PDP11/34

MEMORY MGMT EXERCISER

MD-11-DFKTG-B

EP DFKTG B DL B

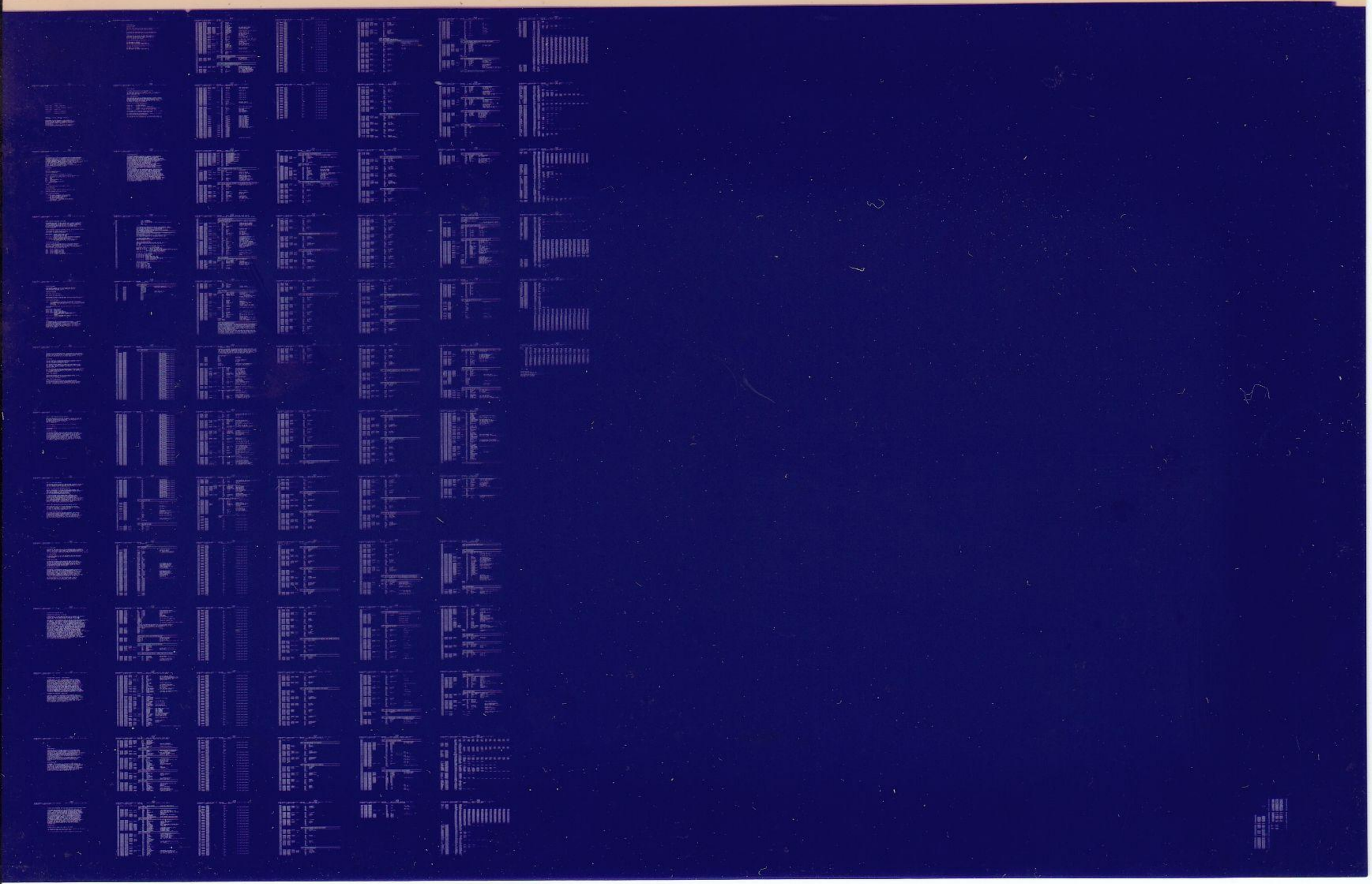
COPYRIGHT 1977

FICHE 1 OF 1

MAR 1977

digital

MADE IN USA



B01

EJF1DZ@MCCSE@	00010000	770225	PDP10 411	HDR1DFKTGBSE@	00010000	770225

.REM *

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DFKTG-B-D

PRODUCT NAME: 11/34 MEMORY MANAGEMENT EXERCISER

PRODUCT DATE: JANUARY 1977

MAINTAINER: DIAGNOSTIC PROGRAMMING

AUTHOR: DIAGNOSTIC ENGINEERING

COPYRIGHT (C) DIGITAL EQUIPMENT CORPORATION
1975, 1977

THE MATERIAL IN THIS DOCUMENT IS FOR INFORMATION
PURPOSES ONLY AND IS SUBJECT TO CHANGE WITHOUT NOTICE.
DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY
FOR THE USE OF SOFTWARE ON EQUIPMENT WHICH IS NOT
SUPPLIED BY IT.
DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY
FOR ANY ERRORS WHICH MAY APPEAR IN THE DOCUMENT.

1.0 ABSTRACT

THIS PROGRAM IS AN INTERACTIVE EXERCISER FOR THE MEMORY MANAGEMENT
PORTION OF A PDP 11/34. IT PERFORMS A TEST OF INSTRUCTIONS AND
CONCURRENT OPERATIONS OF I/O EQUIPMENT WHILE RELOCATING THRU MEMORY.
IT PROVIDES NUMEROUS MODES OF TESTING, FROM 4K EXECUTION WITH
THE MEMORY MANAGEMENT TURNED OFF AND ONLY KERNEL MODE IN USE, TO 128K EXECUTION
WITH EACH USER PAGE MAPPED SEQUENTIALLY TO EVERY 4K BANK OF MEMORY.
THIS PROGRAM IS NOT TO BE CONSIDERED A TOTAL CHECK OF THE
SYSTEM. IF AN ERROR IS DETECTED IN AN I/O DEVICE,
IT WILL PROBABLY BE NECESSARY TO CORRECT THE MALFUNCTION WITH THE
RESPECTIVE DIAGNOSTIC FOR THAT DEVICE.

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11/34 STANDARD COMPUTER
TELETYPE OR EQUIVALENT

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE

MEMORY UP TO 124 KW OF MEMORY-DOES NOT HAVE TO BE CONTIGUOUS,
        BUT BLOCKS OF LESS THAN 4KW WILL NOT BE USED
RF11   DISK
RK11   DISK
TC11   DECTAPE-TRANSPORT ONE(1)
KW11-L LINE CLOCK
KL11   ASR33 OR ASR35 TELEPRINTER
LP11   LINE PRINTER

2.2 STORAGE

THIS PROGRAM USES MEMORY FROM 00000 TO 17760.

3.0 LOADING PROCEDURE

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4.0 STARTING PROCEDURE AND SWITCH SETTINGS

4.1 NORMAL STARTING PROCEDURE

SET DESIRED MEMORY MANAGEMENT OPTION SWITCHES
        (IN LOC. 174, MMOPT) (SEE SECTION 4.2)
        ALL ZERO FOR WORST CASE TESTING
SET DESIRED SWITCH REGISTER BITS.
        (USE LOC. 176 FOR SOFTWARE SWITCH REGISTER
        IF NECESSARY). (SEE SECTION 4.3 AND 5.1.2)
LOAD ADDRESS 200 AND START.

4.1 NORMAL STARTING PROCEDURE (CONTINUED)

THE PROGRAM WILL RING THE BELL (UNLESS THE TTY OUTPUT IS SELECTED) AT THE END OF EACH BANK. IF SWITCHES 0,1 AND 2 WERE ALL DOWN WHEN START WAS PRESSED (SELECTING THE USE OF 4K PHYSICAL ADDRESS SPACE AS 32K VIRTUAL ADDRESS SPACE-SEE 5.3.1) AN ASTERISK WILL BE TYPED AT THE END OF A FULL PASS THRU ALL MEMORY (UNLESS THE TTY OUTPUT IS SELECTED).

4.2 MEMORY MANAGEMENT SELECTION SWITCHES (INITIAL SWITCH REGISTER SETTINGS).

THE SWITCHES SET BEFORE STARTUP DETERMINE THE WAY IN WHICH MEMORY IS MAPPED AND EXERCISED:

MMOPT BIT0=1---INHIBIT MEMORY MGMT. (SR0<0> WILL NOT BE SET AT ALL)
MMOPT BIT1=1---INHIBIT USE OF USER MODE.
(ALSO INHIBITS 4K AS 32K)
MMOPT BIT2=1---INHIBIT 4K AS 32 K (ALSO INHIBITED IF EITHER SW0 OR SW1 IS SET)-SEE SECTION 5.3.1 FOR EXPLANATION
MMOPT BIT5=1---INHIBIT VARIABLE CORE EXPANSION
=0 OR DOWN-CORE EXPAND UNLESS SW0, 1 AND 2 ARE ALL DOWN
(IN WHICH CASE 4K AS 32K IS RUN INSTEAD)

4.3 DEVICE SELECTION SWITCHES

THE DEVICE SELECTION SWITCHES ARE SET IN THE SWITCH REGISTER (USE LOC. 176 FOR SOFTWARE SW. REG. IF NECESSARY) ALSO SEE SEC. 5.1.2. EACH SWITCH, IF SET, INHIBITS A SINGLE I/O DEVICE FROM BEING EXERCISED. IF A DEVICE DOES NOT EXIST, THE CORRESPONDING INHIBIT SWITCH DOES NOT HAVE TO BE SET.

SW0=1 OR UP---INHIBIT TTY OUTPUT
SW3=1 OR UP---INHIBIT RK11 DISK
SW4=1 OR UP---INHIBIT LINE CLOCK
SW5=1 OR UP---INHIBIT RF11 DISK
SW6=1 OR UP---INHIBIT TC11 DECTAPE
SW7=1 OR UP---INHIBIT LINE PRINTER (USE SA310 IF LP11 IS SELECTED)

4.4 RESTART PROCEDURE

USING RESTART ADDRESS 310 THE SWITCH REGISTER SETTINGS GIVEN PREVIOUSLY ARE USED (FOR BOTH MEMORY MANAGEMENT SELECTION AND DEVICE SELECTION).

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

5.1.1 BASIC SWITCH SETTINGS-STARTUP

SEE SECTIONS 4.2 AND 4.3 FOR THE BASIC SWITCH SETTINGS USED AT STARTUP. THOSE SWITCHES ARE NOT RECHECKED AFTER THEY ARE INITIALLY STORED.

5.1.2 DYNAMIC SWITCH SETTINGS

NOTE; IF NO HARDWARE SWITCH REGISTER IS AVAILABLE, THE PROGRAM WILL AUTOMATICALLY USE THE CONTENTS OF LOC. 176 AS THE SOFTWARE SWITCH REG. THE USER SHOULD SET THIS LOCATION BEFORE STARTING THE PROGRAM.

THE FOLLOWING SWITCHES ARE RECHECKED PERIODICALLY DURING PROGRAM EXECUTION:

SW15=1 OR UP---HALT ON ERROR
SW14=1 OR UP---SCOPE LOOP
SW13=1 OR UP---INHIBIT PRINT OUT
SW12=1 OR UP---INHIBIT TRACE TRAPPING
SW11=1 OR UP---INHIBIT SUB-PROGRAM ITERATION AND INHIBIT TESTS WHICH USE ALL COMBINATIONS OF NUMBERS
SW10=1 OR UP---INHIBIT PROCESSOR TEST (ONCE SET, PROCESSOR TEST IS PERMANENTLY INHIBITED)

5.2 SUBROUTINE ABSTRACTS

5.2.1 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST. IT RECORDS THE STARTING ADDRESS OF EACH SUBTEST 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 256 ITERATIONS ON THAT SUBTEST BEFORE THE NEXT SUBTEST IS ENTERED. SWITCH 11 ON A 1 INHIBITS ITERATION OF SUBTESTS.

5.2.2 HLT

THIS EMT CALLS THE SUBROUTINE PRINT, WHICH PRINTS OUT THE LOCATION COUNTER AT THE TIME OF FAILURE, THE CONTENTS OF THE PROCESSOR STATUS REGISTER, AND THE CONTENTS OF THE CURRENT BANK COUNTER. NOTE THAT THE LOCATION COUNTER WILL BE THE VIRTUAL ADDRESS OF THE HLT PLUS TWO.

5.2.3 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.

EACH VECTOR ENTRANCE ADDRESS IS LOADED WITH THE ADDRESS OF THE NEXT LOCATION. THE NEXT LOCATION IS LOADED WITH A HALT (000000). THUS AN ILLEGAL TRAP OR INTERRUPT WILL CAUSE A HALT AT THE TRAP LOCATION PLUS TWO.

IF A HALT OCCURS IN THE TRAP OR INTERRUPT AREA EXAMINE KERNEL REGISTER SIX. IT WILL CONTAIN THE CURRENT STACK ADDRESS. THE CONTENTS OF THE CURRENT STACK ADDRESS IS THE VIRTUAL PC AT THE TIME THE TRAP OR INTERRUPT OCCURRED.

5.2.4 EMTSRV (EMT HANDLER)

THIS ROUTINE DECODES THE EMT CALLS AND PASSES CONTROL TO THE CORRECT SERVICE ROUTINE. THE ROUTINES HANDLED BY EMT CALLS ARE PRINT (HLT CALL) AND EOBSRV (EOB CALL).

5.2.6 EOBSRV (END OF BANK SERVICE)

THE VARIOUS EXECUTION OPTIONS FOR THIS EXERCISER REQUIRE SPECIAL HANDLING WHEN THE END OF THE PROCESSOR TESTS IS REACHED IN A BANK. THIS SERVICE ROUTINE PERFORMS THE VARIOUS MAPPING FUNCTIONS, DEPENDING UPON THE INITIAL SWITCH REGISTER SETTINGS.

5.2.7 BEGINX (CORE EXPANSION SPECIAL HANDLER)

WHEN CORE EXPANSION IS UTILIZED, A NUMBER OF SPECIAL ACTIONS MUST BE TAKEN AT THE BEGINNING OF EACH BANK. THE SCOPE ROUTINE VECTOR IS LOADED TO POINT TO THE NEW BANK, AND IF TC11 AND RF11 CODE AND BUFFER RELOCATION IS ALLOWED.

5.2.9 PFAIL (POWER FAIL)

IN THIS VERSION THE POWER FAIL ROUTINE IS NOT OPERABLE.

5.2.11 TYOUT (TTY OUTPUT)

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

5.2.12 RFSTART (RF11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS A PART OF THE TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCKS 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 "DATI" 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.

5.2.13 ENDZ (TC11 END ZONE HANDLER)

THIS ROUTINE IS PART OF THE TC11 SERVICE CODE. IT DRIVES THE DECTAPE INTO THE FORWARD OR REVERSE END ZONE, THEN REVERSES IT. IT ALSO DOES THE NECESSARY SETUP TO BEGIN READING OR WRITING THE TAPE.

5.2.14 REGEN (TC11 WRITE BUFFER REGENERATE ROUTINE)

THE TC11 CODE WRITES THE ENTIRE DECTAPE GOING FORWARD, THEN READS IT IN REVERSE. THE BUFFER IS REGENERATED BEFORE WRITING THE TAPE, AND IS CLEARED OUT ONCE THE ENTIRE TAPE HAS BEEN WRITTEN. THIS ROUTINE REGENERATES THE WRITE BUFFER.

5.2.15 RBN (TC11 READ BLOCK NUMBER SERVICE ROUTINE)

AT THE END OF EACH "BLOCK NUMBER FOUND" INTERRUPT, THIS ROUTINE IS ENTERED (UNLESS END ZONE IS BEING SEARCHED FOR). IT CHECKS FOR THE CORRECT SEQUENCE OF BLOCK NUMBERS, THEN SETS UP THE TC11 TO WRITE A BLOCK IF THE TAPE IS TRAVELLING FORWARD. IF IT IS GOING IN REVERSE, THE ROUTINE CHECKS TO SEE IF DATA IS STILL BEING CHECKED FROM A PREVIOUS READ. IF IT'S NOT, THE ROUTINE SETS UP TO READ A BLOCK. IF DATA IS STILL BEING CHECKED FROM BEFORE, IT SIMPLY DOES ANOTHER READ BLOCK NUMBER.

5.2.16 NXTBLK (TC11 READ BLOCK AND WRITE BLOCK SERVICE ROUTINE)

WHEN A READ BLOCK OR A WRITE BLOCK OPERATION IS COMPLETED, THIS ROUTINE IS ENTERED. IT CHECKS THE ERROR BIT, THEN SETS UP A CALL TO CHECK DATA IF DATA WAS JUST READ IN. THE ROUTINE ALSO SETS UP A READ BLOCK NUMBER OPERATION.

5.2.17 TCCK (TC11 CHECK DATA ROUTINE)

WHEN A READ BLOCK OPERATION HAS BEEN COMPLETED, THIS ROUTINE IS CALLED VIA A PRIORITY INTERRUPT REQUEST AT LEVEL 3. THE ENTIRE BUFFER IS CHECKED, AND THE CONTENTS OF THE BUFFER IS ALTERED AS THE CHECK PROGRESSES. THUS, IF A READ BLOCK OPERATION DOES NOT ACTUALLY READ IN ANY DATA, THE DATA CHECK ROUTINE WILL FIND BAD DATA INSTEAD OF SEEING GOOD DATA FROM AN EARLIER READ.

5.2.18 LCLK (LINE CLOCK)

THIS TEST OF THE LINE CLOCK IS IN THE INTERRUPT MODE. IF OPERATING CORRECTLY THE SYSTEM I/O WILL RUN AT FULL SPEED FOR 55 SECONDS, AND THEN ALL I/O AT LEVEL FOUR OR LESS (AND THE PROCESSOR TESTS) WILL STALL FOR 5 SECONDS. TIMES GIVEN ARE BASED ON 60 CYCLES AS THE LINE FREQUENCY.

5.2.19 LP1 (LINE PRINTER)

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

5.2.20 RKSTART (RK-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF THE TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCKS THRU THE DISK MEMORY. AFTER THE TOTAL DISK HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK.

5.2.22 CORE EXPANSION (DET1)

THIS ROUTINE IS CONTROLLED BY SWITCH 5. IF CALLED, THE PROCESSOR MAINLINE CODE WILL EXPAND TO THE MAXIMUM MEMORY THAT IS AVAILABLE (UP TO 28K). THE ROUTINE DETERMINES THE MAXIMUM MEMORY SIZE BY DOING A "DATO" TO A LOCATION IN EACH BANK. IF THE BANK DOES NOT EXIST, A TIMEOUT WILL OCCUR. AN IMAGE OF BANK 0 IS THEN TRANSFERRED TO EACH EXISTING BANK. THE CODE IN EACH BANK EXCEPT THE LAST IS MODIFIED TO CHANGE THE END OF BANK CALL TO A JUMP TO BEGINX (CORE EXPANSION SPECIAL HANDLER) IN THE NEXT BANK.

THE LISTING SHOWS ONLY THE CODE FOR BANK ZERO. WHEN AN ERROR OCCURS THAT IS NOT IN BANK ZERO, IGNORE THE BANK BITS OF THE PRINT OUT AND USE THE LISTING FOR BANK ZERO.

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1 PROCESSOR TEST EXECUTION - 4K AS 32K

IF MMOPT BITS 0, 1, AND 2 ARE ALL ZERO (=0) AT STARTUP, THE PROCESSOR TEST WILL BE EXECUTED TREATING EACH 4K BANK AS 32K OF VIRTUAL ADDRESS SPACE. THE FOLLOWING DETAILS THIS MODE OF OPERATION.

USER PAGE 0 IS FIRST MAPPED RW, BANK 0, AND ALL OTHER USER PAGES ARE MAPPED NON-RESIDENT. THE PROCESSOR TESTS ARE EXECUTED IN USER THRU USER PAGE 0. WHEN DONE, USER PAGE 0 IS CHANGED TO NON-RESIDENT, AND USER PAGE 1 IS MAPPED RW, BANK 0. THE PC IS CHANGED TO ADDRESS THE START OF THE PROCESSOR TESTS THRU PAGE 1, AND ANOTHER PASS THRU THE PROCESSOR TESTS IS EXECUTED. AT THE END OF THIS PASS, USER PAGE 2 IS MAPPED RW, BANK 0, AND USER PAGE 1 IS MA' NON-RESIDENT. THE PC IS AGAIN CHANGED. THIS TIME TO ACCESS USER PAGE 2, AND THE PROCESSOR TESTS ARE EXECUTED THRU USER PAGE 2. THIS CYCLE IS REPEATED FOR THE REMAINING USER PAGES, MAPPING EACH IN TURN TO BANK 0 AND CHANGING THE PC TO EXECUTE THRU THE ONE CURRENTLY MAPPED. WHEN THE PASS USING USER PAGE 7 IS COMPLETED, A SEARCH IS MADE FOR THE NEXT 4K BANK OF MEMORY. WHEN A BANK IS FOUND, THE PROGRAM IS COPIED INTO THAT BANK FROM BANK 0. USER PAGE 0 IS MAPPED TO THE NEW BANK, AND THE PC IS CHANGED TO EXECUTE THRU USER PAGE 0. THE PREVIOUS CYCLE IS REPEATED, BUT THIS TIME EACH USER PAGE IS MAPPED IN TURN TO THE NEW BANK. ONCE EXECUTION THRU USER PAGE 7 IS COMPLETED, A SEARCH IS MADE FOR THE NEXT BANK. THE PREVIOUS BANK IS CLEARED (EXCEPT FOR THE LOADER), AND THE PROGRAM IS COPIED FROM BANK 0 INTO THE CURRENT BANK. THE CYCLE REPEATS UNTIL THE EXTERNAL BANK IS REACHED, AT WHICH POINT USER 0 IS MAPPED BACK TO BANK 0 AND THE PROCESS STARTS AGAIN.

5.3.2 PROCESSOR TEST EXECUTION - CORE EXPANSION

IF MMOPT BITS 0, 1, OR 2 IS UP AND SW5 IS ZERO AT STARTUP, THE PROCESSOR TESTS WILL BE CORE EXPANDED THRU ALL AVAILABLE MEMORY UP TO 28K. THE ROUTINE DET1 DOES THIS CORE EXPANSION, COPYING BANK 0 INTO EACH OF THE OTHER BANKS. THE EMT CALL AT THE END OF EACH BANK (EOB) WHICH CALLS THE END OF BANK SERVICE ROUTINE IS CHANGED TO A JUMP TO BEGINX IN THE NEXT BANK. THE EOB CALL IN THE LAST BANK IS LEFT ALONE. IF MMOPT BITS 0 AND 1 WERE BOTH ZERO AT STARTUP, USER PAGES 0 THRU 6 ARE MAPPED SO THAT THE PHYSICAL AND VIRTUAL ADDRESSES CORRESPOND, AND THE PROCESSOR TESTS ARE THEN RUN IN USER. IF BIT0 WAS ZERO BUT BIT1 WAS ONE, KERNEL PAGES 0-6 ARE MAPPED SO THAT THE PHYSICAL AND VIRTUAL ADDRESSES ARE THE SAME, AND THE PROCESSOR TESTS ARE THEN RUN IN KERNEL MODE. IF BIT0 WAS ONE, ORDINARY CORE EXPANSION IS RUN WITH NO SPECIAL MAPPING REQUIRED (MEMORY MGMT. IS TURNED OFF).

5.3.3 PROCESSOR TEST EXECUTION - BANK 0 ONLY

IF BITS 0, 1 OR 2 IS UP AND BIT3 IS UP AT STARTUP, ONLY BANK 0 IS UTILIZED. IN THIS CASE, IF BIT0 AND BIT1 WERE ZERO THE PROCESSOR TESTS ARE EXECUTED IN USER, WITH USER PAGE 0 MAPPED TO BANK 0. IF BIT0 WAS ZERO AND BIT1 WAS ONE, THE PROCESSOR TESTS ARE EXECUTED IN KERNEL, WITH KERNEL PAGE 0 MAPPED TO BANK 0. IF BIT0 WAS ONE, THE MEMORY MGMT. IS TURNED OFF AND THE PROCESSOR TESTS ARE EXECUTED IN KERNEL MODE OR USER MODE (DEPENDING ON BIT1) IN BANK 0 ONLY.

6.0 ERRORS

6.1 ERROR PRINTOUT

PRINTOUTS ARE IN AN EXTENDED VERSION OF THE STANDARD FORMAT,
USING THREE WORDS. THE FIRST WORD IS THE OCTAL VALUE OF THE
VIRTUAL PC+2 OF THE DETECTED ERROR. THE SECOND WORD IS THE
CONTENTS OF THE PROCESSOR STATUS REGISTER WHEN THE ERROR WAS DETECTED.
THE THIRD IS THE TOP 12 BITS OF THE 18-BIT ADDRESS OF
THE BANK BEING CURRENTLY USED FOR EXECUTION OF THE PROCESSOR TEST.
THE FOURTH IS RETURN WHICH IS THE RETURN ADDRESS IN THE
CURRENT BANK OF MEMORY.
TO GET THE STARTING ADDRESS OF THE CURRENT BANK SIMPLY APPEND
TWO ZEROS TO THE END OF THE OCTAL VALUE PRINTED OUT (I.E.
007400 INDICATES THE BANK BEGINNING AT PHYSICAL ADDRESS
740000).

6.2 ERROR RECOVERY

IN GENERAL, TEST FAILURES WILL PRINTOUT AN ERROR MESSAGE AND
CONTINUE. IF THE "HALT ON ERROR" SWITCH IS SET, HITTING CONTINUE
WILL RECOVER. IF THE PROGRAM HANGS UP IN A LOOP, THE ERROR IS
LIKELY TO BE A SIGNAL WHICH WAS NEVER RECEIVED. IF A HALT
OCCURS IN THE TRAP AND VECTOR AREA THE PROGRAM MUST BE RESTARTED.
IF THE PROGRAM HALTS IN THE MAIN FLOW, CONSULT THE LISTING IF NO
MESSAGE IS TYPED OUT. FOR TTY READER AND HSR, TAPE MUST BE
REPOSITIONED TO LEADER BEFORE RESTARTING THE TEST.

6.3 FINDING WHICH PROCESSOR TEST WAS BEING EXECUTED WHEN AN ERROR OCCURRED

SOME ERRORS ARE DEPENDENT ON THE PROCESSOR TEST BEING RUN (SUCH AS LATENCY ERRORS WHICH ONLY SHOW UP IN WORST-CASE PROCESSOR TIMING). THE SCOPE ROUTINE CONTAINS A LOCATION CALLED "RETURN" WHICH STORES THE STARTING ADDRESS OF THE PROCESSOR TEST CURRENTLY BEING EXECUTED. NOTE THAT THE SCOPE ROUTINE IS EXECUTED IN USER MODE IF SW1 IS DOWN AT STARTUP, AND IS THEREFORE RELOCATED WITH THE PROCESSOR TESTS. THUS, TO DETERMINE WHICH PROCESSOR TEST WAS BEING EXECUTED WHEN A FAILURE OCCURRED, FIRST CHECK THE CONTENTS OF CURBNK IN BANK 0. THIS LOCATION CONTAINS THE ADDRESS OF THE CURRENT PHYSICAL BANK, SHIFTED RIGHT 6 PLACES. BY APPENDING 2 ZEROES TO IT, YOU HAVE THE 18-BIT ADDRESS OF THE CURRENT BANK OF MEMORY. ADD TO THIS THE ADDRESS OF RETURN IN BANK 0 AND YOU HAVE THE ADDRESS OF RETURN IN THE CURRENT BANK OF MEMORY. THE CONTENTS OF RETURN IN THE CURRENT BANK OF MEMORY IS THE VIRTUAL ADDRESS OF THE START OF THE CURRENT PROCESSOR TEST.

7.0 RESTRICTIONS

PROGRAM MUST BE LOADED INTO LOWER 4K OF MEMORY.

THE INHIBIT SWITCHES MUST ONLY BE SET FOR ALL DEVICES THAT ARE PART OF THE SYSTEM BUT WHICH YOU DO NOT WISH TO RUN.

IF THE LINE PRINTER IS USED, STARTING ADDRESS 310 MUST BE USED.

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

EXECUTION TIME VARIES WITH THE AMOUNT OF MEMORY, THE TYPES OF MEMORY, AND THE OPTIONAL MODES OF EXECUTION USED.

A PASS RUN WITH CORE EXPANSION AND 4K AS 32K RELOCATION BOTH INHIBITED TAKES LESS THAN 10 SECONDS (RUNNING NO I/O).

A PASS RUN WITH 4K AS 32K, IN CORE MEMORY WITH NO I/O, TAKES ABOUT 5 MINUTES PER 4K BANK. (AN ASTERIK IS PRINTED AT THE END OF A FULL PASS, AND THE BELL IS RUNG AT THE END OF EACH 4K BANK.

ACT11 WITH OPTIONS SET AS DESCRIBED IN SECTION 8.3:

1ST PASS ABOUT 3 SECONDS.
2ND PASS ABOUT 60 SECONDS (TRACE MODE ON).
3RD PASS ABOUT 30 SECONDS (TRACE MODE OFF).

XXDP WITH OPTIONS SET AS DESCRIBED IN SECTION 8.3:

1ST PASS 1 TO 2 SECONDS.
2ND PASS ABOUT 24 SECONDS (TRACE MODE ON).
3RD PASS ABOUT 12 SECONDS (TRACE MODE OFF).

8.2 STACK POINTERS

THE KERNEL STACK POINTER IS INITIALIZED TO 17760.

THE USER STACK POINTER IS INITIALIZED TO 400. IT IS RELOCATED THRU ALL USER PAGES AND TO EVERY 4K BANK IF THE 4K AS 32K MODE OF EXECUTION IS RUN.

8.3 ACT11/XXDP OPERATION

FOUR LOCATIONS ARE USED AS SOFTWARE SWITCHES TO CONTROL PROGRAM OPERATION DURING ACT11 OR XXDP CHAIN MODE OPERATION. THE SOFTWARE SWITCHES CONTENTS ARE USED TO SET SOFTWARE SWITCHES MMOPT AND SREG2, WHICH ARE THE LOCATIONS THAT ARE ROUTINELY CHECKED BY THE PROGRAM TO CONTROL ITS OPERATION.

THE ACT11/XXDP SOFTWARE SWITCHES ARE:

```
ACTSW1: 40      ;NO CORE EXPANSION.
ACTSW2: 201     ;INHIBIT LPT AND TTY DURING ACT11.

XDPSW1: 46      ;INHIBIT KT11D, NO CORE EXPANSION,NO 4K AS 32
XDPSW2: 1       ;INHIBIT TTY WHILE IN XXDP CHAIN MODE.
```

SWITCH XDPSW1 MUST ALWAYS BE LEFT WITH THE VALUE 46, AS IF CHANGED, THE PROGRAM WILL NOT FUNCTION UNDER CHAIN MODE.

ALL OTHER SWITCHES MAY BE CHANGED FREELY, ESPECIALLY THE DEVICE SELECTION SWITCHES XDPSW2 AND ACTSW2.

THE LOAD MEDIUM IS NOT EXERCISED BY THE PROGRAM WHEN LOADED VIA TCDP OR RKDP (THAT IS DECTAPE OR RK11 WILL NOT BE EXERCISED THEN).

9.0 PROGRAM DESCRIPTION

THIS MEMORY MANAGEMENT EXERCISER IS DESIGNED TO RUN BACKGROUND
PROCESSOR TESTS AND FOREGROUND CONCURRENT I/O WITH MEMORY
MANAGEMENT UTILIZED IN ANY OF SEVERAL DIFFERENT MODES. THE VARIOUS
MODES AVAILABLE FOR UTILIZING MEMORY MANAGEMENT ARE INCLUDED TO AID
IN FAULT ISOLATION BY PROVIDING A SERIES OF STEPS FROM SIMPLE TO COMPLEX.
MEMORY MANAGEMENT CAN BE LEFT TURNED OFF AND THE PROCESSOR TESTS
CAN STILL BE RUN IN 4K ONLY OR CORE EXPANDED UP TO 28K.
WITH MEMORY MANAGEMENT ON, THE PROGRAM CAN
BE RUN USING ONLY 4K, WITH EVERYTHING MAPPED IN KERNEL SPACE
OR WITH USER AND KERNEL BOTH USED. AT THE NEXT LEVEL
OF COMPLEXITY, CORE EXPANSION CAN BE RUN WITH MEMORY MANAGEMENT
ON, USING KERNEL ONLY OR USING BOTH MODES AS DESIRED.
FINALLY, ALL AVAILABLE MEMORY (IN 4K PIECES) CAN BE UTILIZED BY
RUNNING 4K AS 32K.
THERE IS NO MONITOR IN THE CONVENTIONAL SENSE. EACH DEVICE THAT
IS TO BE EXERCISED HAS ITS 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. IT 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.
THE PRIMER CODE THEN ENTERS THE MEMORY MANAGEMENT SETUP CODE.
THE RF11 AND TC11 PRIMER CODE IS IN WITH THE MEMORY MANAGEMENT SETUP
CODE SINCE THEY REQUIRE CERTAIN PARTS OF THE MEMORY MANAGEMENT CODE TO
BE RUN FIRST. AFTER MEMORY MANAGEMENT IS TURNED ON, EXECUTION
OF THE BACKGROUND PROCESSOR TESTS BEGINS, AND THE I/O DEVICES ARE
SERVICED WHEN THEY INTERRUPT.

```
                *

                                .LIST   ME,SEQ,BIN
                                .NLIST  MC,CND,MD,TOC
                                .TITLE  DFKTGB MAINDEC-11-DFKTG-B MEMORY MGMT. EXERCISER
                                .ABS
                                .DSABL  ERFZ


                        ;THIS PROGRAM IS A MODIFICATION OF THE 11/40 DIAGNOSTIC, DBKTG.
                        ;THIS TEST HAS BEEN MODIFIED TO PROVIDE SOFTWARE SWITCH CAPABILITY
                        ;AND TO ACCOUNT FOR ANY 11/34-11/40 DIFFERENCES.
                        ;THIS PROGRAM IS INTENDED FOR USE ON ONLY 11/34 PROCESSORS
                        ;*****************************************************************
                        .SBTTL  OPERATING INSTRUCTIONS
                        ;*****************************************************************
                        ;PDP11/34 SYSTEM EXERCISER, WITH MEMORY MGMT. --- TTY,PC11,KW11-L
                        ;LP11,RF11,TC11
                        ;TEST SIMULTANEOUS RUNNING OF I/O, WITH PROCESSOR INSTRUCTION TEST AND
                        ;WITH TRACE BIT ENABLED TO BE CONSIDERED MAINLINE CODE

                        ;I/O RUNS IN KERNEL MODE
                        ;CPU TESTS RUN IN USER MODE UNLESS INHIBITED BY SR SETTINGS
                        ;MEMORY MANAGEMENT IS UTILIZED

                        ;(R6) IS THE STACK POINTER
                        ;((R6)) IS THE PC+2 OF LOCATION WHERE THE TRAP ORIGINATED
                        ;FOR NORMAL OPERATION RUN WITH ALL SWITCHES DOWN
                        ;SA - 200
                        ;RESTART - 310 (SR SETTINGS PREVIOUSLY MADE ARE USED)

                        ;AT STARTUP, MMOPT (LOC. 174) SETTINGS ARE:
                        ;MMOPT BIT 0=1 OR UP --- RUN WITHOUT MEMORY MGMT.
                        ;MMOPT BIT 1=1 OR UP --- RUN ALL IN KERNEL MODE (INHIBITS RUNNING 4K AS 32K)
                        ;MMOPT BIT 2=1 OR UP --- INHIBIT RUNNING 28K USER MEMORY MGMT. FROM EVERY 4K
                                        ;BANK (ALLOW NORMAL CORE EXPANSION)
                        ;MMOPT BIT 5=1 OR UP---INHIBIT VARIABLE CORE EXPANSION

                        ;SR (USE LOC. 176 IF NECESSARY), BIT SETTINGS ARE:
                        ;SR 15=1 OR UP---HALT ON ERROR
                        ;SR 14=1 OR UP---SCOPE LOOP
                        ;SR 13=1 OR UP---INHIBIT PRINT OUT
                        ;SR 12=1 OR UP---INHIBIT TRACE TRAPPING
                        ;SR 11=1 OR UP---INHIBIT SUB-PROGRAM ITERATION AND INHIBIT TESTS WHICH
                                        ;USE ALL COMBINATIONS OF NUMBERS
                        ;SR 10=1 OR UP---INHIBIT PROCESSOR TEST

                        ;SPECIAL DELETE SWITCHES-SET RESPECTIVE SWITCH TO A 1 TO INHIBIT
                        ;INITIATION OF DEVICE
                        ;SW 0=1 INHIBIT TTY OUTPUT
                        ;SW 3=1 INHIBIT RK11 DISK
                        ;SW 4=1 INHIBIT LINE CLOCK
                        ;SW 5=1 INHIBIT RF11 DISK
                        ;SW 6=1 INHIBIT TC11 DECTAPE
                        ;SW 7=1 INHIBIT LINE PRINTER
```

```
                        ;*****************************************************************************
                        .SBTTL  DEFINITIONS
                        ;*****************************************************************************
000240                          NOP=240                 ;SYSTEM NULL OPERATION
104400                          SCOPE=TRAP              ;TRAP USED SCOPE LOOP AND ITERATION
000410                          TCSR=TTCSR
000412                          TDBR=TTDBR
177776                          PSR=177776
104006                          HLT=104006              ;ERROR PRINTOUT CALL
104010                          EOB=104010              ;END OF BANK CALL
000000                          R0=%0
000001                          R1=%1
000002                          R2=%2
000003                          R3=%3
000004                          R4=%4
000005                          R5=%5
000006                          SP=%6
000006                          R6=SP
000007                          PC=%7
```

```
                                        ;*****************************************************************************
                                        .SBTTL  TRAP CATCHER
                                        ;*****************************************************************************
                    000000              .=0
000000  000002                          .+2                     ;TRAP ENTRANCE
000002  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000004  000006                          .+2                     ;TRAP ENTRANCE
000006  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000010  000012                          .+2                     ;TRAP ENTRANCE
000012  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000014  000016                          .+2                     ;TRAP ENTRANCE
000016  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000020  000022                          .+2                     ;TRAP ENTRANCE
000022  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000024  000026                          .+2                     ;TRAP ENTRANCE
000026  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000030  000032                          .+2                     ;TRAP ENTRANCE
000032  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000034  000036                          .+2                     ;TRAP ENTRANCE
000036  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000040  000042                          .+2                     ;TRAP ENTRANCE
000042  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000044  000046                          .+2                     ;TRAP ENTRANCE
000046  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000050  000052                          .+2                     ;TRAP ENTRANCE
000052  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000054  000056                          .+2                     ;TRAP ENTRANCE
000056  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000060  000062                          .+2                     ;TRAP ENTRANCE
000062  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000064  000066                          .+2                     ;TRAP ENTRANCE
000066  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000070  000072                          .+2                     ;TRAP ENTRANCE
000072  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000074  000076                          .+2                     ;TRAP ENTRANCE
000076  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000100  000102                          .+2                     ;TRAP ENTRANCE
000102  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000104  000106                          .+2                     ;TRAP ENTRANCE
000106  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000110  000112                          .+2                     ;TRAP ENTRANCE
000112  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000114  000116                          .+2                     ;TRAP ENTRANCE
000116  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000120  000122                          .+2                     ;TRAP ENTRANCE
000122  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000124  000126                          .+2                     ;TRAP ENTRANCE
000126  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000130  000132                          .+2                     ;TRAP ENTRANCE
000132  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000134  000136                          .+2                     ;TRAP ENTRANCE
000136  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000140  000142                          .+2                     ;TRAP ENTRANCE
000142  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
000144  000146                          .+2                     ;TRAP ENTRANCE
000146  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
```

```
   688  000150  000152                .+2                 ;TRAP ENTRANCE
   689  000152  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   690  000154  000156                .+2                 ;TRAP ENTRANCE
   691  000156  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   692  000160  000162                .+2                 ;TRAP ENTRANCE
   693  000162  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   694  000164  000166                .+2                 ;TRAP ENTRANCE
   695  000166  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   696  000170  000172                .+2                 ;TRAP ENTRANCE
   697  000172  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   698  000174  000176                .+2                 ;TRAP ENTRANCE
   699  000176  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   700  000200  000202                .+2                 ;TRAP ENTRANCE
   701  000202  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   702  000204  000206                .+2                 ;TRAP ENTRANCE
   703  000206  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   704  000210  000212                .+2                 ;TRAP ENTRANCE
   705  000212  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   706  000214  000216                .+2                 ;TRAP ENTRANCE
   707  000216  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   708  000220  000222                .+2                 ;TRAP ENTRANCE
   709  000222  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   710  000224  000226                .+2                 ;TRAP ENTRANCE
   711  000226  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   712  000230  000232                .+2                 ;TRAP ENTRANCE
   713  000232  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   714  000234  000236                .+2                 ;TRAP ENTRANCE
   715  000236  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   716  000240  000242                .+2                 ;TRAP ENTRANCE
   717  000242  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   718  000244  000246                .+2                 ;TRAP ENTRANCE
   719  000246  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   720  000250  000252                .+2                 ;TRAP ENTRANCE
   721  000252  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   722  000254  000256                .+2                 ;TRAP ENTRANCE
   723  000256  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   724  000260  000262                .+2                 ;TRAP ENTRANCE
   725  000262  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   726  000264  000266                .+2                 ;TRAP ENTRANCE
   727  000266  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   728  000270  000272                .+2                 ;TRAP ENTRANCE
   729  000272  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   730  000274  000276                .+2                 ;TRAP ENTRANCE
   731  000276  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   732  000300  000302                .+2                 ;TRAP ENTRANCE
   733  000302  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   734  000304  000306                .+2                 ;TRAP ENTRANCE
   735  000306  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   736  000310  000312                .+2                 ;TRAP ENTRANCE
   737  000312  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   738  000314  000316                .+2                 ;TRAP ENTRANCE
   739  000316  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   740  000320  000322                .+2                 ;TRAP ENTRANCE
   741  000322  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
   742  000324  000326                .+2                 ;TRAP ENTRANCE
   743  000326  000000                HALT                ;TRAPPED TO PREVIOUS LOCATION
```

```
744  000330  000332                  .+2                             ;TRAP ENTRANCE
745  000332  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
746  000334  000336                  .+2                             ;TRAP ENTRANCE
747  000336  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
748  000340  000342                  .+2                             ;TRAP ENTRANCE
749  000342  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
750  000344  000346                  .+2                             ;TRAP ENTRANCE
751  000346  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
752  000350  000352                  .+2                             ;TRAP ENTRANCE
753  000352  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
754  000354  000356                  .+2                             ;TRAP ENTRANCE
755  000356  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
756  000360  000362                  .+2                             ;TRAP ENTRANCE
757  000362  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
758  000364  000366                  .+2                             ;TRAP ENTRANCE
759  000366  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
760  000370  000372                  .+2                             ;TRAP ENTRANCE
761  000372  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
762  000374  000376                  .+2                             ;TRAP ENTRANCE
763  000376  000000                  HALT                            ;TRAPPED TO PREVIOUS LOCATION
764
765                          ;******************************************************************************
766                          .SBTTL  LOAD VECTOR AREA
767                          ;******************************************************************************
768       000024                     .=24
769  000024  016370                  PFAIL                           ;POWER FAIL TRAP
770  000026  000340                  340
771       000030                     .=30
772  000030  015072                  EMTSRV                          ;EMT CALLS
773  000032  000340                  340                             ;HIGHEST PRIORITY
774       000034                     .=34
775  000034  014570                  SCOPEC                          ;USER TRAP
776  000036  000000                  0
777       000040                     .=40                            ;LOAD MEDIUM INDICATOR.
778  000040  000000                  0                               ;LOADS AS 0.
779       000042                     .=42                            ;AUTOMATIC MODE INDICATOR.(ACT11/AXDP).
780  000042  000000                  0                               ;ZERO AT LOAD TIME.
781       000046                     .=46                            ;POINTER TO LOGICAL END.
782  000046  015640                  $ENDAD
783       000052                     .=52                            ;PROGRAM ATTRIBUTES WORD.
784  000052  040000                  40000
785       000174                     .=174
786  000174  000000             MMOPT:  0                            ;MEMORY MANAGEMENT OPTION SEL.
787  000176  000000             SWREG:  0                            ;SOFTWARE SWITCH REG.
788       000176                     SREG2=SWREG
789
790
791                          ;******************************************************************************
792                          .SBTTL  LOAD STARTING AREA
793                          ;******************************************************************************
794       000200                     .=200
795  000200  000137  000664          JMP     @#START
796       000300                     .=300
797  000300  000137  000664          JMP     @#START
798       000310                     .=310
799  000310  000137  000624          JMP     @#RSTRT
```

```
                                ;*******************************************************************************
                                .SBTTL  DATA AREA
                                ;*******************************************************************************
                    000400              .=400
000400  000000    UBUFF:  0                       ;BUFFER FOR USER SP
                    000406              .=.+4                   ;FOR STACK OVERRUN
000406  177560    TRCSR:  177560                  ;TTY READER STATUS REGISTER
000410  177564    TTCSR:  177564                  ;TTY PUNCH STATUS REGISTER
000412  177566    TTDBR:  177566
000414  000064    TTPVC:  64
000416  000066    TTPST:  66
000420  000000    TTSAV:  0
000422  000100    KWLVC:  100
000424  000102    KWLST:  102
000426  177546    LKCSR:  177546
000430  177514    LPCSR:  177514
000432  177516    LPDBR:  177516
000434  000200    LPVC:   200
000436  000202    LPST:   202
000440  177470    RFDAE:  177470                  ;DISK ADDRESS AND ERROR
000442  177466    RFDAR:  177466                  ;DISK ADDRESS REGISTER
000444  177462    RFWC:   177462                  ;WORD COUNT REGISTER
000446  177464    RFCAR:  177464                  ;CURRENT ADDRESS REGISTER
000450  177460    RFCSR:  177460                  ;STATUS REGISTER
000452  177461    RFCSRH: 177461                  ;HIGH BYTE ADDRESS OR CSR
000454  000204    RFVC:   204
000456  000206    RFST:   206
000460  177413    RKDAH:  177413                  ;HIGH BYTE DISK ADR
000462  177412    RKDAE:  177412                  ;DISK ADDRESS REGISTER
000464  177406    RKWC:   177406                  ;WORD COUNT REGISTER
000466  177410    RKBAR:  177410                  ;CURRENT ADDRESS REGISTER
000470  177404    RKCSR:  177404                  ;STATUS REGISTER
000472  177405    RKCSRH: 177405                  ;HIGH BYTE OF CSR
000474  000220    RKVC:   220                     ;TRAP VECTOR
000476  000222    RKST:   222
000500  177572    SR0:    177572                  ;MEMORY MANAGEMENT  REGISTERS
000502  177600    UPDR0:  177600
000504  177602    UPDR1:  177602
000506  177616    UPDR7:  177616
000510  177640    UPAR0:  177640
000512  177642    UPAR1:  177642
000514  177656    UPAR7:  177656
000516  172300    KPDR0:  172300
000520  172302    KPDR1:  172302
000522  172304    KPDR2:  172304
000524  172316    KPDR7:  172316
000526  172340    KPAR0:  172340
000530  172342    KPAR1:  172342
000532  172344    KPAR2:  172344
000534  172356    KPAR7:  172356

000536  177600    IPDRTAB:177600
000540  177640            177640
000542  172300            172300
000544  172340    IPDREND:172340
```

```
000546  177570                  SR:     177570                  ;SWITCH REGISTER POINTER
000550  177571                  SRH:    177571                  ;HIGH BYTE OF SW. REG. POINTER
000552  177342                  TCCM:   177342                  ;CONTROL AND FUNCTION
000554  177340                  TCST:   177340                  ;GENERAL STATUS
000556  177350                  TCDT:   177350                  ;DATA
000560  177344                  TCWC:   177344                  ;WORD COUNT
000562  177346                  TCBA:   177346                  ;BUS ADDRESS
000564  000214                  TCIV:   214                     ;DECTAPE INTERRUPT VECTOR
000566  000216                  TCSTA:  216
000570  000000                  CURBNK: 0                       ;SAF TO POINT TO CURRENT BANK
000572  000000                  OLDBNK: 0
000574  000000                  CURPAR: 0                       ;ADDRESS OF CURRENT ISAR
000576  000000                  CURPDR:0
000600  000000                  BNKSTR: 0                       ; PC TO POINT TO BEGIN THRU CURRENT SEGMENT
000602  000000                  TRPB:   0
                                ;THE NEXT TWO WORDS ARE THE MEMORY MAP. THE FIRST WORD REPRESENTS
                                ;0-64K WITH ONE BIT REPRESENTING A 4K CONTIGUOUS BLOCK. IF THE
                                ;BIT=1 THAT 4K BLOCK IS PRESENT. THE LSB REPRESENTS 0-4K, THE NEXT
                                ;SIGNIFICANT BIT REPRESENTS 4-8K ANS SO ON.
000604  177777                  MEM0:   177777                  ;0-64K
000606  077777                  MEM1:   77777                   ;64-124K
000610  000001                  COREPT: 1
000612  000604                  MEMUT:  MEM0
000614  000000                  TBANK:  0
000616  000000                  REFF:   0
000620  000000                  TEST:   0

                                ;******************************************************************
                                .SBTTL  FILLCT, ACT11, XXDP SOFTWARE SWITCHES
                                ;******************************************************************
000622  000014                  FILLCT: 14                      ;CONSOLE FILL COUNT.
000624  000040                  ACTSW1: 40                      ;NO CORE EXPANSION.
000626  000201                  ACTSW2: 201                     ;NO LP, NO  TTY.
000630  000046                  XDPSW1: 46                      ;NO CORE EXPANSION, NO 4 AS 32, ETC.
000632  000001                  XDPSW2: 1                       ;NO TTY.

                                ;******************************************************************
                                .SBTTL  RESTART ADD USING INITIAL SR SETTINGS
                                ;******************************************************************
000634  012706  017760          RSTRT:  MOV     #KSTACK,R6
000640  012737  016370  000024          MOV     #PFAIL,@#24
000646  005737  000042                  TST     @#42            ;IN AUTO MODE? (ACT11/XXDP)
000652  001077                  BNE     START2                  ;BR IF YES.
000654  117737  177670  000177        MOVB    @SRH,@#SREG2+1  ;UPDATE DYNAMIC SWITCH SETTINGS.
000662  000473                  BR      START2

                                ;******************************************************************
                                .SBTTL  START UP FOR MINI MONITOR - NORMAL START FROM LOC 000200
                                ;******************************************************************
000664  012706  017760          START:  MOV     #KSTACK,R6      ;SET UP STACK
000670  012737  000137  000200        MOV     #137,@#200      ;RESTORE 200 IF START AT 300
000676  012737  000664  000202        MOV     #START,@#202
000704  005067  177672                CLR     TRPB            ;NO TRACE IN FIRST PASS.
000710  005067  013772                CLR     PASCNT          ;CLEAR THE PASS COUNTER.
000714  013746  000004                MOV     @#4,-(SP)       ;SAVE ERROR VECTOR
```

```
912  000720  013746  000006                    MOV     @#6,-(SP)
913  000724  012767  000740  177052            MOV     #1$,4                   ;SET UP TIME OUT VECTOR
914  000732  005777  177610                    TST     @SR                     ;TRY TO REFERENCE HARDWARE SW. REG.
915  000736  000404                            BR      2$                      ;BRANCH IF NO TIMEOUT TRAP OCCURS
916  000740  012767  000176  177600  1$:       MOV     #SWREG,SR               ;POINT TO SOFTWARE SW. REG.
917  000746  022626                            CMP     (SP)+,(SP)+             ;RESTORE STACK
918  000750  016767  177572  177572  2$.       MOV     SR,SRH
919  000756  005267  177566                    INC     SRH
920  000762  012637  000006                    MOV     (SP)+,@#6               ;RESTORE ERROR VECTOR
921  000766  012637  000004                    MOV     (SP)+,@#4
922  000772  005737  000042                    TST     @#42                    ;IN AUTOMATIC TEST MODE?
923  000776  001422                            BEQ     STARTX                  ;BR IF NOT IN AUTOMATIC MODE.
924  001000  023727  000042  015640            CMP     @#42,#$ENDAD            ;IN ACT11 MODE?
925  001006  001007                            BNE     3$                      ;BR IF NOT.
926  001010  016737  177610  000174            MOV     ACTSW1,@#MMOPT          ;YES. SET MMOPT FROM ACTSW1.
927  001016  016737  177604  000176            MOV     ACTSW2,@#SREG2          ;SET SREG2 FROM ACTSW2.
928  001024  000412                            BR      START1
929  001026  016737  177576  000174  3$:       MOV     XDPSW1,@#MMOPT          ;XXDP MODE. SET MMOPT FROM XDPSW1.
930  001034  016737  177572  000176            MOV     XDPSW2,@#SREG2          ;SET SREG2 FROM XDPSW2.
931  001042  000403                            BR      START1
932  001044                           STARTX:
933  001044  017737  177476  000176            MOV     @SR,@#SREG2
934  001052                           START1:
935  001052  004767  013752          START2:   JSR     %7,NRALL
936  001056  012777  077406  177432            MOV     #77406,@KPDR0
937  001064  012777  007600  177442            MOV     #7600,@KPAR7    ;MAP PAGE 7 TO EXT BANK
938  001072  012777  077406  177424            MOV     #77406,@KPDR7
939  001100  005067  177510                    CLR     TBANK
940  001104  012767  177777  177472            MOV     #177777,MEM0    ;SET UP CORE MAPS
941  001112  012767  077777  177466            MOV     #77777,MEM1
942  001120  012767  000001  177462            MOV     #1,COREPT       ;SET UP 4K POINTER
943  001126  012767  000604  177456            MOV     #MEM0,MEMUT
944  001134  012777  077406  177360            MOV     #77406,@KPDR2   ;BEING CHECKED FOR
945  001142  012737  001212  000004            MOV     #TMEMEX,@#4     ;SET UP FOR TIME OUTS
946  001150  005037  000006                    CLR     @#6
947  001154  052777  000001  177316            BIS     #1,@SR0
948  001162  016777  177426  177342  MAP1:     MOV     TBANK,@KPAR2    ;MAP KERNEL PAGE 2 TO BANK
949  001170  005737  041000                    TST     @#41000         ;1ST K PRESENT
950  001174  005737  045000                    TST     @#45000         ;2ND K PRESENT
951  001200  005737  051000                    TST     @#51000         ;3RD K PRESENT
952  001204  005737  055000                    TST     @#55000         ;4TH K PRESENT
953  001210  000404                            BR      MOVEPT          ;OK, FULL 4K BLOCK PRESENT
954  001212  046777  177372  177372  TMEMEX:   BIC     COREPT,@MEMUT   ;NO, BLOCK NOT PRESENT
955  001220  022626                            CMP     (SP)+,(SP)+     ;ADJUST STACK POINTER
956  001222  062767  000200  177364  MOVEPT:   ADD     #200,TBANK      ;UPDATE BANK POINTER
957  001230  006367  177354                    ASL     COREPT
958  001234  103006                            BCC     MAP2            ;THIS 1ST MEM WORD DONE
959  001236  012767  000001  177344            MOV     #1,COREPT
960  001244  012767  000606  177340            MOV     #MEM1,MEMUT
961  001252  022767  007600  177334  MAP2:     CMP     #7600,TBANK     ;EXTERNAL BANK YET
962  001260  001340                            BNE     MAP1            ;NO,NOT YET?
963  001262  012767  000001  177320            MOV     #1,COREPT       ;RE-INIT
964  001270  012767  000604  177314            MOV     #MEM0,MEMUT
965  001276  042777  000001  177174            BIC     #1,@SR0
966  001304  012737  014570  000034            MOV     #SCOPEC,@#34
967  001312  005037  000036                    CLR     @#36                    ;INITIALIZE SCOPE CALL TO KERNEL STATUS
```

```
001316  012737  015072  000030          MOV     #EMTSRV,@#30
001324  012737  000340  000032          MOV     #340,@#32
001332  012737  005542  014704          MOV     #BEGIN,@#RETURN
001340  012737  000340  177776          MOV     #340,@#PSR              ;LOCK OUT INTERRUPTS
001346  005037  016060                  CLR     @#PRTON                 ;PRINT ROUTINE BUSY FLAG
001352  000005                          RESET
001354  012737  002404  000004          MOV     #NODEV,@#4              ;RETURN FOR NO DEVICE
001362  005037  000006                  CLR     @#6
                        ;*****************************************************************
                        .SBTTL  TTY INIT
                        ;*****************************************************************
001366  005067  001464                  CLR     DATA2                   ;BASE DATA FOR TTY TELEPRINTER
001372  033727  000176  000001          BIT     @#SREG2,#1                      ;INHIBIT TTY OUTPUT?
001400  001006                          BNE     ST3                     ;YES, GO CHECK NEXT
001402  012777  003070  177004          MOV     #TYOUTR,@TTPVC          ;NO, SETUP INTERRUPT VECTOR
001410  052777  000100  176772          BIS     #100,@TTCSR             ;START TTY OUTPUT
                        ;*****************************************************************
                        .SBTTL  RK11 INIT
                        ;*****************************************************************
001416  012700  000010          ST3:    MOV     #10,R0
001422  122737  000002  000041          CMPB    #2,@#41                 ;LOAD MEDIUM RK11?
001430  001432                          BEQ     ST4                     ;BR IF YES. DON'T USE RK11 THEN.
001432  032737  000010  000176          BIT     #10,@#SREG2             ;INHIBIT RK DISK
001440  001026                          BNE     ST4                     ;YES, SKIP OVER
001442  005777  177022                  TST     @RKCSR                  ;PRESENT
001446  012777  003466  177020          MOV     #IRK,@RKVC              ;SETUP VECTOR RETURNS
001454  012777  000240  177014          MOV     #240,@RKST              ;PRIORITY 5 SERVICE.
001462  012767  043503  002040          MOV     #43503,RKFUNCT
001470  005077  176766                  CLR     @RKDAE                  ;INIT
001474  016777  002170  176764          MOV     LLIMIT,@RKBAR           ;CORE BASE
001502  016777  002164  176754          MOV     WORDCT,@RKWC            ;TRANSFER LENGTH
001510  116777  002014  176752          MOVB    RKFUNCT,@RKCSR
                        ;*****************************************************************
                        .SBTTL  LINE CLOCK INIT
                        ;*****************************************************************
001516  006300          ST4:    ASL     R0
001520  033727  000176  000020          BIT     @#SREG2,#20             ;INHIBIT LINE CLOCK?
001526  001015                          BNE     ST5                     ;YES, GO CK NEXT
001530  005777  176672                  TST     @LKCSR                  ;PRESENT
001534  012777  003146  176660          MOV     #LK3,@KWLVC
001542  012777  000300  176654          MOV     #300,@KWLST
001550  005067  001466                  CLR     TIME                    ;NO, INITIALIZE COUNT
001554  052777  000100  176644          BIS     #100,@LKCSR             ;START LINE CLOCK
                        ;*****************************************************************
                        .SBTTL  RF11 INIT
                        ;*****************************************************************
001562  006300          ST5:    ASL     R0
001564  033727  000176  000040          BIT     @#SREG2,#40             ;TEST FOR INHIBITING RF11 DISK
001572  001026                          BNE     ST6                     ;SKIP IF SET
001574  005777  176650                  TST     @RFCSR                  ;PRESENT?
001600  012777  003562  176646          MOV     #IRF,@RFVC              ;SET UP TRAP RETURN
001606  012777  000240  176642          MOV     #240,@RFST
001614  012767  043503  002044          MOV     #43503,RFFUNCT          ;WRITE CHECK/WRITE
001622  105277  176624                  INCB    @RFCSRH                 ;INITIALIZE DISK-DAR,DAE
001626  016777  002040  176610          MOV     WORDCT,@RFWC            ;LENGTH OF TRANSFER
001634  016777  002030  176604          MOV     LLIMIT,@RFCAR           ;CORE ADDRESS OF START OF TRANSFER
```

```
1024  001642  116777  002020  176600          MOVB    RFFUNCT,@RFCSR          ;START RF11 READ OR WRITE
1025                                  ;*****************************************************************
1026                                  .SBTTL  TC11 INIT
1027                                  ;*****************************************************************
1028  001650  006300                  ST6:    ASL     R0
1029  001652  122737  000001  000041          CMPB    #1,@#41                 ;LOAD MEDIUM DECTAPE?
1030  001660  001417                          BEQ     ST7                     ;BR IF YES. DON'T USE IT THEN.
1031  001662  033727  000176  000100          BIT     @#SREG2,#100            ;CHECK FOR INHIBITING TC11 DECTAPE
1032  001670  001013                          BNE     ST7                     ;SKIP IF SET
1033  001672  005777  176656                  TST     @TCST                   ;PRESENT?
1034  001676  012777  003702  176660          MOV     #FENDZ,@TCIV            ;GO TO END ZONE ON INTERRUPT
1035  001704  012777  000300  176654          MOV     #300,@TCSTA
1036  001712  012777  004503  176632          MOV     #R+IE+RB+DO,@TCCM       ;START REVERSE READ BLOCK NUMBER
1037                                  ;*****************************************************************
1038                                  .SBTTL  LINE PRINTER INIT
1039                                  ;*****************************************************************
1040  001720  006300                  ST7:    ASL     R0
1041  001722  033727  000176  000200          BIT     @#SREG2,#200            ;INHIBIT LINE PRINTER?
1042  001730  001032                          BNE     ST8                     ;YES, GO CK NEXT
1043  001732  005777  176472                  TST     @LPCSR                  ;PRESENT?
1044  001736  012737  002016  000004          MOV     #ST8,@#4                ;DON'T CHANGE 200 IF NO SUCH DEVICE
1045  001744  012767  000137  001274          MOV     #137,SOLPAT             ;RESET FOR START OF LINE PATTERN
1046  001752  012767  000117  001360          MOV     #79.,CLINCT             ;LINE COUNT
1047  001760  012767  000137  001262          MOV     #137,CURPAT
1048  001766  012777  000014  176436          MOV     #14,@LPDBR              ;LINE FEED TO POSITION BUFFER
1049  001774  012777  003270  176432          MOV     #LPINTR,@LPVC           ;INTERRUPT ENABLE
1050  002002  012777  000200  176426          MOV     #200,@LPST              ;PROCESSOR LEVEL 4
1051  002010  012777  000100  176412          MOV     #100,@LPCSR             ;INTERRUPT ENABLE
1052                                  ;*****************************************************************
1053                                  .SBTTL  PRE-PASS SETUP
1054                                  ;*****************************************************************
1055  002016  005037  000006          ST8:    CLR     @#6                     ;CHANGE ADDRESS ERROR VECTOR TO CAUSE
1056  002022  012737  000006  000004          MOV     #6,@#4                  ;HALT ON A TRAP TO 4
1057  002030  004767  000370                  JSR     %7,DET1                 ;CHECK FOR CORE EXPANSION
1058  002034  032737  000001  000174          BIT     #1,@#MMOPT              ;INHIBIT MEMORY MGMT?
1059  002042  001106                          BNE     MODE                    ;YES - GO SETUP USER
1060  002044  004767  012760                  JSR     %7,NRALL                ;NO - MAKE ALL SEGMENTS INITIALLY NON-RESIDENT
1061  002050  012777  077406  176446          MOV     #77406,@KPDR7
1062  002056  012777  007600  176450          MOV     #7600,@KPAR7
1063  002064  032737  000006  000174          BIT     #6,@#MMOPT              ;INHIBIT USER/KERNEL OR 4K AS 32K?
1064  002072  001415                          BEQ     SEGM1                   ;NO - BRANCH
1065  002074  012701  000007                  MOV     #7,R1                   ;YES - MAP KERNEL ASR'S 0-6 TO PA
1066  002100  016702  176422                  MOV     KPAR0,R2
1067  002104  005003                          CLR     R3
1068  002106  010312                  SETEX:  MOV     R3,@R2
1069  002110  012762  077406  177740          MOV     #77406,-40(R2)
1070  002116  005722                          TST     (R2)+
1071  002120  062703  000200                  ADD     #200,R3
1072  002124  077110                          SOB     R1,SETEX
1073  002126  012777  077406  176362  SEGM1:  MOV     #77406,@KPDR0           ;MAP KERNEL 0 TO BANK 0, RW
1074  002134  032737  000004  000174          BIT     #4,@#MMOPT              ;INHIBIT RUNNING 4K AS 32K?
1075  002142  001416                          BEQ     USEALL                  ;NO, SETUP FOR RUNNING 4K AS 32K
1076  002144  012701  000010                  MOV     #10,R1                  ;YES, MAP ALL USER ASR'S TO PA
1077  002150  016702  176334                  MOV     UPAR0,R2
1078  002154  005003                          CLR     R3
1079  002156  010312                  SETUSE: MOV     R3,(R2)
```

```
1080  002160  062703  000200                ADD     #200,R3
1081  002164  012762  077406  177740        MOV     #77406,-40(R2)
1082  002172  005722                        TST     (R2)+
1083  002174  077110                        SOB     R1,SETUSE
1084  002176  000425                        BR      SETSEG
1085  002200  012777  077406  176274  USEALL: MOV   #77406,@UPDR0          ;MAP USER ASR0 TO BANK 0, RW
1086  002206  012737  000000  000570        MOV     #0,@#CURBNK             ;CURRENT SAR CONTENTS
1087  002214  012767  000001  176366        MOV     #1,COREPT               ;INIT MAP POINTERS
1088  002222  012767  000604  176362        MOV     #MEM0,MEMUT
1089  002230  016767  176254  176336        MOV     UPAR0,CURPAR            ;CURRENT SEGMENT REGISTER ADDRESSES
1090  002236  016767  176240  176332        MOV     UPDR0,CURPDR
1091  002244  012767  005542  176326        MOV     #BEGIN,BNKSTR           ;CURRENT STARTING PC
1092  002252  052777  000001  176220  SETSEG: BIS   #1,@SR0                 ;SET MEM MGMT ENABLE BIT
1093  002260  005767  176316        MODE:   TST     TRPB                    ;USE TRACE MODE?
1094  002264  001406                        BEQ     1$                      ;BR IF NOT.
1095  002266  012737  015662  000014        MOV     #TRTRP,@#14             ;SET UP TRACE TRAP VECTOR.
1096  002274  012746  000020                MOV     #20,-(SP)               ;ALLOW TRACE MODE.
1097  002300  000406                        BR      2$
1098  002302  012737  000016  000014  1$:    MOV     #16,@#14                ;NO TRACE MODE . RESET THE VECTOR.
1099  002310  005037  000016                CLR     @#16
1100  002314  005046                        CLR     -(SP)                   ;INSURE NO TRACE WILL BE ENABLED.
1101  002316  012746  002324        2$:     MOV     #3$,-(SP)               ;CONTINUE AT 3$.
1102  002322  000002                        RTI                             ; DO IT NOW.
1103  002324  032737  000002  000174  3$:    BIT     #2,@#MMOPT              ;INHIBIT USER/KERNEL?
1104  002332  001016                        BNE     MAIN+2                  ;YES - SKIP OVER
1105  002334  052737  140000  000036        BIS     #140000,@#36            ;SET USER BIT IN SCOPE STATUS
1106  002342  012746  000400                MOV     #UBUFF,-(R6)
1107  002346  052737  030000  177776        BIS     #30000,@#PSR
1108  002354  006606                        MTPI    SP                      ;SET UP USER STACK
1109  002356  012737  140000  177776        MOV     #140000,@#PSR           ;CHANGE TO USER
1110  002364  000401                        BR      .+4
1111  002366  000001                MAIN:   WAIT
1112  002370  033727  000176  002000        BIT     @#SREG2,#2000           ;INHIBIT PROCESSOR TEST
1113  002376  001373                        BNE     MAIN
1114  002400  000167  003136                JMP     BEGIN
1115
1116                                  ;******************************************************************************
1117                                  .SBTTL  NON-EXISTING DEVICE SERVICE
1118                                  ;******************************************************************************
1119  002404  050037  000176        NODEV:  BIS     R0,@#SREG2              ;SET INHIBIT BIT
1120  002410  162716  000006                SUB     #6,(SP)                 ;ALTER PC RETURN
1121  002414  042766  000017  000002        BIC     #17,2(SP)               ;CLEAR Z BIT ON STACK
1122  002422  000002                        RTI
1123
1124                                  ;******************************************************************************
1125                                  .SBTTL  PDP-11 MEMORY DETERMINATION AND SETUP
1126                                  ;******************************************************************************
1127                                  ;USE WITH VARIABLE CORE QUANTITY SYSTEMS/
1128  002424  012767  104010  012074  DET1:   MOV     #EOB,DONE               ;RESTORE INITIAL CODE
1129  002432  032737  000007  000174        BIT     #7,@#MMOPT              ;INHIBIT RUNNING 4K AS 32K USER?
1130                                                                        ;OR INHIBIT SEGMENTATION?
1131  002440  001001                        BNE     .+4                     ;YES - ALLOW CORE EXPANSION
1132  002442  000207                        RTS     %7                      ;NO - INHIBIT CORE EXPANSION
1133  002444  032737  000040  000174        BIT     #40,@#MMOPT             ;CHECK VARIABLE CORE SWITCH
1134  002452  001401                        BEQ     DET4                    ;USE VARIABLE CORE ROUTINE
1135  002454  000207                        RTS     %7                      ;4K ONLY (SWITCH SET)
```

```
1136  002456  012737  002542  000004  DET4:   MOV     #DET2,@#4               ;TRAP VECTOR SETUP
1137  002464  012737  000340  000006          MOV     #340,@#6                ;TRAP STATUS SETUP
1138  002472  000241                          CLC
 39   002474  005537  037770          EIGHT:  ADC     @#37770                 ;CHECK FOR 8K
 40   002500  000240                          NOP
1141  002502  005537  057770                  ADC     @#57770                 ;CHECK FOR 12K
1142  002506  000240                          NOP
1143  002510  005537  077770                  ADC     @#077770                ;CHECK FOR 16K
1144  002514  000240                          NOP
1145  002516  005537  117770                  ADC     @#117770                ;CHECK FOR 20K
1146  002522  000240                          NOP
1147  002524  005537  137770                  ADC     @#137770                ;CHECK FOR 24K
1148  002530  000240                          NOP
1149  002532  005537  157770                  ADC     @#157770                ;CHECK FOR 28K
1150  002536  000240                          NOP
1151  002540  000437                          BR      STRT28
1152  002542  012602                  DET2:   MOV     (6)+,%2                 ;RETRIEVE TRAP PC
1153  002544  005726                          TST     (6)+                    ;DISCARD TRAP STATUS WORD
1154  002546  062702  000074                  ADD     #STRT4-EIGHT-4,R2
1155  002552  000112                          JMP     @R2
1156
1157  002554  005000                  MOVE:   CLR     %0                      ;SET UP MAIN CORE POINTER
1158  002556  010102                          MOV     %1,%2
1159  002560  062702  015030                  ADD     #D+2,%2                 ;SET UP MAX CORE MOVE
1160  002564  012021                          MOV     (0)+,(1)+               ;MOVE WORD
1161  002566  020201                          CMP     %2,%1                   ;MOVE COMPLETE?
1162  002570  001375                          BNE     .-4                     ;MOVE ANOTHER WORD
1163  002572  000207                          RTS     %7                      ;MOVE COMPLETE
1164  002574  000521                  STRT4:  BR      DET3
1165  002576  000240                          NOP
1166  002600  000240                          NOP
1167  002602  004767  000110                  JSR     %7,XFER8                ;START 8K TRANSFER
1168  002606  000506                          BR      MOD4                    ;START 4K MODIFY
1169  002610  004767  000072                  JSR     %7,XFER12               ;START 12K TRANSFER
1170  002614  000475                          BR      MOD8                    ;START 8K MODIFY
1171  002616  004767  000054                  JSR     %7,XFER16               ;START 16K TRANSFER
1172  002622  000464                          BR      MOD12                   ;START 12K MODIFY
1173  002624  004767  000036                  JSR     %7,XFER20               ;START 20K TRANSFER
1174  002630  000453                          BR      MOD16                   ;START 16K MODIFY
1175  002632  004767  000020                  JSR     %7,XFER24               ;START 24K TRANSFER
1176  002636  000442                          BR      MOD20                   ;START 20K MODIFY
1177  002640  004767  000002          STRT28: JSR     %7,XFER28               ;START 28K TRANSFER
1178  002644  000431                          BR      MOD24                   ;START 24K MODIFY
1179  002646  012701  140000          XFER28: MOV     #140000,%1              ;SET UP MOVE START LOCATION
1180  002652  004767  177676                  JSR     %7,MOVE                 ;GO TO MOVE SUBROUTINE
1181  002656  012701  120000          XFER24: MOV     #120000,%1
1182  002662  004767  177666                  JSR     %7,MOVE
1183  002666  012701  100000          XFER20: MOV     #100000,%1
1184  002672  004767  177656                  JSR     %7,MOVE
1185  002676  012701  060000          XFER16: MOV     #60000,%1
1186  002702  004767  177646                  JSR     %7,MOVE
1187  002706  012701  040000          XFER12: MOV     #40000,%1
1188  002712  004767  177636                  JSR     %7,MOVE
1189  002716  012701  020000          XFER8:  MOV     #20000,%1
1190  002722  004767  177626                  JSR     %7,MOVE
1191  002726  000207                          RTS     %7                      ;RETURN FROM TRANSFERS
```

```
1192  002730  012767  000137  131570  MOD24:  MOV     #137,DONE+120000
1193  002736  012767  145510  131564          MOV     #BEGINX+140000,DONE+120002
1194  002744  012767  000137  111554  MOD20:  MOV     #137,DONE+100000
1195  002752  012767  125510  111550          MOV     #BEGINX+120000,DONE+100002
1196  002760  012767  000137  071540  MOD16:  MOV     #137,DONE+60000
1197  002766  012767  105510  071534          MOV     #BEGINX+100000,DONE+60002
1198  002774  012767  000137  051524  MOD12:  MOV     #137,DONE+40000
1199  003002  012767  065510  051520          MOV     #BEGINX+60000,DONE+40002
1200  003010  012767  000137  031510  MOD8:   MOV     #137,DONE+20000
1201  003016  012767  045510  031504          MOV     #BEGINX+40000,DONE+20002
1202  003024  012767  000137  011474  MOD4:   MOV     #137,DONE
1203  003032  012767  025510  011470          MOV     #BEGINX+20000,DONE+2
1204  003040  005067  000006          DET3:   CLR     @#6
1205  003044  012737  000006  000004          MOV     #6,@#4
1206  003052  000207                          RTS     %7
1207
1208                                  ;*****************************************************************************
1209                                  .SBTTL  TTY TRANSMITTER PRINT VALUES 0 TO 377
1210                                  ;*****************************************************************************
1211  003054  005027  000000          TYOUT:  CLR     #0                      ;INITAL DATA
1212          003056                  DATA2=.-2
1213  003060  016777  177772  175324  TYOUT1: MOV     DATA2,@TTDBR            ;OUTPUT TO DEVICE
1214  003066  000002                  TYOUTR: RTI                             ;RETURN TO MAINLINE**
1215  003070  017767  175314  175322          MOV     @TTCSR,TTSAV
1216  003076  105767  175316                  TSTB    TTSAV                   ;TEST FOR DONE
1217  003102  100401                          BMI     .+4                     ;BRANCH IF FLAG FOUND
1218  003104  104006                          HLT                             ;FALSE INTERRUPT RETURN
1219  003106  005267  177744                  INC     DATA2                   ;INCREMENT DATA
1220  003112  022767  000400  177736          CMP     #400,DATA2              ;TEST DATA FOR UPPER LIMIT
1221  003120  001755                          BEQ     TYOUT                   ;AT UPPER LIMIT START OVER
1222  003122  000756                          BR      TYOUT1                  ;FINISH REST OF DATA
1223
1224                                  ;*****************************************************************************
1225                                  .SBTTL  TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
1226                                  ;*****************************************************************************
1227  003124  005037  003242          LK1:    CLR     @#TIME                  ;CLEAR LINE CLOCK TIMER
1228  003130  052777  000100  175270          BIS     #100,@LKCSR
1229  003136  052737  000100  177776          BIS     #100,@#PSR
1230  003144  000002                  LK2:    RTI
1231  003146  105777  175254          LK3:    TSTB    @LKCSR
1232  003152  100401                          BMI     .+4
1233  003154  104006                          HLT                             ;FALSE INTERRUPT
1234  003156  042777  000200  175242          BIC     #200,@LKCSR
1235  003164  005237  003242          LK4:    INC     @#TIME                  ;HERE ON INTERRUPTS
1236  003170  022737  006344  003242          CMP     #3300.,@#TIME           ;55 SEC YET?
1237  003176  103362                          BHIS    LK2                     ;BR IF NOT
1238  003200  042777  000100  175220          BIC     #100,@LKCSR
1239  003206  042737  000100  177776          BIC     #100,@#PSR              ;LOWER PRIORITY
1240  003214  022737  007020  003242          CMP     #3600.,@#TIME           ;OME MINUTE YET
1241  003222  001740                          BEQ     LK1                     ;YES RESET TIMER
1242  003224  105777  175176                  TSTB    @LKCSR                  ;NO, SKIP TILL MINUTE UP
1243  003230  100375                          BPL     .-4
1244  003232  042777  000200  175166          BIC     #200,@LKCSR             ;CLEAR FLAG
1245  003240  000751                          BR      LK4
1246  003242  000000                  TIME:   0
1247
```

```
1248                                    ;*****************************************************************************
1249                                    .SBTTL  LINE PRINTER SERVICE
1250                                    ;*****************************************************************************
1251                                    ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER/
1252                                    ;INTERRUPT VECTOR IS 200/
1253  003244  012727  000000  000000  LP1:    MOV     #0,#0                   ;START OF LINE TO CURRENT
1254           003250                         CURPAT=.-2                      ;CHARACTER BEING PRINTED
1255           003246                         SOLPAT=.-4                      ;START OF LINE CHARACTER
1256  003252  016777  177772  175152  LP2:    MOV     CURPAT,@LPDBR           ;CURRENT PATTERN TO LINE PRINTER
1257  003260  105777  175144                  TSTB    @LPCSR
1258  003264  100420                         BMI     LP6
1259  003266  000002                         RTI                             ;RETURN TO MAIN LINE
1260  003270  105777  175134          LPINTR: TSTB    @LPCSR                  ;TEST FOR FLAG
1261  003274  100414                         BMI     LP6
1262  003276  005737  000042                TST     @#42                    ;MONITOR LOAD
1263  003302  001410                         BEQ     LP7                     ;NO, ERROR
1264  003304  032777  100000  175116        BIT     #100000,@LPCSR          ;YES, IS ERROR SET
1265  003312  001404                         BEQ     LP7                     ;NO, ERROR
1266  003314  042777  000100  175106        BIC     #100,@LPCSR             ;DIS ABLE INTERRUPT
1267  003322  000002                         RTI
1268  003324  104006                  LP7:   HLT                             ;FALSE RETURN FROM MAIN LINE
1269  003326  026727  000006  000117  LP6:    CMP     CLINCT,#79.             ;TEST FOR END OF LINE
1270  003334  001415                         BEQ     LP4                     ;GO GENERATE CR/LF
1271  003336  005227  000000                INC     #0                      ;INCREMENT LINE POSITION COUNT
1272           003340                         CLINCT=.-2                      ;POSITION OF LINE
1273  003342  026727  177702  000137        CMP     CURPAT,#137             ;TEST FOR MAXIMUM PATTERN
1274  003350  001403                         BEQ     LP3                     ;YES - GO TO LP3 AND RESET
1275  003352  005267  177672                INC     CURPAT                  ;NO - INCREMENT TO NEXT PATTERN
1276  003356  000735                         BR      LP2                     ;GO SEND IT TO LINE PRINTER
1277  003360  012767  000040  177662  LP3:    MOV     #40,CURPAT              ;RESET PATTERN AND SEND TO PRINTER
1278  003366  000731                         BR      LP2                     ;SENT TO LINE PRINTER
1279  003370  005067  177744          LP4:    CLR     CLINCT                  ;RESET LINE COUNT
1280  003374  012777  000012  175030        MOV     #12,@LPDBR              ;LINE FEED
1281  003402  105777  175022                TSTB    @LPCSR
1282  003406  100375                         BPL     .-4
1283  003410  026727  177632  000137        CMP     SOLPAT,#137             ;START OF LINE PATTERN
1284  003416  001403                         BEQ     LP5
1285  003420  005267  177622                INC     SOLPAT                  ;INCREMENT START OF LINE
1286  003424  000707                         BR      LP1
1287  003426  012767  000040  177612  LP5:    MOV     #40,SOLPAT              ;RESET START OF LINE
1288  003434  000703                         BR      LP1                     ;PRINT
1289
1290                                    ;*****************************************************************************
1291                                    .SBTTL  RK11 SERVICE
1292                                    ;*****************************************************************************
1293                                    ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
1294  003436  005077  175020          RKSTART:       CLR     @RKDAE  ;INIT
1295  003442  013777  003670  175016  RK1:    MOV     @#LLIMIT,@RKBAR         ;CORE BASE
1296  003450  013777  003672  175006          MOV     @#WORDCT,@RKWC          ;TRANSFER LENGTH
1297  003456  113777  003530  175004          MOVB    @#RKFUNCT,@RKCSR        ;WRITE OR WRITE CK TO DSK
1298  003464  000002                         RTI                             ;RETURN TO MAINLINE
1299  003466  032777  100200  174774  IRK:    BIT     #100200,@RKCSR          ;INTERRUPT RETURN
1300  003474  003002                         BGT     .+6
1301  003476  104006                         HLT
1302  003500  000756                         BR      RKSTART
1303  003502  032777  000037  174752          BIT     #37,@RKDAE              ;DISK AT UPPER LIMIT?
```

```
1304  003510  001354                          BNE     RK1
1305  003512  122777  000031  174740          CMPB    #31,@RKDAH
1306  003520  001350                          BNE     RK1
1307  003522  000337  003530                  SWAB    @#RKFUNCT               ;CHANGE COMMAND
1308  003526  000743                          BR      RKSTART                 ;RESTART NEW TRANSFER OF DISK
1309  003530  000000                  RKFUNCT:        0
1310
1311                                  ;*****************************************************************************
1312                                  .SBTTL  RF11 DISK
1313                                  ;*****************************************************************************
1314  003532  105277  174714          RFSTART:        INCB    @RFCSRH         ;INITIALIZE DISK - DAR-DAE
1315  003536  013777  003670  174702  RF1:     MOV     @#LLIMIT,@RFCAR         ;CORE BASE
1316  003544  013777  003672  174672          MOV     @#WORDCT,@RFWC          ;LENGTH OF TRANSFER
1317  003552  113777  003666  174670          MOVB    @#RFFUNCT,@RFCSR                ;WRITE OR WRITE CHECK TO DISK
1318  003560  000002                          RTI                             ;RETURN TO MAINLINE CODE
1319  003562  105777  174662          IRF:    TSTB    @RFCSR                  ;INTERRUPT VECTOR POINTS HERE
1320  003566  100402                          BMI     .+6
1321  003570  104006                          HLT                             ;RF11 READY NOT UP
1322  003572  000757                          BR      RFSTART
1323  003574  005777  174650                  TST     @RFCSR                  ;ERROR SET?
1324  003600  100012                          BPL     ERROK                   ;BRANCH IF NOT
1325  003602  032777  020000  174640          BIT     #20000,@RFCSR           ;YES-WRITE CHECK ERROR?
1326  003610  001404                          BEQ     ERRSET                  ;NO-BRANCH
1327  003612  104006                          HLT                             ;YES-RF11 WRITE CHECK ERROR
1328  003614  000337  003666                  SWAB    @#RFFUNCT               ;CHANGE COMMAND TO DO WRITE
1329  003620  000744                          BR      RFSTART
1330  003622  104006                  ERRSET: HLT                             ;RF11 ERROR SET-NOT WRITE CHECK
1331  003624  000742                          BR      RFSTART
1332  003626  005777  174612          ERROK:  TST     @RFWC
1333  003632  100002                          BPL     .+6
1334  003634  104006                          HLT                             ;RF-11 WORD COUNT NOT ZERO
1335  003636  000735                          BR      RFSTART
1336  003640  122777  000003  174572          CMPB    #3,@RFDAE               ;DISK AT UPPER LIMIT? 7=2, 17=4, 37=8
1337  003646  001333                          BNE     RF1                     ;NO
1338  003650  027727  174566  174000          CMP     @RFDAR,#174000          ;AS FAR ON DISK AS WE CAN GO
1339  003656  101727                          BLOS    RF1                     ;NO
1340  003660  000337  003666                  SWAB    @#RFFUNCT               ;CHANGE COMMAND
1341  003664  000722                          BR      RFSTART                 ;RESTART NEW TRANSFER OF DISK
1342  003666  000000                  RFFUNCT:        0                       ;DISK COMMAND
1343  003670  005542                  LLIMIT: BEGIN                           ;FIRST CORE ADDRESS OF TRANSFER
1344  003672  176000                  WORDCT: -2000                           ;LENGTH OF TRANSFER
1345
1346                                  ;*****************************************************************************
1347                                  .SBTTL  TC11 DIAGNOSTIC ROUTINE
1348                                  ;*****************************************************************************
1349                                  ;DECTAPE DIAGNOSTIC ROUTINE.  THE TAPE IS FIRST DRIVEN TO THE FORWARD
1350                                  ;END ZONE. THE DESIRED DATA IS THEN GENERATED IN THE DECTAPE BUFFER AREA
1351                                  ;AND DATA IS WRITTEN ONTO ALL BLOCKS FROM THE BLOCK NUMBER IN TCFRST
1352                                  ;THRU THE BLOCK NUMBER IN TCLAST.  BLOCK NUMBERS ARE ALSO CHECKED FOR
1353                                  ;BEING IN ORDER. AFTER THE BLOCK NUMBER IN TCLAST IS WRITTEN, TAPE IS
1354                                  ;DRIVEN INTO THE REVERSE END ZONE.
1355                                  ;THE TAPE IS THEN STARTED IN REVERSE, AND WHEN THE CLOSEST BLOCK THAT
1356                                  ;WAS WRITTEN (TCLAST) IS FOUND, IT IS READ INTO THE DECTAPE BUFFER AREA.
1357                                  ;THE PROGRAM INTERRUPT REQUEST FACILITY IS THEN USED TO BOOK A REQUEST
1358                                  ;FOR CHECKING THE DATA AT LEVEL 3, AND NO FURTHER DATA IS READ IN
1359                                  ;UNTIL THAT DATA HAS BEEN CHECKED.  AFTER IT IS CHECKED, THE DATA IS
```

```
                                        ;SCRAMBLED TO GUARANTEE THAT NEW DATA IS REALLY READ IN NEXT TIME. WHILE
                                        ;THIS IS GOING ON, BLOCK NUMBERS ARE CHECKED FOR BEING IN ORDER AS THE
                                        ;TAPE TRAVELS TOWARD THE FORWARD END ZONE.ONCE THE DATA IS FULLY CHECKED
                                        ;THE NEXT BLOCK THAT COMES UP IS READ IN AND THE PROCESS REPEATED.  ONCE
                                        ;THE BLOCK WHOSE NUMBER IS IN TCFRST HAS BEEN READ, THE TAPE IS DRIVEN
                                        ;INTO THE FORWARD END ZONE AND THE WHOLE SEQUENCE IS REPEATED.

                                        ;FUNCTION VALUES IN CSR
                                        ;DT11 DEC TAPE
            000004                      RD=4                            ;READ DATA
            000014                      WD=14                           ;WRITE DATA
            000002                      RB=2
            000500                      IE=500                          ;INTERRUPT ENABLE+UNIT 1
            000001                      DO=1                            ;DO - THE FUNCTION
            004000                      R=4000                          ;REVERSE

003674      000000                      TCFIRST:        0               ;FIRST BLOCK TO BE SEARCHED FOR
003676      001101                      TCLAST: 577.                    ;LAST BLOCK TO BE SEARCHED FOR
003700      000000                      TCEXPE: 0                       ;THE BLOCK THAT IS EXPECTED

                                        ;GO TO FORWARD END ZONE
003702  012777  003702  174654  FENDZ:  MOV     #FENDZ,@TCIV            ;END ZONE VECTOR SETUP
003710  005777  174640                  TST     @TCST                   ;TEST FOR END ZONE
003714  100403                          BMI     FEND1                   ;AT END ZONE?
003716  105277  174630                  INCB    @TCCM                   ;SET DO - NO DELAY
003722  000002                          RTI                             ;NO - WAIT SOME MORE
003724  012777  003754  174632  FEND1:  MOV     #TCF1,@TCIV             ;YES - NEW VECTOR
003732  042777  104000  174612          BIC     #104000,@TCCM           ;SEARCH BLOCK FOWARD
003740  016767  177730  177732          MOV     TCFIRST,TCEXPE          ;COUNT WHEN THIS BLOCK IS FOUND
003746  105277  174600          TCF1A:  INCB    @TCCM                   ;SET DO
003752  000002                          RTI                             ;RETURN ON NEXT BLOCK
003754  032777  100200  174570  TCF1:   BIT     #100200,@TCCM           ;ANY ERROR ON READ?
003762  100001                          BPL     .+4
003764  104006                          HLT                             ;TC ERROR SET - FORWARD READ BLOCK
003766  001001                          BNE     .+4                     ;DONE FLAG UP?
003770  104006                          HLT                             ;FALSE INTERRUPT
003772  027767  174560  177700          CMP     @TCDT,TCEXPE            ;IS THIS OUR BLOCK FOR SYNC
004000  002762                          BLT     TCF1A                   ;NO-READ SOME MORE BLOCKS
004002  001401                          BEQ     TCF2                    ;YES
004004  104006                          HLT                             ;WE PASSED THE BLOCK

004006  012777  004022  174550  TCF2:   MOV     #TCF3,@TCIV             ;VECTOR FOR SEQUENTIAL READS
004014  105277  174532                  INCB    @TCCM                   ;SET DO
004020  000002                          RTI                             ;RETURN AND TEST SEQENTIAL BLOCKS

                                        ;FIND SEQUENTIAL BLOCK AT FOWARD DIRECTION
004022  032777  100200  174522  TCF3:   BIT     #100200,@TCCM           ;TEST ERROR AND READY
004030  100001                          BPL     .+4
004032  104006                          HLT                             ;FOWARD READ ERROR TC-11
004034  001001                          BNE     .+4
004036  104006                          HLT                             ;FALSE INTERRUPT ON TC-11
004040  027767  174512  177630          CMP     @TCDT,TCLAST            ;HAVE WE TESTED ALL BLOCKS
004046  001414                          BEQ     RENDZ                   ;YES DRIVE UNIT IN END ZONE TO START OVER
004050  005267  177624                  INC     TCEXPE                  ;NO-INCREMENT EXPECTED COUNT
004054  027767  174476  177616          CMP     @TCDT,TCEXPE            ;IS CURRENT BLOCK CORRECT
004062  001401                          BEQ     .+4
```

```
1416  004064  104006                          HLT                     ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
1417  004066  000427                          BR      TCWBK           ;THIS ROUTINE WRITES A BLOCK
1418  004070  105277  174456          TCF4:   INCB    @TCCM           ;SET DO
1419  004074  000002                          RTI
1420  004076  000701                  XFENDZ: BR      FENDZ           ;INDIRECT LINK
1421:
1422                                  ;MOVE TAPE TO REVERSE END ZONE
1423  004100  012777  004100  174456  RENDZ:  MOV     #RENDZ,@TCIV    ;END ZONE VECTOR SETUP
1424  004106  016767  177564  177564          MOV     TCLAST,TCEXPE   ;SET UP FOR REVERSE SEARCH
1425  004114  005777  174434                  TST     @TCST           ;IN END ZONE
1426  004120  100403                          BMI     REND1           ;YES - START TO TURN UNIT AROUND
1427  004122  105277  174424                  INCB    @TCCM           ;SET DO
1428  004126  000002                          RTI                     ;NO - WAIT TILL WE ARE
1429  004130  012777  004503  174414  REND1:  MOV     #R+IE+RB+DO,@TCCM ;FUNCTION = READ BLOCK, REVERSE AND GO
1430  004136  012777  004226  174420          MOV     #TCR1,@TCIV     ;SET UP NEW INTERRUPT VECTOR
1431  004144  000002                          RTI
1432                                  ;WRITE FORWARD ALL BLOCKS EXCEPT 0
1433
1434  004146  012777  004200  174410  TCWBK:  MOV     #TCWB1,@TCIV    ;INTERRUPT VECTOR FOR WRITE
1435  004154  012777  177400  174376          MOV     #-400,@TCWC     ;ONE BLOCK
1436  004162  012777  004510  174372          MOV     #TCWBUF,@TCBA   ;THE WRITE BUFFER ADDRESS
1437  004170  112777  000515  174354          MOVB    #IE+WD+DC,@TCCM ;WRITE THE BLOCK
1438  004176  000002                          RTI                     ;RETURN WHEN BLOCK IS WRITTEN
1439  004200  005777  174346          TCWB1:  TST     @TCCM           ;ANY ERRORS
1440  004204  100001                          BPL     .+4
1441  004206  104006                          HLT
1442  004210  012777  004022  174346          MOV     #TCF3,@TCIV     ;SEARCH BLOCK VECTOR
1443  004216  112777  000502  174326          MOVB    #IE+RB,@TCCM    ;READ BLOCK
1444  004224  000721                          BR      TCF4            ;FIND THE NEXT BLOCK
1445
1446  004226  032777  100200  174318  TCR1:   BIT     #100200,@TCCM   ;TEST FOR ERROR AND READY
1447  004234  100001                          BPL     .+4
1448  004236  104006                          HLT                     ;DECTAPE ERROR ON READ BLOCK REVERSE
1449  004240  001001                          BNE     .+4
1450  004242  104006                          HLT                     ;FALSE INTERRUPT FROM DECTAPE
1451  004244  027767  174306  177426          CMP     @TCDT,TCEXPE    ;IS IT OUR FIRST BLOCK
1452  004252  001406                          BEQ     TCR2            ;YES - GO TEST THE REST
1453  004254  002002                          BGE     TCR1A           ;NO - HAVE WE PASSED THE BLOCK
1454  004256  104006                          HLT                     ;WE PASS OUR BLOCK
1455  004260  000707                          BR      RENDZ           ;GO TO END ZONE AND TRY AGAIN
1456  004262  105277  174264          TCR1A:  INCB    @TCCM           ;SET DO
1457  004266  000002                          RTI                     ;WE FOUND OUR FIRST BLOCK
1458  004270  012777  004304  174266  TCR2:   MOV     #TCR3,@TCIV     ;SET UP INTERRUPT TO TEST ALL BLOCKS
1459  004276  105277  174250                  INCB    @TCCM           ;SET DO
1460  004302  000002                          RTI                     ;WAIT FOR NEXT BLOCK TO INTERRUPT
1461
1462                                  ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
1463  004304  032777  100200  174240  TCR3:   BIT     #100200,@TCCM   ;TEST FOR READ AND ERROR
1464  004312  100001                          BPL     .+4
1465  004314  104006                          HLT                     ;ERROR READING SEQUENTIAL BLOCK IN REVERSE
1466  004316  001001                          BNE     .+4
1467  004320  104006                          HLT                     ;FALSE DECTAPE INTERRUPT
1468  004322  026777  177346  174226          CMP     TCFIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1469  004330  001662                          BEQ     XFENDZ          ;YES - GO TO END ZONE TO RESTART
1470  004332  005367  177342                  DEC     TCEXPE          ;NO - DECREMENT BLOCK NUMBER
1471  004336  027767  174214  177334          CMP     @TCDT,TCEXPE    ;TEST SEQUENTAIL BLOCK IN REVERSE
```

```
1472  004344  001401                        BEQ     .+4
1473  004346  104006                        HLT                     ;TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1474  004350  000403                        BR      TCRBK           ;THIS ROUTINE READ A BLOCK
1475  004352  105277  174174        TCR4:   INCB    @TCCM           ;SET DO
1476  004356  000002                        RTI                     ;LETS TRY A NEW BLOCK
1477
1478                                ;READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1479  004360  012777  004416  174176 TCRBK:  MOV     #TCRB1,@TCIV    ;SET UP INTERRUPT VECTOR
1480  004366  012777  177400  174164        MOV     #-400,@TCWC     ;READ ONE BLOCK
1481  004374  012777  004510  174160        MOV     #TCRBUF,@TCBA   ;WHERE BUFFER IS
1482  004402  112777  000505  174142        MOVB    #IE+RD+DO,@TCCM ;READ THE BLOCK
1483  004410  004767  000030                JSR     %7,TC1          ;CHECK DATA BUFFER
1484  004414  000002                        RTI                     ;EXIT - RETURN WHEN BLOCK IS READ
1485  004416  005777  174130        TCRB1:  TST     @TCCM           ;AND ERRORS
1486  004422  100001                        BPL     .+4
1487  004424  104006                        HLT                     ;DECTAPE ERROR
1488  004426  012777  004304  174130        MOV     #TCR3,@TCIV     ;NEW VECTOR FOR BLOCK SEARCH
1489  004434  112777  000502  174110        MOVB    #IE+RB,@TCCM    ;READ BLOCK FUNCTION
1490  004442  000743                        BR      TCR4            ;RETURN TO BLOCK SEARCH
1491
1492                                ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
1493                                ;BY DOING A CHECK SUM ON THE DATA
1494  004444  010146                TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
1495  004446  010246                        MOV     %2,-(6)
1496  004450  010346                        MOV     %3,-(6)
1497  004452  005003                        CLR     %3              ;SUM OF DATA
1498  004454  012701  004510                MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
1499  004460  012702  005510                MOV     #TCRBUF+1000,%2 ;END OF READ BUFFER
1500  004464  062103                TC2:    ADD     (1)+,%3         ;EVEN ADD
1501  004466  062103                        ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
1502  004470  001401                        BEQ     .+4
1503  004472  104006                        HLT                     ;DATA ERROR TC-11
1504  004474  020102                        CMP     %1,%2           ;AT END OF BUFFER?
1505  004476  001372                        BNE     TC2             ;NO - SUM THE REST
1506  004500  012603                        MOV     (6)+,%3         ;RESTORE THE REGISTERS
1507  004502  012602                        MOV     (6)+,%2
1508  004504  012601                        MOV     (6)+,%1
1509  004506  000207                        RTS     %7              ;EXIT
1510
1511                                ;THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1512  004510                        TCWBUF:
1513  004510                        TCRBUF:
1514            000001                      N=1
1515  004510    000001                      N                       ;DECTAPE WRITE BUFFER
1516  004512    177777                      -N
1517            000002                      N=N+1
1518  004514    000002                      N                       ;DECTAPE WRITE BUFFER
1519  004516    177776                      -N
1520            000003                      N=N+1
1521  004520    000003                      N                       ;DECTAPE WRITE BUFFER
1522  004522    177775                      -N
1523            000004                      N=N+1
1524  004524    000004                      N                       ;DECTAPE WRITE BUFFER
1525  004526    177774                      -N
1526            000005                      N=N+1
1527  004530    000005                      N                       ;DECTAPE WRITE BUFFER
```

```
1528  004532  177773          -N
1529          000006          N=N+1
1530  004534  000006          N                       ;DECTAPE WRITE BUFFER
1531  004536  177772          -N
1532          000007          N=N+1
1533  004540  000007          N                       ;DECTAPE WRITE BUFFER
1534  004542  177771          -N
1535          000010          N=N+1
1536  004544  000010          N                       ;DECTAPE WRITE BUFFER
1537  004546  177770          -N
1538          000011          N=N+1
1539  004550  000011          N                       ;DECTAPE WRITE BUFFER
1540  004552  177767          -N
1541          000012          N=N+1
1542  004554  000012          N                       ;DECTAPE WRITE BUFFER
1543  004556  177766          -N
1544          000013          N=N+1
1545  004560  000013          N                       ;DECTAPE WRITE BUFFER
1546  004562  177765          -N
1547          000014          N=N+1
1548  004564  000014          N                       ;DECTAPE WRITE BUFFER
1549  004566  177764          -N
1550          000015          N=N+1
1551  004570  000015          N                       ;DECTAPE WRITE BUFFER
1552  004572  177763          -N
1553          000016          N=N+1
1554  004574  000016          N                       ;DECTAPE WRITE BUFFER
1555  004576  177762          -N
1556          000017          N=N+1
1557  004600  000017          N                       ;DECTAPE WRITE BUFFER
1558  004602  177761          -N
1559          000020          N=N+1
1560  004604  000020          N                       ;DECTAPE WRITE BUFFER
1561  004606  177760          -N
1562          000021          N=N+1
1563  004610  000021          N                       ;DECTAPE WRITE BUFFER
1564  004612  177757          -N
1565          000022          N=N+1
1566  004614  000022          N                       ;DECTAPE WRITE BUFFER
1567  004616  177756          -N
1568          000023          N=N+1
1569  004620  000023          N                       ;DECTAPE WRITE BUFFER
1570  004622  177755          -N
1571          000024          N=N+1
1572  004624  000024          N                       ;DECTAPE WRITE BUFFER
1573  004626  177754          -N
1574          000025          N=N+1
1575  004630  000025          N                       ;DECTAPE WRITE BUFFER
1576  004632  177753          -N
1577          000026          N=N+1
1578  004634  000026          N                       ;DECTAPE WRITE BUFFER
1579  004636  177752          -N
1580          000027          N=N+1
1581  004640  000027          N                       ;DECTAPE WRITE BUFFER
1582  004642  177751          -N
1583          000030          N=N+1
```

```
1584  004644  000030                    N                       ;DECTAPE WRITE BUFFER
1585  004646  177750                    -N
1586          000031                    N=N+1
1587  004650  000031                    N                       ;DECTAPE WRITE BUFFER
1588  004652  177747                    -N
1589          000032                    N=N+1
1590  004654  000032                    N                       ;DECTAPE WRITE BUFFER
1591  004656  177746                    -N
1592          000033                    N=N+1
1593  004660  000033                    N                       ;DECTAPE WRITE BUFFER
1594  004662  177745                    -N
1595          000034                    N=N+1
1596  004664  000034                    N                       ;DECTAPE WRITE BUFFER
1597  004666  177744                    -N
1598          000035                    N=N+1
1599  004670  000035                    N                       ;DECTAPE WRITE BUFFER
1600  004672  177743                    -N
1601          000036                    N=N+1
1602  004674  000036                    N                       ;DECTAPE WRITE BUFFER
1603  004676  177742                    -N
1604          000037                    N=N+1
1605  004700  000037                    N                       ;DECTAPE WRITE BUFFER
1606  004702  177741                    -N
1607          000040                    N=N+1
1608  004704  000040                    N                       ;DECTAPE WRITE BUFFER
1609  004706  177740                    -N
1610          000041                    N=N+1
1611  004710  000041                    N                       ;DECTAPE WRITE BUFFER
1612  004712  177737                    -N
1613          000042                    N=N+1
1614  004714  000042                    N                       ;DECTAPE WRITE BUFFER
1615  004716  177736                    -N
1616          000043                    N=N+1
1617  004720  000043                    N                       ;DECTAPE WRITE BUFFER
1618  004722  177735                    -N
1619          000044                    N=N+1
1620  004724  000044                    N                       ;DECTAPE WRITE BUFFER
1621  004726  177734                    -N
1622          000045                    N=N+1
1623  004730  000045                    N                       ;DECTAPE WRITE BUFFER
1624  004732  177733                    -N
1625          000046                    N=N+1
1626  004734  000046                    N                       ;DECTAPE WRITE BUFFER
1627  004736  177732                    -N
1628          000047                    N=N+1
1629  004740  000047                    N                       ;DECTAPE WRITE BUFFER
1630  004742  177731                    -N
1631          000050                    N=N+1
1632  004744  000050                    N                       ;DECTAPE WRITE BUFFER
1633  004746  177730                    -N
1634          000051                    N=N+1
1635  004750  000051                    N                       ;DECTAPE WRITE BUFFER
1636  004752  177727                    -N
1637          000052                    N=N+1
1638  004754  000052                    N                       ;DECTAPE WRITE BUFFER
1639  004756  177726                    -N
```

```
1640            000053                  N=N+1
1641  004760    000053                  N                       ;DECTAPE WRITE BUFFER
1642  004762    177725                  -N
1643            000054                  N=N+1
1644  004764    000054                  N                       ;DECTAPE WRITE BUFFER
1645  004766    177724                  -N
1646            000055                  N=N+1
1647  004770    000055                  N                       ;DECTAPE WRITE BUFFER
1648  004772    177723                  -N
1649            000056                  N=N+1
1650  004774    000056                  N                       ;DECTAPE WRITE BUFFER
1651  004776    177722                  -N
1652            000057                  N=N+1
1653  005000    000057                  N                       ;DECTAPE WRITE BUFFER
1654  005002    177721                  -N
1655            000060                  N=N+1
1656  005004    000060                  N                       ;DECTAPE WRITE BUFFER
1657  005006    177720                  -N
1658            000061                  N=N+1
1659  005010    000061                  N                       ;DECTAPE WRITE BUFFER
1660  005012    177717                  -N
1661            000062                  N=N+1
1662  005014    000062                  N                       ;DECTAPE WRITE BUFFER
1663  005016    177716                  -N
1664            000063                  N=N+1
1665  005020    000063                  N                       ;DECTAPE WRITE BUFFER
1666  005022    177715                  -N
1667            000064                  N=N+1
1668  005024    000064                  N                       ;DECTAPE WRITE BUFFER
1669  005026    177714                  -N
1670            000065                  N=N+1
1671  005030    000065                  N                       ;DECTAPE WRITE BUFFER
1672  005032    177713                  -N
1673            000066                  N=N+1
1674  005034    000066                  N                       ;DECTAPE WRITE BUFFER
1675  005036    177712                  -N
1676            000067                  N=N+1
1677  005040    000067                  N                       ;DECTAPE WRITE BUFFER
1678  005042    177711                  -N
1679            000070                  N=N+1
1680  005044    000070                  N                       ;DECTAPE WRITE BUFFER
1681  005046    177710                  -N
1682            000071                  N=N+1
1683  005050    000071                  N                       ;DECTAPE WRITE BUFFER
1684  005052    177707                  -N
1685            000072                  N=N+1
1686  005054    000072                  N                       ;DECTAPE WRITE BUFFER
1687  005056    177706                  -N
1688            000073                  N=N+1
1689  005060    000073                  N                       ;DECTAPE WRITE BUFFER
1690  005062    177705                  -N
1691            000074                  N=N+1
1692  005064    000074                  N                       ;DECTAPE WRITE BUFFER
1693  005066    177704                  -N
1694            000075                  N=N+1
1695  005070    000075                  N                       ;DECTAPE WRITE BUFFER
```

```
1696  005072  177703          -N
1697          000076          N=N+1
1698  005074  000076          N                       ;DECTAPE WRITE BUFFER
1699  005076  177702          -N
1700          000077          N=N+1
1701  005100  000077          N                       ;DECTAPE WRITE BUFFER
1702  005102  177701          -N
1703          000100          N=N+1
1704  005104  000100          N                       ;DECTAPE WRITE BUFFER
1705  005106  177700          -N
1706          000101          N=N+1
1707          000100          N=N-1
1708  005110  177700          -N
1709  005112  000100          N                       ;DEC TAPE WRITE BUFFER
1710          000077          N=N-1
1711  005114  177701          -N
1712  005116  000077          N                       ;DEC TAPE WRITE BUFFER
1713          000076          N=N-1
1714  005120  177702          -N
1715  005122  000076          N                       ;DEC TAPE WRITE BUFFER
1716          000075          N=N-1
1717  005124  177703          -N
1718  005126  000075          N                       ;DEC TAPE WRITE BUFFER
1719          000074          N=N-1
1720  005130  177704          -N
1721  005132  000074          N                       ;DEC TAPE WRITE BUFFER
1722          000073          N=N-1
1723  005134  177705          -N
1724  005136  000073          N                       ;DEC TAPE WRITE BUFFER
1725          000072          N=N-1
1726  005140  177706          -N
1727  005142  000072          N                       ;DEC TAPE WRITE BUFFER
1728          000071          N=N-1
1729  005144  177707          -N
1730  005146  000071          N                       ;DEC TAPE WRITE BUFFER
1731          000070          N=N-1
1732  005150  177710          -N
1733  005152  000070          N                       ;DEC TAPE WRITE BUFFER
1734          000067          N=N-1
1735  005154  177711          -N
1736  005156  000067          N                       ;DEC TAPE WRITE BUFFER
1737          000066          N=N-1
1738  005160  177712          -N
1739  005162  000066          N                       ;DEC TAPE WRITE BUFFER
1740          000065          N=N-1
1741  005164  177713          -N
1742  005166  000065          N                       ;DEC TAPE WRITE BUFFER
1743          000064          N=N-1
1744  005170  177714          -N
1745  005172  000064          N                       ;DEC TAPE WRITE BUFFER
1746          000063          N=N-1
1747  005174  177715          -N
1748  005176  000063          N                       ;DEC TAPE WRITE BUFFER
1749          000062          N=N-1
1750  005200  177716          -N
1751  005202  000062          N                       ;DEC TAPE WRITE BUFFER
```

```
1752            000061                  N=N-1
1753  005204   177717                   -N
1754  005206   000061                   N                       ;DEC TAPE WRITE BUFFER
1755            000060                  N=N-1
1756  005210   177720                   -N
1757  005212   000060                   N                       ;DEC TAPE WRITE BUFFER
1758            000057                  N=N-1
1759  005214   177721                   -N
1760  005216   000057                   N                       ;DEC TAPE WRITE BUFFER
1761            000056                  N=N-1
1762  005220   177722                   -N
1763  005222   000056                   N                       ;DEC TAPE WRITE BUFFER
1764            000055                  N=N-1
1765  005224   177723                   -N
1766  005226   000055                   N                       ;DEC TAPE WRITE BUFFER
1767            000054                  N=N-1
1768  005230   177724                   -N
1769  005232   000054                   N                       ;DEC TAPE WRITE BUFFER
1770            000053                  N=N-1
1771  005234   177725                   -N
1772  005236   000053                   N                       ;DEC TAPE WRITE BUFFER
1773            000052                  N=N-1
1774  005240   177726                   -N
1775  005242   000052                   N                       ;DEC TAPE WRITE BUFFER
1776            000051                  N=N-1
1777  005244   177727                   -N
1778  005246   000051                   N                       ;DEC TAPE WRITE BUFFER
1779            000050                  N=N-1
1780  005250   177730                   -N
1781  005252   000050                   N                       ;DEC TAPE WRITE BUFFER
1782            000047                  N=N-1
1783  005254   177731                   -N
1784  005256   000047                   N                       ;DEC TAPE WRITE BUFFER
1785            000046                  N=N-1
1786  005260   177732                   -N
1787  005262   000046                   N                       ;DEC TAPE WRITE BUFFER
1788            000045                  N=N-1
1789  005264   177733                   -N
1790  005266   000045                   N                       ;DEC TAPE WRITE BUFFER
1791            000044                  N=N-1
1792  005270   177734                   -N
1793  005272   000044                   N                       ;DEC TAPE WRITE BUFFER
1794            000043                  N=N-1
1795  005274   177735                   -N
1796  005276   000043                   N                       ;DEC TAPE WRITE BUFFER
1797            000042                  N=N-1
1798  005300   177736                   -N
1799  005302   000042                   N                       ;DEC TAPE WRITE BUFFER
1800            000041                  N=N-1
1801  005304   177737                   -N
1802  005306   000041                   N                       ;DEC TAPE WRITE BUFFER
1803            000040                  N=N-1
1804  005310   177740                   -N
1805  005312   000040                   N                       ;DEC TAPE WRITE BUFFER
1806            000037                  N=N-1
1807  005314   177741                   -N
```

```
1808  005316  000037                  N                       ;DEC TAPE WRITE BUFFER
1809          000036                  N=N-1
1810  005320  177742                  -N
1811  005322  000036                  N                       ;DEC TAPE WRITE BUFFER
1812          000035                  N=N-1
1813  005324  177743                  -N
1814  005326  000035                  N                       ;DEC TAPE WRITE BUFFER
1815          000034                  N=N-1
1816  005330  177744                  -N
1817  005332  000034                  N                       ;DEC TAPE WRITE BUFFER
1918          000033                  N=N-1
1819  005334  177745                  -N
1820  005336  000033                  N                       ;DEC TAPE WRITE BUFFER
1821          000032                  N=N-1
1822  005340  177746                  -N
1823  005342  000032                  N                       ;DEC TAPE WRITE BUFFER
1824          000031                  N=N-1
1825  005344  177747                  -N
1826  005346  000031                  N                       ;DEC TAPE WRITE BUFFER
1827          000030                  N=N-1
1828  005350  177750                  -N
1829  005352  000030                  N                       ;DEC TAPE WRITE BUFFER
1830          000027                  N=N-1
1831  005354  177751                  -N
1832  005356  000027                  N                       ;DEC TAPE WRITE BUFFER
1833          000026                  N=N-1
1834  005360  177752                  -N
1835  005362  000026                  N                       ;DEC TAPE WRITE BUFFER
1836          000025                  N=N-1
1837  005364  177753                  -N
1838  005366  000025                  N                       ;DEC TAPE WRITE BUFFER
1839          000024                  N=N-1
1840  005370  177754                  -N
1841  005372  000024                  N                       ;DEC TAPE WRITE BUFFER
1842          000023                  N=N-1
1843  005374  177755                  -N
1844  005376  000023                  N                       ;DEC TAPE WRITE BUFFER
1845          000022                  N=N-1
1846  005400  177756                  -N
1847  005402  000022                  N                       ;DEC TAPE WRITE BUFFER
1848          000021                  N=N-1
1849  005404  177757                  -N
1850  005406  000021                  N                       ;DEC TAPE WRITE BUFFER
1851          000020                  N=N-1
1852  005410  177760                  -N
1853  005412  000020                  N                       ;DEC TAPE WRITE BUFFER
1854          000017                  N=N-1
1855  005414  177761                  -N
1856  005416  000017                  N                       ;DEC TAPE WRITE BUFFER
1857          000016                  N=N-1
1858  005420  177762                  -N
1859  005422  000016                  N                       ;DEC TAPE WRITE BUFFER
1860          000015                  N=N-1
1861  005424  177763                  -N
1862  005426  000015                  N                       ;DEC TAPE WRITE BUFFER
1863          000014                  N=N-1
```

```
1864  005430  177764                  -N
1865  005432  000014                  N                       ;DEC TAPE WRITE BUFFER
1866          000013                  N=N-1
1867  005434  177765                  -N
1868  005436  000013                  N                       ;DEC TAPE WRITE BUFFER
1869          000012                  N=N-1
1870  005440  177766                  -N
1871  005442  000012                  N                       ;DEC TAPE WRITE BUFFER
1872          000011                  N=N-1
1873  005444  177767                  -N
1874  005446  000011                  N                       ;DEC TAPE WRITE BUFFER
1875          000010                  N=N-1
1876  005450  177770                  -N
1877  005452  000010                  N                       ;DEC TAPE WRITE BUFFER
1878          000007                  N=N-1
1879  005454  177771                  -N
1880  005456  000007                  N                       ;DEC TAPE WRITE BUFFER
1881          000006                  N=N-1
1882  005460  177772                  -N
1883  005462  000006                  N                       ;DEC TAPE WRITE BUFFER
1884          000005                  N=N-1
1885  005464  177773                  -N
1886  005466  000005                  N                       ;DEC TAPE WRITE BUFFER
1887          000004                  N=N-1
1888  005470  177774                  -N
1889  005472  000004                  N                       ;DEC TAPE WRITE BUFFER
1890          000003                  N=N-1
1891  005474  177775                  -N
1892  005476  000003                  N                       ;DEC TAPE WRITE BUFFER
1893          000002                  N=N-1
1894  005500  177776                  -N
1895  005502  000002                  N                       ;DEC TAPE WRITE BUFFER
1896          000001                  N=N-1
1897  005504  177777                  -N
1898  005506  000001                  N                       ;DEC TAPE WRITE BUFFER
1899
```

```
1900                                    ;*************************************************************************
1901                                    .SBTTL  MAIN ROUTINE: CPU BACKGROUND TESTS
1902                                    ;*************************************************************************
1903  005510  010701                   BEGINX: MOV     PC,R1           ;SET UP R1 TO SELECT CURBNK
1904  005512  042701  017777                   BIC     #17777,R1
1905  005516  042737  160000  000034           BIC     #160000,@#34            ;SET SCOPE RET TO CURRENT BANK
1906  005524  050137  000034                   BIS     R1,@#34
1907  005530  000301                           SWAB    R1
1908  005532  006201                           ASR     R1
1909  005534  006201                           ASR     R1
1910  005536  010137  000570                   MOV     R1,@#CURBNK
1911
1912                                    ;BINARY INSTRUCTIONS
1913                                    ;INDEX, AND INDIRECT TEST OF PDP-11
1914  005542                            BEGIN:
1915  005542  005000                           CLR     R0                      ;CHECK RANDOM NUMBER GENERATOR SEEDS.
1916  005544  066700  007210                   ADD     RP1,R0                  ;AND RESTORE IF ZEROED.
1917  005550  066700  007206                   ADD     RP2,R0
1918  005554  001006                           BNE     1$                      ;BR IF NOT ZEROED.
1919  005556  012767  001233  007174           MOV     #1233,RP1               ;RESTORE RP1 SEED.
1920  005564  012767  007622  007170           MOV     #7622,RP2               ;RESTORE RP2 SEED.
1921  005572  005067  007104           1$:     CLR     SCOPEF
1922  005576  010767  007102                   MOV     PC,RETURN               ;FOR SCOPING - SETUP ADDRESS OF BEGIN1 IN
1923  005602  062767  000042  007074           ADD     #42,RETURN              ;THIS BANK THRU CURRENT ASR
1924  005610  016767  007064  007060           MOV     $ICNT,ICOUNT            ;ITERATION COUNT
1925  005616  005737  000042                   TST     @#42                    ;AUTO MODE?
1926  005622  001407                           BEQ     2$                      ;BR IF NOT.
1927  005624  023737  000042  000046           CMP     @#42,@#46               ;XXDP CHAIN MODE?
1928  005632  001403                           BEQ     2$                      ;BR IF NOT.
1929  005634  016767  007050  007034           MOV     XDPCNT,ICOUNT           ;USE XXDP CHAIN ITERATION COUNT.
1930  005642                            2$:
1931                                    ;*************************************************************************
1932                                    .SBTTL  TEST COMPARE INSTRUCTION INDEXED
1933                                    ;*************************************************************************
1934  005642  012700  177770                   MOV     #-10,%0                 ;MINUS 10 TO REG 0
1935  005646  026027  014774  125252           CMP     A(0),#125252            ;(A INDEX BY MINUS 10) TO #125252
1936  005654  001401                           BEQ     .+4
1937  005656  104006                           HLT                             ;COMPARE WITH INDEX FAILED
1938  005660  104400                           SCOPE
1939
1940  005662  012700  000010                   MOV     #10,%0
1941  005666  022760  052525  014774           CMP     #052525,A(0)
1942  005674  001401                           BEQ     .+4
1943  005676  104006                           HLT
1944  005700  104400                           SCOPE
1945
1946  005702  012700  177770                   MOV     #-10,%0
1947  005706  026060  014774  014774           CMP     A(0),A(0)
1948  005714  001401                           BEQ     .+4
1949  005716  104006                           HLT
1950  005720  104400                           SCOPE
1951
1952  005722  012700  000010                   MOV     #+10,%0
1953  005726  026060  014774  014774           CMP     A(0),A(0)
1954  005734  001401                           BEQ     .+4
1955  005736  104006                           HLT
```

```
1956  005740  104400                          SCOPE
1957
1958  005742  012700  177774                  MOV     #-4,%0
1959  005746  012701  000010                  MOV     #+10.%1
1960  005752  026061  014774  014774          CMP     A(0),A(1)
1961  005760  001401                          BEQ     .+4
1962  005762  104006                          HLT
1963  005764  104400                          SCOPE
1964
1965  005766  012700  177774                  MOV     #-4,%0
1966  005772  012701  000010                  MOV     #10,%1
1967  005776  026160  014774  014774          CMP     A(1),A(0)
1968  006004  001401                          BEQ     .+4
1969  006006  104006                          HLT
1970  006010  104400                          SCOPE
1971
1972                                  ;*****************************************************************************
1973                                  .SBTTL  TEST MOVE INSTRUCTION FOR INDEX
1974                                  ;*****************************************************************************
1975
1976  006012  012700  177770                  MOV     #-10,%0
1977  006016  016067  014774  006772          MOV     A(0),TEMP
1978  006024  026727  006766  125252          CMP     TEMP,#125252
1979  006032  001401                          BEQ     .+4
1980  006034  104006                          HLT
1981  006036  104400                          SCOPE
1982
1983  006040  012700  177770                  MOV     #-10,%0
1984  006044  012760  125252  015016          MOV     #125252,TEMP(0)
1985  006052  023727  015006  125252          CMP     @#C,#125252
1986  006060  001401                          BEQ     .+4
1987  006062  104006                          HLT
1988  006064  104400                          SCOPE
1989
1990                                  ;*****************************************************************************
1991                                  .SBTTL  TEST BIC INSTRUCTION FOR INDEXING
1992                                  ;*****************************************************************************
1993  006066  012767  177777  006722          MOV     #-1,TEMP
1994  006074  012700  177770                  MOV     #-10,%0
1995  006100  046067  014774  006710          BIC     A(0),TEMP
1996  006106  026727  006704  052525          CMP     TEMP,#052525
1997  006114  001401                          BEQ     .+4
1998  006116  104006                          HLT
1999  006120  104400                          SCOPE
2000
2001  006122  012700  177770                  MOV     #-10,%0
2002  006126  012767  177777  006652          MOV     #-1,TEMP-10
2003  006134  042767  052525  006644          BIC     #052525,TEMP-10
2004  006142  026727  006640  125252          CMP     TEMP-10,#125252
2005  006150  001401                          BEQ     .+4
2006  006152  104006                          HLT
2007  006154  104400                          SCOPE
2008
2009  006156  012737  125252  015016          MOV     #125252,@#TEMP
2010  006164  012700  177770                  MOV     #-10,%0
2011  006170  166760  006570  015026          SJB     B,TEMP+10(0)
```

```
2012  006176  001401                          BEQ     .+4
2013  006200  104006                          HLT
2014  006202  104400                          SCOPE
2015
2016  006204  012737  052525  015016          MOV     #052525,@#TEMP
2017  006212  012700  000010                  MOV     #10,%0
2018  006216  166760  006562  015006          SUB     A+10,C(0)
2019  006224  001401                          BEQ     .+4
2020  006226  104006                          HLT
2021  006230  104400                          SCOPE
2022
2023                                  ;*****************************************************************************
2024                                  .SBTTL  TEST UNARYS INDEXED
2025                                  ;*****************************************************************************
2026
2027  006232  012737  177777  015016          MOV     #-1,@#TEMP
2028  006240  012700  000010                  MOV     #+10,%0
2029  006244  005060  015006                  CLR     C(0)
2030  006250  005737  015016                  TST     @#TEMP
2031  006254  001401                          BEQ     .+4
2032  006256  104006                          HLT
2033  006260  104400                          SCOPE
2034
2035  006262  012737  177777  015016          MOV     #-1,@#TEMP
2036  006270  012700  000010                  MOV     #10,%0
2037  006274  005160  015006                  COM     C(0)
2038  006300  005737  015016                  TST     @#TEMP
2039  006304  001401                          BEQ     .+4
2040  006306  104006                          HLT
2041  006310  104400                          SCOPE
2042
2043  006312  012737  177777  015016          MOV     #-1,@#TEMP
2044  006320  012700  177770                  MOV     #-10.%0
2045  006324  005260  015026                  INC     D(0)
2046  006330  005737  015016                  TST     @#TEMP
2047  006334  001401                          BEQ     .+4
2048  006336  104006                          HLT
2049  006340  104400                          SCOPE
2050
2051  006342  012737  000001  015016          MOV     #1,@#TEMP
2052  006350  012700  177770                  MOV     #-10,%0
2053  006354  005360  015026                  DEC     D(0)
2054  006360  005737  015016                  TST     @#TEMP
2055  006364  001401                          BEQ     .+4
2056  006366  104006                          HLT
2057  006370  104400                          SCOPE
2058
2059  006372  012737  000001  015016          MOV     #1,@#TEMP
2060  006400  012700  000010                  MOV     #10,%0
2061  006404  005360  015006                  DEC     C(0)
2062  006410  005737  015016                  TST     @#TEMP
2063  006414  001401                          BEQ     .+4
2064  006416  104006                          HLT
2065  006420  104400                          SCOPE
2066
2067  006422  012737  000001  015016          MOV     #1,@#TEMP
```

```
2068  006430  012700  177770                MOV     #-10,%0
2069  006434  005460  015026                NEG     D(0)
2070  006440  022737  177777  015016        CMP     #-1,@#TEMP
2071  006446  001401                        BEQ     .+4
2072  006450  104006                        HLT
2073  006452  104400                        SCOPE
2074
2075  006454  012737  000001  015016        MOV     #1,@#TEMP
2076  006462  012700  000010                MOV     #+10,%0
2077  006466  005460  015006                NEG     C(0)
2078  006472  022737  177777  015016        CMP     #-1,@#TEMP
2079  006500  001401                        BEQ     .+4
2080  006502  104006                        HLT
2081  006504  104400                        SCOPE
2082
2083  006506  012737  177777  015016        MOV     #-1,@#TEMP
2084  006514  012700  177770                MOV     #-10,%0
```

```
2085  006520  000261                          SEC
2086  006522  005560  015026                  ADC     D(0)
2087  006526  005737  015016                  TST     @#TEMP
2088  006532  001401                          BEQ     .+4
2089  006534  104006                          HLT
2090  006536  104400                          SCOPE
2091
2092  006540  012737  177777  015016          MOV     #-1,@#TEMP
2093  006546  012700  000010                  MOV     #+10,%0
2094  006552  000261                          SEC
2095  006554  005560  015006                  ADC     C(0)
2096  006560  005737  015016                  TST     @#TEMP
2097  006564  001401                          BEQ     .+4
2098  006566  104006                          HLT
2099  006570  104400                          SCOPE
2100
2101  006572  012737  000001  015016          MOV     #1,@#TEMP
2102  006600  012700  177770                  MOV     #-10,%0
2103  006604  000261                          SEC
2104  006606  005660  015026                  SBC     D(0)
2105  006612  005737  015016                  TST     @#TEMP
2106  006616  001401                          BEQ     .+4
2107  006620  104006                          HLT
2108  006622  104400                          SCOPE
2109
2110  006624  012737  000001  015016          MOV     #1,@#TEMP
2111  006632  012700  000010                  MOV     #+10,%0
2112  006636  000261                          SEC
2113  006640  005660  015006                  SBC     C(0)
2114  006644  005737  015016                  TST     @#TEMP
2115  006650  001401                          BEQ     .+4
2116  006652  104006                          HLT
2117  006654  104400                          SCOPE
2118
2119                                  ;*****************************************************************************
2120                                  .SBTTL  TEST JMP INDIRECT
2121                                  ;*****************************************************************************
2122  006656  010700                          MOV     %7,%0
2123  006660  062700  000010                  ADD     #10.%0
2124  006664  000110                          JMP     @%0
2125  006666  104006                          HLT
2126  006670  000240                          NOP
2127  006672  104400                          SCOPE
2128
2129  006674  010700                          MOV     %7,%0
2130  006676  062700  000010                  ADD     #10.%0
2131  006702  000110                          JMP     @%0
2132  006704  104006                          HLT
2133  006706  000240                          NOP
2134  006710  104400                          SCOPE
2135
2136                                  ;*****************************************************************************
2137                                  .SBTTL  TEST INDIRECT ADDRESSINGTEST COMPARE INSTRUCTION
2138                                  ;*****************************************************************************
2139  006712  023727  014764  125252          CMP     @#8,#125252
2140  006720  001401                          BEQ     .+4
```

```
2141  006722  104006                          HLT
2142  006724  104400                          SCOPE
2143
2144  006726  022737  125252  014764          CMP     #125252,@#B
2145  006734  001401                          BEQ     .+4
2146  006736  104006                          HLT
2147  006740  104400                          SCOPE
2148
2149  006742  023737  014764  014764          CMP     @#B,@#B
2150  006750  001401                          BEQ     .+4
2151  006752  104006                          HLT
2152  006754  104400                          SCOPE
2153
2154                                  ;*****************************************************************************
2155                                  .SBTTL  TEST MOVE INSTRUCTIONS
2156                                  ;*****************************************************************************
2157  006756  013700  014764                  MOV     @#B,%0
2158  006762  022700  125252                  CMP     #125252,%0
2159  006766  001401                          BEQ     .+4
2160  006770  104006                          HLT
2161  006772  104400                          SCOPE
2162
2163  006774  012737  125252  015016          MOV     #125252,@#TEMP
2164  007002  023737  014764  015016          CMP     @#B,@#TEMP
2165  007010  001401                          BEQ     .+4
2166  007012  104006                          HLT
2167  007014  104400                          SCOPE
2168
2169  007016  013737  014764  015006          MOV     @#B,@#C
2170  007024  023737  014764  015006          CMP     @#B,@#C
2171  007032  001401                          BEQ     .+4
2172  007034  104006                          HLT
2173  007036  104400                          SCOPE
2174
2175                                  ;*****************************************************************************
2176                                  .SBTTL  TEST BIC INSTRUCTION INDIRECT
2177                                  ;*****************************************************************************
2178  007040  012700  177777                  MOV     #-1,%0
2179  007044  043700  014764                  BIC     @#B,%0
2180  007050  020027  052525                  CMP     %0,#052525
2181  007054  001401                          BEQ     .+4
2182  007056  104006                          HLT
2183  007060  104400                          SCOPE
2184
2185  007062  012737  177777  015016          MOV     #-1,@#TEMP
2186  007070  042737  125252  015016          BIC     #125252,@#TEMP
2187  007076  022737  052525  015016          CMP     #052525,@#TEMP
2188  007104  001401                          BEQ     .+4
2189  007106  104006                          HLT
2190  007110  104400                          SCOPE
2191
2192  007112  012737  177777  015006          MOV     #-1,@#C
2193  007120  043737  014764  015006          BIC     @#B,@#C
2194  007126  023727  015006  052525          CMP     @#C,#52525
2195  007134  001401                          BEQ     .+4
2196  007136  104006                          HLT
```

```
2197  007140  104400                          SCOPE
2198
2199                                  ;*****************************************************************************
2200                                  .SBTTL  TEST SUBTRACT INSTRUCTION
2201                                  ;*****************************************************************************
2202  007142  012700  125252          MOV     #125252,%0
2203  007146  163700  014764          SUB     @#B,%0
2204  007152  020027  000000          CMP     %0,#0
2205  007156  001401                  BEQ     .+4
2206  007160  104006                  HLT
2207  007162  104400                  SCOPE
2208
2209  007164  012737  125252  015016  MOV     #125252,@#TEMP
2210  007172  166737  005566  015016  SUB     B,@#TEMP
2211  007200  001401                  BEQ     .+4
2212  007202  104006                  HLT
2213  007204  104400                  SCOPE
2214
2215  007206  012767  125252  005602  MOV     #125252,TEMP
2216  007214  163767  014764  005574  SUB     @#B,TEMP
2217  007222  005767  005570          TST     TEMP
2218  007226  001401                  BEQ     .+4
2219  007230  104006                  HLT
2220  007232  104400                  SCOPE
2221
2222                                  ;*****************************************************************************
2223                                  .SBTTL  TEST ADD INDIRECT
2224                                  ;*****************************************************************************
2225  007234  005000                  CLR     %0
2226  007236  063700  014764          ADD     @#B,%0
2227  007242  022700  125252          CMP     #125252,%0
2228  007246  001401                  BEQ     .+4
2229  007250  104006                  HLT
2230  007252  104400                  SCOPE
2231
2232  007254  005037  015016          CLR     @#TEMP
2233  007260  062737  125252  015016  ADD     #125252,@#TEMP
2234  007266  022737  125252  015016  CMP     #125252,@#TEMP
2235  007274  001401                  BEQ     .+4
2236  007276  104006                  HLT
2237  007300  104400                  SCOPE
2238
2239  007302  012737  125252  015016  MOV     #125252,@#TEMP
2240  007310  067737  005466  015016  ADD     @A+6,@#TEMP
2241  007316  023727  015016  177777  CMP     @#TEMP,#-1
2242  007324  001401                  BEQ     .+4
2243  007326  104006                  HLT
2244  007330  104400                  SCOPE
2245
2246                                  ;*****************************************************************************
2247                                  .SBTTL  TEST UNARYS INDIRECT
2248                                  ;*****************************************************************************
2249  007332  012737  177777  015016  MOV     #-1,@#TEMP
2250  007340  005037  015016          CLR     @#TEMP
2251  007344  005737  015016          TST     @#TEMP
2252  007350  001401                  BEQ     .+4
```

```
2253  007352  104006                          HLT
2254  007354  104400                          SCOPE
2255
2256  007356  012737  125252  015016          MOV     #125252,@#TEMP
2257  007364  005137  015016                  COM     @#TEMP
2258  007370  022737  052525  015016          CMP     #052525,@#TEMP
2259  007376  001401                          BEQ     .+4
2260  007400  104006                          HLT
2261  007402  104400                          SCOPE
2262
2263  007404  005037  015016                  CLR     @#TEMP
2264  007410  005237  015016                  INC     @#TEMP
2265  007414  022737  000001  015016          CMP     #1,@#TEMP
2266  007422  001401                          BEQ     .+4
2267  007424  104006                          HLT
2268  007426  104400                          SCOPE
2269
2270  007430  005037  015016                  CLR     @#TEMP
2271  007434  005377  005360                  DEC     @TEMP+2
2272  007440  023727  015016  177777          CMP     @#TEMP,#-1
2273  007446  001401                          BEQ     .+4
2274  007450  104006                          HLT
2275  007452  104400                          SCOPE
2276
2277  007454  012737  000001  015016          MOV     #1,@#TEMP
2278  007462  005437  015016                  NEG     @#TEMP
2279  007466  022737  177777  015016          CMP     #-1,@#TEMP
2280  007474  001401                          BEQ     .+4
2281  007476  104006                          HLT
2282  007500  104400                          SCOPE
2283
2284                                  ;*****************************************************************************
2285                                  .SBTTL  TEST INDIRECT ADDRESSING WITH INDEXING, TEST COMPARE INSTRUCTION
2286                                  ;*****************************************************************************
2287  007502  027727  005260  125252          CMP     @B+2,#125252
2288  007510  001401                          BEQ     .+4
2289  007512  104006                          HLT
2290  007514  104400                          SCOPE
2291
2292  007516  022777  125252  005242          CMP     #125252,@B+2
2293  007524  001401                          BEQ     .+4
2294  007526  104006                          HLT
2295  007530  104400                          SCOPE
2296
2297  007532  027777  005230  005226          CMP     @B+2,@B+2
2298  007540  001401                          BEQ     .+4
2299  007542  104006                          HLT
2300  007544  104400                          SCOPE
2301
2302                                  ;*****************************************************************************
2303                                  .SBTTL  TEST MOVE INSTRUCTIONS
2304                                  ;*****************************************************************************
2305  007546  017700  005214                  MOV     @B+2,%0
2306  007552  022700  125252                  CMP     #125252,%0
2307  007556  001401                          BEQ     .+4
2308  007560  104006                          HLT
```

```
2309  007562  104400                          SCOPE
2310
2311  007564  012777  125252  005226          MOV     #125252,@TEMP+2
2312  007572  023737  014764  015016          CMP     @#B,@#TEMP
2313  007600  001401                          BEQ     .+4
2314  007602  104006                          HLT
2315  007604  104400                          SCOPE
2316
2317  007606  017777  005154  005174          MOV     @B+2,@C+2
2318  007614  023737  014764  015006          CMP     @#B,@#C
2319  007622  001401                          BEQ     .+4
2320  007624  104006                          HLT
2321  007626  104400                          SCOPE
2322
2323                                  ;*****************************************************************************
2324                                  .SBTTL  TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2325                                  ;*****************************************************************************
2326  007630  012700  177777                  MOV     #-1,%0
2327  007634  047700  005126                  BIC     @B+2,%0
2328  007640  020027  052525                  CMP     %0,#52525
2329  007644  001401                          BEQ     .+4
2330  007646  104006                          HLT
2331  007650  104400                          SCOPE
2332
2333  007652  012737  177777  015016          MOV     #-1,@#TEMP
2334  007660  042777  125252  005132          BIC     #125252,@TEMP+2
2335  007666  022737  052525  015016          CMP     #52525,@#TEMP
2336  007674  001401                          BEQ     .+4
2337  007676  104006                          HLT
2338  007700  104400                          SCOPE
2339
2340  007702  012737  177777  015006          MOV     #-1,@#C
2341  007710  047777  005052  005072          BIC     @B+2,@C+2
2342  007716  026737  005062  015006          CMP     A+10,@#C
2343  007724  001401                          BEQ     .+4
2344  007726  104006                          HLT
2345  007730  104400                          SCOPE
2346
2347  007732  012700  125252                  MOV     #125252,%0
2348  007736  167700  005024                  SUB     @B+2,%0
2349  007742  020027  000000                  CMP     %0,#0
2350  007746  001401                          BEQ     .+4
2351  007750  104006                          HLT
2352  007752  104400                          SCOPE
2353
2354  007754  012737  125252  015016          MOV     #125252,@#TEMP
2355  007762  166777  004776  005030          SUB     B,@TEMP+2
2356  007770  001401                          BEQ     .+4
2357  007772  104006                          HLT
2358  007774  104400                          SCOPE
2359
2360  007776  012737  125252  015016          MOV     #125252,@#TEMP
2361  010004  167777  004756  005006          SUB     @B+2,@TEMP+2
2362  010012  005737  015016                  TST     @#TEMP
2363  010016  001401                          BEQ     .+4
2364  010020  104006                          HLT
```

```
2365  010022  104400                          SCOPE
2366
2367                                  ;*****************************************************************************
2368                                  .SBTTL  TEST ADD INDIRECT WITH INDEXING
2369                                  ;*****************************************************************************
2370  010024  005000                          CLR     %0
2371  010026  067700  004734                 ADD     @B+2,%0
2372  010032  022700  125252                 CMP     #125252,%0
2373  010036  001401                         BEQ     .+4
2374  010040  104006                         HLT
2375  010042  104400                         SCOPE
2376
2377  010044  005037  015016                 CLR     @#TEMP
2378  010050  062777  125252  004742         ADD     #125252,@TEMP+2
2379  010056  022737  125252  015016         CMP     #125252,@#TEMP
2380  010064  001401                         BEQ     .+4
2381  010066  104006                         HLT
2382  010070  104400                         SCOPE
2383
2384  010072  012737  125252  015016         MOV     #125252,@#TEMP
2385  010100  067777  004676  004712         ADD     @A+6,@TEMP+2
2386  010106  023727  015016  177777         CMP     @#TEMP,#-1
2387  010114  001401                         BEQ     .+4
2388  010116  104006                         HLT
2389  010120  104400                         SCOPE
2390
2391                                  ;*****************************************************************************
2392                                  .SBTTL  TEST UNARYS INDIRECT WITH INDEXING
2393                                  ;*****************************************************************************
2394  010122  012737  177777  015016         MOV     #-1,@#TEMP
2395  010130  005077  004664                 CLR     @TEMP+2
2396  010134  005737  015016                 TST     @#TEMP
2397  010140  001401                         BEQ     .+4
2398  010142  104006                         HLT
2399  010144  104400                         SCOPE
2400
2401  010146  012737  125252  015016         MOV     #125252,@#TEMP
2402  010154  005177  004640                 COM     @TEMP+2
2403  010160  022737  052525  015016         CMP     #052525,@#TEMP
2404  010166  001401                         BEQ     .+4
2405  010170  104006                         HLT
2406  010172  104400                         SCOPE
2407
2408  010174  005037  015016                 CLR     @#TEMP
2409  010200  005277  004614                 INC     @TEMP+2
2410  010204  022737  000001  015016         CMP     #1,@#TEMP
2411  010212  001401                         BEQ     .+4
2412  010214  104006                         HLT
2413  010216  104400                         SCOPE
2414
2415  010220  005037  015016                 CLR     @#TEMP
2416  010224  005377  004570                 DEC     @TEMP+2
2417  010230  023727  015016  177777         CMP     @#TEMP,#-1
2418  010236  001401                         BEQ     .+4
2419  010240  104006                         HLT
2420  010242  104400                         SCOPE
```

```
2421
2422  010244  012737  000001  015016          MOV     #1,@#TEMP
2423  010252  005477  004542                  NEG     @TEMP+2
2424  010256  022737  177777  015016          CMP     #-1,@#TEMP
2425  010264  001401                          BEQ     .+4
2426  010266  104006                          HLT
2427  010270  104400                          SCOPE
2428
2429  010272  012737  177777  015016          MOV     #-1,@#TEMP
2430  010300  000261                          SEC
2431  010302  005577  004512                  ADC     @TEMP+2
2432  010306  005737  015016                  TST     @#TEMP
2433  010312  001401                          BEQ     .+4
2434  010314  104006                          HLT
2435  010316  104400                          SCOPE
2436
2437  010320  012737  000001  015016          MOV     #1,@#TEMP
2438  010326  000261                          SEC
2439  010330  005677  004464                  SBC     @TEMP+2
2440  010334  005737  015016                  TST     @#TEMP
2441  010340  001401                          BEQ     .+4
2442  010342  104006                          HLT
2443  010344  104400                          SCOPE
2444
2445                                  ;*****************************************************************************
2446                                  .SBTTL  TEST OF COMBINED INDEXING AND INDIRECT
2447                                  ;*****************************************************************************
2448  010346  012700  177772                  MOV     #-6,%0
2449  010352  027027  014774  125252          CMP     @A(0),#125252
2450  010360  001401                          BEQ     .+4
2451  010362  104006                          HLT
2452  010364  104400                          SCOPE
2453
2454  010366  012700  177772                  MOV     #-6,%0
2455  010372  022770  125252  014774          CMP     #125252,@A(0)
2456  010400  001401                          BEQ     .+4
2457  010402  104006                          HLT
2458  010404  104400                          SCOPE
2459
2460  010406  012700  177772                  MOV     #-6,%0
2461  010412  012701  000002                  MOV     #+2,%1
2462  010416  027071  014774  014774          CMP     @A(0),@A(1)
2463  010424  001401                          BEQ     .+4
2464  010426  104006                          HLT
2465  010430  104400                          SCOPE
2466
2467                                  ;*****************************************************************************
2468                                  .SBTTL  TEST BIC INSTRUCTION
2469                                  ;*****************************************************************************
2470  010432  012700  000006                  MOV     #+6,%0
2471  010436  012767  177777  004352          MOV     #-1,TEMP
2472  010444  047067  014774  004344          BIC     @A(0),TEMP
2473  010452  022767  125252  004336          CMP     #125252,TEMP
2474  010460  001401                          BEQ     .+4
2475  010462  104006                          HLT
2476  010464  104400                          SCOPE
```

```
2477
2478  010466  012700  177772          MOV     #-6,%0
2479  010472  012737  177777  015006  MOV     #-1,@#C
2480  010500  042770  125252  015016  BIC     #125252,@TEMP(0)
2481  010506  023727  015006  052525  CMP     @#C,#052525
2482  010514  001401                  BEQ     .+4
2483  010516  104006                  HLT
2484  010520  104400                  SCOPE
2485
2486  010522  012737  177777  015006  MOV     #-1,@#C
2487  010530  012700  177772          MOV     #-6,%0
2488  010534  012701  177772          MOV     #-6,%1
2489  010540  047071  014774  015016  BIC     @A(0),@TEMP(1)
2490  010546  022737  052525  015006  CMP     #052525,@#C
2491  010554  001401                  BEQ     .+4
2492  010556  104006                  HLT
2493  010560  104400                  SCOPE
2494
2495                          ;BINARY INSTRUCTIONS
2496                          ;INDEX, AND INDIRECT TEST OF PDP-11
2497                          ;*****************************************************************
2498                          .SBTTL  TEST COMPARE INSTRUCTION INDEXED
2499                          ;*****************************************************************
2500  010562  012700  177770          MOV     #-10,%0                 ;MINUS 10 TO REG 0
2501  010566  126027  014774  000252  CMPB    A(0),#000252            ;(A INDEX BY MINUS 10) TO #125252
2502  010574  001401                  BEQ     .+4
2503  010576  104006                  HLT                             ;COMPARE WITH INDEX FAILED
2504  010600  104400                  SCOPE
2505
2506  010602  012700  177770          MOV     #-10,%0                 ;FOR INDEX
2507  010606  122760  000252  014774  CMPB    #000252,A(0)            ;A INDEXED
2508  010614  001401                  BEQ     .+4
2509  010616  104006                  HLT
2510  010620  104400                  SCOPE
2511
2512  010622  012700  000010          MOV     #10,%0                  ;INDEX
2513  010626  126027  014774  000125  CMPB    A(0),#000125
2514  010634  001401                  BEQ     .+4
2515  010636  104006                  HLT
2516  010640  104400                  SCOPE
2517
2518  010642  012700  000010          MOV     #10,%0
2519  010646  122760  000125  014774  CMPB    #000125,A(0)
2520  010654  001401                  BEQ     .+4
2521  010656  104006                  HLT
2522  010660  104400                  SCOPE
2523
2524  010662  012700  177770          MOV     #-10,%0
2525  010666  126060  014774  014774  CMPB    A(0),A(0)
2526  010674  001401                  BEQ     .+4
2527  010676  104006                  HLT
2528  010700  104400                  SCOPE
2529
2530  010702  012700  000010          MOV     #+10,%0
2531  010706  126060  014774  014774  CMPB    A(0),A(0)
2532  010714  001401                  BEQ     .+4
```

```
2533  010716  104006                          HLT
2534  010720  104400                          SCOPE
2535
2536  010722  012700  177770                  MOV     #-10,%0
2537  010726  012701  000004                  MOV     #+4,%1
2538  010732  126061  014774  014774          CMPB    A(0),A(1)
2539  010740  001401                          BEQ     .+4
2540  010742  104006                          HLT
2541  010744  104400                          SCOPE
2542
2543  010746  126160  014774  014774          CMPB    A(1),A(0)
2544  010754  001401                          BEQ     .+4
2545  010756  104006                          HLT
2546  010760  104400                          SCOPE
2547
2548  010762  012700  177774                  MOV     #-4,%0
2549  010766  012701  000010                  MOV     #+10,%1
2550  010772  126061  014774  014774          CMPB    A(0),A(1)
2551  011000  001401                          BEQ     .+4
2552  011002  104006                          HLT
2553  011004  104400                          SCOPE
2554
2555  011006  012700  177774                  MOV     #-4,%0
2556  011012  012701  000010                  MOV     #10,%1
2557  011016  126160  014774  014774          CMPB    A(1),A(0)
2558  011024  001401                          BEQ     .+4
2559  011026  104006                          HLT
2560  011030  104400                          SCOPE
2561
2562                                          ;*****************************************************************************
2563                                          .SBTTL  TEST MOVE INSTRUCTION FOR INDEX
2564                                          ;*****************************************************************************
2565  011032  012700  177770                  MOV     #-10,%0
2566  011036  116067  014774  003752          MOVB    A(0),TEMP
2567  011044  126727  003746  000252          CMPB    TEMP,#000252
2568  011052  001401                          BEQ     .+4
2569  011054  104006                          HLT
2570  011056  104400                          SCOPE
2571
2572  011060  012700  000010                  MOV     #+10,%0
2573  011064  116067  014774  003724          MOVB    A(0),TEMP
2574  011072  126727  003720  000125          CMPB    TEMP,#000125
2575  011100  001401                          BEQ     .+4
2576  011102  104006                          HLT
2577  011104  104400                          SCOPE
2578
2579  011106  012700  177770                  MOV     #-10,%0
2580  011112  112760  125252  015016          MOVB    #125252,TEMP(0)
2581  011120  123727  015006  125252          CMPB    @#C,#125252
2582  011126  001401                          BEQ     .+4
2583  011130  104006                          HLT
2584  011132  104400                          SCOPE
2585
2586  011134  012700  000010                  MOV     #+10,%0
2587  011140  112760  052525  015016          MOVB    #052525,TEMP(0)
2588  011146  123727  015026  052525          CMPB    @#TEMP+10,#052525
```

```
2589  011154  001401                        BEQ     .+4
2590  011156  104006                        HLT
2591  011160  104400                        SCOPE
2592
2593                                ;*****************************************************************************
2594                                .SBTTL  TEST BIC INSTRUCTION FOR INDEXING
2595                                ;*****************************************************************************
2596  011162  012767  177777  003626        MOV     #-1,TEMP
2597  011170  012700  177770                MOV     #-10,%0
2598  011174  146067  014774  003614        BICB    A(0),TEMP
2599  011202  126727  003610  177525        CMPB    TEMP,#177525
2600  011210  001401                        BEQ     .+4
2601  011212  104006                        HLT
2602  011214  104400                        SCOPE
2603
2604  011216  012767  177777  003572        MOV     #-1,TEMP
2605  011224  012700  000010                MOV     #10,%0
2606  011230  146067  014774  003560        BICB    A(0),TEMP
2607  011236  126727  003554  007652        CMPB    TEMP,#0C7652
2608  011244  001401                        BEQ     .+4
2609  011246  104006                        HLT
2610  011250  104400                        SCOPE
2611
2612  011252  012737  177777  015026        MOV     #-1,@#TEMP+10
2613  011260  012700  000010                MOV     #10,%0
2614  011264  142760  125252  015016        BICB    #125252,TEMP(0)
2615  011272  123727  015026  002525        CMPB    @#TEMP+10,#2525
2616  011300  001401                        BEQ     .+4
2617  011302  104006                        HLT
2618  011304  104400                        SCOPE
2619
2620  011306  012700  177770                MOV     #-10,%0
2621  011312  012767  177777  003466        MOV     #-1,TEMP-10
2622  011320  142767  052525  003460        BICB    #052525,TEMP-10
2623  011326  126727  003454  125252        CMPB    TEMP-10,#125252
2624  011334  001401                        BEQ     .+4
2625  011336  104006                        HLT
2626  011340  104400                        SCOPE
2627
2628                                ;*****************************************************************************
2629                                .SBTTL  TEST UNARYS INDEXED
2630                                ;*****************************************************************************
2631  011342  012737  177777  015016        MOV     #-1,@#TEMP
2632  011350  012700  177770                MOV     #-10,%0
2633  011354  105060  015026                CLRB    D(0)
2634  011360  105737  015016                TSTB    @#TEMP
2635  011364  001401                        BEQ     .+4
2636  011366  104006                        HLT
2637  011370  104400                        SCOPE
2638
2639  011372  012737  177777  015016        MOV     #-1,@#TEMP
2640  011400  012700  177770                MOV     #-10,%0
2641  011404  105060  015026                CLRB    D(0)
2642  011410  023727  015016  177400        CMP     @#TEMP,#177400
2643  011416  001401                        BEQ     .+4
2644  011420  104006                        HLT
```

```
2645  011422  104400                          SCOPE
2646
2647  011424  012737  177777  015016          MOV     #-1,@#TEMP
2648  011432  012700  177771                  MOV     #-7,%0
2649  011436  105060  015026                  CLRB    D(0)
2650  011442  023727  015016  000377          CMP     @#TEMP,#000377
2651  011450  001401                          BEQ     .+4
2652  011452  104006                          HLT
2653  011454  104400                          SCOPE
2654
2655  011456  012737  177777  015016          MOV     #-1,@#TEMP
2656  011464  012700  000010                  MOV     #+10,%0
2657  011470  105060  015006                  CLRB    C(0)
2658  011474  105737  015016                  TSTB    @#TEMP
2659  011500  001401                          BEQ     .+4
2660  011502  104006                          HLT
2661  011504  104400                          SCOPE
2662
2663  011506  012737  177777  015016          MOV     #-1,@#TEMP
2664  011514  012700  177770                  MOV     #-10,%0
2665  011520  105160  015026                  COMB    D(0)
2666  011524  105737  015016                  TSTB    @#TEMP
2667  011530  001401                          BEQ     .+4
2668  011532  104006                          HLT
2669  011534  104400                          SCOPE
2670
2671  011536  012737  177777  015016          MOV     #-1,@#TEMP
2672  011544  012700  000010                  MOV     #+10,%0
2673  011550  105260  015006                  INCB    C(0)
2674  011554  105737  015016                  TSTB    @#TEMP
2675  011560  001401                          BEQ     .+4
2676  011562  104006                          HLT
2677  011564  104400                          SCOPE
2678
2679  011566  012737  000001  015016          MOV     #1,@#TEMP
2680  011574  012700  177770                  MOV     #-10.%0
2681  011600  105360  015026                  DECB    D(0)
2682  011604  105737  015016                  TSTB    @#TEMP
2683  011610  001401                          BEQ     .+4
2684  011612  104006                          HLT
2685  011614  104400                          SCOPE
2686
2687  011616  012737  000001  015016          MOV     #1,@#TEMP
2688  011624  012700  000010                  MOV     #+10,%0
2689  011630  105460  015006                  NEGB    C(0)
2690  011634  023727  015016  000377          CMP     @#TEMP,#377
2691  011642  001401                          BEQ     .+4
2692  011644  104006                          HLT
2693  011646  104400                          SCOPE
2694
2695  011650  012737  177777  015016          MOV     #-1,@#TEMP
2696  011656  012700  177770                  MOV     #-10,%0
2697  011662  000261                          SEC
2698  011664  105560  015026                  ADCB    D(0)
2699  011670  023727  015016  177400          CMP     @#TEMP,#177400
2700  011676  001401                          BEQ     .+4
```

```
2701  011700  104006                        HLT
2702  011702  104400                        SCOPE
2703
2704  011704  012737  000001  015016        MOV     #1,@#TEMP
2705  011712  012700  000010                MOV     #+10,%0
2706  011716  000261                        SEC
2707  011720  105660  015006                SBCB    C(0)
2708  011724  005737  015016                TST     @#TEMP
2709  011730  001401                        BEQ     .+4
2710  011732  104006                        HLT
2711  011734  104400                        SCOPE
2712
2713                                  ;*****************************************************************************
2714                                  .SBTTL  TEST INDIRECT ADDRESSING, TEST COMPARE INSTRUCTION
2715                                  ;*****************************************************************************
2716  011736  123727  014764  000252        CMPB    @#B,#000252
2717  011744  001401                        BEQ     .+4
2718  011746  104006                        HLT
2719  011750  104400                        SCOPE
2720
2721  011752  122737  125252  014764        CMPB    #125252,@#B
2722  011760  001401                        BEQ     .+4
2723  011762  104006                        HLT
2724  011764  104400                        SCOPE
2725
2726                                  ;*****************************************************************************
2727                                  .SBTTL  TEST MOVE INSTRUCTIONS
2728                                  ;*****************************************************************************
2729  011766  113700  014764                MOVB    @#B,%0
2730  011772  122700  000252                CMPB    #000252,%0
2731  011776  001401                        BEQ     .+4
2732  012000  104006                        HLT
2733  012002  104400                        SCOPE
2734
2735  012004  112737  125252  015016        MOVB    #125252,@#TEMP
2736  012012  126737  002746  015016        CMPB    B,@#TEMP
2737  012020  001401                        BEQ     .+4
2738  012022  104006                        HLT
2739  012024  104400                        SCOPE
2740
2741                                  ;*****************************************************************************
2742                                  .SBTTL  TEST UNARYS INDIRECT
2743                                  ;*****************************************************************************
2744  012026  012737  177777  015016        MOV     #-1,@#TEMP
2745  012034  105037  015016                CLRB    @#TEMP
2746  012040  023727  015016  177400        CMP     @#TEMP,#177400
2747  012046  001401                        BEQ     .+4
2748  012050  104006                        HLT
2749  012052  104400                        SCOPE
2750
2751  012054  012737  125252  015016        MOV     #125252,@#TEMP
2752  012062  105137  015017                COMB    @#TEMP+1
2753  012066  022737  052652  015016        CMP     #052652,@#TEMP
2754  012074  001401                        BEQ     .+4
2755  012076  104006                        HLT
2756  012100  104400                        SCOPE
```

```
2757
2758  012102  005037  015016                  CLR     @#TEMP
2759  012106  105237  015017                  INCB    @#TEMP+1
2760  012112  022737  000400  015016          CMP     #400,@#TEMP
2761  012120  001401                          BEQ     .+4
2762  012122  104006                          HLT
2763  012124  104400                          SCOPE
2764
2765  012126  005037  015016                  CLR     @#TEMP
2766  012132  105377  002662                  DECB    @TEMP+2
2767  012136  023727  015016  000377          CMP     @#TEMP,#377
2768  012144  001401                          BEQ     .+4
2769  012146  104006                          HLT
2770  012150  104400                          SCOPE
2771
2772  012152  005037  015016                  CLR     @#TEMP
2773  012156  112737  000001  015017          MOVB    #1,@#TEMP+1
2774  012164  105437  015017                  NEGB    @#TEMP+1
2775  012170  022737  177400  015016          CMP     #177400,@#TEMP
2776  012176  001401                          BEQ     .+4
2777  012200  104006                          HLT
2778  012202  104400                          SCOPE
2779
2780                                  ;*******************************************************************************
2781                                  .SBTTL  TEST INDIRECT ADDRESSING WITH INDEXING, TEST COMPARE INSTRUCTION
2782                                  ;*******************************************************************************
2783
2784  012204  122777  125252  002554          CMPB    #125252,@B+2
2785  012212  001401                          BEQ     .+4
2786  012214  104006                          HLT
2787  012216  104400                          SCOPE
2788
2789  012220  127777  002542  002540          CMPB    @B+2,@B+2
2790  012226  001401                          BEQ     .+4
2791  012230  104006                          HLT
2792  012232  104400                          SCOPE
2793
2794                                  ;*******************************************************************************
2795                                  .SBTTL  TEST MOVE INSTRUCTIONS
2796                                  ;*******************************************************************************
2797  012234  117700  002526                  MOVB    @B+2,%0
2798  012240  122700  125252                  CMPB    #125252,%0
2799  012244  001401                          BEQ     .+4
2800  012246  104006                          HLT
2801  012250  104400                          SCOPE
2802
2803  012252  112777  125252  002540          MOVB    #125252,@TEMP+2
2804  012260  126737  002500  015016          CMPB    B,@#TEMP
2805  012266  001401                          BEQ     .+4
2806  012270  104006                          HLT
2807  012272  104400                          SCOPE
2808
2809  012274  117777  002466  002506          MOVB    @B+2,@C+2
2810  012302  126737  002456  015006          CMPB    B,@#C
2811  012310  001401                          BEQ     .+4
2812  012312  104006                          HLT
```

```
2813  012314  104400                          SCOPE
2814
2815                                  ;*****************************************************************************
2816                                  .SBTTL  TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2817                                  ;*****************************************************************************
2818  012316  012700  177777          MOV     #-1,%0
2819  012322  147700  002440          BICB    @B+2,%0
2820  012326  120027  052525          CMPB    %0,#52525
2821  012332  001401                  BEQ     .+4
2822  012334  104006                  HLT
2823  012336  104400                  SCOPE
2824
2825  012340  012737  177777  015016  MOV     #-1,@#TEMP
2826  012346  142777  125252  002444  BICB    #125252,@TEMP+2
2827  012354  122737  052525  015016  CMPB    #52525,@#TEMP
2828  012362  001401                  BEQ     .+4
2829  012364  104006                  HLT
2830  012366  104400                  SCOPE
2831
2832  012370  012737  177777  015006  MOV     #-1,@#C
2833  012376  147777  002364  002404  BICB    @B+2,@C+2
2834  012404  126737  002374  015006  CMPB    A+10,@#C
2835  012412  001401                  BEQ     .+4
2836  012414  104006                  HLT
2837  012416  104400                  SCOPE
2838
2839                                  ;*****************************************************************************
2840                                  .SBTTL  TEST UNARYS INDIRECT WITH INDEXING
2841                                  ;*****************************************************************************
2842  012420  012737  177777  015016  MOV     #-1,@#TEMP
2843  012426  105077  002366          CLRB    @TEMP+2
2844  012432  105737  015016          TSTB    @#TEMP
2845  012436  001401                  BEQ     .+4
2846  012440  104006                  HLT
2847  012442  104400                  SCOPE
2848
2849  012444  005037  015016          CLR     @#TEMP
2850  012450  105277  002344          INCB    @TEMP+2
2851  012454  122737  000001  015016  CMPB    #1,@#TEMP
2852  012462  001401                  BEQ     .+4
2853  012464  104006                  HLT
2854  012466  104400                  SCOPE
2855
2856  012470  005037  015016          CLR     @#TEMP
2857  012474  105377  002320          DECB    @TEMP+2
2858  012500  123727  015016  177777  CMPB    @#TEMP,#-1
2859  012506  001401                  BEQ     .+4
2860  012510  104006                  HLT
2861  012512  104400                  SCOPE
2862
2863  012514  012737  000001  015016  MOV     #1,@#TEMP
2864  012522  105477  002272          NEGB    @TEMP+2
2865  012526  122737  177777  015016  CMPB    #-1,@#TEMP
2866  012534  001401                  BEQ     .+4
2867  012536  104006                  HLT
2868  012540  104400                  SCOPE
```

```
2869
2870  012542  012737  177777  015016          MOV     #-1,@#TEMP
2871  012550  000261                          SEC
2872  012552  105577  002242                  ADCB    @TEMP+2
2873  012556  022737  177400  015016          CMP     #177400,@#TEMP
2874  012564  001401                          BEQ     .+4
2875  012566  104006                          HLT
2876  012570  105737  015016                  TSTB    @#TEMP
2877  012574  001401                          BEQ     .+4
2878  012576  104006                          HLT
2879  012600  104400                          SCOPE
2880
2881  012602  012737  000001  015016          MOV     #1,@#TEMP
2882  012610  000261                          SEC
2883  012612  105377  002202                  DECB    @TEMP+2
2884  012616  005737  015016                  TST     @#TEMP
2885  012622  001401                          BEQ     .+4
2886  012624  104006                          HLT
2887  012626  104400                          SCOPE
2888
2889                                  ;*****************************************
2890                                  .SBTTL  TEST OF COMBINED INDEXING AND INDIRECT
2891                                  ;*****************************************
2892  012630  012700  177772                  MOV     #-6,%0
2893  012634  127027  014774  125252          CMPB    @A(0),#125252
2894  012642  001401                          BEQ     .+4
2895  012644  104006                          HLT
2896  012646  104400                          SCOPE
2897
2898  012650  012700  177772                  MOV     #-6,%0
2899  012654  012701  000002                  MOV     #+2,%1
2900  012660  127071  014774  014774          CMPB    @A(0),@A(1)
2901  012666  001401                          BEQ     .+4
2902  012670  104006                          HLT
2903  012672  104400                          SCOPE
2904
2905                                  ;*****************************************
2906                                  .SBTTL  TEST BIC INSTRUCTION
2907                                  ;*****************************************
2908  012674  012700  000006                  MOV     #+6,%0
2909  012700  012767  177777  002110          MOV     #-1,TEMP
2910  012706  147067  014774  002102          BICB    @A(0),TEMP
2911  012714  122767  125252  002074          CMPB    #125252,TEMP
2912  012722  001401                          BEQ     .+4
2913  012724  104006                          HLT
2914  012726  104400                          SCOPE
2915
2916  012730  012700  177772                  MOV     #-6,%0
2917  012734  012737  177777  015006          MOV     #-1,@#C
2918  012742  142770  125252  015016          BICB    #125252,@TEMP(0)
2919  012750  123727  015006  000125          CMPB    @#C,#000125
2920  012756  001401                          BEQ     .+4
2921  012760  104006                          HLT
2922  012762  104400                          SCOPE
2923
2924  012764  012700  014766                  MOV     #B+2,%0         ;ADDRESS OF ADDRESS OF B
```

```
2925  012770  023067  001770                  CMP     @(0)+,B
2926  012774  001401                          BEQ     .+4
2927  012776  104006                          HLT
2928  013000  104400                          SCOPE
2929
2930  013002  012700  014770                  MOV     #B+4,%0
2931  013006  025067  001752                  CMP     @-(0),B
2932  013012  001401                          BEQ     .+4
2933  013014  104006                          HLT
2934  013016  104400                          SCOPE
2935
2936  013020  012700  014770                  MOV     #B+4,%0
2937  013024  125067  001734                  CMPB    @-(0),B
2938  013030  001401                          BEQ     .+4
2939  013032  104006                          HLT
2940  013034  104400                          SCOPE
2941
2942  013036  012700  015012                  MOV     #C+4,%0
2943  013042  012737  177777  015006          MOV     #-1,@#C
2944  013050  105050                          CLRB    @-(0)
2945  013052  023727  015006  177400          CMP     @#C,#177400
2946  013060  001401                          BEQ     .+4
2947  013062  104006                          HLT
2948  013064  104400                          SCOPE
2949
2950  013066  012737  177777  015006          MOV     #-1,@#C
2951  013074  012700  177772                  MOV     #-6,%0
2952  013100  012701  177772                  MOV     #-6,%1
2953  013104  147071  014774  015016          BICB    @A(0),@TEMP(1)
2954  013112  022737  177525  015006          CMP     #177525,@#C
2955  013120  001401                          BEQ     .+4
2956  013122  104006                          HLT
2957  013124  104400                          SCOPE
2958
2959                        ;*****************************************************************************
2960                        .SBTTL  SET UP TO TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
2961                        ;*****************************************************************************
2962  013126  012700  052525          MOV     #52525,%0       ;THIS IS CHECKED LATER IN PROGRAM
2963
2964                        ;*****************************************************************************
2965                        .SBTTL  TEST JSR INSTRUCTION
2966                        ;*****************************************************************************
2967  013132  004767  000002          JSR     %7, TJSR2       ;PLACE PC ON STACK
2968  013136  000405          TJSR1:  BR      TJSR3           ;RETURN HERE ON RTS %19
2969  013140  121627  013136  TJSR2:  CMPB    @%6,#TJSR1      ;CHECK FOR CORRECT PC ON STACK
2970  013144  001401                  BEQ     .+4
2971  013146  104006                  HLT                     ;INCORRECT PC ON STACK
2972  013150  000207                  RTS     %7              ;RETURN TO IMST AFTER JSR
2973  013152  104400          TJSR3:  SCOPE
2974
2975  013154  000257                  CCC
2976  013156  004717                  JSR     %7,@%7          ;INSTRUCTION UNDER TEST
2977  013160  121627  013160          CMPB    @%6,#TJSR3+6            ;TEST THE STACK
2978  013164  001401                  BEQ     .+4
2979  013166  104006                  HLT                     ;PC OF JSR DID NOT GO TO STACK
2980  013170  005726                  TST     (6)+            ;REPOSITION THE STACK
```

```
2981  013172  104400                          SCOPE
2982
2983                                  ;*****************************************************************************
2984                                  .SBTTL  TEST NESTED SUBROUTINES
2985                                  ;*****************************************************************************
2986  013174  000257                          CCC                             ;CLEAR CONDITION CODES
2987  013176  004767  001360                  JSR     %7,SUBR6
2988  013202  100401                          BMI     .+4
2989  013204  104006                          HLT                             ;JSR OR RTS FAILED
2990  013206  001401                          BEQ     .+4
2991  013210  104006                          HLT                             ;JSR OR RTS FAILED
2992  013212  102401                          BVS     .+4
2993  013214  104006                          HLT                             ;JSR OR RTS FAILED
2994  013216  103401                          BCS     .+4
2995  013220  104006                          HLT                             ;JSR OR RTS FAILED
2996  013222  104400                          SCOPE
2997
2998                                  ;*****************************************************************************
2999                                  .SBTTL  TEST ROTATE ODD BYTE
3000                                  ;*****************************************************************************
3001  013224  104400                          SCOPE
3002  013226  000257                          CCC                                     ;CLEAR "C"
3003  013230  012767  123456  001560          MOV     #123456,TEMP
3004  013236  106067  001555                  RORB    TEMP+1                          ;ROTATE ODD BYTE
3005  013242  103401                          BCS     .+4
3006  013244  104006                          HLT                                     ;C NOT SET
3007  013246  102401                          BVS     .+4
3008  013250  104006                          HLT                                     ;V NOT SET
3009  013252  022767  051456  001536          CMP     #051456,TEMP
3010  013260  001401                          BEQ     .+4
3011  013262  104006                          HLT                                     ;ROTATE FAILED
3012  013264  104400                          SCOPE
3013
3014  013266  000277                          SCC                                     ;SET C
3015  013270  012767  123456  001520          MOV     #123456,TEMP
3016  013276  106067  001515                  RORB    TEMP+1
3017  013302  103401                          BCS     .+4
3018  013304  104006                          HLT                                     ;C NOT SET
3019  013306  102001                          BVC     .+4
3020  013310  104006                          HLT                                     ;V NOT CLEARED
3021  013312  022767  151456  001476          CMP     #.51456,TEMP
3022  013320  001401                          BEQ     .+4
3023  013322  104006                          HLT                                     ;ROTATE FAILED
3024  013324  104400                          SCOPE
3025
3026  013326  000257                          CCC
3027  013330  012767  123456  001460          MOV     #123456,TEMP
3028  013336  106167  001455                  ROLB    TEMP+1
3029  013342  103401                          BCS     .+4
3030  013344  104006                          HLT                                     ;C NOT SET
3031  013346  102401                          BVS     .+4
3032  013350  104006                          HLT                                     ;V NOT SET
3033  013352  022767  047056  001436          CMP     #047056,TEMP
3034  013360  001401                          BEQ     .+4
3035  013362  104006                          HLT                                     ;ROTATE BYTE FAILED
3036  013364  104400                          SCOPE
```

```
3037
3038  013366  000277                    SCC                             ;SET C
3039  013370  012767  123456  001420    MOV     #123456,TEMP
3040  013376  106167  001415            ROLB    TEMP+1
3041  013402  103401                    BCS     .+4
3042  013404  104006                    HLT                             ;C NOT SET
3043  013406  102401                    BVS     .+4
3044  013410  104006                    HLT                             ;V NOT SET
3045  013412  022767  047456  001376    CMP     #047456,TEMP
3046  013420  001401                    BEQ     .+4
3047  013422  104006                    HLT                             ;ROTATE ODD BYTE FAILED
3048  013424  104400                    SCOPE
3049
3050  013426  000257                    CCC                             ;CLEAR C
3051  013430  012767  177777  001360    MOV     #-1,TEMP
3052  013436  106267  001355            ASRB    TEMP+1
3053  013442  103401                    BCS     .+4
3054  013444  104006                    HLT                             ;C NOT SET
3055  013446  102001                    BVC     .+4
3056  013450  104006                    HLT                             ;V NOT CLEARED
3057  013452  026727  001340  177777    CMP     TEMP,#-1
3058  013460  001401                    BEQ     .+4
3059  013462  104006                    HLT                             ;SHIFT FAILED
3060  013464  104400                    SCOPE
3061
3062  013466  000277                    SCC
3063  013470  012767  177777  001320    MOV     #-1,TEMP
3064  013476  106367  001315            ASLB    TEMP+1
3065  013502  103401                    BCS     .+4
3066  013504  104006                    HLT                             ;C NOT SET
3067  013506  102001                    BVC     .+4
3068  013510  104006                    HLT                             ;V NOT CLEARED
3069  013512  026727  001300  177377    CMP     TEMP,#177377
3070  013520  001401                    BEQ     .+4
3071  013522  104006                    HLT                             ;SHIFT BYTE FAILED
3072  013524  104400                    SCOPE
3073
3074
3075                            ;******************************************************************************
3076                            .SBTTL  TEST THAT R0 WASN'T CLEARED BY FALSE SELECTION
3077                            ;******************************************************************************
3078  013526  022700  052525            CMP     #52525,R0
3079  013532  001401                    BEQ     .+4
3080  013534  104006                    HLT
3081  013536  104400                    SCOPE
3082
3083                            ;******************************************************************************
3084                            .SBTTL  TEST COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
3085                            ;******************************************************************************
3086  013540  004767  001146            JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3087  013544  010001                    MOV     R0,R1
3088  013546  020001            CMP1:   CMP     %0,%1                   ;ARE THE EQUAL
3089  013550  001401                    BEQ     .+4
3090  013552  104006                    HLT                             ;R0 AND R1 DID NOT COMPARE
3091  013554  104400                    SCOPE
3092
```

```
3093                                    ;*****************************************************************************
3094                                    .SBTTL  TEST ROTATING RANDOM NUMBERS
3095                                    ;*****************************************************************************
3096  013556  004767  001130                  JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3097  013562  010067  165030                  MOV     R0,REFF                 ;PUT IN REF WORD.
3098  013566  016767  165024  165024  ROTALL: MOV     REFF,TEST
3099  013574  006067  165020                  ROR     TEST
3100  013600  006067  165014                  ROR     TEST
3101  013604  006067  165010                  ROR     TEST
3102  013610  006167  165004                  ROL     TEST
3103  013614  006167  165000                  ROL     TEST
3104  013620  006167  164774                  ROL     TEST
3105  013624  100004                          BPL     .+12
3106  013626  103007                          BCC     .+20                    ;Z=1
3107  013630  102013                          BVC     .+30                    ;Z=1, C=1
3108  013632  104006                          HLT                             ;Z=C, BUT V=1
3109  013634  000411                          BR      .+24
3110  013636  103006                          BCC     .+16                    ;Z=0
3111  013640  102407                          BVS     .+20                    ;Z=0, C=1
3112  013642  104006                          HLT                             ;Z NOT EQUAL C, V=1
3113  013644  000405                          BR      .+14
3114  013646  102404                          BVS     .+12                    ;Z=1, C=0
3115  013650  104006                          HLT                             ;Z NOT EQUAL C, V=1
3116  013652  000402                          BR      .+6
3117  013654  102001                          BVC     .+4                     ;Z=0, C=0
3118  013656  104006                          HLT                             ;Z=C, BUT V=1
3119  013660  026767  164734  164730          CMP     TEST,REFF
3120  013666  001401                          BEQ     .+4
3121  013670  104006                          HLT                             ;INITIAL NOT EQUAL TO FINAL
3122  013672  104400                          SCOPE
3123
3124          000616                  REF=REFF
3125
3126                                    ;*****************************************************************************
3127                                    .SBTTL  TEST ROTATING BYTE EVEN/ODD, RANDOM NUMBERS
3128                                    ;*****************************************************************************
3129  013674  004767  001012                  JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3130  013700  010067  164712                  MOV     R0,REFF                 ;PUT IN REF WORD.
3131  013704  004767  000006                  JSR     %7,ROTBE
3132  013710  004767  000110                  JSR     %7,ROTBO
3133  013714  000503                          BR      ROTEN1
3134  013716  016767  164674  164674  ROTBE:  MOV     REFF,TEST
3135  013724  106067  164670                  RORB    TEST                    ;ROTATE BYTE EVEN
3136  013730  106067  164664                  RORB    TEST
3137  013734  106067  164660                  RORB    TEST
3138  013740  106167  164654                  ROLB    TEST
3139  013744  106167  164650                  ROLB    TEST
3140  013750  106167  164644                  ROLB    TEST
3141  013754  100004                          BPL     .+12
3142  013756  103007                          BCC     .+20                    ;Z=1
3143  013760  102013                          BVC     .+30                    ;Z=1, C=1
3144  013762  104006                          HLT                             ;Z=C, BUT V=1
3145  013764  000411                          BR      .+24
3146  013766  103006                          BCC     .+16                    ;Z=0
3147  013770  102407                          BVS     .+20                    ;Z=0, C=1
3148  013772  104006                          HLT                             ;Z NOT EQUAL C, V=1
```

```
3149  013774  000405                        BR      .+14
3150  013776  102404                        BVS     .+12            ;Z=1, C=0
3151  014000  104006                        HLT                     ;Z NOT EQUAL C, V=1
3152  014002  000402                        BR      .+6
3153  014004  102001                        BVC     .+4             ;Z=0, C=0
3154  014006  104006                        HLT                     ;Z=C, BUT V=1
3155  014010  026767  164604  164600        CMP     TEST,REFF
3156  014016  001401                        BEQ     .+4
3157  014020  104006                        HLT
3158  014022  000207                        RTS     %7
3159  014024  106067  164571        ROTBO:  RORB    TEST+1          ;ROTATE BYTE ODD
3160  014030  106067  164565                RORB    TEST+1
3161  014034  106067  164561                RORB    TEST+1
3162  014040  106167  164555                ROLB    TEST+1
3163  014044  106167  164551                ROLB    TEST+1
```

```
3164  014050  106167  164545            ROLB    TEST+1
3165  014054  100004                    BPL     .+12
3166  014056  103007                    BCC     .+20                    ;Z=1
3167  014060  102013                    BVC     .+30                    ;Z=1, C=1
3168  014062  104006                    HLT                             ;Z=C, BUT V=1
3169  014064  000411                    BR      .+24
3170  014066  103006                    BCC     .+16                    ;Z=0
3171  014070  102407                    BVS     .+20                    ;Z=0, C=1
3172  014072  104006                    HLT                             ;Z NOT EQUAL C, V=1
3173  014074  000405                    BR      .+14
3174  014076  102404                    BVS     .+12                    ;Z=1, C=0
3175  014100  104006                    HLT                             ;Z NOT EQUAL C, V=1
3176  014102  000402                    BR      .+6
3177  014104  102001                    BVC     .+4                     ;Z=0, C=0
3178  014106  104006                    HLT                             ;Z=C, BUT V=1
3179  014110  026767  164504  164500    CMP     TEST,REFF
3180  014116  001401                    BEQ     .+4
3181  014120  104006                    HLT
3182  014122  000207                    RTS     %7
3183  014124  104400            ROTEN1: SCOPE
3184
3185                            ;******************************************************************************
3186                            .SBTTL  ADD AND SUBTRACT RANDOM NUMBERS AGAINST FIXED NUMBERS
3187                            ;******************************************************************************
3188                            ;A+B=C, C-A=B, BF SHOULD EQUAL BI
3189  014126  011667  000054            MOV     @%6,NUMA
3190  014132  004767  000554            JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3191  014136  010067  164454            MOV     R0,REFF                 ;PUT IN REF WORD.
3192  014142  004767  000002            JSR     %7,ADSUB
3193  014146  000420                    BR      ARIEND
3194  014150  016767  164442  164442  ADSUB:   MOV     REFF,TEST
3195  014156  066767  000024  164434          ADD     NUMA,TEST
3196  014164  166767  000016  164426          SUB     NUMA,TEST
3197  014172  026767  164420  164420          CMP     REFF,TEST
3198  014200  001401                    BEQ     .+4
3199  014202  104006                    HLT
3200  014204  000207                    RTS     %7
3201  014206  000000            NUMA:   0
3202  014210  104400            ARIEND: SCOPE
3203
3204                            ;******************************************************************************
3205                            .SBTTL  TEST COMPLIMENTING RANDOM NUMBERS
3206                            ;******************************************************************************
3207  014212  004767  000474            JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3208  014216  010067  164376            MOV     R0,TEST                 ;PUT IN TEST.
3209  014222  012767  177777  164366    MOV     #-1,REFF                ;PREDETERMINE RESULT IN REFF.
3210  014230  160067  164362            SUB     R0,REFF
3211  014234  005167  164360            COM     TEST                    ;DO THE COMPLEMENT.
3212  014240  026767  164354  164350    CMP     TEST,REFF               ;EXPECTED RESULT?
3213  014246  001401                    BEQ     .+4                     ;BR IF YES.
3214  014250  104006                    HLT                             ;ERROR!!. COMPLEMENT OF TEST DID NOT
3215                                                                    ;MATCH EXPECTED RESULTS AS IN REFF.
3216  014252  104400                    SCOPE
3217
3218                            ;******************************************************************************
3219                            .SBTTL  TEST COMB (EVEN BYTE) RANDOM NUMBERS.
```

```
3220                                    ;*************************************************************************
3221  014254  004767  000432              JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3222  014260  010067  164334              MOV     R0,TEST                 ;PUT IN TEST.
3223  014264  012767  177777  164324      MOV     #-1,REFF                ;PREDETERMINE THE RESULT.
3224  014272  160067  164320              SUB     R0,REFF
3225  014276  105167  164316              COMB    TEST                    ;DO COMPLEMENT EVEN BYTE.
3226  014302  126767  164312  164306      CMPB    TEST,REFF               ;EXPECTED RESULT?
3227  014310  001401                      BEQ     .+4                     ;BR IF YES. OK.
3228  014312  104006                      HLT                             ;ERROR!!. RESULT IN TEST DOES NOT MATCH
3229                                                                      ;EXPECTED RESULT IN REFF.
3230  014314  104400                      SCOPE
3231
3232                                    ;*************************************************************************
3233                                    .SBTTL  TEST COMB (ODD BYTE) RANDOM NUMBERS
3234                                    ;*************************************************************************
3235  014316  004767  000370              JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3236  014322  010067  164272              MOV     R0,TEST                 ;PUT IN TEST.
3237  014326  012767  177777  164262      MOV     #-1,REFF                ;PREDETERMINE RESULT.
3238  014334  160067  164256              SUB     R0,REFF
3239  014340  105167  164255              COMB    TEST+1                  ;DO ODD BYTE COMPLEMENT.
3240  014344  126767  164251  164245      CMPB    TEST+1,REFF+1           ;EXPECTED RESULT?
3241  014352  001401                      BEQ     .+4                     ;BR IF YES. OK.
3242  014354  104006                      HLT                             ;ERROR!! RESULT IN TEST DOES NOT MATCH
3243                                                                      ;EXPECTED RESULT IN REFF.
3244  014356  104400                      SCOPE
3245
3246                                    ;*************************************************************************
3247                                    .SBTTL  TEST COMPARE RANDOM VALUES EVEN BYTE WITH ODD
3248                                    ;*************************************************************************
3249  014360  004767  000326              JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3250  014364  110067  000426              MOVB    R0,TEMP                 ;PUT IN LOW BYTE OF TEMP.
3251  014370  110067  000423              MOVB    R0,TEMP+1               ;PUT IN HIGH BYTE.
3252  014374  126767  000416  000415      CMPB    TEMP,TEMP+1             ;DO THE COMPARE.
3253  014402  001401                      BEQ     .+4                     ;BR IF EQUAL. OK.
3254  014404  104006                      HLT                             ;COMPARE FAILED.
3255  014406  002001                      BGE     .+4
3256  014410  104006                      HLT                             ;V IS NOT = TO N
3257  014412  003401                      BLE     .+4
3258  014414  104006                      HLT                             ;V IS SET
3259  014416  104400                      SCOPE
3260
3261                                    ;*************************************************************************
3262                                    .SBTTL  TEST SWAB
3263                                    ;*************************************************************************
3264  014420  012767  000200  164172      MOV     #0200,TEST
3265  014426  000367  164166              SWAB    TEST
3266  014432  100001                      BPL     .+4
3267  014434  104006                      HLT
3268  014436  001401                      BEQ     .+4
3269  014440  104006                      HLT
3270  014442  000367  164152              SWAB    TEST
3271  014446  100401                      BMI     .+4
3272  014450  104006                      HLT
3273  014452  001001                      BNE     .+4
3274  014454  104006                      HLT
3275  014456  104400                      SCOPE
```

```
3276
3277                                    ;*************************************************************************
3278                                    .SBTTL  TEST RANDOM COMBINATIONS OF SWAB
3279                                    ;*************************************************************************
3280  014460  004767  000226           JSR     PC,RNGEN        ;GET RANDOM NUMBER.
3281  014464  010067  164126           MOV     R0,REFF         ;PUT IN REF.
3282  014470  105067  164123           CLRB    REFF+1          ;
3283  014474  116767  164116  164117   MOVB    REFF,TEST+1     ;PUT IN TEST HIGH BYTE.
3284  014502  105067  164112           CLRB    TEST            ;AND CLEAR THE LOW BYTE OF TEST.
3285  014506  000367  164106           SWAB    TEST            ;NOW DO THE SWAB!
3286  014512  026767  164102  164076   CMP     TEST,REFF       ;REFF AND TEST MUST BE SAME.
3287  014520  001401                   BEQ     .+4             ;BR IF SAME. OK.
3288  014522  104006                   HLT                     ;ERROR!!. SWAB FAILURE.
3289  014524  104400                   SCOPE
3290
```

```
3291                                    ;*****************************************************************************
3292                                    .SBTTL  END OF USER CODE IN BANK
3293                                    ;*****************************************************************************
3294                                    ;CALL KERNEL/
3295                                    ;ALTERRED IN CORE EXPANSION/
3296  014526  104010                    DONE:   EOB                             ;THIS EMT CALL GOES TO EOBSRV
3297  014530  000240                            NOP                     ;TO ALLOW CORE EXPANSION TO PATCH IN JMP
3298
3299                                    ;*****************************************************************************
3300                                    .SBTTL  GROUP OF NESTED SUBROUTINES/
3301                                    ;*****************************************************************************
3302  014532  000207                    SUBR1:  RTS     %7                      ;ONE INSTRUCTION
3303  014534  000277                    SUBR2:  SCC                             ;ONE DEEP
3304  014536  000207                            RTS     %7
3305  014540  004767  177770            SUBR3:  JSR     %7,SUBR2                ;TWO DEEP
3306  014544  000207                            RTS     %7
3307  014546  004767  177766            SUBR4:  JSR     %7,SUBR3                ;THREE DEEP
3308  014552  000207                            RTS     %7
3309  014554  004767  177766            SUBR5:  JSR     %7,SUBR4                ;FOUR DEEP
3310  014560  000207                            RTS     %7
3311  014562  004767  177766            SUBR6:  JSR     %7,SUBR5                ;FIVE DEEP
3312  014566  000207                            RTS     %7
3313
3314                                    ;*****************************************************************************
3315                                    .SBTTL  SCOPE AND/OR ITERATION LOOP FOR EACH TEST TIMES/
3316                                    ;*****************************************************************************
3317  014570  005737  000042            SCOPEC: TST     @#42                    ;IN AUTOMATIC MODE?
3318  014574  001017                            BNE     2$                      ;BR IF YES.
3319  014576  032767  002000  163372            BIT     #2000,SREG2             ;INHIBIT PROCESSOR TESTS?
3320  014604  001403                            BEQ     1$                      ;NO
3321  014606  022626                            CMP     (SP)+,(SP)+             ;CLEAN UP EMT CALL FROM STACK.
3322  014610  000167  165552                    JMP     MAIN                    ;YES
3323  014614  032767  040000  163354  1$:       BIT     #40000,SREG2            ;TEST SR FOR SCOPE
3324  014622  001015                            BNE     SCOPEB                  ;YES, SCOPE
3325  014624  032767  004000  163344            BIT     #4000,SREG2             ;NO-TEST FOR ITERATION
3326  014632  001014                            BNE     SCOPEG                  ;INHIBIT ITERATION
3327  014634  005767  000046            2$:     TST     PASCNT                  ;IN FIRST PASS?
3328  014640  001411                            BEQ     SCOPEG                  ;BR IF YES. NO ITERATIONS ON 1ST PASS.
3329  014642  005267  000034                    INC     SCOPEF                  ;INCREMENT COUNT.
3330  014646  026767  000030  000022            CMP     SCOPEF,ICOUNT           ;COMPARE CURRENT COUNT TO MAX NUMBER
3331  014654  103003                            BHIS    SCOPEG                  ;EXIT-DONE
3332  014656  016716  000022            SCOPEB: MOV     RETURN,@SP
3333  014662  000002                            RTI
3334  014664  005067  000012            SCOPEG: CLR     SCOPEF                  ;CLEAR COUNT
3335  014670  011667  000010                    MOV     @%6,RETURN              ;SAVE SCOPE RETURN POINTER
3336  014674  000002                            RTI                             ;RETURN INLINE-NEXT TEST
3337  014676  000000                    ICOUNT: 0                               ;ITERATION COUNT
3338  014700  000024                    $ICNT:  20.                             ;STANDARD ITERATION COUNT.
3339  014702  000000                    SCOPEF: 0                               ;COUNT LOCATION FOR ITERATION LOOP
3340  014704  000000                    RETURN: 0                               ;ADDRESS OF LAST TEST
3341  014706  000000                    PASCNT: 0                               ;HOLDS PASS COUNT.
3342  014710  001750                    XDPCNT: 1000.                           ;PASS COUNT TO USE WHEN IN XXDP CHAIN MODE.
3343
3344
3345                                    ;*****************************************************************************
3346                                    .SBTTL  ROUTINE RNGEN
```

```
3347                                    ;*************************************************************************
3348                                    ;RANDOM NUMBER GENERATOR
3349  014712  016700  000042    RNGEN:  MOV     RP1,R0
3350  014716  006100                    ROL     R0
3351  014720  006100                    ROL     R0
3352  014722  066700  000034            ADD     RP2,R0
3353  014726  010067  000026            MOV     R0,RP1
3354  014732  006100                    ROL     R0
3355  014734  006100                    ROL     R0
3356  014736  066700  000020            ADD     RP2,R0
3357  014742  006100                    ROL     R0
3358  014744  006100                    ROL     R0
3359  014746  010067  000010            MOV     R0,RP2
3360  014752  016700  000002            MOV     RP1,R0
3361  014756  000207                    RTS     PC                  ;RETURN.
3362  014760  001233            RP1:    1233
3363  014762  007622            RP2:    7622
3364
3365                                    ;*************************************************************************
3366                                    .SBTTL  FIXED VALUES FOR USE IN TEST/
3367                                    ;*************************************************************************
3368  014764  125252            B:      125252
3369  014766  014764                    B                               ;ADDRESS OF B
3370  014770  052525                    052525
3371          014774                    .=B+10
3372  014774  177777            A:      -1
3373  014776  015000                    A+4
3374          015000                    .=A+4
3375  015000  125252                    125252
3376  015002  015004                    A+10                            ;ADDRESS OF A+10
3377  015004  052525                    052525
3378
3379                                    ;FOR STORAGE
3380  015006  000000            C:      0
3381  015010  015006                    C                               ;ADDRESS OF C
3382          015016                    .=C+10
3383  015016  000000            TEMP:   0
3384  015020  015016                    TEMP                            ;ADDRESS OF TEMP
3385          015024                    .=TEMP+6
3386  015024  015026                    TEMP+10                         ;ADDRESS OF TEMP+10 OR "D"
3387  015026  000000            D:      0
3388
```

```
3389
3390                                    ;*****************************************************************************
3391                                    .SBTTL  ROUTINE SUBROUTINE TO INITIALIZE ALL PAGES TO NR, BANK 0, 1 PAGE, JP/
3392                                    ;*****************************************************************************
3393  015030  010146              NRALL:  MOV     R1,-(R6)        ;SAVE REGISTERS
3394  015032  010246                      MOV     R2,-(R6)
3395  015034  010346                      MOV     R3,-(R6)
3396  015036  012701  000536              MOV     #IPDRTAB,R1     ;R1 HOLDS ADDRESS OF CURRENT POSITION
3397                                                               ;IN TABLE OF ADDRESSES
3398  015042  012703  000010      NRLOOP: MOV     #8.,R3          ;R3 USED AS COUNTER
3399  015046  012102                      MOV     (R1)+,R2        ;R2 CONTAINS ADDRESS OF PDR OR
3400                                                               ;PAR TO BE CLEARED
3401  015050  005022                      CLR     (R2)+           ;CLEAR ALL ASR'S FOR THIS MODE
3402  015052  077302                      SOB     R3,.-2
3403  015054  020127  000544              CMP     R1,#IPDREND     ;CHECK FOR DONE
3404  015060  003770                      BLE     NRLOOP          ;CLEAR ALL IN NEXT MODE IF NOT DONE
3405  015062  012603                      MOV     (R6)+,R3
3406  015064  012602                      MOV     (R6)+,R2
3407  015066  012601                      MOV     (R6)+,R1
3408  015070  000207                      RTS     %7
3409
3410                                    ;*****************************************************************************
3411                                    .SBTTL  EMT HANDLER/
3412                                    ;*****************************************************************************
3413                                    ;FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES/
3414  015072  162716  000002      EMTSRV: SUB     #2,@SP                  ;GET CALL
3415  015076  006576  000000              MFPI    @(SP)
3416  015102  012667  000022              MOV     (SP)+,EPC
3417  015106  062716  000002              ADD     #2,@SP
3418  015112  105067  000013              CLRB    EPC+1                   ;SAVE OFFSET ONLY
3419  015116  062767  015132  000004      ADD     #EMTAB,EPC              ;POINT TO TABLE OF ADDRESSES
3420  015124  017707  000000              MOV     @EPC,PC                 ;JUMP TO DESIRED ROUTINE
3421  015130  000000              EPC:    0
3422          000000                      PATCH1=0
3423          000000                      PATCH2=0
3424          000000                      PATCH3=0
3425  015132  000000              EMTAB:  PATCH1                          ;PATCH IN ADDRESS OF ROUTINE
3426  015134  000000                      PATCH2
3427  015136  000000                      PATCH3
3428  015140  015664                      PRINT                           ;ERROR PRINTOUT
3429  015142  015144                      EOBSRV                          ;END OF BANK
3430
3431
3432                                    ;*****************************************************************************
3433                                    .SBTTL  ROUTINE END OF BANK SERVICE
3434                                    ;*****************************************************************************
3435  015144  032767  000007  163022  EOBSRV: BIT     #7,MMOPT        ;MEM. MGMT./USER-KERNEL/4KAS 32 INHIBITED?
3436  015152  001406                      BEQ     EOB2            ;NO - CONTINUE
3437  015154  012716  015564      EOB1C:  MOV     #LOGIC,(SP)     ;GO TO BEGIN
3438  015160  012766  000340  000002      MOV     #340,2(SP)      ;WILL ASSUME PRIORITY 7.
3439  015166  000002                      RTI
3440  015170  042737  000340  177776  EOB2:   BIC     #340,@#PSR
3441  015176  026767  163372  163310      CMP     CURPAR,UPAR7    ;LAST USER ASR DONE?
3442  015204  001444                      BEQ     NXTBNK          ;YES - GO FIND NEXT BANK
3443  015206  062737  020000  000034      ADD     #20000,@#34     ;UPDATE SCOPE VECTOR ADDRESS IN BANK 0
3444  015214  062767  020000  163356      ADD     #20000,BNKSTR   ;UPDATE BANK START TO REFERENCE CURRENT ASR
```

```
3445  015222  016716  163352                  MOV     BNKSTR,(SP)
3446  015226  026767  163256  163340          CMP     UPAR0,CURPAR
3447  015234  001404                          BEQ     NXTSEG
3448  015236  005077  163332                  CLR     @CURPAR         ;SET PREVIOUS ASR TO NR, BANK 0
3449  015242  005077  163330                  CLR     @CURPDR
3450  015246  062767  000002  163320  NXTSEG: ADD     #2,CURPAR       ;UPDATE POINTERS TO NEXT SEGMENT
3451  015254  062767  000002  163314          ADD     #2,CURPDR
3452  015262  012777  077406  163306          MOV     #77406,@CURPDR  ;SET NEXT SEGMENT RW, 4K
3453  015270  016777  163274  163276          MOV     CURBNK,@CURPAR  ;MAP NEXT SEGMENT TO CURRENT BANK
3454  015276  052737  030000  177776          BIS     #30000,@#PSR    ;SET PREVIOUS MODE TO USER
3455  015304  006506                          MFPI    R6              ;PICK UP USER STACK POINTER
3456  015306  062716  020000                  ADD     #20000,@R6      ;MAP IT TO NEXT ASR
3457  015312  006606                          MTPI    R6              ;PUT IT BACK
3458  015314  000002                          RTI                     ;GO BACK TO MAINLINE
3459  015316  012746  000400          NXTBNK: MOV     #UBUFF,-(SP)
3460  015322  052737  030000  177776          BIS     #30000,@#PSR
3461  015330  006606                          MTPI    R6
3462  015332  013737  000570  000572          MOV     @#CURBNK,@#OLDBNK       ;SAVE PREV BANK ADDRESS
3463  015340  062767  000200  163222  BNKTST: ADD     #200,CURBNK
3464  015346  005367  163236                  ASL     COREPT
3465  015352  103006                          BCC     1$
3466  015354  012767  000001  163226          MOV     #1,COREPT
3467  015362  012767  000606  163222          MOV     #MEM1,MEMUT
3468  015370  022767  007600  163172  1$:     CMP     #7600,CURBNK    ;CHECK FOR EXTERNAL BANK
3469  015376  001666                          BEQ     EOB1C           ;BR IF YES TO START ANOTHER PASS.
3470  015400  016777  163164  163124  EOB3:   MOV     CURBNK,@KPAR2   ;MAP KERNEL SEGMENT 2 TO BANK BEING LOOKED FOR
3471  015406  012777  077406  163106          MOV     #77406,@KPDR2
3472  015414  036777  163170  163170          BIT     COREPT,@MEMUT
3473  015422  001746                          BEQ     BNKTST
3474  015424  042737  160000  000034          BIC     #160000,@#34    ;INITIALIZE SCOPE VECTOR ADDRESS
3475  015432  005001                          CLR     R1              ;R1 ADDRESSES BANK 0 THRU KERNEL ASR0
3476  015434  012702  040000                  MOV     #40000,R2       ;R2 ADDRESSES NEW BANK THRU KERNEL ASR2
3477  015440  012703  015026                  MOV     #D,R3
3478  015444  006203                          ASR     R3
3479  015446  012122                  CORMOV: MOV     (R1)+,(R2)+
3480  015450  077302                          SOB     R3,CORMOV
3481  015452  016767  163032  163114          MOV     UPAR0,CURPAR    ;FIRST ASR CHECKED IS USER ASR0
3482  015460  016767  163016  163110          MOV     UPDR0,CURPDR
3483  015466  016777  163076  163100          MOV     CURBNK,@CURPAR
3484  015474  012777  077406  163074          MOV     #77406,@CURPDR
3485  015502  005077  163006                  CLR     @UPAR7
3486  015506  005077  162774                  CLR     @UPDR7
3487  015512  026727  163054  000000          CMP     OLDBNK,#0               ;PREV BANK = 0
3488  015520  001414                          BEQ     EOB6            ;YES, DO NOT CLEAR
3489  015522  016777  163044  163002          MOV     OLDBNK,@KPAR2
3490  015530  012777  077406  162764          MOV     #77406,@KPDR2
3491  015536  012701  040000                  MOV     #40000,R1
3492  015542  012703  007630                  MOV     #7630,R3
3493  015546  005021                  BNKLP:  CLR     (R1)+
3494  015550  077302                          SOB     R3,BNKLP
3495  015552  012716  005542          EOB6:   MOV     #BEGIN,(SP)
3496  015556  011667  163016                  MOV     (SP),BNKSTR
3497  015562  000002                          RTI
3498
3499                                  ;******************************************************************************
3500                                  .SBTTL  END OF PASS CODE STARTS HERE
```

```
3501                                        ;*************************************************************************
3502  015564  042777  000001  162706  LOGIC:  BIC     #1,@SR0         ;TURN OFF MEMORY MANAGEMENT.
3503  015572  012737  000016  000014          MOV     #16,@#14        ;RESET THE TRACE VECTOR.
3504  015600  005037  000016                  CLR     @#16
3505  015604  032737  000001  000176          BIT     #1,@#SREG2      ;TTY OUT SELECTED
3506  015612  001404                          BEQ     1$              ;YES, NO ASTERISK
3507  015614  004767  000444                  JSR     PC,BELL         ;RING BELL TOO.
3508  015620  004767  000414                  JSR     PC,STAR         ;TYPE ASTERISK.
3509  015624  005267  177056          1$:     INC     PASCNT          ;INCREMENT PASS COUNT.
3510
3511                                        ;************************START OF "ACT11/XXDP EOP HOOKS"*********************
3512  015630  013701  000042                  MOV     @#42,R1
3513  015634  001405                          BEQ     HERE
3514  015636  000005                          RESET
3515  015640  004711                  $ENDAD: JSR     %7,@R1
3516  015642  000240                          NOP
3517  015644  000240                          NOP
3518  015646  000240                          NOP
3519                                        ;**********************END OF "ACT11/XXDP EOP HOOKS"************************
3520  015650  000005                  HERE:   RESET                   ;ISSUE RESET TO HALT I/O.
3521  015652  005167  162724                  COM     TRPB            ;COMPLEMENT THE TRACE SWITCH.
3522  015656  000137  000634                  JMP     @#RSTRT         ;RESTART.
3523
```

```
3524                                    ;******************************************************************************
3525                                    .SBTTL  RTT EXECUTED WHEN TRACE IS ON/
3526                                    ;******************************************************************************
3527  015662  000006                    TRTRP:  RTT
3528
3529
3530                                    ;******************************************************************************
3531                                    .SBTTL  ROUTINE PRINT
3532                                    ;******************************************************************************
3533                                    ;ENTERED WITH SYSTEM TRAP CALL (HLT)
3534                                    ;PRINT OUT THE ERROR PC+2, STATUS REGISTER, AND LOCATION IN BACKGROUND
3535  015664  005767  000170            PRINT:  TST     PRTON           ;CHECK PRINT ON FLAG
3536  015670  001401                            BEQ     .+4
3537  015672  000002                            RTI                     ;IF ANOTHER HALT IS BEING PRINTED, SKIP THIS ONE
3538  015674  005267  000160                    INC     PRTON
3539  015700  012767  000340  162070            MOV     #340,PSR        ;SET PRIORITY TO 7
3540  015706  036727  162634  020000            BIT     SR,#20000       ;TEST FOR INHIBIT PRINT OUT
3541  015714  001044                            BNE     CK              ;BR TO INHIBIT PRINT.
3542  015716  012657  000132                    MOV     (6)+,SAVPC      ;PC OF FAILING ROUTINE
3543  015722  012667  000130                    MOV     (6)+,SAVPSR     ;PSR OF ERROR CONDITION
3544  015726  024646                            CMP     -(6),-(6)       ;RESTORE STACK
3545  015730  012767  000200  162040            MOV     #200,PSR
3546  015736  004767  000342                    JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN AND LINE FEED
3547  015742  016767  000106  000264            MOV     SAVPC,PTEMP1    ;LOAD WITH FAILING PC+2
3548  015750  004767  000106                    JSR     %7,PROCT        ;PRINT FAILING PC+2
3549  015754  004767  000272                    JSR     %7,SPACE
3550  015760  016767  000072  000246            MOV     SAVPSR,PTEMP1   ;LOAD PROCESSOR STATUS
3551  015766  004767  000070                    JSR     %7,PROCT        ;PRINT PROCESSOR STATUS
3552  015772  004767  000254                    JSR     %7,SPACE
3553  015776  016767  162566  000230            MOV     CURBNK,PTEMP1
3554  016004  004767  000052                    JSR     %7,PROCT
3555  016010  004767  000236                    JSR     %7,SPACE
3556  016014  016767  176664  000212            MOV     RETURN,PTEMP1
3557  016022  004767  000034                    JSR     %7,PROCT
3558  016026  023727  000042  015640  CK:       CMP     @#42,#$ENDAD    ;IN ACT11?
3559  016034  001403                            BEQ     1$              ;BR IF YES TO HALT.
3560  016036  005767  162504                    TST     SR              ;CHECK SR FOR HALT SWITCH
3561  016042  100001                            BPL     .+4             ;BRANCH IF NOT SET
3562  016044  000000                    1$:     HALT                    ;HALT ON ERROR UP
3563  016046  005067  000006                    CLR     PRTON           ;ROUTINE DONE - CLEAR FLAG
3564  016052  000002                            RTI                     ;RETURN TO MAIN LINE
3565  016054  000000                    SAVPC:  0
3566  016056  000000                    SAVPSR: 0
3567  016060  000000                    PRTON:  0
3568
3569
3570                                    ;******************************************************************************
3571                                    .SBTTL  ROUTINE PROCT
3572                                    ;******************************************************************************
3573                                    ;SUBROUTINE TO PRINT OUT OCTAL NUMBER/
3574  016062  012727  000006  016066    PROCT:  MOV     #6,#PTEMP3      ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
3575          016066                    PTEMP3=.-2
3576  016070  005067  000136                    CLR     PRFLG           ;INITIALIZE CARRY FLAG FOR ROTATES
3577  016074  012767  000060  000134            MOV     #60,PTEMP2      ;SETUP R3
3578  016102  005767  000126                    TST     PTEMP1          ;CHECK BIT 15 OF NUMBER
3579  016106  100002                            BPL     .+6             ;BRANCH IF ZERO
```

```
3580  016110  005267  000122          INC     PTEMP2          ;INCREMENT R3 IF ONE
3581  016114  006167  000114          ROL     PTEMP1          ;ROTATE LEFT MOST OCTAL TO RIGHT END
3582  016120  006167  000110          ROL     PTEMP1
3583  016124  005567  000102          ADC     PRFLG           ;STORE CARRY
3584  016130  016746  000102  P.WAIT: MOV     PTEMP2,-(SP)    ;OUTPUT THE CHARACTER
3585  016134  004767  000210          JSR     PC,CHROUT       ;DO IT.
3586  016140  005367  177722          DEC     PTEMP3          ;COUNT
3587  016144  001001                  BNE     P.CNT1          ;BRANCH IF NOT DONE
3588  016146  000207                  RTS     %7              ;BRANCH IF NOT DONE
3589  016150  000241  P.CNT1: CLC                             ;CLEAR CARRY
3590  016152  005767  000054          TST     PRFLG           ;CHECK FOR PREVIOUS CARRY
3591  016156  001403                  BEQ     .+10            ;BRANCH IF PREVIOUSLY ZERO
3592  016160  005067  000046          CLR     PRFLG           ;INITIALIZE FLAG
3593  016164  000261                  SEC                     ;SET CARRY
3594  016166  006167  000042          ROL     PTEMP1          ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
3595  016172  006167  000036          ROL     PTEMP1
3596  016176  006167  000032          ROL     PTEMP1
3597  016202  005567  000024          ADC     PRFLG           ;STORE CARRY
3598  016206  016767  000022  000022  MOV     PTEMP1,PTEMP2   ;LOAD DATA INTO R3
3599  016214  042767  177770  000014  BIC     #177770,PTEMP2  ;CLEAR ALL BUT LOWEST OCTAL DIGIT
3600  016222  052767  000060  000006  BIS     #60,PTEMP2      ;SET TO ASCII EQUIVALENT
3601  016230  000737                  BR      P.WAIT          ;LOOP
3602  016232  000000          PRFLG:  0
3603  016234  000000          PTEMP1: 0                       ;CONTAINS VALUE TO BE OUTPUT
3604  016236  000000          PTEMP2: 0                       ;SCRATCH
3605
3606
3607                          ;******************************************************************************
3608                          .SBTTL  ROUTINE STAR
3609                          ;******************************************************************************
3610                          ;SUBROUTINE TO OUTPUT ASTERISK.
3611  016240  004767  000040  STAR:   JSR     PC,CRLF         ;OUTPUT CRLF.
3612  016244  012746  000052         MOV     #52,-(SP)       ;GO OUTPUT A *
3613  016250  000407                  BR      BELL1
3614
3615
3616                          ;******************************************************************************
3617                          .SBTTL  ROUTINE SPACE
3618                          ;******************************************************************************
3619                          ;SUBROUTINE TO ISSUE SPACE/
3620  016252  012746  000040  SPACE:  MOV     #40,-(SP)       ;OUTPUT SPACE.
3621  016256  004767  000066          JSR     PC,CHROUT       ;DO IT.
3622  016262  000207                  RTS     %7              ;RETURN
3623
3624
3625                          ;******************************************************************************
3626                          .SBTTL  ROUTINE BELL
3627                          ;******************************************************************************
3628                          ;BELL ON PASS COMPLETE
3629  016264  012746  000007  BELL:   MOV     #7,-(SP)        ;OUTPUT BELL.
3630  016270  004767  000054  BELL1:  JSR     PC,CHROUT       ;DO IT.
3631  016274  005327  000000          DEC     #0              ;SLIGHT DELAY.
3632  016300  001375                  BNE     .-4
3633  016302  000207  BELL2:  RTS     %7
3634
3635
```

```
3636                                    ;******************************************************************************
3637                                    .SBTTL  ROUTINE CRLF
3638                                    ;******************************************************************************
3639                                    ;SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED/
3640  016304  012746  000015           CRLF:   MOV     #15,-(SP)       ;OUTPUT CR.
3641  016310  004767  000034                   JSR     PC,CHROUT       ;DO IT.
3642  016314  012746  000012                   MOV     #12,-(SP)       ;OUTPUT LF.
3643  016320  004767  000024                   JSR     PC,CHROUT       ;DO IT.
3644  016324  016746  162272                   MOV     FILLCT,-(SP)    ;GET THE FILL COUNT.
3645  016330  001405                           BEQ     2$              ;BR IF 0.
3646  016332  005046                   1$:     CLR     -(SP)           ;WILL OUTPUT NULLS FOR FILLERS.
3647  016334  004767  000010                   JSR     PC,CHROUT       ;DO IT.
3648  016340  005316                           DEC     (SP)            ;DONE?
3649  016342  001373                           BNE     1$              ;BR IF NOT.
3650  016344  005726                   2$:     TST     (SP)+           ;CLEAN UP STACK.
3651  016346  000207                           RTS     PC              ;RETURN.
3652
3653
3654                                    ;******************************************************************************
3655                                    .SBTTL  ROUTINE CHROUT
3656                                    ;******************************************************************************
3657                                    ;SUBROUTINE TO OUTPUT CHARACTER TO CONSOLE TTY.
3658  016350  016677  000002  162034   CHROUT: MOV     2(SP),@TDBR     ;LOAD THE CONSOLE BUFFER REG.
3659  016356  105777  162026           1$:     TSTB    @TCSR           ;READY?
3660  016362  100375                           BPL     1$              ;BR IF NOT. WAIT.
3661  016364  012616                           MOV     (SP)+,(SP)      ;SET UP  FOR EXIT.
3662  016366  000207                           RTS     PC              ;RETURN.
3663
3664                                    ;ENTER HERE ON POWER FAIL/
3665  016370  013746  000024           PFAIL:  MOV     @#24,-(6)
3666  016374  010667  000010                   MOV     %6,SAVR6                ;STORE STACK POSITION
3667  016400  012737  016412  000024           MOV     #RESTRT,@#24
3668  016406  000000                           HALT                            ;HALT ON POWER DOWN NORMAL
3669  016410  000000                   SAVR6:  0                               ;STACK IS SAVED HERE
3670  016412  016706  177772           RESTRT: MOV     SAVR6,%6                ;RESTORE STACK WHEN POWERING UP
3671  016416  012637  000024                   MOV     (6)+,@#24
3672  016422  022626                           CMP     (SP)+,(SP)+             ;RESTORE STACK
3673  016424  104006                           HLT                             ;POWER FAIL OCCURRED
3674  016426  000167  162202                   JMP     RSTRT
3675                                                                           ;RETURN TO MAIN LINE
3676
3677  016432  000207                   USER:   RTS     %7                      ;OVERLAY USER ROUTINE HERE IF 4KW
3678                                                                           ;USE BANK1 IF 8KW
3679          017760                           .=17760
3680  017760  000000                   KSTACK: 0
3681          000001                           .END
```

```
A       014774  1935  1941  1947  1953  1960  1967  1977  1995  2018  2240  2342  2385  2449
                2455  2462  2472  2489  2501  2507  2513  2519  2525  2531  2538  2543  2550
                2557  2566  2573  2598  2606  2834  2893  2900  2910  2953  3372*  3373  3374
                3376
ACTSW1  000624   887*   926
ACTSW2  000626   888*   927
ADSUB   014150  3192  3194*
ARIEND  014210  3193  3202*
B       014764  2011  2139  2144  2149  2157  2164  2169  2170  2179  2193  2203  2210  2216
                2226  2287  2292  2297  2305  2312  2317  2318  2327  2341  2348  2355  2361
                2371  2716  2721  2729  2736  2784  2789  2797  2804  2809  2810  2819  2833
                2924  2925  2930  2931  2936  2937  3368*  3369  3371
BEGIN   005542   970  1091  1114  1343  1914*  3495
BEGINX  005510  1193  1195  1197  1199  1201  1203  1903*
BELL    016264  3507  3629*
BELL1   016270  3613  3630*
BELL2   016302  3633*
BNKLP   015546  3493*  3494
BNKSTR  000600   869*  1091*  3444*  3445  3496*
BNKTST  015340  3463*  3473
C       015006  1985  2018*  2029*  2037*  2061*  2077*  2095*  2113*  2169*  2170  2192*  2193*  2194
                2317*  2318  2340*  2341*  2342  2479*  2481  2486*  2490  2581  2657*  2673*  2689*
                2707*  2809*  2810  2832*  2833*  2834  2917*  2919  2942  2943*  2945  2950*  2954
                3380*  3381  3382
CHROUT  016350  3585  3621  3630  3641  3643  3647  3658*
CK      016026  3541  3558*
CLINCT= 003340  1046*  1269  1272*  1279*
CMP1    013546  3088*
COREPT  000610   877*   942*   954   957*   959*   963*  1087*  3464*  3466*  3472
CORMOV  015446  3479*  3460
CRLF    016304  3546  3611  3640*
CURBNK  000570   865*  1086*  1910*  3453  3462  3463*  3468  3470  3483  3553
CURPAR  000574   867*  1089*  3441  3446  3448*  3450*  3453*  3481*  3483*
CURPAT= 003250  1047*  1254*  1256  1273  1275*  1277*
CURPDR  000576   868*  1090*  3449*  3451*  3452*  3482*  3484*
D       015026  1159  2045*  2053*  2069*  2086*  2104*  2633*  2641*  2649*  2665*  2681*  2698*  3387*
                3477
DATA2 = 003056   979*  1212*  1213  1219*  1220
DET1    002424  1057  1128*
DET2    002542  1136  1152*
DET3    003040  1164  1204*
DET4    002456  1134  1136*
DO    = 000001  1036  1373*  1429  1437  1482
DONE    014526  1128*  1192*  1193*  1194*  1195*  1196*  1197*  1198*  1199*  1200*  1201*  1202*  1203*
                3296*
EIGHT   002474  1139*  1154
EMTAB   015132  3419  3425*
EMTSRV  015072   772   968  3414*
EOB   = 104010   621*  1128  3296
EOBSRV  015144  3429  3435*
EOB1C   015154  3437*  3469
EOB2    015170  3436  3440*
EOB3    015400  3470*
EOB6    015552  3488  3495*
EPC     015130  3416*  3418*  3419*  3420  3421*
ERROK   003626  1324  1332*
```

```
ERRSET  003622          1326    1330#
FENDZ   003702          1034    1381#   1420
FENDI   003724          1383    1386#
FILLCT  000622           886#   3644
HERE    015650          3513    3520#
HLT4 = 104006            620#   1218    1233    1268    1301    1321    1327    1330    1334    1393    1395    1399    1408
                        1410    1416    1441    1448    1450    1454    1465    1467    1473    1487    1503    1937    1943
                        1949    1955    1962    1969    1980    1987    1998    2006    2013    2020    2032    2040    2048
                        2056    2064    2072    2080    2089    2098    2107    2116    2125    2132    2141    2146    2151
                        2160    2166    2172    2182    2189    2196    2206    2212    2219    2229    2236    2243    2253
                        2260    2267    2274    2281    2289    2294    2299    2308    2314    2320    2330    2337    2344
                        2351    2357    2364    2374    2381    2398    2398    2405    2412    2419    2426    2434    2442
                        2451    2457    2464    2475    2483    2492    2503    2509    2515    2521    2527    2533    2540
                        2545    2552    2559    2569    2576    2583    2590    2601    2609    2617    2625    2636    2644
                        2652    2660    2668    2676    2684    2692    2701    2710    2718    2723    2732    2738    2748
                        2755    2762    2769    2777    2786    2791    2800    2806    2812    2822    2829    2836    2846
                        2853    2860    2867    2875    2878    2886    2895    2902    2913    2921    2927    2933    2939
                        2947    2956    2971    2979    2989    2991    2993    2995    3006    3008    3011    3018    3020
                        3023    3030    3032    3035    3042    3044    3047    3054    3056    3059    3066    3068    3071
                        3080    3090    3108    3112    3115    3118    3121    3144    3148    3151    3154    3157    3168
                        3172    3175    3178    3181    3199    3214    3228    3242    3254    3256    3258    3267    3269
                        3272    3274    3288    3673
ICOUNT  014676          1924#   1929#   3330    3337#
IE   =  000500          1036    1372#   1429    1437    1443    1482    1489
IPDREN  000544           855#   3403
IPDRTA  000536           852#   3396
IRF     003562          1018    1319#
IRK     003466           993    1299#
KFARO   000526           847#   1066
KPAR1   000530           848#
KPAR2   000532           849#    948#   3470#   3489#
KPAR7   000534           850#    937#   1062#
KPDRO   000516           843#    936#   1073#
KPDR1   000520           844#
KPDR2   000522           845#    944#   3471#   3490#
KPDR7   000524           846#    938#   1061#
KSTACK  017760           895     906    3680#
KWLST   000424           814#   1008#
KWLVC   000422           813#   1007#
LKCSR   000426           815#   1006    1010#   1228#   1231    1234#   1238#   1242    1244#
LK1     003124          1227#   1241
LK2     003144          1230#   1237
LK3     003146          1007    1231#
LK4     003164          1235#   1245
LLIMIT  003670           997    1023    1295    1315    1343#
LOGIC   015564          3437    3502#
LPCSR   000430           816#   1043    1051#   1257    1260    1264    1266#   1281
LPDBR   000432           817#   1048#   1256#   1280#
LPINTR  003270          1049    1260#
LPST    000436           819#   1050#
LPVC    000434           818#   1049#
LP1     003244          1253#   1286    1288
LP2     003252          1256#   1276    1278
LP3     003360          1274    1277#
LP4     003370          1270    1279#
LP5     003426          1284    1287#
```

```
LP6      003326            1258    1261    1269*
LP7      003324            1263    1265    1268*
MAIN     002366            1104    1111*   1113    3322
MAP1     001162             948*    962
MAP2     001252             958     961*
MEMUT    000612             878*    943*    954*    960*    964*   1088*   3467*   3472
MEMO     000604             875*    878     940*    943     964    1088
MEM1     000606             876*    941*    960     3467
MMOPT    000174             786*    926*    929*   1058    1063   1074    1103    1129    1133    3435
MODE     002260            1059    1093*
MOD12    002774            1172    1198*
MOD16    002760            1174    1196*
MOD20    002744            1176    1194*
MOD24    002730            1178    1192*
MOD4     003024            1168    1202*
MOD8     003010            1170    1200*
MOVE     002554            1157*   1180    1182    1184    1186    1188    1190
MOVEPT   001222             953     956*
N      = 000001            1514*   1515    1516    1517*   1518    1519    1520*   1521    1522    1523*   1524    1525    1526*
                           1527    1528    1529*   1530    1531    1532*   1533    1534    1535*   1536    1537    1538*   1539
                           1540    1541*   1542    1543    1544*   1545    1546    1547*   1548    1549    1550*   1551    1552
                           1553*   1554    1555    1556*   1557    1558    1559*   1560    1561    1562*   1563    1564    1565*
                           1566    1567    1568*   1569    1570    1571*   1572    1573    1574*   1575    1576    1577*   1579
                           1579    1580*   1581    1582    1583*   1584    1585    1586*   1587    1588    1589*   1590    1591
                           1592*   1593    1594    1595*   1596    1597    1598*   1599    1600    1601*   1602    1603    1604*
                           1605    1606    1607*   1608    1609    1610*   1611    1612    1613*   1614    1615    1616*   1617
                           1618    1619*   1620    1621    1622*   1623    1624    1625*   1626    1627    1628*   1629    1630
                           1631*   1632    1633    1634*   1635    1636    1637*   1638    1639    1640*   1641    1642    1643*
                           1644    1645    1646*   1647    1648    1649*   1650    1651    1652*   1653    1654    1655*   1656
                           1657    1658*   1659    1660    1661*   1662    1663    1664*   1665    1666    1667*   1668    1669
                           1670*   1671    1672    1673*   1674    1675    1676*   1677    1678    1679*   1680    1681    1682*
                           1683    1684    1685*   1686    1687    1688*   1689    1690    1691*   1692    1693    1694*   1695
                           1696    1697*   1698    1699    1700*   1701    1702    1703*   1704    1705    1706*   1707*   1708
                           1709    1710*   1711    1712    1713*   1714    1715    1716*   1717    1718    1719*   1720    1721
                           1722*   1723    1724    1725*   1726    1727    1728*   1729    1730    1731*   1732    1733    1734*
                           1735    1736    1737*   1738    1739    1740*   1741    1742    1743*   1744    1745    1746*   1747
                           1748    1749*   1750    1751    1752*   1753    1754    1755*   1756    1757    1758*   1759    1760
                           1761*   1762    1763    1764*   1765    1766    1767*   1768    1769    1770*   1771    1772    1773*
                           1774    1775    1776*   1777    1778    1779*   1780    1781    1782*   1783    1784    1785*   1786
                           1787    1788*   1789    1790    1791*   1792    1793    1794*   1795    1796    1797*   1798    1799
                           1800*   1801    1802    1803*   1804    1805    1806*   1807    1808    1809*   1810    1811    1812*
                           1813    1814    1815*   1816    1817    1818*   1819    1820    1821*   1822    1823    1824*   1825
                           1826    1827*   1828    1829    1830*   1831    1832    1833*   1834    1835    1836*   1837    1838
                           1839*   1840    1841    1842*   1843    1844    1845*   1846    1847    1848*   1849    1850    1851*
                           1852    1853    1854*   1855    1856    1857*   1858    1859    1860*   1861    1862    1863*   1864
                           1865    1866*   1867    1868    1869*   1870    1871    1872*   1873    1874    1875*   1876    1877
                           1878*   1879    1880    1881*   1882    1883    1884*   1885    1886    1887*   1888    1889    1890*
                           1891    1892    1893*   1894    1895    1896*   1897    1898
NODEV    002404             974    1119*
NOP    = 000240             615*
NRALL    015030             935    1060    3393*
NRLOOP   015042            3398*   3404
NUMA     014206            3189*   3195    3196    3201*
NXTBNK   015316            3442    3459*
NXTSEG   015246            3447    3450*
OLDBNK   000572             866*   3462*   3487    3489
```

```
PASCNT  014706            910*   3327   3341*  3509*
PATCH1= 000000           3422*   3425
PATCH2= 000000           3423*   3426
PATCH3= 000000           3424*   3427
PFAIL   016370            769     896   3665*
PRFLG   016232           3576*   3583*  3590   3592*  3597*  3602*
PRINT   015664           3428    3535*
PROCT   016062           3548    3551   3554   3557   3574*
PRTON   016060            972*   3535   3538*  3563*  3567*
PSR   = 177776            619*    971*  1107*  1109*  1229*  1239*  3440*  3454*  3460*  3539*  3545*
PTEMP1  016234           3547*   3550*  3553*  3556*  3578   3581*  3582*  3594*  3595*  3596*  3598   3603*
PTEMP2  016236           3577*   3580*  3584   3598*  3599*  3600*  3604*
PTEMP3= 016066           3574*   3575*  3586*
P.CNT1  016150           3587    3589*
P.WAIT  016130           3584*   3601
R     = 004000           1036    1374*  1429
RB    = 000002           1036    1371*  1429   1443   1489
RD    = 000004           1369*   1482
REF   = 000616           3124*
REFF    000616            880*   3097*  3098   3119   3124   3130*  3134   3155   3179   3191*  3194   3197   3209*
                         3210*   3212   3223*  3224*  3226   3237*  3238*  3240   3281*  3282*  3283   3286
RENDZ   004100           1412    1423*  1455
REND1   004130           1426    1429*
RESTRT  016412           3667    3670*
RETURN  014704            970*   1922*  1923*  3332   3335*  3340*  3556
RFCAR   000446            823*   1023*  1315*
RFCSR   000450            824*   1017   1024*  1317*  1319   1323   1325
RFCSRH  000452            825*   1021*  1314*
RFDAE   000440            820*   1336
RFDAR   000442            821*   1338
RFFUNC  003666           1020*   1024   1317   1328*  1340*  1342*
RFST    000456            827*   1019*
RFSTAR  003532           1314*   1322   1329   1331   1335   1341
RFVC    000454            826*   1018*
RFWC    000444            822*   1022*  1316*  1332
RF1     003536           1315*   1337   1339
RKBAR   000466            831*    997*  1295*
RKCSR   000470            832*    992    999*  1297*  1299
RKCSRH  000472            833*
RKDAE   000462            829*    996*  1294*  1303
RKDAH   000460            828*   1305
RKFUNC  003530            995*    999   1297   1307*  1309*
RKST    000476            835*    994*
RKSTAR  003436           1294*   1302   1308
RKVC    000474            834*    993*
RKWC    000464            830*    998*  1296*
RK1     003442           1295*   1304   1306
RNGEN   014712           3086    3096   3129   3190   3207   3221   3235   3249   3280   3349*
ROTALL  013566           3098*
ROTBE   013716           3131    3134*
ROTBO   014024           3132    3159*
ROTEN1  014124           3133    3183*
RP1     014760           1916    1919*  3349   3353*  3360   3362*
RP2     014762           1917    1920*  3352   3356   3359*  3363*
RSTRT   000634            799     895*  3522   3674
SAVPC   016054           3542*   3547   3565*
```

```
SAVPSR  016056          3543*   3550    3566#
SAVR6   016410          3666*   3669#   3670
SCOPE = 104400           616#   1938    1944    1950    1956    1963    1970    1981    1988    1999    2007    2014    2021
                        2033    2041    2049    2057    2065    2073    2081    2090    2099    2108    2117    2127    2134
                        2142    2147    2152    2161    2167    2173    2183    2190    2197    2207    2213    2220    2230
                        2237    2244    2254    2261    2268    2275    2282    2290    2295    2300    2309    2315    2321
                        2331    2338    2345    2352    2358    2365    2375    2382    2389    2399    2406    2413    2420
                        2427    2435    2443    2452    2458    2465    2476    2484    2493    2504    2510    2516    2522
                        2528    2534    2541    2546    2553    2560    2570    2577    2584    2591    2602    2610    2618
                        2626    2637    2645    2653    2661    2669    2677    2685    2693    2702    2711    2719    2724
                        2733    2739    2749    2756    2763    2770    2778    2787    2792    2801    2807    2813    2823
                        2830    2837    2847    2854    2861    2868    2879    2887    2896    2903    2914    2922    2928
                        2934    2940    2948    2957    2973    2981    2996    3001    3012    3024    3036    3048    3060
                        3072    3081    3091    3122    3183    3202    3216    3230    3244    3259    3275    3289
SCOPEB  014656          3324    3332#
SCOPEC  014570           775     966    3317#
SCOPEF  014702          1921*   3329*   3330    3334*   3339#
SCOPEG  014664          3326    3328    3331    3334#
SEGM1   002126          1064    1073#
SETEX   002106          1068#   1072
SETSEG  002252          1084    1092#
SETUSE  002156          1079#   1083
SOLPAT= 003246          1045*   1255#   1283    1285*   1287*
SPACE   016252          3549    3552    3555    3620#
SR      000546           856#    914     916*    918     933     3540    3560
SREG2 = 000176           788#    899*    927*    930*    933*    980     990    1004    1015    1031    1041    1112    1119*
                        3319    3323    3325    3505
SRH     000550           857#    899     918*    919*
SRO     000500           836#    947*    965*   1092*   3502*
STAR    016240          3508    3611#
START   000664           795     797     906#    908
STARTX  001044           923     932#
START1  001052           928     931     934#
START2  001052           898     900     935#
STRT28  002640          1151    1177#
STRT4   002574          1154    1164#
ST3     001416           981     987#
ST4     001516           989     991    1003#
ST5     001562          1005    1014#
ST6     001650          1016    1028#
ST7     001720          1030    1032    1040#
ST8     002016          1042    1044    1055#
SUBR1   014532          3302#
SUBR2   014534          3303#   3305
SUBR3   014540          3305#   3307
SUBR4   014546          3307#   3309
SUBR5   014554          3309#   3311
SUBR6   014562          2987    3311#
SWREG   000176           787#    788     916
TBANK   000614           879#    939*    948     956*    961
TCBA    000562           862#   1436*   1481*
TCCM    000552           858#   1036*   1384*   1387*   1389*   1391    1402*   1406    1418#   1427#   1429#   1437#   1439
                        1443*   1446    1456*   1459*   1463    1475*   1482*   1485    1489#
TCDT    000556           860#   1396    1411    1414    1451    1468    1471
TCEXPE  003700          1378#   1388*   1396    1413*   1414    1424*   1451    1470*   1471
TCFIRS  003674          1376#   1388    1468
```

```
TCF1    003754          1386    1391#
TCF1A   003746          1389#   1397
TCF2    004006          1398    1401#
TCF3    004022          1401    1406#   1442
TCF4    004070          1418#   1444
TCIV    000564           863#   1034#   1381#   1386#   1401#   1423#   1430#   1434#   1442#   1458#   1479#   1488#
TCLAST  003676          1377#   1411    1424
TCRBK   004360          1474    1479#
TCRBUF  004510          1481    1498    1499    1513#
TCRBI   004416          1479    1485#
TCR1    004226          1430    1446#
TCR1A   004262          1453    1456#
TCR2    004270          1452    1458#
TCR3    004304          1458    1463#   1488
TCR4    004352          1475#   1490
TCSR  = 000410           617#   3659
TCST    000554           859#   1033    1382    1425
TCSTA   000566           864#   1035#
TCWBK   004146          1417    1434#
TCWBUF  004510          1436    1512#
TCWBI   004200          1434    1439#
TCWC    000560           861#   1435#   1480#
TC1     004444          1483    1494#
TC2     004464          1500#   1505
TDBR  = 000412           618#   3658#
TEMP    015016          1977#   1978    1984#   1993#   1995#   1996    2002#   2003#   2004    2009#   2011#   2016#   2027#
                        2030    2035#   2038    2043#   2046    2051#   2054    2059#   2062    2067#   2070    2075#   2078
                        2083#   2087    2092#   2096    2101#   2105    2110#   2114    2163#   2164    2185#   2186#   2187
                        2209#   2210#   2215#   2216#   2217    2232#   2233#   2234    2239#   2240#   2241    2249#   2250#
                        2251    2256#   2257#   2258    2263#   2264#   2265    2270#   2271#   2272    2277#   2278#   2273
                        2311#   2312    2333#   2334#   2335    2354#   2355#   2360#   2361#   2362    2377#   2378#   2379
                        2384#   2385#   2386    2394#   2395#   2396    2401#   2402#   2403    2408#   2409#   2410    2415#
                        2416#   2417    2422#   2423#   2424    2429#   2431#   2432    2437#   2439#   2440    2471#   2472#
                        2473    2480#   2489#   2566#   2567    2573#   2574    2580#   2587#   2588    2596#   2598#   2599
                        2604#   2606#   2607    2612#   2614#   2615    2621#   2622#   2623    2631#   2634    2639#   2642
                        2647#   2650    2655#   2658    2663#   2666    2671#   2674    2679#   2682    2687#   2690    2695#
                        2699    2704#   2708    2735#   2736    2744#   2745#   2746    2751#   2752#   2753    2758#   2759#
                        2760    2765#   2766#   2767    2772#   2773#   2774#   2775    2803#   2804    2825#   2826#   2827
                        2842#   2843#   2844    2849#   2850#   2851    2856#   2857#   2858    2863#   2864#   2865    2870#
                        2872#   2873    2876    2881#   2883#   2884    2909#   2910#   2911    2918#   2953#   3003#   3004#
                        3009    3015#   3016#   3021    3027#   3028#   3033    3039#   3040#   3045    3051#   3052#   3057
                        3063#   3064#   3069    3250#   3251#   3252    3383#   3384    3385    3386
TEST    000620           881#   3098#   3099#   3100#   3101#   3102#   3103#   3104#   3119    3134#   3135#   3136#   3137#
                        3138#   3139#   3140#   3155    3159#   3160#   3161#   3162#   3163#   3164#   3179    3194#   3195#
                        3196#   3197    3208#   3211#   3212    3222#   3225#   3226    3236#   3239#   3240    3264#   3265#
                        3270#   3283#   3284#   3285#   3286
TIME    003242          1009#   1227#   1235#   1236    1240    1246#
TJSR1   013136          2968#   2969
TJSR2   013140          2967    2969#
TJSR3   013152          2968    2973#   2977
TMEMEX  001212           945     954#
TRCSR   000406           807#
TRPB    000602           870#    909#   1093    3521#
TRTRP   015662          1095    3527#
TTCSR   000410           617     808#    983#   1215
TTDBR   000412           618     809#   1213#
```

```
TTPST   000416            811*
TTPVC   000414            810*    982*
TTSAV   000420            812*   1215*   1216
TYOUT   003054           1211*   1221
TYOUTR  003070            982    1215*
TYOUTI  003060           1213*   1222
UBUFF   000400            805*   1106    3459
UPAR0   000510            840*   1077    1089    3446    3481
UPAR1   000512            841*
UPAR7   000514            842*   3441    3485*
UPDR0   000502            837*   1085*   1090    3482
UPDR1   000504            838*
UPDR7   000506            839*   3486*
USEALL  002200           1075    1085*
USER    016432           3677*
WD    = 000014           1370*   1437
WORDCT  003672            998    1022    1296    1316    1344*
XDPCNT  014710           1929    3342*
XDPSW1  000630            889*    929
XDPSW2  000632            890*    930
XFENDZ  004076           1420*   1469
XFER12  002706           1169    1187*
XFER16  002676           1171    1185*
XFER20  002666           1173    1183*
XFER24  002656           1175    1181*
XFER28  002646           1177    1179*
XFER8   002716           1167    1189*
$ENDAD  015640            782     924    3515*   3558
$ICNT   014700           1924    3338*
.     = 017762            635*    636     638     640     642     644     646     648     650     652     654     656     658
                          660     662     664     666     668     670     672     674     676     678     680     682     684
                          686     688     690     692     694     696     698     700     702     704     706     708     710
                          712     714     716     718     720     722     724     726     728     730     732     734     736
                          738     740     742     744     746     748     750     752     754     756     758     760     762
                          768*    771*    774*    777*    779*    781*    783*    785*    794*    796*    798*    804*    806*
                         1110    1131    1162    1212    1217    1232    1243    1254    1255    1272    1282    1300    1320
                         1333    1392    1394    1407    1409    1415    1440    1447    1449    1464    1466    1472    1486
                         1502    1936    1942    1948    1954    1961    1968    1979    1986    1997    2005    2012    2019
                         2031    2039    2047    2055    2063    2071    2079    2088    2097    2106    2115    2140    2145
                         2150    2159    2165    2171    2181    2188    2195    2205    2211    2218    2228    2235    2242
                         2252    2259    2266    2273    2280    2288    2293    2298    2307    2313    2319    2329    2336
                         2343    2350    2356    2363    2373    2380    2387    2397    2404    2411    2418    2425    2433
                         2441    2450    2456    2463    2474    2482    2491    2502    2508    2514    2520    2526    2532
                         2539    2544    2551    2558    2568    2575    2582    2589    2600    2608    2616    2624    2635
                         2643    2651    2659    2667    2675    2683    2691    2700    2709    2717    2722    2731    2737
                         2747    2754    2761    2768    2776    2785    2790    2799    2805    2811    2821    2828    2835
                         2845    2852    2859    2866    2874    2877    2885    2894    2901    2912    2920    2926    2932
                         2938    2946    2955    2970    2978    2988    2990    2992    2994    3005    3007    3010    3017
                         3019    3022    3029    3031    3034    3041    3043    3046    3053    3055    3058    3065    3067
                         3070    3079    3089    3105    3106    3107    3109    3110    3111    3113    3114    3116    3117
                         3120    3141    3142    3143    3145    3146    3147    3149    3150    3152    3153    3156    3165
                         3166    3167    3169    3170    3171    3173    3174    3176    3177    3180    3198    3213    3227
                         3241    3253    3255    3257    3266    3268    3271    3273    3287    3371*   3374*   3382*   3385*
                         3402    3536    3561    3575    3579    3591    3632    3679*
```

```
MAIN      632#  1900
ROLTIN    632#  3344  3389  3431  3529  3569  3606  3615  3624  3635  3653
SECTIO     569   612   632#  765   791   801   883   892   902   976   984  1000  1011  1025  1037
          1052  1116  1124  1208  1224  1248  1290  1311  1346  1931  1972  1990  2023  2119  2136
          2154  2175  2199  2222  2246  2284  2302  2323  2367  2391  2445  2467  2497  2562  2593
          2628  2713  2726  2741  2780  2794  2815  2839  2889  2905  2959  2964  2983  2998  3075
          3083  3093  3126  3185  3204  3218  3232  3246  3261  3277  3291  3299  3314  3365  3410
          3499  3524
STARS      569   571   612   614   632#  634   765   767   791   793   801   803   883   885   892
           894   902   904   976   978   984   986  1000  1002  1011  1013  1025  1027  1037  1039
          1052  1054  1116  1118  1124  1126  1208  1210  1224  1226  1248  1250  1290  1292  1311
          1313  1346  1348  1900  1902  1931  1933  1972  1974  1990  1992  2023  2025  2119  2121
          2136  2138  2154  2156  2175  2177  2199  2201  2222  2224  2246  2248  2284  2286  2302
          2304  2323  2325  2367  2369  2391  2393  2445  2447  2467  2469  2497  2499  2562  2564
          2593  2595  2628  2630  2713  2715  2726  2728  2741  2743  2780  2782  2794  2796  2815
          2817  2839  2841  2889  2891  2905  2907  2959  2961  2964  2966  2983  2985  2998  3000
          3075  3077  3083  3085  3093  3095  3126  3128  3185  3187  3204  3206  3218  3220  3232
          3234  3246  3248  3261  3263  3277  3279  3291  3293  3299  3301  3314  3316  3345  3347
          3365  3367  3390  3392  3410  3412  3432  3434  3499  3501  3524  3526  3530  3532  3570
          3572  3607  3609  3616  3618  3625  3627  3636  3638  3654  3656
TNCV      3083#  3105  3141  3165

. ABS.  017762     000

 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 DSKZ:DFKTGB,DSKZ:DFKTGB.SEQ/SOL/CRF=DFKTGB
 RUN-TIME:  10 23 3 SECONDS
 RUN-TIME RATIO:  135/37=3.6
 CORE USED:  8K  (15 PAGES)
```