR QUOTIENT REGISTER
4176	*26116	012703	052525	MOV	#52525,R3		LOAD LSH DIVIDEND
4177	*26122	000277		SCC			IPRE SET THE CONDITION CODES
4178	*26124	071261	035572	DIV	B(R1),R2		IDIVIDE #52525 BY 0(R1) (#52525)
4179							IQUOTIENT=I,REM=0,C=N=V=Z=0
4180	*26130	016704	151642	MOV	PS,R4		IGET THE CONDITION CODES
4181	*26134	032704	000017	BIT	#17,R4		
4182	*26140	001401		BEQ	,+4		IBRANCH IF 0
4183	*26142	104000		HLT			ERROR! INCORRECT CONDITION CODES
4184	*26144	020227	000001	CMP	R2,#1		IQUOTIENT CORRECT?
4185	*26150	001401		BEQ	,+4		IBRANCH IF THE QUOTIENT IS CORRECT
4186	*26152	104000		HLT			ERROR! INCORRECT QUOTIENT
4187	*26154	005703		TST	R3		IREMAINDER CORRECT?
4188	*26156	001401		BEQ	,+4		IBRANCH IF THE REMAINDER IS CORRECT
4189	*26160	104000		HLT			ERROR! INCORRECT REMAINDER
4190	*26162	104400		SCOPE			
4191							
4192	*26164	012703	000010	DIV21	MOV #10,R3		LOAD INDEX REGISTER
4193	*26170	012704	157777	MOV	#157777,R4		LOAD MSW DIVIDEND
4194	*26174	012705	100001	MOV	#100001,R5		LOAD LSH DIVIDEND
4195	*26200	012707	100000	MOV	#100000,TEMP		LOAD DIVISOR INTO TEMP
4196	*26206	071473	035616	DIV	0C+2(R3),R4		IDIVIDE #157777 100001 BY 100000
4197							IQUOTIENT=40000,REM=100001,C=N=V=Z=0
4198	*26212	016701	151600	MOV	PS,R1		IGET THE CONDITION CODES
4199	*26216	032701	000017	BIT	#17,R1		
4200	*26222	001401		BEQ	,+4		IBRANCH IF 0'S
4201	*26224	104000		HLT			ERROR! INCORRECT CONDITION CODES
4202	*26226	020427	040000	CMP	R4,#40000		IQUOTIENT CORRECT?
4203	*26232	001401		BEQ	,+4		IBRANCH IF THE QUOTIENT IS CORRECT
4204	*26234	104000		HLT			ERROR! INCORRECT QUOTIENT
4205	*26236	020527	100001	CMP	R5,#100001		IREMAINDER CORRECT?
4206	*26242	001401		BEQ	,+4		IBRANCH IF THE REMAINDER IS CORRECT
4207	*26244	104000		HLT			ERROR! INCORRECT REMAINDER
4208	*26246	104400		SCOPE			
4209							
4210	*26250	132767	000002	BITB	#2,CONFIG+1		IF PROCESSOR IS PDP-11/40
4211	*26256	001006		BNE	COMFIS		IF WITH FIS, EXECUTE FIS TEST
4212	*26260	132767	000004	BITB	#4,CONFIG+1		IF PROCESSOR IS PDP-11/45
4213	*26266	001121		BNE	COMFPP		IF WITH FPP, EXECUTE FPP TEST
4214	*26270	000167	000534	JMP	MANAG1		ICHECK MEMORY MANAGEMENT
4215							
4216							
4217							
4218	*26274	012704	026530	COMFIS1	MOV #FISSTK,R4		ISET STACK POINTER
4219	*26300	012744	107070	MOV	#107070,=(R4)		LOAD DATA ONTO STACK

4220	*26304	012744	134343	MOV	#134343,=(R4)		
4221	*26310	012744	065432	MOV	#065432,=(R4)		
4222	*26314	012744	032107	MOV	#032107,=(R4)		
4223	*26320	012744	123456	MOV	#123456,=(R4)		
4224	*26324	012744	045670	MOV	#045670,=(R4)		
4225	*26330	012744	125252	MOV	#125252,=(R4)		
4226	*26334	012744	135252	MOV	#135252,=(R4)		
4227	*26340	012744	016161	MOV	#016161,=(R4)		
4228	*26344	012744	040616	MOV	#040616,=(R4)		
4229	*26350	000240		NOP			
4230	*26352	075014		FSUB+	R4	1135252,125252,040616,016161=140616,017434	
4231	*26354	075034		FDIV+	R4	1045670,1234567140616,017434=145246,047065	
4232	*26356	075024		FMUL+	R4	1032107,065432=145246,047065=137201,106137	
4233	*26360	075004		FADD+	R4	1134343,107070=137201,106137=137201,115230	
4234	*26362	016767	151410	MOV	PS,ANS3		ISAVE PROCESSOR STATUS
4235	*26370	042767	000020	BIC	#20,ANS3		ICLEAR T BIT FROM RESULT
4236	*26376	012467	007466	MOV	(R4)+,ANS1		ISAVE FIRST HALF OF ANSWER
4237	*26402	012467	007464	MOV	(R4)+,ANS2		ISAVE SECOND HALF OF ANSWER
4238	*26406	010467	007464	MOV	R4,ANS4		ISAVE FINAL STACK POINTER
4239	*26412	122767	000010	CMPB	#10,ANS3		ICHECK FINAL PSW
4240	*26420	001401		BEQ	,+4		
4241	*26422	104000		HLT			IFINAL PSW INCORRECT
4242	*26424	022767	026530	CMP	#FISSTK,ANS4		ICHECK STACKPOINTER POSITION
4243	*26432	001401		BEQ	,+4		
4244	*26434	104000		HLT			ISTACK POINTER INCORRECT
4245	*26436	022767	137201	CMP	#137201,ANS1		ICHECK FIRST HALF OF ANSWER
4246	*26444	001401		BEQ	,+4		
4247	*26446	104000		HLT			IFIRST HALF OF ANSWER INCORRECT
4248	*26450	022767	115230	CMP	#115230,ANS2		ICHECK SECOND HALF OF ANSWER
4249	*26456	001401		BEQ	,+4		
4250	*26460	104000		HLT			ISECOND HALF OF ANSWER INCORRECT
4251	*26462	104400		SCOPE			
4252	*26464	000167	000340	JMP	MANAG1		
4253		026530					
4254	*26530	000000		FISSTK1	0		
4255							
4256							
4257							
4258	*26532	170127	047400	COMFPP1	LDFPS #47400		ISET DOUBLE MODE
4259	*26536	170011		SETD			LOAD ACO WITH 77777
4260	*26540	177027	077777	LDCID	#77777,AC0		LOAD AC1 WITH 2525
4261	*26544	177127	002525	LDCID	#2525,AC1		SET STEP COUNTER
4262	*26550	012702	000012	MOV	#12,R2		IDIVIDE 2525 INTO 77777
4263	*26554	174401		EXLOP1	DIVD AC1,AC0		MULTIPLY 2525 BY ANSWER
4264	*26556	171001		MULD	AC1,AC0		ADD 2525 TO ANSWER
4265	*26560	172001		ADD	AC1,AC0		SUBTRACT 2525 FROM ANSWER
4266	*26562	173001		SURD	AC1,AC0		DO 10 (DECIMAL) TIMES
4267	*26564	005302		DEC	R2		
4268	*26566	001372		BNE EXLOP			
4269	*26570	175467	007274	STCD1	AC0,ANS1		ISAVE ANSWER
4270	*26574	170200		STFPS	FPS		ISAVE FPS
4271	*26576	022767	077777	CMP	#77777,ANS1		IFIS RESULT CORRECT?
4272	*26604	001401		BEQ	,+4		IFYES= BRANCH
4273	*26606	104000		HLT			IFRESULT INCORRECT

4274	*26610	172457	007022	EX41	LDD	D1010,AC0	IGET DATA	
4275	*26614	172702	036070		MOV	#ANS1,R2		
4276	*26620	174022			STD	AC0,(R2)+		
4277	*26622	172567	007010		LDD	D1010,AC1		
4278	*26626	174122			STD	AC1,(R2)+		
4279	*26630	172767	007244		LDD	ANS5,AC3		
4280	*26634	170270			STFPS	FPS		
4281	*26636	173767	007226		CMPO	ANS1,AC3		
4282	*26642	170000			CFCC			
4283	*26644	001401			BEQ	,+4		
4284	*26646	104000			HLT		IANS1 AND ANS5 SHOULD = 1010	
4285	*26650	172567	006764		LDD	D0101,AC1		
4286	*26654	174142			STD	AC1,=(R2)		
4287	*26656	172012			ADDD	(R2),AC0		
4288	*26660	173042			SURD	=(R2),AC0		
4289	*26662	173001			SURD	AC1,AC0		
4290	*26664	175467	007200		STCDI	AC0,ANS1		
4291	*26670	122767	000000	007172	CMO	#0,ANS1		
4292	*26676	170200			STFPS	FPS		
4293	*26700	001401			BEQ	,+4		
4294	*26702	104000			HLT			
4295	*26704	170001		MORE1	SETF		ISET FLOATING MODE	
4296	*26706	177027	000525		LDDCF	#525,AC0		
4297	*26712	177127	000252		LDDCF	#252,AC1		
4298	*26716	174174			STF	AC1,AC4		
4299	*26720	172134			ADDF	AC4,AC1		
4300	*26722	172701			LDF	AC1,AC3	IADD 252 TO 252	
4301	*26724	173003			SURF	AC3,AC0	IINPUT ANSWER IN AC3= 524	
4302	*26726	175067	007136		STEXP	AC0,ANS1	I SUBTRACT 524 FROM 525	
4303	*26732	170200			STFPS	FPS	I ANSWER IN ANS1	
4304	*26734	122767	000001	007176	CMO	#1,ANS1		
4305	*26742	001401			BEQ	,+4	I CORRECT ANSWER SHOULD BE 1	
4306	*26744	104000			HLT			
4307	*26746	177027	000021		LDDCF	#21,AC0	I FPP ANSWER INCORRECT	
4308	*26752	171000			MULF	AC0,AC0	I AC0=21X21=441	
4309	*26754	174427	040400		DIVF	#2,AC0	I DIVIDE BY 2	
4310	*26760	171427	040200		MODF	#1,AC0	I GET INTEGER	
4311	*26764	170200			STFPS	FPS		
4312	*26766	175067	007076		STCFI	AC1,ANS1		
4313	*26772	122767	000220	007070	CMO	#220,ANS1	I CHECK ANSWER (INTEGER PART)	
4314	*27000	001401			BEQ	,+4		
4315	*27002	104000			HLT		I ANSWER INCORRECT	
4316	*27004	171427	041040		MODF	#10,,AC0	I GET FRACTION	
4317	*27010	175067	007054		STCFI	AC1,ANS1		
4318	*27014	122767	000005	007046	CMO	#5,ANS1	I FRACTION CORRECT?	
4319	*27022	001401			BEQ	,+4	I YES= BRANCH	
4320	*27024	104000			HLT		I FRACTIONAL PORTION INCORRECT	
4321	*27026	104400			SCOPE			
4322								
4323	*27030	122767	000003	152024	MANAG11	CMPO	#3,CONFIG	I IF PROCESSOR IS PDP-11/45
4324	*27036	001401			BEQ	MTPD1	I EXECUTE THESE TESTS	
4325	*27040	132767	000010	152015		BITB	#10,CONFIG+1	I IF PROCESSOR IS PDP-11/40
4326	*27046	001002			RNE	MTPD1	I AND HAS MEMORY MANAGEMENT	
4327	*27050	000167	000510		JMP	ENDPRO	I OPTION, EXECUTE THESE TESTS	

4328							
4329							
4330							
4331	*27054	112767	035624	006544	MTPD11	MOV	#TEMP,TEMP+2
4332	*27062	005001				CLR	R1
4333	*27064	112706	036020			MOV	#STACK,SP
4334	*27070	112746	177777			MOV	#1,=(SP)
4335	*27074	005066	000002			CLR	2(SP)
4336	*27100	005067	006020			CLR	TEMP
4337	*27104	000257				CCC	
4338	*27106	116703	150664			MOV	PS,R3
4339	*27112	152703	000011			BIS	#11,R3
4340	*27116	000261				SEC	
4341	*27120	106671	035626			MTPD	#TEMP+2(R1)
4342	*27124	116702	150666			MOV	PS,R2
4343	*27130	120302				CMO	R3,R2
4344	*27132	001401				BEQ	,+4
4345	*27134	104000				HLT	
4346							
4347	*27136	126727	006462	177777		CMO	TEMP,#1
4348	*27144	001401				BEQ	,+4
4349	*27146	104000				HLT	
4350	*27150	122776	036520			CMO	#STACK,SP
4351	*27154	001401				BEQ	,+4
4352	*27156	104000				HLT	
4353	*27160	104400				SCOPE	
4354							
4355							
4356							
4357	*27162	112706	036520			MOV	#STACK,SP
4358	*27166	112716	177777			MOV	#1,(SP)
4359	*27172	112766	177777	177776		MOV	#1,#2(SP)
4360	*27200	005067	006420			CLR	TEMP
4361	*27204	005002				CLR	R2
4362	*27206	112767	035624	006420		MOV	#TEMP,TEMP+10
4363	*27214	000257				CCC	
4364	*27216	000262				SEV	
4365	*27220	106572	035634			MFPD	#TEMP+10(R2)
4366	*27224	016701	150546			MOV	PS,R1
4367	*27230	142701	177700			BIC	#177760,R1
4368	*27234	122701	000004			CMO	#4,R1
4369	*27240	001401				BEQ	,+4
4370	*27242	104000				HLT	
4371	*27244	122767	177777	007246		CMO	#1,STACK
4372	*27252	001401				BEQ	,+4
4373	*27254	104000				HLT	
4374	*27256	005767	007234			TST	STACK#2
4375	*27262	001401				BEQ	,+4
4376	*27264	104000				HLT	
4377	*27266	122776	036516			CMO	#STACK#2,SP
4378	*27272	001401				BEQ	,+4
4379	*27274	104000				HLT	
4380	*27276	104400				SCOPE	
4381							


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4382 *27300 *32767 000001 151554 BIT #1,CONFIG JIF PROCESSOR IS NOT PDP-11/45
4383 *27306 *01526 REC ENDPRO JEXIT PROCESSOR TEST
4384
4385 ,SBTTL TEST THE SPL INSTRUCTION
4386
4387 *27310 *02767 000340 150460 BIC #340,PS JCLEAR PRIORITY LEVEL BITS IF SET
4388 *27316 *00277 SCC JSET PRIORITY LEVEL #7
4389 *27320 *16702 150452 MOV PS,R2 ISET CONDITION CODES
4390 *27324 *05272 000340 BIS #340,R2
4391 *27330 *00277 SCC
4392 *27332 *00237 SPL JSET CONDITION CODES
4393 *27334 *16701 150436 MOV PS,R1 ISET PRIORITY LEVEL #7
4394 *27340 *32781 140000 BIT #UM,R1 IGET STATUS WORD
4395 *27344 *01402 BEQ ,+6 IKERNEL MODE?
4396 *27346 *02702 000340 BIC #340,R2 IBRANCH IF KERNEL MODE
4397 *27352 *02021 R2,R1 ISPL IS A /NOP/ IN SUPERVISORY & USER MODE
4398 *27354 *01401 BEQ ,+4 IHWAS PRIORITY LEVEL SET INTO STATUS
4399 *27356 *10400 HLT I(KERNEL:MODE ONLY)
4400 *27360 *02767 000340 150410 RIC #340,PS IERROR! SPL FAILED TO SET PRIORITY = 7
4401 *27366 *10440 SCOPE
4402
4403 ,SBTTL TEST PIRQ HARDWARE
4404
4405 ITHIS TEST REQUESTS AN INTERRUPT AT LEVEL 3, THE
4406 INITIAL PROCESSOR PRIORITY IS AT LEVEL 7 AND IS SUCCESSIVELY LOWERED
4407 UNTIL THE PROCESSOR PRIORITY IS LESS THAN THE REQUEST
4408 ILEVEL AT WHICH TIME THE INTERRUPT REQUEST SHOULD BE HONORED.
4409 *27370 *01270 036520 MOV #STACK,SP ISET STACK POINTER
4410 *27374 *16701 150376 MOV PS,R1 ISAVE PROCESSOR STATUS
4411 *27400 *04201 177757 BIC #177757,R1 IEXTRACT T BIT
4412 *27404 *11267 000340 MOV #340,PS ISET PROCESSOR PRIORITY LEVEL #7
4413 *27412 *01267 004000 MOV #400,PIRQ IREQUEST AN INTERRUPT AT LEVEL 3
4414 *27420 *02267 004146 150344 CMP #4146,PIRQ IHWAS PIRQ REG LOADED PROPERLY
4415 *27426 *001402 BEQ ,+6
4416 *27430 *104000 HLT IERROR! PIRQ NOT LOADED PROPERLY
4417 *27432 *00442 BR PIRQEX JEXIT TEST
4418 *27434 *01267 027532 150576 MOV #PIRQA,PIRVEC ILOAD INT, REQUEST VECTOR
4419 *27442 *016707 150330 150572 MOV PS,PIRLVL
4420 *27450 *00240 NOP
4421 *27452 *11267 000300 150316 MOV #300,PS ILOWER PRIORITY TO LEVEL 6
4422 *27460 *00240 NOP
4423 *27462 *11267 000240 150306 MOV #240,PS ILOWER PRIORITY TO LEVEL 5
4424 *27470 *00240 NOP
4425 *27472 *11267 000200 150276 MOV #200,PS ILOWER PRIORITY TO LEVEL 4
4426 *27500 *00240 NOP
4427 *27502 *11267 000140 150266 MOV #140,PS ILOWER PRIORITY TO LEVEL 3
4428 *27510 *00240 NOP
4429 *27512 *12707 027536 150520 MOV #PIRQB,PIRVEC IREPOSITION VECTOR
4430 *27520 *11267 000100 150250 MOV #100,PS ILOWER PRIORITY TO LEVEL 2 AN INTERRUPT
4431 I SHOULD OCCUR
4432 *27526 *104000 HLT IERROR! INTERRUPT FAILED
4433 *27530 *00403 BR PIRQEX IGO TO EXIT
4434 *27532 *104000 PIRQA HLT IERROR! AN INTERRUPT OCCURRED WHEN
4435 IPROCESSOR PRIORITY >REQUEST LEVEL
  
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4436 *27534 *000401 BR PIRQEX IGO TO EXIT
4437 *27536 *00240 PIRQB NOP
4438 *27540 *005067 150226 PIRQEX CLR PIRQ IRESTORE VECTOR
4439 *27544 *01267 000242 150466 MOV #242,PIRVEC
4440 *27552 *005067 150464 CLR PIRLVL
4441 *27556 *110107 150214 MOV R1,PS
4442 *27562 *104400 SCOPE
4443
4444 *27564 *005767 000000 ENDPRO1 TST PFLAG ISET WHEN POWER FAILS
4445 *27570 *001404 REC WAITS IEXECUTE WAIT TEST
4446 *27572 *005067 005772 CLR PFLAG ICLEAR FLAG FOR NEXT POWER FAIL
4447 *27576 *000107 152550 JMP ST IRESTART PROGRAM AND DEVICES
4448
4449 ,SBTTL TEST OF WAIT (TRACE TRAPS)
4450
4451 *27602 *005067 151230 WAITS1 CLR ICOUNT
4452 *27606 *02267 000006 004174 CMP #6,TRTRET JIF 11/45, BYPASS THIS CODE
4453 *27614 *001414 BEQ WAITS1
4454 *27616 *104400 SCOPE
4455 *27620 *01267 000100 151210 MOV #100,ICOUNT
4456 *27626 *032767 000020 150142 RIT #20,PS IIS TRACE BIT SET
4457 *27634 *001404 BEQ WAITS IBRANCH IF NOT FOUND
4458 *27636 *000001 WAIT ITRACE SHOULD PASS US
4459 *27640 *000001 WAIT ITHROUGH THE WAIT INSTRUCTION
4460 *27642 *000001 WAIT
4461 *27644 *000001 WAIT
4462 *27646 *104400 WAIT3 SCOPE
4463
4464 ,SBTTL TEST TO SEE IF I/O DEVICES WERE SELECTED
4465
4466 *27650 *016705 151170 MOV SR1,R5 IGET FIRST DEVICE SELECTION REGISTER
4467 *27654 *005105 COM R5
4468 *27656 *032705 173754 BIT #173754,R5 IIF NO INTERRUPTING DEVICES
4469 *27662 *001014 BNE WAIT1 ICHECK NEXT SR
4470 *27664 *016705 151150 MOV SR2,R5 IGET SECOND DEVICE SELECTION REGISTER
4471 *27670 *005105 COM R5
4472 *27672 *032705 144637 BIT #144637,R5 IIF NO INTERRUPTING DEVICES SELECTED
4473 *27676 *001006 BNE WAIT1 ICHECK NEXT SR
4474 *27700 *016705 151144 MOV SR3,R5 IGET THIRD DEVICE SELECTION REGISTER
4475 *27704 *005105 COM R5
4476 *27706 *032705 000000 BIT #0,R5 IIF NO INTERRUPTING DEVICES SELECTED
4477 *27712 *001407 BEQ WAIT4 IBRANCH IF NO DEVICES SELECTED
4478 *27714 *01267 000100 151114 WAIT11 MOV #100,ICOUNT
4479 *27722 *000001 WAIT
4480 *27724 *000001 WAIT IINTERRUPTS WILL OCCUR
4481 *27726 *000001 WAIT IIF DEVICES ARE SELECTED
4482 *27730 *000001 WAIT
4483 *27732 *104400 WAIT4 SCOPE
4484 *27734 *012737 004000 001036 MOV #4000,ICOUNT
4485
4486 *27742 *036727 151100 000100 BIT SR2,#100
4487 *27750 *001402 BEQ ,+6
4488 *27752 *000107 000364 JMP ENDEAE
4489
  
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4490 ,SBTTL TEST KE11=A (PDP=11/20) LEFT SHIFT
4491
4492 *27756 012777 000000 151240 MOV #0,@MQ JLOAD MQ WITH 0
4493 *27764 012777 125252 151234 MOV #125252,@AC JLOAD AC WITH 125252
4494 *27772 012777 177760 151242 MOV #16,@LSH JLOAD SHIFT COUNT (LSH) WITH #16
4495 *300000 022777 000000 151220 CMP #0,@AC JCOMPARE AC WITH 0
4496 *300006 001401 REQ ,+4 JGO TO ERROR IF BAD
4497 *300010 104000 HLT JHALT ON ERROR
4498 *300012 022777 125252 151204 CMP #125252,@MQ JCOMPARE MQ WITH 125252
4499 *300020 001401 REQ ,+4 JGO TO ERROR IF BAD
4500 *300022 104000 HLT
4501 *300024 122777 000020 151200 CMPB #20,@SRE JCOMPARE SR WITH 2
4502 *300032 001401 REQ ,+4 JSKIP ERROR IF GOOD
4503 *300034 104000 HLT JHALT ON ERROR (LEFT SHIFT)
4504 *300036 104400 SCOPE
4505
4506 ,SBTTL TEST KE11=A (PDP=11/20) RIGHT SHIFT
4507
4508 *300040 012777 000000 151156 MOV #0,@MQ JLOAD MQ WITH 0
4509 *300046 012777 177777 151152 MOV #1,@AC JLOAD AC WITH #1
4510 *300054 012777 000020 151162 MOV #16,@ASH JLOAD SHIFT COUNT (ASH) WITH #16
4511 *300062 022777 100000 151136 CMP #100000,@AC JCOMPARE AC WITH 100000
4512 *300070 001401 REQ ,+4 JSKIP ERROR IF GOOD
4513 *300072 104000 HLT JHALT ON ERROR
4514 *300074 022777 000000 151122 CMP #0,@MQ JCOMPARE MQ WITH 0
4515 *300082 001401 REQ ,+4 JSKIP ERROR IF GOOD
4516 *300084 104000 HLT JHALT ON ERROR
4517 *300086 122777 000110 151116 CMPB #110,@SRE JCOMPARE SR WITH 10
4518 *300094 001401 REQ ,+4 JSKIP ERROR IF GOOD
4519 *300096 104000 HLT JHALT ON ERROR (RIGHT SHIFT)
4520 *300100 104400 SCOPE
4521
4522 ,SBTTL TEST KE11=A (PDP=11/20) NORMALIZE
4523
4524 *300122 012777 125252 151074 MOV #125252,@MQ JLOAD MQ WITH 125252
4525 *300130 012777 170000 151070 MOV #170000,@AC JLOAD AC WITH 170000
4526 *300136 005077 151076 CLR @NOR JSTART NORMALIZE
4527 *300142 022777 100005 151056 CMP #100005,@AC JCOMPARE AC WITH 100005
4528 *300150 001401 REQ ,+4 JSKIP ERROR IF GOOD
4529 *300152 104000 HLT JHALT ON ERROR
4530 *300154 022777 052520 151042 CMP #52520,@MQ JCOMPARE MQ WITH 52520
4531 *300162 001401 REQ ,+4 JSKIP ERROR IF GOOD
4532 *300164 104000 HLT JHALT ON ERROR
4533 *300166 122777 000003 151034 CMPB #3,@SC JCOMPARE SC WITH 3
4534 *300174 001401 REQ ,+4 JSKIP ERROR IF GOOD
4535 *300176 104000 HLT JHALT ON ERROR (NORMALIZE)
4536 *300200 104400 SCOPE
4537
4538 ,SBTTL TEST KE11=A (PDP=11/20) MULTIPLY AND DIVIDE BACK TO BACK
4539
4540 *300202 012777 052525 151014 MOV #52525,@MQ
4541 *300210 012777 040000 151016 MOV #40000,@MUL
4542 *300216 012777 040000 151012 MOV #40000,@DIV
4543 *300224 012777 040000 151002 MOV #40000,@MUL
  
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4544 *300232 012777 040000 150776 MOV #40000,@DIV
4545 *300240 012777 040000 150766 MOV #40000,@MUL
4546 *300246 012777 040000 150762 MOV #40000,@DIV
4547 *300254 012777 040000 150752 MOV #40000,@MUL
4548 *300262 012777 040000 150746 MOV #40000,@DIV
4549 *300270 012777 040000 150736 MOV #40000,@MUL
4550 *300276 012777 040000 150732 MOV #40000,@DIV
4551 *300304 022777 052525 150712 CMP #52525,@MQ
4552 *300312 001401 REQ ,+4
4553 *300314 104000 HLT
4554 *300316 005777 150704 TST @AC
4555 *300322 001401 REQ ,+4
4556 *300324 104000 HLT
4557 *300326 122777 000022 150676 CMPB #22,@SRE JCHECK PS 21
4558 *300334 001401 REQ ,+4
4559 *300336 104000 HLT
4560 *300340 104400 SCOPE
4561 *300342 ENDEAEI
4562
4563 ,SBTTL TEST M792YA PAPER TAPE BOOTSTRAP LOADER
4564
4565 *300342 032767 010000 150476 M792YA1 BIT #10000,SR2 JIF SR2 BIT 12 =1, DO NOT
4566 *300350 001041 RNE M792YB JTEST M792YA
4567
4568 JTEST OF M792YA
4569
4570 *300352 005000 CLR R0 JSET UP TO GENERATE CHECKSUM
4571 *300354 005001 CLR R1
4572 *300356 012702 173000 MOV #173000,R2 JFIRST WORD OF M792YA
4573 LOCATED AT 773000
4574 *300362 062200 M792A11 ADD (R2)+,R0 JGENERATE CHECKSUM
4575 *300364 005501 ADC R1
4576 *300366 022702 173100 CMP #173100,R2 JIF NOT END OF BOOT
4577 *300372 001373 RNE M792A1 JCONTINUE
4578 *300374 022737 010712 173014 CMP #10712,@#173#14 J2 VERSIONS
4579 *300402 001010 RNE M792A3
4580 *300404 020027 067715 R0,#67715
4581 *300410 001003 RNE M792A2 JCHECKSUM INCORRECT
4582 *300412 020127 000010 R1,#10
4583 *300416 001415 R0 M792A5 JCHECK SUM CORRECT
4584 *300420 104000 M792A21 HLT ERROR IN M792YA
4585 *300422 000413 BR M792A5 JSCOPE
4586 *300424 022737 005012 173014 M792A31 CMP #5012,@#173014 JIS IT OTHER VERSION
4587 *300432 001006 RNE M792A4 JNOT M792YA
4588 *300434 020027 172735 R0,#172735 JCHECKSUM LOW ORDER
4589 *300440 001003 RNE M792A4
4590 *300442 020127 000010 CMP R1,#10
4591 *300446 001401 REQ M792A5
4592 *300450 104000 HLT JCHECKSUM ERROR, OR
4593 JDEVICE IS NOT M792YA
4594 *300452 104400 M792A51 SCOPE
4595
4596 ,SBTTL TEST M792YB, MR110B BULK BOOTSTRAP LOADERS
4597
  
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4598	M30454	M32767	020000	150364	M792YB1	BIT	#20000,SR2	JIF SR2 BIT 13=1, DO NOT
4599	M30462	M01053				RNE	ENDBOOT	JTEST M792YB, MR11=DR
4600	M30464	M22737	010702	173100		CMP	#10702,##173100	JIS DEVICE MR11=0B
4601	M30472	M01426				BEQ	MR11DB	
4602	M30474	M22737	013701	173100		CMP	#13701,##173100	JIS DEVICE M792YB
4603	M30502	M01017				RNE	M792B2	
4604	M30504	M05000				CLR	R0	JSET UP TO GENERATE CHECKSUM
4605	M30506	M05001				CLR	R1	
4606	M30510	012702	173100			MOV	#173100,R2	JFIRST WORD OF M792YB JLOCATED AT 773100
4607								JGENERATE CHECKSUM
4608	M30514	M02200			M792B11	ADD	(R2)+,R0	
4609	M30516	M05501				ADC	R1	
4610	M30520	M22702	173100			CMP	#173100,R2	
4611	M30524	M01373				RNE	M792B1	
4612	M30526	M20027	171631			CMP	R0,#171631	JTEST LOW ORDER CHECKSUM
4613	M30532	M01003				RNE	M792B2	
4614	M30534	M20127	000006			CMP	R1,#6	JTEST HIGH ORDER CHECKSUM
4615	M30540	M01401				REQ	M792B3	
4616	M30542	M04000			M792B21	HLT		JCHECKSUM ERROR
4617	M30544	M04400			M792B31	SCOPE		
4618	M30546	M00421				BR	ENDBOOT	
4619	M30550	M05000			MR11DB1	CLR	R0	JSET UP TO GENERATE CHECKSUM
4620	M30552	M05001				CLR	R1	
4621	M30554	M12702	173100			MOV	#173100,R2	JFIRST WORD OF MR11=0B JLOCATED AT 773100
4622								JGENERATE CHECKSUM
4623	M30560	M02200			MR11011	ADD	(R2)+,R0	
4624	M30562	M05501				ADC	R1	
4625	M30564	M22702	173200			CMP	#173200,R2	
4626	M30570	M01373				RNE	MR1101	
4627	M30572	M20027	115006			CMP	R0,#115006	JTEST LOW ORDER CHECKSUM
4628	M30576	M01003				RNE	MR1102	
4629	M30600	M20127	000007			CMP	R1,#7	JTEST HIGH ORDER CHECKSUM
4630	M30604	M01401				REQ	MR1103	
4631	M30606	M04000			MR11021	HLT		JCHECKSUM ERROR
4632	M30610	M04400			MR11031	SCOPE		
4633	M30612					ENDBOOT1		
4634								
4635								
4636								
4637								
4638								
4639	M30612	M32767	004000	150224	UDC111	BIT	#4000,SR1	JIF SR1 BIT11=1, DO NOT
4640	M30620	M01114				RNE	DR11B	JTEST UDC11
4641	M30622	M12767	000300	147406		MOV	#300,UDPS	JSERVICE FIRST INTERRUPT AT LEVEL 6
4642	M30630	M05077	150624			CLR	@UDCR	JCLEAR CONTROL REGISTER
4643	M30634	M05077	150622			CLR	@UDSR	JCLEAR SCAN REGISTER
4644	M30640	M05067	000204			CLR	UDFLG	JCLEAR SOFTWARE DONE FLAG
4645	M30644	M05067	002026			CLR	WATCHD	JCLEAR UDC11 DEFERRED
4646								JINTERRUPT OCCURED FLAG
4647	M30650	M05067	002006			CLR	WATCHUI	JCLEAR UDC11 IMMEDIATE
4648								JINTERRUPT OCCURED FLAG
4649	M30654	M04400				SCOPE		
4650	M30656	M05777	150600			TST	@UDSR	JGENERATE RIF
4651	M30662	M00240				NOP		JWAIT FOR CLEAR DONE

4652	M30664	M52777	000025	150566		BIS	#25,@UDCR	JSET IMMEDIATE INTERRUPT ENABLE
4653								JIMMEDIATE SCAN ENABLE
4654								JGENERATE RIF
4655	M30672	M52777	000400	150560		BIS	#400,@UDCR	JSET MAINTENANCE MODE
4656	M30700	M05767	000144			TST	UDFLG	JWAIT FOR INTERRUPT
4657	M30704	M00375				BPL	,#4	
4658	M30706	M05067	000136			CLR	UDFLG	JCLEAR SOFTWARE DONE FLAG
4659	M30712	M12767	000200	147316	IMM11	MOV	#200,236	JSERVICE NEXT INTERRUPT AT LEVEL 4
4660	M30720	M22777	100201	150532		CMP	#100201,@UDCR	JIS IMM DONE, ERROR, *RIF SET
4661	M30726	M01401				REQ	,#4	
4662	M30730	M04000				HLT		JERROR
4663	M30732	M05777	150924			TST	@UDSR	JGENERATE RIF
4664	M30736	M00240				NOP		JWAIT FOR CLR DONE
4665	M30740	M12767	000001	001714		MOV	#1,WATCHUI	JSET UDC11 IMMEDIATE
4666								JINTERRUPT OCCURED FLAG
4667	M30746	M52777	000013	150904		BIS	#13,@UDCR	JSET DEFERRED INTERRUPT ENABLE
4668								JDEFERRED SCAN ENABLE
4669	M30754	M52777	000400	150476		BIS	#400,@UDCR	JSET MAINTENANCE MODE
4670	M30762	M05767	000062			TST	UDFLG	JWAIT FOR INTERRUPT
4671	M30766	M00375				BPL	,#4	
4672	M30770	M05067	000054			CLR	UDFLG	JCLEAR SOFTWARE DONE FLAG
4673	M30774	M12767	000300	147234	DEF11	MOV	#300,236	JSERVICE NEXT INTERRUPT AT LEVEL 6
4674	M31002	M22777	100041	150450		CMP	#100041,@UDCR	JIS DEF DONE, ERROR+RIF SET
4675	M31010	M01401				BEQ	,#4	
4676	M31012	M04000				HLT		JERROR
4677	M31014	M12767	000001	001654		MOV	#1,WATCHD	JSET UDC DEFERRED
4678								JINTERRUPT OCCURED FLAG
4679	M31022	M04400				SCOPE		
4680	M31024	M00412				BR	DR11B	
4681								
4682								
4683								
4684	M31026	M05167	000016		UDINT1	COM	UDFLG	JSET SOFTWARE DONE FLAG
4685	M31032	M42777	000036	150420		BIC	#36,@UDCR	JDISABLE CONTROL
4686	M31040	M42777	000400	150412		BIC	#400,@UDCR	JREMOVE INTERRUPT
4687	M31046	M00002				RTI		
4688	M31050	M00000				UDFLG:	#	
4689								
4690								
4691								
4692	M31052	M32767	000040	147766	DR11B1	BIT	#40,SR2	J20 WORD XFER
4693	M31060	M01035				RNE	DRENDA	
4694	M31062	M05067	000100			CLR	DRFLG	
4695	M31066	M04400				SCOPE		
4696	M31070	M12777	177760	150360		MOV	#20,@DRWC	
4697	M31076	M12777	031170	150350		MOV	#DRBUF,@DRBA	
4698	M31104	M12777	177777	150336		MOV	#1,@DRORR	
4699	M31112	M12777	010101	150332		MOV	#010101,@DRS*	JMAINT, IE AND GO
4700	M31120	M05767	000042			TST	DRFLG	
4701	M31124	M01775				BEQ	,#4	
4702	M31126	M05067	000034			CLR	DRFLG	
4703	M31132	M12701	031170			MOV	#DRBUF,R1	
4704	M31136	M22121				CMP	(R1)+,(R1)+	JFIRST AND SECOND WORD
4705	M31140	M01776				REQ	,#2	JSHOULD BE EQUAL

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4706 *31142 020127 031230 CMP R1,#DREND
4707 *31146 101001 RMI ,+4
4708 *31190 104000 HLT
4709 *31192 104400 SCOPE
4710 *31194 001197 000000 DREND:JMP DN11
4711
4712 IENTER HERE ON DR11=B INTERRUPT
4713
4714 *31160 005267 000002 DR1R: INC DRFLG
4715 *31164 000002 RTI
4716 *31166 000000 DRFLG: ?
4717 *31170 DRBUF: ?
4718 *31172 000000 N
4719 *31174 000000 N
4720 *31176 000000 #N
4721 *31176 000000 #N
4722 *31200 031200 #N
4723 *31200 031200 N
4724 *31202 031200 N
4725 *31204 146600 #N
4726 *31206 146600 #N
4727 *31210 031210 #N
4728 *31210 031210 N
4729 *31212 031210 N
4730 *31214 146570 #N
4731 *31216 146570 #N
4732 *31220 031220 #N
4733 *31220 031220 N
4734 *31222 031220 N
4735 *31224 146500 #N
4736 *31226 146500 #N
4737 *31230 031230 #N
4738 *31230 DREND:
4739
4740 ;SBTTL TEST OF DN11 IN MAINTENANCE MODE
4741
4742 *31230 032767 002000 147610 DN11: RIT #2000,SR2
4743 *31236 001074 RNE DNEND
4744 *31240 012777 031432 150066 MOV #DNISR,#DNVCR
4745 *31246 012777 002200 150062 MOV #200,#DNLVL
4746 *31254 032767 002200 146514 RIS #200,PS
4747 *31262 005067 000106 CLR DNFLG
4748 *31266 104400 SCOPE
4749 *31270 012777 000015 150034 MOV #515,#DNCSR
4750
4751 ISET CALL REQUEST, MASTER
4752 IENABLE, MAINTENANCE MODE
4753 IINTERUPT ENABLE,
4754 IFORCE PRESENT NEXT DIGIT
4755 IALLOW INTERRUPTS
4756 IWAIT FOR INTERRUPT
4757 *31316 012777 001115 150006 MOV #1115,#DNCSR
4758
4759 ICLEAR SOFTWARE DONE FLAG
4760 ISET CALL REQUEST, MASTER
4761 IENABLE, MAINTENANCE MODE,
4762 IINTERUPT ENABLE
    
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4760
4761 *31324 042767 000340 146444 RIC #340,PS
4762 *31332 005767 000116 TST DNFLG
4763 *31336 100375 BPL ,+4
4764 *31340 005067 000110 CLR DNFLG
4765 *31344 012777 000115 147760 MOV #115,#DNCSR
4766
4767 ICLEAR SOFTWARE DONE FLAG
4768 ISET CALL REQUEST, MASTER
4769 IENABLE, MAINTENANCE MODE
4770 IINTERUPT ENABLE
4771 IFORCE POWER OFF
4772 IENABLE INTERRUPTS
4773 IWAIT FOR INTERRUPT
4774 *31372 100375 BPL ,+4
4775 *31374 005067 000004 CLR DNFLG
4776 *31400 012777 004115 147724 MOV #4115,#DNCSR
4777
4778 ICLEAR SOFTWARE DONE FLAG
4779 ISET CALL REQUEST, MASTER
4780 IENABLE, MAINTENANCE MODE
4781 IINTERUPT ENABLE
4782 IFORCE ABANDON CALL AND RETRY
4783 IALLOW INTERRUPTS
4784 IWAIT FOR INTERRUPT
4785
4786 *31432 105777 147674 DNISR: TSTB #DNCSR
4787 *31436 100421 RMI ,+4
4788 *31440 104000 HLT
4789 *31442 005077 147664 CLR #DNCSR
4790 *31446 005167 000002 COM DNFLG
4791 *31452 000002 RTI
4792 *31454 000000 DNFLG: ?
4793
4794 ;SBTTL TEST OF DR11=A,C IN MAINTENANCE MODE
4795
4796 INOTE: MAINTENANCE CABLE MUST BE INSTALLED!!!
4797
4798 *31456 032767 000004 147364 DRACT: RIT #4,SR3
4799 *31464 001101 RNE K8STRY
4800 *31466 005067 147344 CLR ICOUNT
4801 *31472 005077 147430 CLR #DRACCS
4802 *31476 005001 CLR R1
4803 *31500 104400 SCOPE
4804 *31502 010177 147422 DRACT:J MOV R1,#DRACOB
4805 *31506 020177 147416 CMP R1,#DRACOB
4806 *31512 001401 BEQ ,+4
4807 *31514 104000 HLT
4808 *31516 020177 147410 CMP R1,#DRACIB
4809 *31522 001401 BEQ ,+4
4810 *31524 104000 HLT
4811 *31526 005201 INC R1
4812 *31530 001364 RNE DRACT:J
4813 *31532 104400 SCOPE
    
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4814 *31534 012777 031664 147372 MOV #DRACTI,@DRIVEC ISET UP INPUT INTERRUPT VECTOR
4815 *31542 012777 000240 147366 MOV #240,@DRILVL
4816 *31550 012777 031666 147362 MOV #DRACTO,@DROVEC ISET UP OUTPUT INTERRUPT VECTOR
4817 *31556 012777 000240 147356 MOV #240,@DROLVL
4818 *31564 104400 SCOPE
4819 *31566 012767 004000 147242 MOV #4000,@COUNT
4820 *31574 005002 CLR R2
4821 *31576 005077 147326 CLR @DRACOB ICLEAR CONTROL REGISTER
4822 *31602 005077 147320 CLR @DRACCS ICLEAR CONTROL REGISTER
4823 *31606 052767 000240 146162 RIS #240,PS ILOCK OUT DR11=A,C INTERRUPTS
4824 *31614 012777 000003 147304 MOV #3,@DRACCS ISET MAINTENANCE BITS FOR
4825 IDR11=C INTERRUPT GENERATION
4826 *31622 012777 100200 147300 MOV #100200,@DRACOR ISET MAINTENANCE BITS FOR
4827 IDR11=A INTERRUPT GENERATION
4828 *31630 052777 000140 147270 RIS #140,@DRACCS ISET INTERRUPT ENABLES
4829 *31636 042767 000240 146132 RIC #240,PS IALLOW INTERRUPTS
4830 *31644 005777 147256 TST @DRACCS IWAIT FOR INPUT INTERRUPT
4831 *31650 100375 BPL ,+4
4832 *31652 105777 147250 TSTB @DRACCS IWAIT FOR OUTPUT INTERRUPT
4833 *31656 100375 BPL ,+4
4834 *31660 104400 SCOPE
4835 *31662 000402 RR KGSTRT
4836 *31664 000002 DRACTI: RTI
4837 *31666 000002 DRACTO: RTI
4838
4839 ;SBTTL TEST KG11=A CYCLIC REDUNDANCY CHECK OPTION
4840
4841 ;TEST THE RESULTS OF CRC16, CCITT, AND CRC12 BY COMPARING
4842 ;KNOWN RESULTS AGAINST HARDWARE GENERATED DATA
4843
4844 *31670 032767 000001 147152 KGSTRT: BIT #1,SR3 IIF SR3 BIT #1, DO NOT
4845 *31676 001042 RNE KGEND ITEST KG11A
4846 *31700 104400 SCOPE
4847 *31702 012701 032010 KGTEST: MOV #KGCP,R1 IINSTRUCTION TO BE EXECUTED
4848 *31706 012702 032016 MOV #KGCP,R2 ITABLE OF DATA
4849 *31712 012704 032056 MOV #KGCP,R4 ITABLE OF RESULTS
4850 *31716 012777 000020 147540 KGTA: MOV #20,@KGCSR ICLEAR BCC REGISTER
4851 *31724 011177 147534 MOV (R1),@KGCSR ISET UP CSR FROM INSTRUCTION TABLE
4852 *31730 011277 147534 MOV (R2),@KGDBR ISEND DATA TO DEVICE
4853
4854 *31734 105777 147524 TSTB @KGCSR ISTART BCC COMPUTATION
4855 *31740 001775 BEQ ,+4 IWAIT FOR DONE
4856 *31742 017767 147520 003654 MOV #KGBCC,TEMP IPROGRAM WILL HANG IF DONE NEVER SETS
4857 *31750 021467 003650 CMP (R4),TEMP IREAD RESULTS OF BCC
4858 *31754 001401 BEQ ,+4 ICOMPARE EXPECTED AND RECEIVED RESULTS
4859 *31756 104000 HLT
4860 *31760 022224 CMP (R2)+,(R4)+ IBCC INCORRECT, ERROR
4861 *31762 020227 032056 CMP R2,#KGCP IADVANCE DATA AND RESULT POINTERS
4862 *31766 001353 RNE KGTA IEND OF DATA
4863 *31770 012702 032016 MOV #KGCP,R2 INO, CONTINUE
4864 *31774 022167 000014 CMP (R1)+,KGCI2 IRESET DATA POINTER
4865 *32000 001346 RNE KGTA IADVANCE INSTRUCTION POINTER
4866 *32002 104400 SCOPE
4867 *32004 000167 000206 KGEND: JMP DM11BB
  
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4868 *32010 000111 KGIP: 000111 ICRC16 INSTRUCTION WORD
4869 *32012 000115 KGCI: 000115 ICCITT INSTRUCTION WORD
4870 *32014 000100 KGCI2: 000100 ICRC12 INSTRUCTION WORD
4871
4872 ;DATA TABLE FOR CRC TESTS
4873
4874 *32016 000401 KGDP: 000401
4875 *32020 177376 177376
4876 *32022 01002 01002
4877 *32024 176775 176775
4878 *32026 002004 002004
4879 *32030 175773 175773
4880 *32032 004010 004010
4881 *32034 173767 173767
4882 *32036 010020 010020
4883 *32040 167757 167757
4884 *32042 020040 020040
4885 *32044 157737 157737
4886 *32046 040100 040100
4887 *32050 137677 137677
4888 *32052 100200 100200
4889 *32054 077577 077577
4890
4891 ;RESULT TABLE FOR CRC16
4892
4893 *32056 050300 KGCP: 050300
4894 *32060 160301 160301
4895 *32062 120600 120600
4896 *32064 010601 010601
4897 *32066 001403 001403
4898 *32070 131402 131402
4899 *32072 003006 003006
4900 *32074 133007 133007
4901 *32076 006014 006014
4902 *32100 136015 136015
4903 *32102 014030 014030
4904 *32104 124031 124031
4905 *32106 030060 030060
4906 *32110 100061 100061
4907 *32112 060140 060140
4908 *32114 150141 150141
4909
4910 ;RESULT TABLE FOR CCITT
4911
4912 *32116 004121 004121
4913 *32120 174351 174351
4914 *32122 010242 010242
4915 *32124 160032 160032
4916 *32126 020504 020504
4917 *32130 150774 150774
4918 *32132 041210 041210
4919 *32134 131060 131060
4920 *32136 102420 102420
4921 *32140 072650 072650
  
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4922 *32142 *01061 *01061
4923 *32144 171211 171211
4924 *32146 *02142 *02142
4925 *32150 172332 172332
4926 *32152 *04304 *04304
4927 *32154 174174 174174
4928
4929
4930 *32156 *24051 *24051
4931 *32158 *30061 *30061
4932 *32162 *24421 *24421
4933 *32164 *30411 *30411
4934 *32166 *25041 *25041
4935 *32170 *31071 *31071
4936 *32172 *26401 *26401
4937 *32174 *32431 *32431
4938 *32176 *21001 *21001
4939 *32200 *35031 *35031
4940 *32202 *36001 *36001
4941 *32204 *22031 *22031
4942 *32206 *00000 *00000
4943 *32210 *14030 *14030
4944 *32212 *00000 *00000
4945 *32214 *14030 *14030
4946
4947 ,SBTTL DM11=BB MODEM CONTROL TEST
4948
4949 IDM11=BB MODEM CONTROL MULTIPLEXER
4950 JSCANNER LOGIC TEST
4951 JINPUT 1'S INTO ALL SCANNER MEMORY LOCATIONS
4952 JVERIFY THAT AN INTERRUPT OCCURS FOR EACH LINE
4953
4954 *04000 CLRSCN=4000
4955 *02000 CLRMUX=2000
4956 *01000 MAINT=1000
4957 *00400 STEP=400
4958 *00100 INTENA=100
4959 *00040 SCNENA=40
4960 *00240 DONE=200
4961 *00020 BUSY=20
4962 *32216 *32767 *00010 146624 DM11BBI BIT #10,SR3 JIF SR3 BIT 3=1, DO NOT
4963 *32224 *01100 *01100 BNE DMBEND JTEST DM11=BB
4964 *32226 104400 SCOPE
4965 *32230 *12777 *00600 147274 SCNT1I MOV #CLRMUX+CLRSCN,DMBCSR
4966 *32236 *32777 *00020 147266 RIT #BUSY,DMBCSR JCLEAR ALL MULTIPLEXER FLIPFLOPS
4967 *32244 *01374 RNE ,*6
4968 *32246 *12700 *00020 MOV #16,R0 JSET UP TO WRITE 1'S INTO
4969 *32252 *00577 147254 CLR #DMBCSR JALL LINE ENABLE FLIPFLOPS
4970 *32256 *12777 *00001 147250 SCNT1AI MOV #1,DMBLSR JSET FLIPFLOP
4971 *32264 *32777 *00400 147240 RIS #STEP,DMBCSR JGO TO NEXT LINE
4972 *32272 *005300 DEC R0
4973 *32274 *01370 RNE SCNT1AI
4974 *32276 *12777 *032410 147232 MOV #DMBINT,DMBVEC JSET UP LOCAL INTERRUPT SERVICE
4975 *32304 *12705 171340 MOV #171340,R5
  
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4976 *32310 *12777 *00020 147222 MOV #200,DMBVLV JSERVICE AT LEVEL 4
4977 *32316 *12700 *00020 MOV #16,R0
4978 *32322 *12777 *01117 147202 MOV #MAINT+INTENA+17,DMBCSR JSET INTERRUPT ENABLE AND MAINTENANCE MODE
4979 *32330 *32767 *00020 145440 SCNT1BI RIS #200,PS JINHIBIT INTERRUPTS
4980 *32336 *32777 *00040 147166 RIS #SCNENA,DMBCSR JSTART SCANNER
4981 *32344 *42767 *00020 145424 RIC #200,PS
4982 *32352 *105777 147124 TSTB #DMBCSR
4983 *32356 100375 BPL ,*4
4984 *32360 *02577 147146 CMP R0,DMBCSR
4985 *32364 *01401 REQ SCNT1DI
4986 *32366 104000 HLT
4987 *32370 *02777 *00024 147134 SCNT1DI RIC #SCNENA+DONE,DMBCSR JSCANNER LOGIC ERROR
4988 *32376 *005205 INC R5 JCLEAR SCAN ENABLE AND DONE
4989 *32400 *005300 DEC R0 JUPDATE EXPECTED RESULT
4990 *32402 *01352 RNE SCNT1B JCONTINUE IF NOT DONE
4991 *32404 104400 SCNT1EI SCOPE JCHECK FOR ITERATIONS, LOOP
4992 *32406 *00407 BR DMBEND
4993
4994 JENTER HERE ON DM11=BB INTERRUPT
4995
4996 *32410 *105777 147116 DMBINTI TSTB #DMBCSR JIS DONE BIT SET
4997 *32414 100001 BPL ,*4
4998 *32416 *00002 RTI JYES, RETURN
4999 *32420 104000 HLT JINTERRUPT WITH DONE NOT SET
5000 *32422 *22626 CMP (SP)+,(SP)+ JADJUST STACK
5001 *32424 *00767 RR SCNT1E JRESTART AFTER ERROR
5002
5003 ,SBTTL DEVICE WATCHDOGS
5004
5005 JVERIFY SELECTED DEVICES ARE RUNNING
5006
5007
5008 *32426 *00507 146424 WATCHI CLR ICOUNT
5009 *32432 *32767 *04000 145130 RIT #400,SR JIF ITERATIONS ARE INHIBITED
5010 *32440 *01402 REQ ,*6 JDO NOT CHECK WATCHDOGS
5011 *32442 *00167 *00450 JMP ENDWATCH
5012 *32446 *16701 146372 MOV SR1,R1
5013 *32452 *16702 146370 MOV SR2,R2
5014 *32456 *32701 *00020 RIT #20,R1 JIF KW11=L WAS NOT SELECTED
5015 *32462 *01006 BNE WAT1 JDO NOT CHECK WATCHDOG
5016 *32464 *005767 *00006 TST WATCKL JOID KW11=L INTERRUPT
5017 *32470 *01001 BNE ,*4
5018 *32472 104000 HLT
5019 *32474 *005027 CLR (PC)+ JNO INTERRUPT THIS PASS, ERROR
5020 *32476 *00000 WATCHKI @ JCLEAR INTERRUPT OCCURED FLAG
5021 *32500 *32767 *000100 146336 WAT1I BIT #100,SR1 JKW11=L INTERRUPT OCCURED FLAG
5022 *32506 *01006 BNE WAT2 JIF KW11=P WAS NOT SELECTED
5023 *32510 *005767 *00006 TST WATCKP JDO NOT CHECK WATCHDOG
5024 *32514 *01001 BNE ,*4
5025 *32516 104000 HLT
5026 *32520 *005027 CLR (PC)+
5027 *32522 *00000 WATCKPI @
5028 *32524 *32701 *00400 WAT2I BIT #400,R1 JIF BUS TESTER SECTIONS 1 AND 2
5029 *32530 *01014 BNE WAT3 JWERE NOT SELECTED
  
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5138 IDO SIMPLE CORE EXPANSION TO REST OF MEMORY
5139 033116 036727 144446 001000 BIT SR,#1000 ITEST FOR MEMORY EXPANSION
5140 033124 001065 RNE EXPAN3 I SHOULD BE SWITCH TEST
5141 033126 012737 000002 001036 MOV #2,#ICOUNT
5142 033134 012767 033142 149722 MOV #EXPAND,RETURN
5143 033142 026767 149704 149706 EXPAND1 CMP LUCORE,HCORE I MORE THAN 8KW?
5144 033150 103053 RHIS EXPANS I NO = DON'T EXPAND
5145 033152 016701 149674 MOV LUCORE,R1 IYES EXPAND
5146 033156 012702 033226 EXPAN1 MOV #LTESTL,R2 I MOVE THE CODE BETWEEN
5147 033162 012221 EXPAN2 MOV (R2)+,(R1)+ I LTESTL AND HTESTL TILL
5148 033164 020227 033300 CMP R2,#HTESTL+2 I CORE IS FULL
5149 033170 001374 RNE EXPAN2
5150 033172 022167 149600 CMP R1,HCORE
5151 033176 101767 RLAS EXPAN1 I BRANCH TILL MEMORY IS FULL
5152 033200 012721 000137 MOV #137,(R1)+ I SET UP RETURN FROM
5153 033204 012721 033300 MOV #EXPANS,(R1)+ I HIGH CORE JMP #EXPAND3
5154 033210 104400 SCOPE
5155 033212 012737 004000 001036 MOV #4000,#ICOUNT
5156 033220 000177 149620 JMP #LUCORE
5157 033224 151456 ROTVAL I 151456
5158
5159 I THIS IS THE TEST THAT WILL BE EXPANDED
5160 I IN TO THE REST OF MEMORY
5161 HERE#0
5162
5163 033226 000277 LTESTL1 SCC I SET CARRY BIT
5164 033230 012727 123456 000000 MOV #123456,#HERE I HERE CONTAINS VALUE
5165 033236 100067 177773 LTEST11 RORB LTEST1#1 I HERE IS ROTATED
5166 033242 103401 BCS ,+4
5167 033244 104000 HLT I C BIT WAS NOT SET
5168 033246 102001 RVC ,+4
5169 033250 104000 HLT
5170 033252 022767 151456 177754 CMP #151456,LTEST1#2 I CHECK HERE FOR CORRECT ROTATE BYTE
5171 033260 001401 REQ ,+4
5172 033262 104000 HLT I ROTATE FAILED
5173 033264 023767 033224 177742 CMP #ROTVAL,LTEST1#2
5174 033272 001401 REQ ,+4
5175 033274 104000 HLT I REF1 TO LOW MEMORY FAILED
5176 033276 104400 HTESTL1 SCOPE
5177
5178 033300 EXPAN3 I EXTENDED MEMORY RETURNS HERE AFTER BEING EXECUT
5179
5180 033300 012767 004000 149530 MOV #4000,ICOUNT
5181 ,SBTTL BACKGROUND OVERLAY CALL
5182
5183 033306 016767 144464 144506 MOV PS,IOTLVL I SERVICE OVERLAY AT CURRENT PROCESSOR
5184 I STATUS AND MODE
5185 033314 016767 144500 149542 MOV IOTVEC,RETURN I SET UP NEW SCOPE POINTER
5186
5187 I THE NEXT INSTRUCTION IS THE CALL TO A USER BACKGROUND OVERLAY
5188 I THE USER MUST SET UP THE IOT VECTOR TO GET TO HIS PROGRAM
5189
5190 033322 000004 IOT
5191

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5192 ,SBTTL ASTERISK ON PASS COMPLETE
5193
5194 033324 004767 001332 BELL1 JSR PC,HSPPLSP I DETERMINE IF OUTPUT TO TTY OR HSP
5195 033330 032777 000100 001400 BIT #100,@TCR I IF OUTPUT DEVICE IS RUNNING
5196 033336 001025 RNE ENOPAS I DO NOT SEND BELL
5197 033340 105777 001372 TSTB @TCR I WAIT FOR FLAG; MAKE SURE NOT BUSY
5198 033344 100375 BPL ,+4
5199 033346 012777 000215 001360 MOV #215,@TDBR I OUTPUT CR
5200 033354 105777 001356 TSTB @TCR
5201 033360 100375 BPL ,+4
5202 033362 012777 000212 001344 MOV #212,@TDBR I OUTPUT LF
5203 033370 105777 001342 TSTB @TCR
5204 033374 100375 BPL ,+4
5205 033376 012777 000052 001330 MOV #1,@TDBR I OUTPUT ASTERISK CODE
5206 033404 105777 001326 TSTB @TCR I WAIT FOR DONE
5207 033410 100375 BPL ,+4
5208
5209 ,SBTTL END OF PASS
5210
5211 I END OF PASS SERVICE
5212 I CHECK FOR EXIT TO EXTERNAL MONITOR
5213 I CHECK FOR BUS SWITCH RELEASE
5214 I CHECK FOR ISOLATION
5215 I CHECK FOR PROCESSOR MODE CHANGE
5216 I CHECK FOR USE OF K11
5217
5218 033412 016767 144360 002204 ENOPAS1 MOV PS,TEMP I SAVE CURRENT PROCESSOR STATUS
5219 033420 005067 144392 CLR PS I CLEAR PS (EXCEPT TRACE BIT)
5220 033424 132767 000010 149431 BITB #10,CONFIG#1 I IF SEGMENTATION IS AVAILABLE
5221 033432 001402 REQ ,+6 I TURN IT OFF
5222 033434 005067 144132 CLR SSR0
5223 033440 013701 000042 MOV #42,R1 I GET CONTENTS OF LOC 42
5224 033444 001426 REQ ENOP1 I BRANCH IF NOT QUICK VERIFY OR AUTO ACCEPT
5225 033446 105767 149415 TSTB @VFLG I IS THIS AUTO ACCEPT?
5226 033452 001423 BEQ ENOP1 I YES= BRANCH ;CONT IF OV
5227 033454 000085 RESET
5228 033456 012767 000137 144514 MOV #137,200 I RESTORE 200
5229 033464 012767 001542 144510 MOV #BEGIN1,202 I AND 202
5230 033472 012706 036322 MOV #STACKK,SP I RESTORE STACK
5231 033476 005046 CLR #1,SP I SET UP TO CLEAR T BIT
5232 033500 012746 033506 MOV #LOGICAL,#1,SP I BY RTI, GO TO LOGICAL
5233 033504 000002 RTI
5234 033506 004711 LOGICAL1 JSR PC,(R1) I RETURN TO MONITOR
5235 033510 000240 NOP I FOR ACT11
5236 033512 000240 NOP
5237 033514 000240 NOP
5238 033516 000137 000200 JMP #200 I JDDP RETURN TO START
5239 033522 005767 001762 ENOP1 TST ISFLG I IF ISOLATION IS SELECTED
5240 033526 001403 BEQ ENOP2
5241 033530 104000 HLT
5242 033532 004767 JSR PC,ISOLAT I TYPE STATUS OF SYSTEM
5243 033536 005267 000506 ENOP2 INC PASCNT I ISOLATE NEXT DEVICE
5244 033542 005267 149274 INC PASCNT I INCREMENT PASS COUNT
5245 033546 016767 149270 144014 MOV PASCNT,LIGHTS I DISPLAY PASS COUNT

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5246 *33554 *12706 036322 MOV #STACKK,SP ;SET EXEC STACK POINTER
5247 *33560 005046 CLP =(SP) ;PRESET 'NEW' STATUS
5248 *33562 005767 144254 TST 42 ;IF 42=0, HIGH SPEED DUMP
5249 *33566 001407 BEQ ENDPAX ;
5250 *33570 026767 000534 000530 CMP PASCCT,PASEX ;IF AUTO ACCEPT OR DDP CHAIN MODE,
5251 *33576 001003 RNE ENDPAX ;BRANCH IF NOT ALL MODES HAVE BEEN TESTED
5252 *33600 005067 000524 CLR PASCCT ;ALL MODES HAVE BEEN RUN- GO TO THE
5253 *33604 000723 RR EXIT ;MONITOR RETURN
5254 *33606 032767 010000 143754 ENDPAX1 BIT #10000,SR ;FREEZE IN CURRENT MODE?
5255 *33614 001403 REQ ENDPAX1 ;NO- BRANCH
5256 *33616 0016716 002002 MOV TEMP,(SP) ;YES- SET UP TO RESTART WITH
5257 *33622 000424 RR DTREL ;CURRENT STATUS
5258 *33624 0016700 000500 ENDPAX1 MOV PASCCT,R0
5259 *33630 020067 000472 CMP R0,PASEX
5260 *33634 002003 RLT 13
5261 *33636 005067 000466 CLR PASCCT
5262 *33642 005000 CLR R0
5263 *33644 006300 1$1 ASL R0 ;CALCULATE OFFSET
5264 *33646 066720 000452 ADD PASPAR,R0 ;GET TABLE STARTING ADDRESS
5265 *33652 011016 MOV (R0),(SP) ;LOAD PARAMETERS IN 'NEW' STATUS
5266 *33654 026727 145102 000002 CMP PASCNT,#2 ;IF LESS THAN 2 PASSES COMPLETE
5267 *33662 103404 RLO DTREL ;DON'T ALLOW KT11
5268 *33664 032767 000000 145156 BIT #00,SR3 ;KT11 INHIBITED?
5269 *33672 001400 REC SEGOPT ;NO- GO TURN ON IF AVAILABLE
5270 *33674 032767 000002 145142 DTREL1 BIT #2,SR1 ;CHECK FOR MULTIPROCESSORS
5271 *33702 001037 RNE NOOPT ;BRANCH AROUND IF SET
5272 *33704 000005 RESET ;RELEASE SWITCH
5273 *33706 005027 033710 CLR #BUSWT ;ALLOW OTHER PROCESSOR TO REQUEST SWITCH
5274 *33710 033710 BUSWT=-2
5275 *33712 005367 177772 DEC BUSWT
5276 *33716 001375 RNF ;+4
5277 *33720 032777 020000 149252 BIT #20000,@DTCSR1 ;MONITOR NON-NEUTRAL BIT
5278 *33726 001374 RNE ;+6
5279 *33730 012777 000001 149242 MOV #1,@DTCSR1 ;REQUEST SWITCH
5280 *33736 105777 149236 TSTS @DTCSR1 ;WAIT FOR IT TO CONNECT
5281 *33742 100375 RPL ;+4
5282 *33744 005067 001654 CLR TEMP ;DELAY FOR DEVICES
5283 *33750 005267 001650 INC TEMP ;TO INITIALIZE
5284 *33754 001375 RNE ;+4
5285 *33756 052777 001000 149214 BIT #1000,@DTCSR1 ;ISSUE SWITCHED BUS INIT
5286 *33764 032777 001000 149206 BIT #1000,@DTCSR1 ;WAIT FOR INIT TO FINISH
5287 *33772 001374 RNE ;+6
5288 *33774 012746 002452 MOV #STA,=(SP) ;SWITCH IS CONNECTED - RESTART PROGRAM
5289 *34000 000402 RR EXOPT
5290 *34002 012746 014606 NOOPT: MOV #PROCTS,=(SP) ;RESTART
5291 *34006 000002 EXOPT: RTI ;PROGRAM
5292
5293 *34010 000002 TRTRET: RTI ;RETURN TO PROGRAM FROM TRAP
5294 *34012 000000 HALT ;RTI FAILED
5295
5296 000014 TRTVEC=14 ;TRACE TRAP VECTOR
5297
5298
5299 *34014 132767 000010 145041 IKT11 OPTION SEGOPT: BITB #10,CONFIG+1 ;CHECK IF AVAILABLE
  
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5300 *34022 001724 PER DTREL ;RETURN IF NOT AVAILABLE
5301 *34024 005067 143542 CLR SSR0 ;DISABLE IF ON
5302 *34030 032767 000001 145024 BIT #1,CONFIG ;IF PROCESSOR IS PDP-11/40
5303 *34036 001423 REQ SEG4 ;MAP FOR 11/40
5304 *34040 004567 000136 JSR R5,MAP ;MAP FOR PDP-11/45
5305 *34044 000006 6
5306 *34046 177640 UISAR0
5307 *34050 177660 UDSAR0
5308 *34052 172240 SISAR0
5309 *34054 172260 SDSAR0
5310 *34056 172340 KISAR0
5311 *34060 172360 KDSAR0
5312 *34062 004567 000150 JSR R5,MAPA
5313 *34066 000006 6
5314 *34070 177600 UISDR0
5315 *34072 177620 UDSDR0
5316 *34074 172200 SISDR0
5317 *34076 172220 SDSDR0
5318 *34100 172300 KISDR0
5319 *34102 172320 KDSDR0
5320 *34104 000412 RR
5321 *34106 004567 000070 SEG40: JSR SEGALL ;MAP FOR 11/40
5322 *34112 000002 2
5323 *34114 177640 UISAR0
5324 *34116 172340 KISAR0
5325 *34120 004567 000112 JSR R5,MAPA
5326 *34124 000002 2
5327 *34126 177600 UISDR0
5328 *34130 172300 KISDR0
5329 *34132 012767 034152 144110 SEGALL: MOV #SEGERR,SEGVEC ;LOAD KT11 ERROR VECTOR
5330 *34140 005067 144106 CLR SEGVFC+2
5331 *34144 005267 143422 INC SSR0 ;ENABLE KT11
5332 *34150 000651 RR DTREL ;RETURN
5333
5334 IKT11 ERROR
5335 *34152 016767 143414 000020 SEGERR: MOV SSR0,SSR0T ;SAVE SSR0 INDICATORS
5336 *34160 012767 000007 136330 MOV #7,SSR3 ;ENABLE D SPACES
5337 *34166 012767 000001 143376 MOV #1,SSR0 ;CLEAR FLAGS
5338 *34174 000167 144092 JMP SEGLVL ;GO HALT
5339 *34200 000000 SSR0T: 0 ;IKT11 ERROR FLAGS ARE SAVED HERE
5340
5341 IKT11 REGISTER ADDRESSES
5342 177572 SSR0=177572
5343 172516 SSR3=172516
5344 177600 UISDR0=177600
5345 177620 UDSDR0=177620
5346 177640 UISAR0=177640
5347 177660 UDSAR0=177660
5348 172200 SISDR0=172200
5349 172220 SDSDR0=172220
5350 172240 SISAR0=172240
5351 172260 SDSAR0=172260
5352 172300 KISDR0=172300
5353 172320 KDSDR0=172320
  
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5354 172340
5355 172360
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5407
  
```

```

KISAR0#172340
KDSAR0#172360

JSETUP K711 REGISTERS
MAP1 MOV (R5)+,R2
MAP1A1 MOV (R5)+,R0
R3 MOV #7,R1
CLR R3
MOV #200,R4

MAP11 MOV R3,(P0)+
ADD R4,R3
SOB R1,MAP1
MOV #760,(R0)+
SOB R2,MAP1A
RTS R5

MAPAI MOV (R5)+,R2
MAP2AI MOV (R5)+,R0
MOV #1,R1

MAP2I MOV #77406,(R0)+
SOB R1,MAP2
SOB R2,MAP2A
RTS R5

IPDP=11/45 PASS PARAMETER TABLE
PAS451 000000
000020
004000
004020
004000
004020
040000
040020
044000
044020
140000
140020
144000
144020

IPDP=11/40 PASS PARAMETER TABLE
PAS40I 000000
000020
140000
140020

PAS2I 000000
000020

PASPARI 0
  
```

IGET ADDRESS OF PAR TO BE SET UP
 IGET REGISTER COUNT

ILOAD PAR
 ISETUP TO LOAD NEXT PAR
 ILOAD NEXT PAR IF NOT DONE
 ISET LAST PAR
 IGET NEXT GROUP

IGET PDR ADDRESS

IPDR= 4K R/W UP

IFEXIT

IPDP=11/45 PASS PARAMETER TABLE

```

ISTATUS=#0
ITHE IT' BIT
ITHE REGISTER SET BIT
ITHE REGISTER SET & Y BIT
ISUPERVISOR MODE
ISUPERVISOR MODE & T BIT
ISUPERVISOR & REC SET
ISUPERVISOR,REC SET & IT' BIT
IUSER MODE
IUSER MODE & IT' BIT
IUSER MODE, REC SET
IUSER MODE,REC SET & IT' BIT
  
```

IPDP=11/40 PASS PARAMETER TABLE

```

PAS40I 000000
000020
140000
140020

PAS2I 000000
000020

PASPARI 0
  
```

IPOINTER TO PASS PARAMETER TABLE

```

5408 34326 000000
5409 34330 000000
5410 34332 034320
5411 34334 034320
5412 34336 034310
5413 34338 034260
5414 34340 000002
5415 34342 000004
5416 34344 000004
5417 34350 000014
5418
5419
5420
5421
5422
  
```

```

IPASS COMPLETE COUNT

IPDP=11/40 PASS PARAMETER TABLE
PAS40I 000000
000020
140000
140020

PAS2I 000000
000020

PASPARI 0
  
```

ISBTTL ERROR HANDLER

ENTERED WITH SYSTEM TRAP CALL (ERROR) AT LEVEL 7
 PRINT OUT THE ERROR INFORMATION

```

34352 005767 144462
34356 001401
34360 000002
34362 005267 144452
34366 042767 000140 143402
34374 036727 143170 020000
34402 001401
34404 000477
34406 010667
34412 011667 000322
34416 016667 000022
34424 004767 000232
34430 105777 000302
34434 100375
34436 012777 000215
34444 100375 000266
34450 100375
34452 012777 000212
34460 010667 000242
34464 010367 000240
34470 010467 000240
34474 016702 000240
34480 004767 000240
34484 016702 000232
34490 004767 000230
34494 016702 144344
34500 004767 000220
34504 012702 036520
34510 166702 000170
34514 004767 000204
34518 013702 001044
34524 004767 001044
34530 013702 001046
34534 004767 001046
34538 013702 001046
34544 004767 001046
34548 016702 000132
34554 016702 000130
34560 016702 000126
34564 016702 000126
  
```

IS ROUTINE BUSY
 IYES IT IS BUSY
 IPRINT ROUTINE BUSY
 IDROP TO LEVEL 4
 ITEST FOR INHIBIT PRINT OUT
 IBRANCH TO PRINT
 IINHIBIT, RETURN TO MAIN STREAM
 IPC OF FAILING ROUTINE
 IPS OF ERROR CONDITION

ICR

ILLINE FEED
 ISAVE R2
 ISAVE R3
 ISAVE R4

IPRINT OCTAL NUMBER
 IPRINT OCTAL NUMBER
 ICPU TEST ID

IHOW FAR STACK POSITIVE

IPRINT SR1

IPRINT SR2

IRESTORE REGISTERS

```

PASEXI 0
PASCTI 0
PASTABI PAS20
PAS2M
PAS40
PAS45
EXITCTI 2
4
14
  
```

IHOW FAR STACK POSITIVE

IPRINT SR1
 IPRINT SR2
 IRESTORE REGISTERS

```

5462 *34604 005767 142700 PRINT11 TST SR ;TEST FOR HALT SWITCH
5463 *34610 100045 RPL PRINT2
5464 *34612 010046 MOV R0,=(SP) ;SAVE R0 ON STACK
5465 *34614 016700 000120 MOV SAVPC,R0
5466 *34620 000000 HALT ;HALT ON ERROR SET
5467 *34622 012600 MOV (SP)+,R0
5468 *34624 032767 000400 142736 PRINT21 RIT #400,SR
5469 *34632 001402 BEQ +6
5470 *34634 004767 000400 JSR PC,ISOLATE
5471 *34640 032767 000100 142722 RIT #100,SR
5472 *34646 001003 RNE PRINT3
5473 *34650 005067 144104 CLR PRFLAG ;CLEAR PRINT ROUTINE BUSY
5474 *34654 000002 RTI ;RETURN TO MAIN STREAM
5475 *34656 000137 002302 PRINT31 JMP @#ST ;TO RESTART PROG
5476
5477 *34662 016767 144216 000046 HSP1SPI MOV TTCSP,TCSR
5478 *34670 016767 144212 000036 MOV TDBF,TDRR
5479 *34676 036727 142666 000200 RIT SR,#200
5480 *34704 001476 BEQ HPLPEX
5481 *34706 016767 144202 000022 MOV HPCSP,TCSR
5482 *34714 016767 144176 000012 MOV HPDR,TDRR
5483 *34722 000207 HPLPEX1 RTS PC
5484 *34724 000000 SAVSPA1 Z
5485 *34726 000000 SAVR21 Z
5486 *34730 000000 SAVR31 Z
5487 *34732 000000 SAVR41 Z
5488 *34734 177566 TDBR1 ;DATA
5489 *34736 177564 TCSR1 ;PS
5490 *34740 000000 SAVPC1 Z
5491 *34742 000000 SAVPS1 Z
5492
5493 ;CONVERT DATA TO ASCII AND TYPE
5494
5495 *34744 012704 035070 PRTAB1 MOV #LISTND,R4 ;SET UP POINTER TO DATA STORAGE
5496 *34750 012767 000006 000074 PRTAB11 MOV #6,ASCNT ;16 DIGITS WILL BE EXTRACTED
5497 *34756 010203 PRTAB111 MOV R2,R3 ;GET DATA TO BE CONVERTED
5498 *34760 042703 177770 RIC #177770,R3 ;EXTRACT 1 OCTAL DIGIT
5499 *34764 062703 000200 ADD #260,R3 ;CONVERT TO ASCII
5500 *34770 010344 MOV R3,=(R4) ;SAVE ASCII DIGIT
5501 *34772 006202 ASR R2 ;POSITION NEXT DIGIT
5502 *34774 006202 ASR R2 ;TO BE EXTRACTED
5503 *34776 006202 ASR R2
5504 *35000 005367 000046 DEC ASCNT ;IF ALL DIGITS HAVE NOT BEEN
5505 *35004 001364 RNE PRTAB1 ;EXTRACTED, CONTINUE
5506 *35006 042714 000006 RIC #6,(R4)
5507 *35012 012767 000007 000032 XLIST1 MOV #7,ASCNT ;SEND 7 CHAR TO TTY
5508 *35020 105777 177712 WAIT21 TSTB @TCSR
5509 *35024 100375 BPL WAIT2
5510 *35026 012477 177022 MOV (R4)+,@TDBR
5511 *35032 005367 000014 DEC ASCNT
5512 *35036 001401 RNE HDFHM ;FINISH PRINTING GET NXT NUM
5513 *35040 000767 RR WAIT2
5514 *35042 105777 177670 HDFHM1 TSTB @TCSR
5515 *35046 100375 RPL ,=4
  
```

```

5516 *35050 000207 RTS PC ;HEAD FOR HOME
5517 *35052 000000 ASCNT1 Z
5518 *35054 000000 LIST1 Z
5519 *35056 000000 Z
5520 *35058 000000 Z
5521 *35062 000000 Z
5522 *35064 000000 Z
5523 *35066 000000 Z
5524 *35070 000240 LISTND1 240 ;SEPARATOR
5525
5526 ;SCOPE LOOP ROUTINE ENTERED BY USER TRAP
5527 *35072 016716 143766 SCOPEB1 MOV RETURN,(SP) ;SET UP FOR NEXT TEST
5528 *35076 005767 155000 SCOPE11 TST TCFLAG ;DETAPE DATA
5529 *35102 001402 BEQ +6 ;BRANCH IF NO NEW DATA
5530 *35104 004767 000004 JSR PC,TC1 ;CHECK TC DATA
5531
5532 *35110 004767 000100 JSR PC,TWAIT ;SPECIAL SERVICE COUF
5533 *35114 000002 RTI ;CHECK INHIBIT PROCESSOR SWITCH
5534 ;SCOPE RETURN
5535
5536 ;SBTTL SCOPE LOOP ROUTINE
5537
5538 *35116 032767 040000 142444 SCOPE11 RIT #40000,SR ;TEST FOR LOOP
5539 *35124 001302 RNE SCOPEB ;YES SCOPE
5540 *35126 105767 143735 TSTB @VFLG ;IF @VFLG NOT 0
5541 *35132 001015 RNE SCOPFA ;NO ITERATIONS OF TEST
5542 *35134 032767 004000 142426 RIT #40000,SR ;NO = TEST FOR ITERATION
5543 *35142 001007 RNE SCOPFEG ;INHIBIT ITERATION
5544 *35144 026767 143710 143664 CMP SCOPEF,ICOUNT
5545 *35152 001403 BEQ SCOPFEG
5546 *35154 005267 143700 INC SCOPFEG ;EXIT = DONE
5547 *35160 000744 RR SCOPFEG ;INCREMENT COUNT
5548 *35162 005067 143672 SCOPE11 CLR SCOPFF ;LOOP SOME MORE
5549 *35166 011667 143672 SCOPEA1 MOV @SP,RETURN ;CLEAR COUNT
5550 *35172 000002 RTI ;SAVE SCOPE RETURN POINTER
5551 ;RETURN INLINE=NEXT TEST
5552
5553 ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
5554 *35174 005067 154702 TC11 CLR TCFLAG ;BY DOING A CHECK SUM ON THE DATA
5555 *35200 010146 MOV R1,=(SP) ;SET BY TC READ ROUTINE
5556 *35202 010246 MOV R2,=(SP) ;SAVE THESE ON THE STACK
5557 *35204 010346 MOV R3,=(SP)
5558 *35206 005003 CLR R3
5559 *35210 012701 012700 MOV #TCRBUF,R1 ;SUM OF DATA
5560 *35214 012702 013700 MOV #TCRBUF+1000,R2 ;ADDRESS OF READ BUFFER
5561 *35220 062103 TC21 ADD (R1)+,R3 ;END OF READ BUFFER
5562 *35222 062103 ADD (R1)+,R3 ;EVEN ADD
5563 *35224 001775 BEQ TC2 ;ODD ADD =2'S COMPLEMENT
5564 *35226 020102 CMP R1,R2
5565 *35230 101001 RHI ,+4 ;AT END OF BUFFER?
5566 *35232 104000 HLT ;YES=BRANCH
5567 *35234 012603 MOV (SP)+,R3 ;DATA ERROR
5568 *35236 012602 MOV (SP)+,R2 ;RESTORE THE REGISTERS
5569 *35240 012601 MOV (SP)+,R1
  
```

```

5570 *35242 000207          RTS      PC
5571 *35244                TWA1T1   RTS      PC
5572 *35244 032767 002000 142316 BIT      #2000,SR
5573 *35252 001402          REG      EWAIT
5574 *35254 000001          WAIT
5575 *35256 000772          BR      TWA1T
5576 *35260 000207          EWA1T1  RTS      PC
5577
5578
5579 *35262 000207          JGROUP OF NESTED SUBROUTINES
5580 *35264 000277          SUBR1A1 RTS      PC
5581 *35266 000287          SUBR2A1 SCC
5582 *35270 004767 177770          SUBR3A1 JSR     PC,SUBR2A
5583 *35274 000207          RTS      PC
5584 *35276 004767 177766          SUBR4A1 JSR     PC,SUBR3A
5585 *35302 000207          RTS      PC
5586 *35304 004767 177766          SUBR5A1 JSR     PC,SUBR4A
5587 *35310 000207          RTS      PC
5588 *35312 004767 177766          SUBSPA1 JSR     PC,SUBR5A
5589 *35316 000207          RTS      PC
5590
5591          ,SBTTL ISOLATION ROUTINE
5592
5593          ITHIS ROUTINE ON ERROR DETECTION OR END OF PASS OF
5594          JPROCESSOR TEST WILL DELETE ONE DEVICE OF THOSE THAT
5595          JHAVE BEEN SELECTED TO RUN, ON ENTERING THIS ROUTINE
5596          JTHE CURRENTLY DELETED ONE WILL BE RESTORED AND A
5597          JNEW DEVICE DELETED.
5598
5599 *35320 032767 000400 142242 IS0LAT1 BIT      #400,SR
5600 *35326 001015          RNE     ISOLA1
5601 *35330 005767 000154          TST     ISFLG
5602 *35334 001411          REG      ISOLA2
5603 *35336 016705 000144          MOV     ISCNT,R5
5604 *35342 046765 000144 001044          R1C     ISWRD,SR1(R5)
5605 *35350 005067 000134          CLR     ISFLG
5606 *35354 000167 144772          JMP     ST
5607 *35360 000207          ISOLA21 RTS      PC
5608 *35362 005767 000122          ISOLA11 TST     ISFLG
5609 *35366 001012          RNE     ISO2
5610 *35370 012767 000001 000112          MOV     #1,ISFLG
5611 *35376 005067 000104          ISO11  CLR     ISCNT
5612 *35402 012767 000004 000102          MOV     #4,ISWRD
5613 *35410 005005          CLR     R5
5614 *35412 000410          BR      ISO4
5615 *35414 016705 000066          ISO21  MOV     ISCNT,R5
5616 *35420 046765 000066 001044          R1C     ISWRD,SR1(R5)
5617 *35426 006367 000000          ISO31  ASL     ISWRD
5618 *35432 001411          REG      ISO5
5619 *35434 036765 000052 001044          ISO41  BIT     ISWRD,SR1(R5)
5620 *35442 001371          RNE     ISO3
5621 *35444 056765 000042 001044          R1S     ISWRD,SR1(R5)
5622 *35452 000167 144674          JMP     ST
5623 *35456 062767 000002 000022          ISO51  ADD     #2,ISCNT
  
```

```

5624 *35464 026727 000016 000006          CMP     ISCNT,#6
5625 *35472 001741          REG      ISO1
5626 *35474 005267 000012          INC     ISWRD
5627 *35500 014705 000002          MOV     ISCNT,R5
5628 *35504 000753          BR      ISO4
5629 *35506 000000          ISCNT1  0
5630 *35510 000000          ISFLG1  0
5631 *35512 000000          ISWRD1  0
5632
5633          JENTER HERE ON POWER FAILURE
5634
5635
5636 *35514 012767 000001 000046          PFAIL1 MOV     #1,PFFLAG
5637 *35522 012767 035532 142274          MOV     #RESTART,24
5638 *35530 000000          HALT
5639
5640          JPROCESSOR WILL TRAP HERE WHEN POWER IS RESTORED
5641
5642 *35532 012706 036520          RESTAR1 MOV     #STACK,SP
5643 *35536 012767 035514 142260          MOV     #PFAIL,24
5644 *35544 005067 143270          CLR     PFFLAG
5645 *35550 005067 000050          CLR     TEMP
5646 *35554 005267 000044          INC     TEMP
5647 *35560 001375          RNE     #4
5648 *35562 104000          HLT
5649 *35564 000167 157016          JMP     PROCTS
5650 *35570 000000          PFFLAG1 0
5651 *35572 125252          R1      125252
5652
5653          ,SBTTL FIXED VALUES AND TEMPORARY STORAGE FOR PROCESSOR TEST
5654
5655 *35574 035572          B      0
5656 *35576 052525          #52525
5657
5658          ,=B+10
5659 *35602 177777          A1      #1
5660 *35604 035606          A+4
5661
5662          ,=A+4
5663 *35606 125252          #125252
5664 *35610 035612          A+10
5665 *35612 052525          #52525
5666 *35614 000000          C1      0
5667 *35616 035614          C
5668
5669          ,=C+10
5670 *35624 000000          TEMP1  0
5671 *35626 035624          TEMP
5672
5673          ,=TEMP+6
5674 *35632 035634          #TEMP+10
5675 *35634 000000          D1      0
5676
5677          ,SBTTL FLOATING POINT CONSTANTS AND DATA
  
```


A	035602	AANS1	035712	AAR0	036562	AAR1	036564
AAR2	036566	AAR3	036570	AA11	006566	AA11V	000140
ABCA	001474	ABCSR	001500	ABDBR	001472	ABWC	001476
AC	001224	ACTFLG	001066	AC0	=X0000004	AC1	=X0000001
AC2	=X000002	AC3	=X000003	AC4	=X0000004	AC5	=X0000005
ADEK	006412	ADCONT	006516	ADCSR	001300	ADCSRO	001302
ADDBR	001276	ADLOOP	006434	ADSUB	024332	ADTBLA	006546
ADTBLB	006556	ADTEMP	006536	AD1D	006304	AD11V	000130
AD0101	035664	AD1	006342	AD1000	035670	AD1071	035666
AD2	006360	ADST01	036040	AFADD	009700	AFCAR	001430
AFCIV	000134	AFCCLR	009770	AFCOM	006056	AFCOM1	006100
AFCSR	001424	AFCSTR1	006236	AFCR2	006237	AFC11	005670
AFCBR	001426	AFFXA	006024	AFCR1	006237	AFCOM1	006100
AFMOV1	006200	AFFFLG	006242	AFCR2	006237	AFHOV	006156
AFSEL	006240	AFFSP2	009762	AFCR1	006244	AFPTA	006234
AFPEMP	006240	ANS1	036070	AFCR2	006244	AFPTA2	006264
ANS4	036076	ANS2	036072	ANS2	036072	ANS3	036074
ANS8	036106	ANS3	036100	ANS6	036102	ANS7	036104
ASMC1	025722	ARIEND	024410	ASCNT	035052	ASH	001244
B	035570	ASMC2	026014	ASH1	025604	ASH2	025666
BBWC	001506	BBCA	001504	BBCSR	001510	BBDBR	001502
BBEIN4	002306	BDATA1	004510	BDATA2	004540	BEGIN1	001542
BUST2	014060	RELL	033324	BR	= 000002	BUST1	001370
BUSY	= 000020	RUST3	014144	RUST4	014516	BUSMT	= 033710
CBCSR	001520	C	035614	CBBUF	014240	BCA	001514
CBUS1	014072	CBCTA	014234	CBCTR	014236	CBDBR	001512
CDBUFF	005424	CBUS3	014176	CBWC	001516	CBDA	001274
CDENDP	= 005544	CDCC	001272	CDCHK1	005374	CDEND1	= 005666
CDLDP2	005312	CDISR	005160	CDISR1	005200	CDLDP1	005262
CDTOP	= 005424	CDRET	005346	CDRET1	005352	CDST	001270
CHAR3	006730	CHAR	006642	CHAR1	006664	CHAR2	006704
CLRMUX	= 002000	CHAR4	007056	CHOUT	006540	CLINCT	012150
CNTR	036602	CLRSCN	= 004000	CMP1	023632	CMP2	023454
NFIG	001062	COMFIS	026274	COMFPP	026532	COMPAR	023626
CRB1	001264	CORTSB	002236	CORTST	002212	CORTS1	002254
CRCHK3	005124	CRB2	001266	CRCHK1	004754	CRCHK2	005102
CRCK1	005150	CRCHK4	005056	CRCHK5	005136	CRCHK6	= 005072
CRCNT	005034	CRCK2	005154	CRCLT	005156	CRCM11	004714
CRS	001262	CRCNT	005022	CRDRV	000230	CRDRPS	000232
CURPAT	012144	CRSUM1	005146	CRSUM2	005150	CR1	005010
DALTA	035714	D	035634	DAC0	001326	DAC1	001330
DATAS	004604	DALTB	035724	DALTC	035734	DASH	036550
DBCSR	001530	DATA4	004700	DBBUF	= 014240	DBCA	001524
DBIG	035672	DBCTA	014602	DBCTB	014604	DBDBR	001522
DCBCNT	010614	DBUS1	014452	DBUS3	014544	DBWC	001526
DCBAY4	011050	DCDAT1	010634	DCDAT2	010722	DCDAT3	010762
DCINS	010720	DCINF	010746	DCIN1	010726	DCIN2	010732
DCINS	010676	DCIN3A	011054	DCIN3B	011046	DCIN4A	011060
DCOUTF	010744	DCIN5A	011024	DCOUT	010640	DCOUTA	010766
DCRCSR	001410	DCOUT1	010644	DCOUT3	010772	DCRBR	001416
DCFCR	001404	DCRDBR	001412	DCRSR	001414	DCFCR	001420
DCITIV	000304	DCTOBA	001422	DCTDBR	001406	DCIRIV	000300
DCIT2	010750	DC11R1	010654	DC11R2	011002	DCIT1	010622
DEVTAB	036730	DC2RIV	000310	DC2TIV	000314	DEFI	030774
		DIV	001236	DIV1	026110	DIV2	026164

DMBAR	001342	DMBARI	011546	DMBAS	001346	DMBAT	011500
DMBCSR	001530	DMBEND	032426	DMRINT	032410	DMRLSR	001534
DMBLVL	001540	DMBRK	001344	DMRVEC	001536	DMCAT	011400
DMCSR	001340	DMMSK	011540	DMPRIA	004142	DMPR1B	004162
DMPRIC	004020	DMPKIM	004022	DMPTR	011544	DMRINA	011256
DMRINB	011266	DMRINC	011272	DMRIND	011322	DMRINX	011346
DMRPR1	001352	DMRVEC	001350	DMYDAT	011542	DMYIN	011122
DMYINA	011154	DMYINB	011210	DMYINX	011220	DMYIN1	011140
DMYPR1	001356	DMYVERO	001354	DMWCT	011440	DMYRT1	001032
DMVRTS	001034	DMZERO	035702	DM11BB	032216	DM11R	011226
DMY1	011072	DNCSR	001332	DNEND	031430	DNPLG	031454
DNTR	031430	DNLVL	001336	DNVEC	001334	DN1	031230
DO	= 000001	DONE	= 000020	DPESYN	001372	DPB	001362
DPRDAT	010616	DPRIV	001374	DPRP	001376	DPB	001360
DPSSR	010742	DPSSR1	011070	DPYNC	001370	DPB	001366
DPYDAT	010620	DPTIV	001400	DPTP	001402	DPB	001364
DPYSYN	010612	DP11A	003714	DP11R	010462	DP11PA	010530
DP11RB	010542	DP11RC	010564	DP11RR	010570	DP11T	010374
DRACCS	001126	DRACIB	001132	DRACOB	001130	DRACT	031456
DRACT1	031664	DRACTO	031666	DRACT1	031502	DRBA	001454
DRBIV	000124	DRBUF	031170	DRDBR	001450	DREND	031230
DREND	031154	DRFLG	031166	DR1LVL	001136	DRIR	031160
DRIVEC	001134	DRQLVL	001142	DROVEC	001140	DRS1	001452
DRWC	001456	DR11B	031052	DSMALL	035654	DRCSR1	001200
DYREL	033674	D0100	036004	D0100X	036016	D0101	035640
D0111	036024	D1000	036006	D1001	035646	D1010	035636
D20	035774	D37	035754	D40	035744	D46	035764
D5701	036034	ENDB00	030612	ENDBUF	010142	ENDEAE	030342
ENBPAS	033412	ENDPAX	033606	ENDPA1	033624	ENBP0	027564
ENDP1	033522	ENDP2	033536	ENDWAT	033116	FWAIT	035260
EXIT	033454	EXITCT	034342	FXLOP	026554	FXOPT	034006
EXPAND	033142	EXPAN1	033156	EXPAN2	033162	FXPAN3	033300
EXP1A	014060	EX4	026610	E,PUN	000760	F,TCR	= 000762
E,1DB	= 000770	E,0	000636	E,1	= 000666	F,2	= 000700
E,3	= 000736	E,4	000750	F	= 000000	FADD	= 075000
FDIV	= 075030	FEA	036112	FEC	036110	FEND1	012206
FISSTK	= 026530	FLTERR	036056	FMUL	= 075020	FPERF	036116
FPS	= X000000	FPTADR	036120	FPVECT	036122	FSUB	= 075010
FUNCT1	007540	F5701	036042	GETSW	001020	HCORE	001056
WPHM	035042	HERE	= 000000	HPCSR	001114	HPBR	001116
WPLPEX	034722	HPOUTR	004622	HPOUT1	004702	HPOUT2	004676
WRCSR	001110	HDRBR	001112	HSP1V	000074	HSPLSP	034662
HSR1NR	004552	HSRIN1	004610	HSRIN2	004614	HSRIV	000070
WTESTL	033276	ICOUNT	001036	IE	= 000100	HWI	000712
INVCNT	004712	INTENA	= 000100	TOTLVL	000022	IOTVEC	000020
ISONT	035506	ISFLG	035510	ISLAT	035320	ISOL1	035362
ISBLA2	035360	IS01	035376	IS02	035414	IS03	035426
IS04	035434	IS05	035456	ISWRD	035512	KDSAR0	= 172360
KDSDR0	= 172320	KGBCC	001466	KGCIT	032012	KGCP	032056
KGCSR	001464	KGC12	032014	KGDBR	001470	KGPP	032016
KGEND	032004	KGIP	032010	KGSTR	031670	KGTA	031716
KGPEST	031700	KISAR0	= 172340	KISDR0	= 172300	KLIV	000100
KW05B	001444	KWCSR	001442	KWCTR	001446	KWIV	000104
KWRATE	010350	KW11L	010352	KW11P	010214	KW11PA	010262

KW11PB 010304	KW11PC 010326	LIGHTS = 177570	LINKFR 001437
LIST 035054	LISTND 035077	LKCSR 001120	LLIMIT 007542
LOCORE 001052	LOGICA 033506	LPCSR 001122	LPOBR 001124
LPINTR 01200*	LPINZ 012074	LP1 012126	LP2 012134
LPS 012042	LP4 012052	LP5 012120	LSH 001242
LYESTL 033224	LYEST1 033236	MAINLI 004440	MAINS 004442
MAINT 001707	MANAG1 027030	MAP 034202	MAPA 034236
MAP1 03422*	MAP1A 034204	MAP2 034246	MAP2A 034240
MARK 02524*	MARK0A 025246	MARK1 = 006401	MORE 026704
MG 001224	MR11DB 030550	MR11D1 030560	MR11P2 030606
MR11D3 03061*	MTRC 001436	MTRKSP 007650	MTRKY 007672
MTC 001434	MTC A 001440	MTC 010000	MTRK1 010006
MTC2 012044	MTDATA 012072	MTRV 002224	MTRNG 010212
MTPD1 027054	MTRBUF 012074	MTRDX 007744	MTRPAD 007712
MTRX 007564	MTR0 012070	MTR1 007774	MTR2 007776
MYS 001432	MTRBUF 012144	MTRWRT 007566	MTRWRTX 007620
MUL 001234	MUL1 025434	MUL2 025516	M792A1 030362
M792A2 03042*	M792A3 030424	M792A4 030450	M792A5 030452
M792B1 030514	M792P2 030542	M792B3 030544	M792VA 030342
M792YB 030454	N 031230	NOOPT 034002	MOR 001240
NUMA 024406	N1 036555	OVFLAG 001026	P 036536
PASCNT 001042	PASCT 034330	PASEX 034326	PASPAR 034324
PASTAB 034332	PAS20 034320	PAS40 034310	PAS45 034260
PC = 000007	PFAIL 035514	PFFLAG 035570	PRLVL 000242
PIRQ = 177772	PIRQA 027532	PIRQB 027536	PIRQFX 027540
PIRVEC 00024*	PNTX 036600	POINTA 006542	POINTB 006544
PREG1 03454*	PREG2 034550	PREG3 034560	PRFLAG 001440
PRIME 001022	PRINT 034352	PRINT1 034604	PRINT2 034624
PRINT3 034656	PROCTS = 014606	PRTAB 034744	PRTAD1 034756
PS = 177774	QVFLG = 001067	R = 004000	RB = 000402
RCBAR 001172	RCCSR 001174	RCCSRH 001176	RCAP 001166
RCDBR 001164	RCFUNC 007414	RCIV 000210	RCIA 001162
RCSTAR 007354	RCWC 001170	RCWORD 007416	RC11 007314
RC2 007362	RD = 000004	REC1A 014056	REC = 024056
REF 024056	RENDZ 012362	REND1 012412	RESTAR 035532
RESYNC 010444	RETURN 001064	RFCAR 001154	RFSR 001156
RFCSRH 00116*	RFD 003030	RFDAC 001144	RFNAP 001150
RFBDR 001146	RFIV 000204	RFSTAR 007502	RFWC 001152
RF1 007506	RF11 007420	RJMP1 016326	RJMP2 016344
RKBAR 001212	RKCSR 001214	RKCSRH 001216	RKMAN 001206
RKBAR 001204	RKDBR 001202	RKDRV 001222	RKNSP 001220
RKFUNC 007204	RKIV 000220	RKSTAR 007144	RKVC 001210
RKWOPD 007206	RK1 007152	RK11 007074	ROTALL 023732
ROYBE 024074	ROTB0 024200	ROTE1 024276	ROTVAL 033224
RPBAR 001316	RPCA 001304	RPCSR 001320	RPCSRH 001322
RPD 00265*	RPDAM 001306	RPDAR 001312	RPPSP 001310
RPPUNC 007312	RPIV 000254	RPSTAR 007250	RPWC 001314
RPWORD 00731*	RP1 007264	RP11 007210	RTA 025404
RTYB 025416	RUNSW 002342	R0 = 000000	R1 = 000001
R2 = 000002	R3 = 000003	R4 = 000004	R5 = 000005
SAVADR 036052	SAVPC 034740	SAVPS 034742	SAVR2 034726
SAVRS 03473*	SAVR4 034732	SAVSPA 034724	SAVST5 036054
SC 00123*	SCNENA = 000040	SCNT1 032230	SCNT1A 032256
SCNT1B 03233*	SCNT1D 032370	SCNT1E 032404	SCOFF = 104400

SCOPEA 035166	SCOPEB 035072	SCOPEC 035116	SCOPEF 001760
SCOPEG 035162	SCOPEY 035076	SCSR 001324	SDSAP0 = 172260
SDSDR0 = 17222*	SEGALL 034132	SEGERR 034152	SEGLVL 000252
SEGOPT 034014	SEGVEC 000250	SEG40 034106	SEND1A 014054
SETSW 002152	SISAR0 = 172240	SISDR0 = 172200	SIFCP 036004
SOB1 025156	SOR2 025154	SOR3 025166	SOR4 025176
SOB5 02517*	SOR6 025204	SOLPAT 012146	SP = 000000
SR = 17757*	SRE 001232	SR1 001044	SR2 001046
SR3 00105*	SSR0 = 177572	SSR0T 034200	SSP3 = 172516
ST 002352	STA 002452	STACK 036520	STACKK 036322
START 002032	STC2 004272	STC3 004360	STEP = 000400
STMT 003674	STORE 036726	ST00 002634	ST01 002726
ST1 00274*	ST1B 003434	ST1C 003466	ST1C1 003504
ST1D 003516	ST1D1 003540	ST10 003302	ST10R 004424
ST11 003332	ST13 004272	ST17 003362	ST2 002752
ST3 002764	ST3B 003632	ST4 004360	ST4A 002776
ST5 003014	ST6 003062	ST7 003112	STR 003152
ST9 003234	SUBR1A 035262	SURR2A 035264	SURR3A 035270
SUBR4A 035276	SUBR5A 035304	SURSPA 035312	SWABA 024770
SWITCH 00216*	TBPTR 006534	TCRA 001256	TCCM 001246
TCDRV 00126*	TCDT 001252	TCEXPE 012162	TCP1RS 012156
TCFLAG 012152	TCF1 012236	TCF1A 012230	TCF2 012270
TCF3 012304	TCF4 012352	TCIV 000214	TCLAST 012160
TCOM 02443*	TCOMA 024412	TCON2 024512	TCOM3 024574
TCRBK 012664	TCRBUF 012750	TCRB1 012722	TCR1 012524
TCR1A 012566	TCR2 012574	TCR3 012610	TCP4 012656
TCSR 034734	TCST 001250	TCSTAT 012154	TCWBK 012436
TCWBUF 01275*	TCWB1 012470	TCWC 001254	TC1 035174
TC1 01216*	TC2 035220	TDDR 034734	TEMP 035624
TEST 02406*	TEST0 014626	TEXT 036522	TJSR1 023216
TJSR2 02322*	TJSR3 023232	TM11 007546	TCSR 001100
TRDR 001102	TRTRET 034010	TRVVEC = 000014	TSCOMB 024652
TSCOM1 024646	TSRT2A 024062	YSTAR1 024314	TS45 025026
TTCSP 001104	TTDBR 001106	YTPIV 000064	TTRIV 000060
TYVINR 004456	TYVIN1 004514	YTYIN2 004520	TYVIN3 004506
TYMTR 001100*	TYV9 010420	YWAIT 035244	YXT1 006634
TYOUTR 004526	TYOUT1 004542	TYOUT2 004550	Y1B 010416
Y19 01046*	UDCR 001460	UDC11 030612	UDFLG 031050
UDINT 031026	UDIV 000234	UDPS 000236	UDSAP0 = 177660
UDSDR0 = 17762*	UDSR 001462	UISAR0 = 177640	UISDR0 = 177600
UM = 140007	WAITS 027602	WAIT1 027714	WAIT2 035020
WAITS 027646	WAIT4 027732	WATCAF 032544	WATCAD 033052
WATCAF 033006	WATCBB 032560	WATCCB 032602	WATCDB 032616
WATCDM 033114	WATCDP 033074	WATCCM 032426	WATCCL 032476
WATCKP 032522	WATCRC 032720	WATCRF 032640	WATCPK 033030
WATCUD 032676	WATCUI 032662	WATDC1 032742	WATDC2 032764
WAT1 032507	WAT10 033010	WAT12 033032	WAT13 033054
WAT14 033076	WAT15 033116	WAT2 032524	WAT3 032562
WAT4 032627	WAT5 032642	WAT6 032700	WAT7 032722
WAT8 032744	WAT9 032766	WD = 000014	WEIRD 036554
WORDCT 007544	XD 036543	XLIST = 000012	XOP1 025042
XPOS 036574	XTC11 012360	YPOS 036572	YPT 036576
YDMPRT = 00024*	YDONE = 000200	YGO = 000001	YMAINT = 000004
YEX = 040007	YQVRUN = 020000	YREADY = 100000	YRIE = 000100

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DEGAC:P11 SYMBOL TABLE
,YTE = 010000 ,TYPE 030114 = 037036

ERRORS DETECTED: 0

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DEGAC:P11

#DEGAC,DEGAC/SOL+DEGAC,P11
RUN-TIME: 22 40 1 SECONDS
CORE USED: 54

