KT11-D

EXERCISER

MD-11-DBKTG-C

EP-DBKTG-C-DL-A

FICHE 1 OF 1

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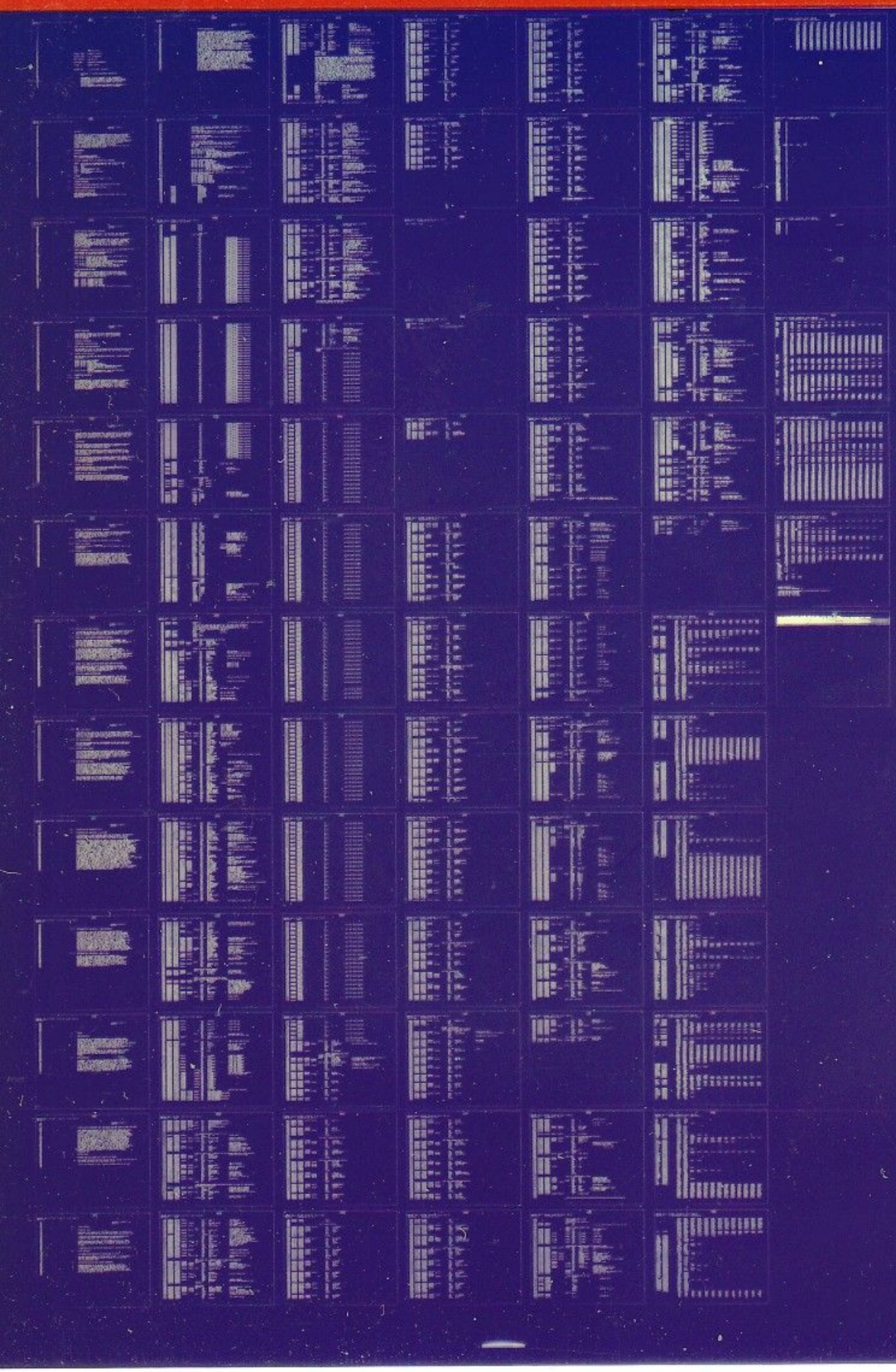
MADE IN USA



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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DBKTG-C
PRODUCT NAME:	KT11-D EXERCISER
DATE CREATED:	JUNE 20,1973
MAINTAINER:	DIAGNOSTIC PROGRAMMING
AUTHOR:	ROBERT WHITTON
REVISED BY:	W.F. KELLICKER 25-FEB-74

1.0 ABSTRACT

THIS PROGRAM IS AN INTERACTIVE EXERCISER FOR A PDP-11/40 EQUIPPED WITH THE KT11-D OPTION. 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 KT11-D 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-11/40 STANDARD COMPUTER
KT11-D MEMORY MANAGEMENT OPTION

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

LOAD STARTING ADDRESS 200.
SET DESIRED MEMORY MANAGEMENT SELECTION SWITCHES (SEE 4.2)-ALL DOWN FOR WORST CASE TESTING.
PRESS START.

4.1 NORMAL STARTING PROCEDURE (CONTINUED)

THE PROGRAM WILL IMMEDIATELY HALT. AT THE HALT, SET THE DESIRED DEVICE SELECTION SWITCHES (SEE 4.3) AND THE DESIRED DYNAMIC SWITCHES (SEE 5.1.2).
PRESS CONTINUE.
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 AT STARTUP DETERMINE THE WAY IN WHICH MEMORY IS MAPPED AND EXERCISED:

SW0=1 OR UP---INHIBIT THE KT11-D (SR0<0> WILL NOT BE SET AT ALL)
SW1=1 OR UP---INHIBIT USE OF USER MODE.
(ALSO INHIBITS 4K AS 32K)
SW2=1 OR UP---INHIBIT 4K AS 32 K (ALSO INHIBITED IF EITHER SW0 OR SW1 IS SET)-SEE SECTION 5.3.1 FOR EXPLANATION
SW5=1 OR UP---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 AT THE FIRST (AND ONLY) HALT. 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). NO HALT OCCURS AFTER START IS PRESSED.

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

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 SWITCHES 0, 1, AND 2 ARE ALL DOWN (=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 MADE 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 SWITCH 0, 1, OR 2 IS UP AND SW5 IS DOWN AT STARTUP, THE PROCESSOR TESTS WILL BE CORE EXPANDED THRU ALL AVAILABLE MEMORY UP TP 28K. THR 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 SWITCHES 0 AND 1 WERE BOTH DOWN 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 SW0 WAS DOWN BUT SW1 WAS SET, 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 SW0 WAS SET, ORDINARY CORE EXPANSION IS RUN WITH NO SPECIAL MAPPING REQUIRED (KT11-D IS TURNED OFF).

5.3.3 PROCESSOR TEST EXECUTION - BANK 0 ONLY

IF SW0, 1 OR 2 IS UP AND SW5 IS UP AT STARTUP, ONLY BANK 0 IS UTILIZED. IN THIS CASE, IF SW0 AND SW1 WERE DOWN THE PROCESSOR TESTS ARE EXECUTED IN USER, WITH USER PAGE 0 MAPPED TO BANK 0. IF SW0 WAS DOWN AND SW1 WAS UP, THE PROCESSOR TESTS ARE EXECUTED IN KERNEL, WITH KERNEL PAGE 0 MAPPED TO BANK 0. IF SW0 WAS UP, THE KT11-D IS TURNED OFF AND THE PROCESSOR TESTS ARE EXECUTED IN KERNEL MODE OR USER MODE (DEPENDING ON SW1) 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, THE DEVICES RUN, 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 15 SECONDS PER 4K BANK. (AN ASTERISK IS PRINTED AT THE END OF A FULL PASS, AND THE BELL IS RUNG AT THE END OF EACH 4K BANK).

A PASS RUN WITH 4K AS 32 WITH TAKES ABOUT 1 MINUTE PER 4K BANK.

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 MONITORING PHYSICAL AND VIRTUAL ADDRESSES

DURING EXECUTION OF 4K AS 32K, IT IS HELPFUL TO SET THE ADDRESS SELECTOR TO PROGRAM PHYSICAL AND THE DATA SELECTOR TO DATA PATHS. IF THIS IS DONE, THE ADDRESS LIGHTS WILL INDICATE THE CURRENT PHYSICAL ADDRESSES WHILE THE DATA LIGHTS WILL SHOW THE CURRENT VIRTUAL ADDRESSES (SINCE THEY ARE USED AS DATA A GREAT DEAL OF THE TIME).

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 KT11-D SETUP CODE.
THE RF11 AND TC11 PRIMER CODE IS IN WITH THE KT11-D SETUP
CODE SINCE THEY REQUIRE CERTAIN PARTS OF THE KT11-D 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.

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                                ;PDP11/40 SYSTEM EXERCISER, WITH KT11-D --- 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
                                ;KT11-D 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, SR SETTINGS ARE:
                                ;SR 0=1 OR UP --- RUN WITHOUT KT11-D
                                ;SR 1=1 OR UP --- RUN ALL IN KERNEL MODE (INHIBITS RUNNING 4K AS 32K)
                                ;SR 2=1 OR UP --- INHIBIT RUNNING 28K USER KT11-D FROM EVERY 4K
                                                 ;BANK (ALLOW NORMAL CORE EXPANSION)
                                ;SR 5=1 OR UP---INHIBIT VARIABLE CORE EXPANSION

                                ;AT HALT, SR 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

                                ;DEFINITIONS
000240                                  NOP=240                 ;SYSTEM NULL OPERATION
104400                                  SCOPE=TRAP              ;TRAP USED SCOPE LOOP AND ITERATION
000410                                  TCSR=TTCSR
000412                                  TDBR=TTDBR
177570                                  SR=177570
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
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                 000004                          R4=%4
                 000005                          R5=%5
                 000006                          SP=%6
                 000006                          R6=SP
                 000007                          PC=%7

                                                 .SBTTL MAIN
                                        ;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
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   654  000136  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   655  000140  000142                    .+2         ;TRAP ENTRANCE
   656  000142  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   657  000144  000146                    .+2         ;TRAP ENTRANCE
   658  000146  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   659  000150  000152                    .+2         ;TRAP ENTRANCE
   660  000152  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   661  000154  000156                    .+2         ;TRAP ENTRANCE
   662  000156  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   663  000160  000162                    .+2         ;TRAP ENTRANCE
   664  000162  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   665  000164  000166                    .+2         ;TRAP ENTRANCE
   666  000166  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   667  000170  000172                    .+2         ;TRAP ENTRANCE
   668  000172  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   669  000174  000176                    .+2         ;TRAP ENTRANCE
   670  000176  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   671  000200  000202                    .+2         ;TRAP ENTRANCE
   672  000202  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   673  000204  000206                    .+2         ;TRAP ENTRANCE
   674  000206  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   675  000210  000212                    .+2         ;TRAP ENTRANCE
   676  000212  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   677  000214  000216                    .+2         ;TRAP ENTRANCE
   678  000216  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   679  000220  000222                    .+2         ;TRAP ENTRANCE
   680  000222  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   681  000224  000226                    .+2         ;TRAP ENTRANCE
   682  000226  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   683  000230  000232                    .+2         ;TRAP ENTRANCE
   684  000232  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   685  000234  000236                    .+2         ;TRAP ENTRANCE
   686  000236  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   687  000240  000242                    .+2         ;TRAP ENTRANCE
   688  000242  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   689  000244  000246                    .+2         ;TRAP ENTRANCE
   690  000246  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   691  000250  000252                    .+2         ;TRAP ENTRANCE
   692  000252  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   693  000254  000256                    .+2         ;TRAP ENTRANCE
   694  000256  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   695  000260  000262                    .+2         ;TRAP ENTRANCE
   696  000262  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   697  000264  000266                    .+2         ;TRAP ENTRANCE
   698  000266  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   699  000270  000272                    .+2         ;TRAP ENTRANCE
   700  000272  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   701  000274  000276                    .+2         ;TRAP ENTRANCE
   702  000276  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   703  000300  000302                    .+2         ;TRAP ENTRANCE
   704  000302  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   705  000304  000306                    .+2         ;TRAP ENTRANCE
   706  000306  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   707  000310  000312                    .+2         ;TRAP ENTRANCE
   708  000312  000000                    HALT        ;TRAPPED TO PREVIOUS LOCATION
   709  000314  000316                    .+2         ;TRAP ENTRANCE
```

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  710  000316  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  711  000320  000322                          .+2                     ;TRAP ENTRANCE
  712  000322  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  713  000324  000326                          .+2                     ;TRAP ENTRANCE
  714  000326  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  715  000330  000332                          .+2                     ;TRAP ENTRANCE
  716  000332  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  717  000334  000336                          .+2                     ;TRAP ENTRANCE
  718  000336  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  719  000340  000342                          .+2                     ;TRAP ENTRANCE
  720  000342  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  721  000344  000346                          .+2                     ;TRAP ENTRANCE
  722  000346  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  723  000350  000352                          .+2                     ;TRAP ENTRANCE
  724  000352  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  725  000354  000356                          .+2                     ;TRAP ENTRANCE
  726  000356  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  727  000360  000362                          .+2                     ;TRAP ENTRANCE
  728  000362  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  729  000364  000366                          .+2                     ;TRAP ENTRANCE
  730  000366  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  731  000370  000372                          .+2                     ;TRAP ENTRANCE
  732  000372  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  733  000374  000376                          .+2                     ;TRAP ENTRANCE
  734  000376  000000                          HALT                    ;TRAPPED TO PREVIOUS LOCATION
  735
  736                                   ;LOAD VECTOR AREA
  737           000024                          .=24
  738  000024   016634                         PFAIL                   ;POWER FAIL TRAP
  739  000026   000340                         340
  740           000030                          .=30
  741  000030   015050                         EMTSRV                  ;EMT CALLS
  742  000032   000340                         340                     ;HIGHEST PRIORITY
  743           000034                          .=34
  744  000034   014642                         SCOPEC                  ;USER TRAP
  745  000036   000000                         0
  746
  747
  748                                   ;LOAD STARTING AREA
  749           000200                          .=200
  750  000200   000137  000640                 JMP     @#START
  751           000300                          .=300
  752  000300   000137  000640                 JMP     @#START
  753           000310                          .=310
  754  000310   000137  000616                 JMP     @#RSTRT
  755
  756                                   ;DATA AREA
  757           000400                          .=400
  758  000400   000000                 UBUFF:  0                       ;BUFFER FOR USER SP
  759           000406                          .=.+4                   ;FOR STACK OVERRUN
  760  000406   177560                 TRCSR:  177560                  ;TTY READER STATUS REGISTER
  761  000410   177564                 TTCSR:  177564                  ;TTY PUNCH STATUS REGISTER
  762  000412   177566                 TTDBR:  177566
  763  000414   000064                 TTPVC:  64
  764  000416   000066                 TTPST:  66
  765  000420   000000                 TTSAV:  0
```

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   766  000422  000100                KWLVC:  100
   767  000424  000102                KWLST:  102
   768  000426  177546                LKCSR:  177546
   769  000430  177514                LPCSR:  177514
   770  000432  177516                LPDBR:  177516
   771  000434  000200                LPVC:   200
   772  000436  000202                LPST:   202
   773  000440  177470                RFDAE:  177470          ;DISK ADDRESS AND ERROR
   774  000442  177466                RFDAR:  177466          ;DISK ADDRESS REGISTER
   775  000444  177462                RFWC:   177462          ;WORD COUNT REGISTER
   776  000446  177464                RFCAR:  177464          ;CURRENT ADDRESS REGISTER
   777  000450  177460                RFCSR:  177460          ;STATUS REGISTER
   778  000452  177461                RFCSRH: 177461          ;HIGH BYTE ADDRESS OR CSR
   779  000454  000204                RFVC:   204
   780  000456  000206                RFST:   206
   781  000460  177413                RKDAH:  177413  ;HIGH BYTE DISK ADR
   782  000462  177412                RKDAE:  177412          ;DISK ADDRESS REGISTER
   783  000464  177406                RKWC:   177406  ;WORD COUNT REGISTER
   784  000466  177410                RKBAR:  177410  ;CURRENT ADDRESS REGISTER
   785  000470  177404                RKCSR:  177404          ;STATUS REGISTER
   786  000472  177405                RKCSRH: 177405          ;HIGH BYTE OF CSR
   787  000474  000220                RKVC:   220             ;TRAP VECTOR
   788  000476  000222                RKST:   222
   789  000500  177572                SR0:    177572          ;KT11-D  REGISTERS
   790  000502  177600                UPDR0:  177600
   791  000504  177602                UPDR1:  177602
   792  000506  177616                UPDR7:  177616
   793  000510  177640                UPAR0:  177640
   794  000512  177642                UPAR1:  177642
   795  000514  177656                UPAR7:  177656
   796  000516  172300                KPDR0:  172300
   797  000520  172302                KPDR1:  172302
   798  000522  172304                KPDR2:  172304
   799  000524  172316                KPDR7:  172316
   800  000526  172340                KPAR0:  172340
   801  000530  172342                KPAR1:  172342
   802  000532  172344                KPAR2:  172344
   803  000534  172356                KPAR7:  172356
   804
   805  000536  177600                IPDRTAB:177600
   806  000540  177640                        177640
   807  000542  172300                        172300
   808  000544  172340                IPDREND:172340
   809  000546  000000                SREG1:  0               ;STORES KT11-D SWITCH REGISTER SETTINGS
   810  000550  000000                SREG2:  0               ;STORES SR SETTINGS
   811  000552  177342                TCCM:   177342          ;CONTROL AND FUNCTION
   812  000554  177340                TCST:   177340          ;GENERAL STATUS
   813  000556  177350                TCDT:   177350          ;DATA
   814  000560  177344                TCWC:   177344          ;WORD COUNT
   815  000562  177346                TCBA:   177346          ;BUS ADDRESS
   816  000564  000214                TCIV:   214             ;DECTAPE INTERRUPT VECTOR
   817  000566  000216                TCSTA:  216
   818  000570  000000                CURBNK: 0               ;SAF TO POINT TO CURRENT BANK
   819  000572  000000                OLDBNK: 0
   820  000574  000000                CURPAR: 0               ;ADDRESS OF CURRENT ISAR
   821  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

                               ;RESTART ADD USING INITIAL SR SETTINGS
000616 012706 017760           RSTRT:  MOV     #KSTACK,R6
000622 012737 016634 000024            MOV     #PFAIL,@#24
000630 113737 177571 000551            MOVB    @#SR+1,@#SREG2+1
000636 000455                          BR      START1

                               ;START UP FOR MINI MONITOR

000640 012706 017760           START:  MOV     #KSTACK,R6              ;SET UP STACK
000644 012737 000137 000200            MOV     #137,@#200              ;RESTORE 200 IF START AT 300
000652 012737 000640 000202            MOV     #START,@#202
000660 005737 000042                   TST     @#42                    ;CHECK FOR MONITOR OPERATION
000664 001433                          BEQ     STARTX
000666 012737 000002 000006            MOV     #RTI,@#6                ;IS THIS AN 11/40
000674 012700 000003                   MOV     #3,R0
000700 000261                          SEC
000702 005737 177772                   TST     @#177772                ;R0=3 IF 11/45
000706 005600                          SBC     R0                      ;R0=2 IF 11/40
000710 000261                          SEC                             ;R0=1 IF 11/20
000712 105737 177777                   TSTB    @#PSR+1                 ;R0=0 IF 11/05
000716 005600                          SBC     R0
000720 005037 177700                   CLR     @#177700
000724 005037 000006                   CLR     @#6
000730 022700 000002                   CMP     #2,R0
000734 001402                          BEQ     .+6
000736 000167 014700                   JMP     LOGIC
000742 005037 000546                   CLR     @#SREG1                 ;RUN ALL SW DOWN IF MONITOR
000746 005037 000550                   CLR     @#SREG2
000752 000407                          BR      START1
000754 013737 177570 000546    STARTX: MOV     @#SR,@#SREG1            ;STORE KT11-D SWITCHES
000762 000000                          HALT
000764 013737 177570 000550            MOV     @#SR,@#SREG2
000772 004767 014010           START1: JSR     %7,NRALL
000776 012777 077406 177512            MOV     #77406,@KPDR0
001004 012777 007600 177522            MOV     #7600,@KPAR7    ;MAP PAGE 7 TO EXT BANK
001012 012777 077406 177504            MOV     #77406,@KPDR7
001020 005067 177570                   CLR     TBANK
001024 012767 177777 177552            MOV     #177777,MEM0    ;SET UP CORE MAPS
001032 012767 077777 177546            MOV     #77777,MEM1
001040 012767 000001 177542            MOV     #1,COREPT       ;SET UP 4K POINTER
001046 012767 000604 177536            MOV     #MEM0,MEMUT
001054 012777 077406 177440            MOV     #77406,@KPDR2   ;BEING CHECKED FOR
001062 012737 001132 000004            MOV     #TMEMEX,@#4     ;SET UP FOR TIME OUTS
001070 005037 000006                   CLR     @#6
```

```
878  001074  052777  000001  177376          BIS     #1,@SR0
879  001102  016777  177506  177422  MAP1:   MOV     TBANK,@KPAR2    ;MAP KERNEL PAGE 2 TO BANK
880  001110  005737  041000                  TST     @#41000         ;1ST K PRESENT
881  001114  005737  045000                  TST     @#45000         ;2ND K PRESENT
882  001120  005737  051000                  TST     @#51000         ;3RD K PRESENT
883  001124  005737  055000                  TST     @#55000         ;4TH K PRESENT
884  001130  000404                          BR      MOVEPT          ;OK, FULL 4K BLOCK PRESENT
885  001132  046777  177452  177452  TMEMEX: BIC     COREPT,@MEMUT   ;NO, BLOCK NOT PRESENT
886  001140  022626                          CMP     (SP)+,(SP)+     ;ADJUST STACK POINTER
887  001142  062767  000200  177444  MOVEPT: ADD     #200,TBANK      ;UPDATE BANK POINTER
888  001150  006367  177434                  ASL     COREPT
889  001154  103006                          BCC     MAP2            ;THIS 1ST MEM WORD DONE
890  001156  012767  000001  177424          MOV     #1,COREPT
891  001164  012767  000606  177420          MOV     #MEM1,MEMUT
892  001172  022767  007600  177414  MAP2:   CMP     #7600,TBANK     ;EXTERNAL BANK YET
893  001200  001340                          BNE     MAP1            ;NO,NOT YET?
894  001202  012767  000001  177400          MOV     #1,COREPT       ;RE-INIT
895  001210  012767  000604  177374          MOV     #MEM0,MEMUT
896  001216  042777  000001  177254          BIC     #1,@SR0
897  001224  012767  000001  013502          MOV     #1,ICOUNT
898  001232  004767  015344                  JSR     %7,CRLF
899  001236  012737  014642  000034          MOV     #SCOPEC,@#34
900  001244  005037  000036                  CLR     @#36                    ;INITIALIZE SCOPE CALL TO KERNEL STATUS
901  001250  012737  015050  000030          MOV     #EMTSRV,@#30
902  001256  012737  000340  000032          MOV     #340,@#32
903  001264  012737  005452  014740          MOV     #BEGIN,@#RETURN
904  001272  005037  014736                  CLR     @#SCOPEF
905  001276  012737  000340  177776          MOV     #340,@#PSR              ;LOCK OUT INTERRUPTS
906  001304  005037  016352                  CLR     @#PRTON                 ;PRINT ROUTINE BUSY FLAG
907  001310  000005                          RESET
908  001312  012737  002314  000004          MOV     #NODEV,@#4                      ;RETURN FOR NO DEVICE
909  001320  005037  000006                  CLR     @#6
910  001324  005067  001436                  CLR     DATA2                   ;BASE DATA FOR TTY TELEPRINTER
911  001330  005737  000042                  TST     @#42                    ;ACT 11?
912  001334  001012                          BNE     ST3                     ;YES
913  001336  033727  000550  000001          BIT     @#SREG2,#1                      ;INHIBIT TTY OUTPUT?
914  001344  001006                          BNE     ST3                     ;YES, GO CHECK NEXT.
915  001346  012777  003000  177040          MOV     #TYOUTR,@TTPVC          ;NO, SETUP INTERRUPT VECTOR
916  001354  052777  000100  177026          BIS     #100,@TTCSR             ;START TTY OUTPUT
917  001362  012700  000010          ST3:    MOV     #10,R0
918  001366  032737  000010  000550          BIT     #10,@#SREG2             ;INHIBIT RK DISK
919  001374  001026                          BNE     ST4                     ;YES, SKIP OVER
920  001376  005777  177066                  TST     @RKCSR          ;PRESENT
921  001402  012777  003376  177064          MOV     #IRK,@RKVC              ;SETUP VECTOR RETURNS
922  001410  012777  000240  177060          MOV     #240,@RKST
923  001416  012767  043503  002014          MOV     #43503,RKFUNCT
924  001424  005077  177032                  CLR     @RKDAE                  ;INIT
925  001430  016777  002144  177030          MOV     LLIMIT,@RKBAR           ;CORE BASE
926  001436  016777  002140  177020          MOV     WORDCT,@RKWC            ;TRANSFER LENGTH
927  001444  116777  001770  177016          MOVB    RKFUNCT,@RKCSR
928  001452  006300                  ST4:    ASL     R0
929  001454  033727  000550  000020          BIT     @#SREG2,#20             ;INHIBIT LINE CLOCK?
930  001462  001015                          BNE     ST5                     ;YES, GO CK NEXT
931  001464  005777  176736                  TST     @LKCSR                  ;PRESENT
932  001470  012777  003056  176724          MOV     #LK3,@KWLVC
933  001476  012777  000300  176720          MOV     #300,@KWLST
```

```
 934  001504  005067  001442                    CLR     TIME                    ;NO, INITIALIZE COUNT
 935  001510  052777  000100  176710            BIS     #100,@LKCSR             ;START LINE CLOCK
 936  001516  006300                    ST5:    ASL     R0
 937  001520  033727  000550  000040            BIT     @#SREG2,#40             ;TEST FOR INHIBITING RF11 DISK
 938  001526  001026                            BNE     ST6                     ;SKIP IF SET
 939  001530  005777  176714                    TST     @RFCSR                  ;PRESENT?
 940  001534  012777  003472  176712            MOV     #IRF,@RFVC              ;SET UP TRAP RETURN
 941  001542  012777  000240  176706            MOV     #240,@RFST
 942  001550  012767  043503  002020            MOV     #43503,RFFUNCT          ;WRITE CHECK/WRITE
 943  001556  105277  176670                    INCB    @RFCSRH                 ;INITIALIZE DISK-DAR,DAE
 944  001562  016777  002014  176654            MOV     WORDCT,@RFWC            ;LENGTH OF TRANSFER
 945  001570  016777  002004  176650            MOV     LLIMIT,@RFCAR           ;CORE ADDRESS OF START OF TRANSFER
 946  001576  116777  001774  176644            MOVB    RFFUNCT,@RFCSR          ;START RF11 READ OR WRITE
 947  001604  006300                    ST6:    ASL     R0
 948  001606  033727  000550  000100            BIT     @#SREG2,#100            ;CHECK FOR INHIBITING TC11 DECTAPE
 949  001614  001013                            BNE     ST7                     ;SKIP IF SET
 950  001616  005777  176732                    TST     @TCST                   ;PRESENT?
 951  001622  012777  003612  176734            MOV     #FENDZ,@TCIV            ;GO TO END ZONE ON INTERRUPT
 952  001630  012777  000300  176730            MOV     #300,@TCSTA
 953  001636  012777  004503  176706            MOV     #R+IE+RB+DO,@TCCM       ;START REVERSE READ BLOCK NUMBER
 954  001644  006300                    ST7:    ASL     R0
 955  001646  005737  000042                    TST     @#42                    ;ACT 11?
 956  001652  001402                            BEQ     1$                      ;YES
 957  001654  050037  000550                    BIS     R0,@#SREG2
 958  001660  033727  000550  000200  1$:       BIT     @#SREG2,#200            ;INHIBIT LINE PRINTER?
 959  001666  001032                            BNE     ST8                     ;YES, GO CK NEXT
 960  001670  005777  176534                    TST     @LPCSR                  ;PRESENT?
 961  001674  012737  001754  000004            MOV     #ST8,@#4                ;DON'T CHANGE 200 IF NO SUCH DEVICE
 962  001702  012767  000137  001246            MOV     #137,SOLPAT             ;RESET FOR START OF LINE PATTERN
 963  001710  012767  000117  001332            MOV     #79.,CLINCT             ;LINE COUNT
 964  001716  012767  000137  001234            MOV     #137,CURPAT
 965  001724  012777  000014  176500            MOV     #14,@LPDBR              ;LINE FEED TO POSITION BUFFER
 966  001732  012777  003200  176474            MOV     #LPINTR,@LPVC           ;INTERRUPT ENABLE
 967  001740  012777  000200  176470            MOV     #200,@LPST              ;PROCESSOR LEVEL 4
 968  001746  012777  000100  176454            MOV     #100,@LPCSR             ;INTERRUPT ENABLE
 969  001754  005037  000602            ST8:    CLR     @#TRPB                  ;NO "T" BIT FIRST PASS
 970  001760  005037  000006                    CLR     @#6                     ;CHANGE ADDRESS ERROR VECTOR TO CAUSE
 971  001764  012737  000006  000004            MOV     #6,@#4                  ;HALT ON A TRAP TO 4
 972  001772  004737  016676                    JSR     %7,@#USER               ;FOR USER I/O PROGRAM INSERTION
 973  001776  004767  000332                    JSR     %7,DET1                 ;CHECK FOR CORE EXPANSION
 974  002002  032737  000001  000546            BIT     #1,@#SREG1              ;INHIBIT KT11-D?
 975  002010  001106                            BNE     MODE                    ;YES - GO SETUP USER
 976  002012  004767  012770                    JSR     %7,NRALL                ;NO - MAKE ALL SEGMENTS INITIALLY NON-RESIDENT
 977  002016  012777  077406  176500            MOV     #77406,@KPDR7
 978  002024  012777  007600  176502            MOV     #7600,@KPAR7
 979  002032  032737  000006  000546            BIT     #6,@#SREG1              ;INHIBIT USER/KERNEL OR 4K AS 32K?
 980  002040  001415                            BEQ     SEGM1                   ;NO - BRANCH
 981  002042  012701  000007                    MOV     #7,R1                   ;YES - MAP KERNEL ASR'S 0-6 TO PA
 982  002046  016702  176454                    MOV     KPAR0,R2
 983  002052  005003                            CLR     R3
 984  002054  010312                    SETEX:  MOV     R3,@R2
 985  002056  012762  077406  177740            MOV     #77406,-40(R2)
 986  002064  005722                            TST     (R2)+
 987  002066  062703  000200                    ADD     #200,R3
 988  002072  077110                            SOB     R1,SETEX
 989  002074  012777  077406  176414  SEGM1:   MOV     #77406,@KPDR0           ;MAP KERNEL 0 TO BANK 0, RW
```

```
  990  002102  032737  000004  000546          BIT     #4,@#SREG1              ;INHIBIT RUNNING 4K AS 32K?
  991  002110  001416                          BEQ     USEALL                  ;NO, SETUP FOR RUNNING 4K AS 32K
  992  002112  012701  000010                  MOV     #10,R1                  ;YES, MAP ALL USER ASR'S TO PA
  993  002116  016702  176366                  MOV     UPAR0,R2
  994  002122  005003                          CLR     R3
  995  002124  010312                  SETUSE: MOV     R3,(R2)
  996  002126  062703  000200                  ADD     #200,R3
  997  002132  012762  077406  177740          MOV     #77406,-40(R2)
  998  002140  005722                          TST     (R2)+
  999  002142  077110                          SOB     R1,SETUSE
 1000  002144  000425                          BR      SETSEG
 1001  002146  012777  077406  176326  USEALL: MOV     #77406,@UPDR0           ;MAP USER ASR0 TO BANK 0, RW
 1002  002154  012737  000000  000570          MOV     #0,@#CURBNK             ;CURRENT SAR CONTENTS
 1003  002162  012767  000001  176420          MOV     #1,COREPT               ;INIT MAP POINTERS
 1004  002170  012767  000604  176414          MOV     #MEMO,MEMUT
 1005  002176  016767  176306  176370          MOV     UPAR0,CURPAR            ;CURRENT SEGMENT REGISTER ADDRESSES
 1006  002204  016767  176272  176364          MOV     UPDR0,CURPDR
 1007  002212  012767  005452  176360          MOV     #BEGIN,BNKSTR           ;CURRENT STARTING PC
 1008  002220  052777  000001  176252  SETSEG: BIS     #1,@SR0                 ;SET KT11-D BIT
 1009  002226  042737  000340  177776  MODE:   BIC     #340,@#PSR              ;PRIORITY LEVEL 0
 1010  002234  032737  000002  000546          BIT     #2,@#SREG1              ;INHIBIT USER/KERNEL?
 1011  002242  001016                          BNE     MAIN+2                  ;YES - SKIP OVER
 1012  002244  052737  140000  000036          BIS     #140000,@#36            ;SET USER BIT IN SCOPE STATUS
 1013  002252  012746  000400                  MOV     #UBUFF,-(R6)
 1014  002256  052737  030000  177776          BIS     #30000,@#PSR
 1015  002264  006606                          MTPI    SP                      ;SET UP USER STACK
 1016  002266  012737  140000  177776          MOV     #140000,@#PSR           ;CHANGE TO USER
 1017  002274  000401                          BR      .+4
 1018  002276  000001                  MAIN:   WAIT
 1019  002300  033727  000550  002000          BIT     @#SREG2,#2000           ;INHIBIT PROCESSOR TEST
 1020  002306  001373                          BNE     MAIN
 1021  002310  000167  003136                  JMP     BEGIN
 1022
 1023                                  ;NON-EXISTING DEVICE SERVICE
 1024  002314  050037  000550          NODEV:  BIS     R0,@#SREG2              ;SET INHIBIT BIT
 1025  002320  162716  000006                  SUB     #6,(SP)                 ;ALTER PC RETURN
 1026  002324  042766  000017  000002          BIC     #17,2(SP)               ;CLEAR Z BIT ON STACK
 1027  002332  000002                          RTI
 1028
 1029                                  ;PDP-11 MEMORY DETERMINATION AND SETUP/
 1030                                  ;USE WITH VARIABLE CORE QUANTITY SYSTEMS/
 1031  002334  012767  104010  012236  DET1:   MOV     #EOB,DONE               ;RESTORE INITIAL CODE
 1032  002342  032767  000007  176176          BIT     #7,SREG1                ;INHIBIT RUNNING 4K AS 32K USER?
 1033                                                                          ;OR INHIBIT SEQMENTATION?
 1034  002350  001001                          BNE     .+4                     ;YES - ALLOW CORE EXPANSION
 1035  002352  000207                          RTS     %7                      ;NO - INHIBIT CORE EXPANSION
 1036  002354  032737  000040  000546          BIT     #40,@#SREG1             ;CHECK VARIABLE CORE SWITCH
 1037  002362  001401                          BEQ     DET4                    ;USE VARIABLE CORE ROUTINE
 1038  002364  000207                          RTS     %7                      ;4K ONLY (SWITCH SET)
 1039  002366  012737  002452  000004  DET4:   MOV     #DET2,@#4               ;TRAP VECTOR SETUP
 1040  002374  012737  000340  000006          MOV     #340,@#6                ;TRAP STATUS SETUP
 1041  002402  000241                          CLC
 1042  002404  005537  037770          EIGHT:  ADC     @#37770                 ;CHECK FOR 8K
 1043  002410  000240                          NOP
 1044  002412  005537  057770                  ADC     @#57770                 ;CHECK FOR 12K
 1045  002416  000240                          NOP
```

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1046  002420  005537  077770                  ADC     @#077770        ;CHECK FOR 16K
1047  002424  000240                          NOP
1048  002426  005537  117770                  ADC     @#117770        ;CHECK FOR 20K
1049  002432  000240                          NOP
1050  002434  005537  137770                  ADC     @#137770        ;CHECK FOR 24K
1051  002440  000240                          NOP
1052  002442  005537  157770                  ADC     @#157770        ;CHECK FOR 28K
1053  002446  000240                          NOP
1054  002450  000437                          BR      STRT28
1055  002452  012602                  DET2:   MOV     (6)+,%2         ;RETRIEVE TRAP PC
1056  002454  005726                          TST     (6)+            ;DISCARD TRAP STATUS WORD
1057  002456  062702  000074                  ADD     #STRT4-EIGHT-4,R2
1058  002462  000112                          JMP     @R2
1059
1060  002464  005000                  MOVE:   CLR     %0              ;SET UP MAIN CORE POINTER
1061  002466  010102                          MOV     %1,%2
1062  002470  062702  015006                  ADD     #D+2,%2         ;SET UP MAX CORE MOVE
1063  002474  012021                          MOV     (0)+,(1)+       ;MOVE WORD
1064  002476  020201                          CMP     %2,%1           ;MOVE COMPLETE?
1065  002500  001375                          BNE     .-4             ;MOVE ANOTHER WORD
1066  002502  000207                          RTS     %7              ;MOVE COMPLETE
1067  002504  000521                  STRT4:  BR      DET3
1068  002506  000240                          NOP
1069  002510  000240                          NOP
1070  002512  004767  000110                  JSR     %7,XFER8        ;START 8K TRANSFER
1071  002516  000506                          BR      MOD4            ;START 4K MODIFY
1072  002520  004767  000072                  JSR     %7,XFER12       ;START 12K TRANSFER
1073  002524  000475                          BR      MOD8            ;START 8K MODIFY
1074  002526  004767  000054                  JSR     %7,XFER16       ;START 16K TRANSFER
1075  002532  000464                          BR      MOD12           ;START 12K MODIFY
1076  002534  004767  000036                  JSR     %7,XFER20       ;START 20K TRANSFER
1077  002540  000453                          BR      MOD16           ;START 16K MODIFY
1078  002542  004767  000020                  JSR     %7,XFER24       ;START 24K TRANSFER
1079  002546  000442                          BR      MOD20           ;START 20K MODIFY
1080  002550  004767  000002          STRT28: JSR     %7,XFER28       ;START 28K TRANSFER
1081  002554  000431                          BR      MOD24           ;START 24K MODIFY
1082  002556  012701  140000          XFER28: MOV     #140000,%1      ;SET UP MOVE START LOCATION
1083  002562  004767  177676                  JSR     %7,MOVE         ;GO TO MOVE SUBROUTINE
1084  002566  012701  120000          XFER24: MOV     #120000,%1
1085  002572  004767  177666                  JSR     %7,MOVE
1086  002576  012701  100000          XFER20: MOV     #100000,%1
1087  002602  004767  177656                  JSR     %7,MOVE
1088  002606  012701  060000          XFER16: MOV     #60000,%1
1089  002612  004767  177646                  JSR     %7,MOVE
1090  002616  012701  040000          XFER12: MOV     #40000,%1
1091  002622  004767  177636                  JSR     %7,MOVE
1092  002626  012701  020000          XFER8:  MOV     #20000,%1
1093  002632  004767  177626                  JSR     %7,MOVE
1094  002636  000207                          RTS     %7              ;RETURN FROM TRANSFERS
1095  002640  012767  000137  131732  MOD24:  MOV     #137,DONE+120000
1096  002646  012767  145420  131726          MOV     #BEGINX+140000,DONE+120002
1097  002654  012767  000137  111716  MOD20:  MOV     #137,DONE+100000
1098  002662  012767  125420  111712          MOV     #BEGINX+120000,DONE+100002
1099  002670  012767  000137  071702  MOD16:  MOV     #137,DONE+60000
1100  002676  012767  105420  071676          MOV     #BEGINX+100000,DONE+60002
1101  002704  012767  000137  051666  MOD12:  MOV     #137,DONE+40000
```

```
1102  002712  012767  065420  051662          MOV     #BEGINX+60000,DONE+40002
1103  002720  012767  000137  031652  MOD8:   MOV     #137,DONE+20000
1104  002726  012767  045420  031646          MOV     #BEGINX+40000,DONE+20002
1105  002734  012767  000137  011636  MOD4:   MOV     #137,DONE
1106  002742  012767  025420  011632          MOV     #BEGINX+20000,DONE+2
1107  002750  005037  000006          DET3:   CLR     @#6
1108  002754  012737  000006  000004          MOV     #6,@#4
1109  002762  000207                          RTS     %7
1110
1111                                  ;TTY TRANSMITTER PRINT VALUES 0 TO 377/
1112  002764  005027  000000          TYOUT:  CLR     #0                      ;INITAL DATA
1113          002766                  DATA2=.-2
1114  002770  016777  177772  175414  TYOUT1: MOV     DATA2,@TTDBR            ;OUTPUT TO DEVICE
1115  002776  000002                  RTI                             ;RETURN TO MAINLINE**
1116  003000  017767  175404  175412  TYOUTR: MOV     @TTCSR,TTSAV
1117  003006  105767  175406                  TSTB    TTSAV                   ;TEST FOR DONE
1118  003012  100401                  BMI     .+4                     ;BRANCH IF FLAG FOUND
1119  003014  104006                  HLT                             ;FALSE INTERRUPT RETURN
1120  003016  005267  177744                  INC     DATA2                   ;INCREMENT DATA
1121  003022  022767  000400  177736          CMP     #400,DATA2              ;TEST DATA FOR UPPER LIMIT
1122  003030  001755                  BEQ     TYOUT                   ;AT UPPER LIMIT START OVER
1123  003032  000756                  BR      TYOUT1                  ;FINISH REST OF DATA
1124
1125                                  ;TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
1126  003034  005037  003152          LK1:    CLR     @#TIME                  ;CLEAR LINE CLOCK TIMER
1127  003040  052777  000100  175360          BIS     #100,@LKCSR
1128  003046  052737  000100  177776          BIS     #100,@#PSR
1129  003054  000002          LK2:    RTI
1130  003056  105777  175344  LK3:    TSTB    @LKCSR
1131  003062  100401                  BMI     .+4
1132  003064  104006                  HLT                             ;FALSE INTERRUPT
1133  003066  042777  000200  175332          BIC     #200,@LKCSR
1134  003074  005237  003152          LK4:    INC     @#TIME                  ;HERE ON INTERRUPTS
1135  003100  022737  006344  003152          CMP     #3300.,@#TIME           ;55 SEC YET?
1136  003106  103362                  BHIS    LK2                     ;BR IF NOT
1137  003110  042777  000100  175310          BIC     #100,@LKCSR
1138  003116  042737  000100  177776          BIC     #100,@#PSR              ;LOWER PRIORITY
1139  003124  022737  007020  003152          CMP     #3600.,@#TIME           ;OME MINUTE YET
1140  003132  001740                  BEQ     LK1                     ;YES RESET TIMER
1141  003134  105777  175266                  TSTB    @LKCSR                  ;NO, SKIP TILL MINUTE UP
1142  003140  100375                  BPL     .-4
1143  003142  042777  000200  175256          BIC     #200,@LKCSR             ;CLEAR FLAG
1144  003150  000751                  BR      LK4
1145  003152  000000          TIME:   0
1146
1147                                  ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER/
1148                                  ;INTERRUPT VECTOR IS 200/
1149  003154  012727  000000  000000  LP1:    MOV     #0,#0                   ;START OF LINE TO CURRENT
1150          003160                  CURPAT=.-2                      ;CHARACTER BEING PRINTED
1151          003156                  SOLPAT=.-4                      ;START OF LINE CHARACTER
1152  003162  016777  177772  175242  LP2:    MOV     CURPAT,@LPDBR           ;CURRENT PATTERN TO LINE PRINTER
1153  003170  105777  175234                  TSTB    @LPCSR
1154  003174  100420                  BMI     LP6
1155  003176  000002                  RTI                             ;RETURN TO MAIN LINE
1156  003200  105777  175224  LPINTR: TSTB    @LPCSR                  ;TEST FOR FLAG
1157  003204  100414                  BMI     LP6
```

```
1158  003206  005737  000042                    TST     @#42                    ;MONITOR LOAD
1159  003212  001410                            BEQ     LP7                     ;NO, ERROR
1160  003214  032777  100000  175206            BIT     #100000,@LPCSR          ;YES, IS ERROR SET
1161  003222  001404                            BEQ     LP7                     ;NO, ERROR
1162  003224  042777  000100  175176            BIC     #100,@LPCSR             ;DISABLE INTERRUPT
1163  003232  000002                            RTI
1164  003234  104006                    LP7:    HLT                             ;FALSE RETURN FROM MAIN LINE
1165  003236  026727  000006  000117    LP6:    CMP     CLINCT,#79.             ;TEST FOR END OF LINE
1166  003244  001415                            BEQ     LP4                     ;GO GENERATE CR/LF
1167  003246  005227  000000                    INC     #0                      ;INCREMENT LINE POSITION COUNT
1168          003250                    CLINCT=.-2                              ;POSITION OF LINE
1169  003252  026727  177702  000137            CMP     CURPAT,#137             ;TEST FOR MAXIMUM PATTERN
1170  003260  001403                            BEQ     LP3                     ;YES - GO TO LP3 AND RESET
1171  003262  005267  177672                    INC     CURPAT                  ;NO - INCREMENT TO NEXT PATTERN
1172  003266  000735                            BR      LP2                     ;GO SEND IT TO LINE PRINTER
1173  003270  012767  000040  177662    LP3:    MOV     #40,CURPAT              ;RESET PATTERN AND SEND TO PRINTER
1174  003276  000731                            BR      LP2                     ;SENT TO LINE PRINTER
1175  003300  005067  177744            LP4:    CLR     CLINCT                  ;RESET LINE COUNT
1176  003304  012777  000012  175120            MOV     #12,@LPDBR              ;LINE FEED
1177  003312  105777  175112                    TSTB    @LPCSR
1178  003316  100375                            BPL     .-4
1179  003320  026727  177632  000137            CMP     SOLPAT,#137             ;START OF LINE PATTERN
1180  003326  001403                            BEQ     LP5
1181  003330  005267  177622                    INC     SOLPAT                  ;INCREMENT START OF LINE
1182  003334  000707                            BR      LP1
1183  003336  012767  000040  177612    LP5:    MOV     #40,SOLPAT              ;RESET START OF LINE
1184  003344  000703                            BR      LP1                     ;PRINT
1185
1186                                    ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
1187  003346  005077  175110            RKSTART:        CLR     @RKDAE  ;INIT
1188  003352  013777  003600  175106    RK1:    MOV     @#LLIMIT,@RKBAR         ;CORE BASE
1189  003360  013777  003602  175076            MOV     @#WORDCT,@RKWC          ;TRANSFER LENGTH
1190  003366  113777  003440  175074            MOVB    @#RKFUNCT,@RKCSR        ;WRITE OR WRITE CK TO DSK
1191  003374  000002                            RTI                             ;RETURN TO MAINLINE
1192  003376  032777  100200  175064    IRK:    BIT     #100200,@RKCSR          ;INTERRUPT RETURN
1193  003404  003002                            BGT     .+6
1194  003406  104006                            HLT
1195  003410  000756                            BR      RKSTART
1196  003412  032777  000037  175042            BIT     #37,@RKDAE              ;DISK AT UPPER LIMIT?
1197  003420  001354                            BNE     RK1
1198  003422  122777  000031  175030            CMPB    #31,@RKDAH
1199  003430  001350                            BNE     RK1
1200  003432  000337  003440                    SWAB    @#RKFUNCT               ;CHANGE COMMAND
1201  003436  000743                            BR      RKSTART                 ;RESTART NEW TRANSFER OF DISK
1202  003440  000000                    RKFUNCT:        0
1203
1204                                    ;RF11 DISK
1205  003442  105277  175004            RFSTART:        INCB    @RFCSRH         ;INITIALIZE DISK - DAR-DAE
1206  003446  013777  003600  174772    RF1:    MOV     @#LLIMIT,@RFCAR         ;CORE BASE
1207  003454  013777  003602  174762            MOV     @#WORDCT,@RFWC          ;LENGTH OF TRANSFER
1208  003462  113777  003576  174760            MOVB    @#RFFUNCT,@RFCSR                ;WRITE OR WRITE CHECK TO DISK
1209  003470  000002                            RTI                             ;RETURN TO MAINLINE CODE
1210  003472  105777  174752            IRF:    TSTB    @RFCSR                  ;INTERRUPT VECTOR POINTS HERE
1211  003476  100402                            BMI     .+6
1212  003500  104006                            HLT                             ;RF11 READY NOT UP
1213  003502  000757                            BR      RFSTART
```

```
1214  003504  005777  174740          TST     @RFCSR          ;ERROR SET?
1215  003510  100012                  BPL     ERROK           ;BRANCH IF NOT
1216  003512  032777  020000  174730  BIT     #20000,@RFCSR   ;YES-WRITE CHECK ERROR?
1217  003520  001404                  BEQ     ERRSET          ;NO-BRANCH
1218  003522  104006                  HLT                     ;YES-RF11 WRITE CHECK ERROR
1219  003524  000337  003576          SWAB    @#RFFUNCT       ;CHANGE COMMAND TO DO WRITE
1220  003530  000744                  BR      RFSTART
1221  003532  104006          ERRSET: HLT                     ;RF11 ERROR SET-NOT WRITE CHECK
1222  003534  000742                  BR      RFSTART
1223  003536  005777  174702  ERROK:  TST     @RFWC
1224  003542  100002                  BPL     .+6
1225  003544  104006                  HLT                     ;RF-11 WORD COUNT NOT ZERO
1226  003546  000735                  BR      RFSTART
1227  003550  122777  000003  174662  CMPB    #3,@RFDAE       ;DISK AT UPPER LIMIT? 7=2, 17=4, 37=8
1228  003556  001333                  BNE     RF1             ;NO
1229  003560  027727  174656  174000  CMP     @RFDAR,#174000  ;AS FAR ON DISK AS WE CAN GO
1230  003566  101727                  BLOS    RF1             ;NO
1231  003570  000337  003576          SWAB    @#RFFUNCT       ;CHANGE COMMAND
1232  003574  000722                  BR      RFSTART         ;RESTART NEW TRANSFER OF DISK
1233  003576  000000          RFFUNCT:        0               ;DISK COMMAND
1234  003600  005452          LLIMIT: BEGIN                   ;FIRST CORE ADDRESS OF TRANSFER
1235  003602  176000          WORDCT: -2000                   ;LENGTH OF TRANSFER
1236
1237                          ;DECTAPE DIAGNOSTIC ROUTINE.  THE TAPE IS FIRST DRIVEN TO THE FORWARD
1238                          ;END ZONE. THE DESIRED DATA IS THEN GENERATED IN THE DECTAPE BUFFER AREA
1239                          ;AND DATA IS WRITTEN ONTO ALL BLOCKS FROM THE BLOCK NUMBER IN TCFRST
1240                          ;THRU THE BLOCK NUMBER IN TCLAST.  BLOCK NUMBERS ARE ALSO CHECKED FOR
1241                          ;BEING IN ORDER. AFTER THE BLOCK NUMBER IN TCLAST IS WRITTEN, TAPE IS
1242                          ;DRIVEN INTO THE REVERSE END ZONE.
1243                          ;THE TAPE IS THEN STARTED IN REVERSE, AND WHEN THE CLOSEST BLOCK THAT
1244                          ;WAS WRITTEN (TCLAST) IS FOUND, IT IS READ INTO THE DECTAPE BUFFER AREA.
1245                          ;THE PROGRAM INTERRUPT REQUEST FACILITY IS THEN USED TO BOOK A REQUEST
1246                          ;FOR CHECKING THE DATA AT LEVEL 3, AND NO FURTHER DATA IS READ IN
1247                          ;UNTIL THAT DATA HAS BEEN CHECKED.  AFTER IT IS CHECKED, THE DATA IS
1248                          ;SCRAMBLED TO GUARANTEE THAT NEW DATA IS REALLY READ IN NEXT TIME. WHILE
1249                          ;THIS IS GOING ON, BLOCK NUMBERS ARE CHECKED FOR BEING IN ORDER AS THE
1250                          ;TAPE TRAVELS TOWARD THE FORWARD END ZONE.ONCE THE DATA IS FULLY CHECKED
1251                          ;THE NEXT BLOCK THAT COMES UP IS READ IN AND THE PROCESS REPEATED.  ONCE
1252                          ;THE BLOCK WHOSE NUMBER IS IN TCFRST HAS BEEN READ, THE TAPE IS DRIVEN
1253                          ;INTO THE FORWARD END ZONE AND THE WHOLE SEQUENCE IS REPEATED.
1254
1255                          ;FUNCTION VALUES IN CSR
1256                          ;DT11 DEC TAPE
1257          000004          RD=4                            ;READ DATA
1258          000014          WD=14                           ;WRITE DATA
1259          000002          RB=2
1260          000500          IE=500                          ;INTERRUPT ENABLE+UNIT 1
1261          000001          DO=1                            ;DO - THE FUNCTION
1262          004000          R=4000                          ;REVERSE
1263
1264  003604  000000          TCFIRST:        0               ;FIRST BLOCK TO BE SEARCHED FOR
1265  003606  001101          TCLAST: 577.                    ;LAST BLOCK TO BE SEARCHED FOR
1266  003610  000000          TCEXPE: 0                       ;THE BLOCK THAT IS EXPECTED
1267
1268                          ;GO TO FORWARD END ZONE
1269  003612  012777  003612  174744  FENDZ:  MOV     #FENDZ,@TCIV    ;END ZONE VECTOR SETUP
```

```
1270  003620  005777  174730                TST     @TCST           ;TEST FOR END ZONE
1271  003624  100403                      BMI     FEND1           ;AT END ZONE?
1272  003626  105277  174720                INCB    @TCCM           ;SET DO - NO DELAY
1273  003632  000002                      RTI                     ;NO - WAIT SOME MORE
1274  003634  012777  003664  174722  FEND1:  MOV     #TCF1,@TCIV     ;YES - NEW VECTOR
1275  003642  042777  104000  174702        BIC     #104000,@TCCM   ;SEARCH BLOCK FOWARD
1276  003650  016767  177730  177732        MOV     TCFIRST,TCEXPE  ;COUNT WHEN THIS BLOCK IS FOUND
1277  003656  105277  174670        TCF1A:  INCB    @TCCM           ;SET DO
1278  003662  000002                      RTI                     ;RETURN ON NEXT BLOCK
1279  003664  032777  100200  174660  TCF1:   BIT     #100200,@TCCM   ;ANY ERROR ON READ?
1280  003672  100001                      BPL     .+4
1281  003674  104006                      HLT                     ;TC ERROR SET - FORWARD READ BLOCK
1282  003676  001001                      BNE     .+4             ;DONE FLAG UP?
1283  003700  104006                      HLT                     ;FALSE INTERRUPT
1284  003702  027767  174650  177700        CMP     @TCDT,TCEXPE    ;IS THIS OUR BLOCK FOR SYNC
1285  003710  002762                      BLT     TCF1A           ;NO-READ SOME MORE BLOCKS
1286  003712  001401                      BEQ     TCF2            ;YES
1287  003714  104006                      HLT                     ;WE PASSED THE BLOCK
1288
1289  003716  012777  003732  174640  TCF2:   MOV     #TCF3,@TCIV     ;VECTOR FOR SEQUENTIAL READS
1290  003724  105277  174622                INCB    @TCCM           ;SET DO
1291  003730  000002                      RTI                     ;RETURN AND TEST SEQENTIAL BLOCKS
1292
1293                                ;FIND SEQUENTIAL BLOCK AT FOWARD DIRECTION
1294  003732  032777  100200  174612  TCF3:   BIT     #100200,@TCCM   ;TEST ERROR AND READY
1295  003740  100001                      BPL     .+4
1296  003742  104006                      HLT                     ;FOWARD READ ERROR TC-11
1297  003744  001001                      BNE     .+4
1298  003746  104006                      HLT                     ;FALSE INTERRUPT ON TC-11
1299  003750  027767  174602  177630        CMP     @TCDT,TCLAST    ;HAVE WE TESTED ALL BLOCKS
1300  003756  001414                      BEQ     RENDZ           ;YES DRIVE UNIT IN END ZONE TO START OVER
1301  003760  005267  177624                INC     TCEXPE          ;NO-INCREMENT EXPECTED COUNT
1302  003764  027767  174566  177616        CMP     @TCDT,TCEXPE    ;IS CURRENT BLOCK CORRECT
1303  003772  001401                      BEQ     .+4
1304  003774  104006                      HLT                     ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
1305  003776  000427                      BR      TCWBK           ;THIS ROUTINE WRITES A BLOCK
1306  004000  105277  174546        TCF4:   INCB    @TCCM           ;SET DO
1307  004004  000002                      RTI
1308  004006  000701                XFENDZ: BR      FENDZ           ;INDIRECT LINK
1309
1310                                ;MOVE TAPE TO REVERSE END ZONE
1311  004010  012777  004010  174546  RENDZ:  MOV     #RENDZ,@TCIV    ;END ZONE VECTOR SETUP
1312  004016  016767  177564  177564        MOV     TCLAST,TCEXPE   ;SET UP FOR REVERSE SEARCH
1313  004024  005777  174524                TST     @TCST           ;IN END ZONE
1314  004030  100403                      BMI     REND1           ;YES - START TO TURN UNIT AROUND
1315  004032  105277  174514                INCB    @TCCM           ;SET DO
1316  004036  000002                      RTI                     ;NO - WAIT TILL WE ARE
1317  004040  012777  004503  174504  REND1:  MOV     #R+IE+RB+DO,@TCCM ;FUNCTION = READ BLOCK, REVERSE AND GO
1318  004046  012777  004136  174510        MOV     #TCR1,@TCIV     ;SET UP NEW INTERRUPT VECTOR
1319  004054  000002                      RTI
1320                                ;WRITE FORWARD ALL BLOCKS EXCEPT 0
1321
1322  004056  012777  004110  174500  TCWBK:  MOV     #TCWB1,@TCIV    ;INTERRUPT VECTOR FOR WRITE
1323  004064  012777  177400  174466        MOV     #-400,@TCWC     ;ONE BLOCK
1324  004072  012777  004420  174462        MOV     #TCWBUF,@TCBA   ;THE WRITE BUFFER ADDRESS
1325  004100  112777  000515  174444        MOVB    #IE+WD+DO,@TCCM ;WRITE THE BLOCK
```

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1326  004106  000002                          RTI             ;RETURN WHEN BLOCK IS WRITTEN
1327  004110  005777  174436          TCWB1:  TST     @TCCM   ;ANY ERRORS
1328  004114  100001                          BPL     .+4
1329  004116  104006                          HLT
1330  004120  012777  003732  174436          MOV     #TCF3,@TCIV     ;SEARCH BLOCK VECTOR
1331  004126  112777  000502  174416          MOVB    #IE+RB,@TCCM    ;READ BLOCK
1332  004134  000721                          BR      TCF4    ;FIND THE NEXT BLOCK
1333
1334  004136  032777  100200  174406  TCR1:   BIT     #100200,@TCCM   ;TEST FOR ERROR AND READY
1335  004144  100001                          BPL     .+4
1336  004146  104006                          HLT             ;DECTAPE ERROR ON READ BLOCK REVERSE
1337  004150  001001                          BNE     .+4
1338  004152  104006                          HLT             ;FALSE INTERRUPT FROM DECTAPE
1339  004154  027767  174376  177426          CMP     @TCDT,TCEXPE    ;IS IT OUR FIRST BLOCK
1340  004162  001406                          BEQ     TCR2    ;YES - GO TEST THE REST
1341  004164  002002                          BGE     TCR1A   ;NO - HAVE WE PASSED THE BLOCK
1342  004166  104006                          HLT             ;WE PASS OUR BLOCK
1343  004170  000707                          BR      RENDZ   ;GO TO END ZONE AND TRY AGAIN
1344  004172  105277  174354          TCR1A:  INCB    @TCCM   ;SET DO
1345  004176  000002                          RTI             ;WE FOUND OUR FIRST BLOCK
1346  004200  012777  004214  174356  TCR2:   MOV     #TCR3,@TCIV     ;SET UP INTERRUPT TO TEST ALL BLOCKS
1347  004206  105277  174340                  INCB    @TCCM   ;SET DO
1348  004212  000002                          RTI             ;WAIT FOR NEXT BLOCK TO INTERRUPT
1349
1350                                  ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
1351  004214  032777  100200  174330  TCR3:   BIT     #100200,@TCCM   ;TEST FOR READ AND ERROR
1352  004222  100001                          BPL     .+4
1353  004224  104006                          HLT             ;ERROR READING SEQUENTIAL BLOCK IN REVERSE
1354  004226  001001                          BNE     .+4
1355  004230  104006                          HLT             ;FALSE DECTAPE INTERRUPT
1356  004232  026777  177346  174316          CMP     TCFIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1357  004240  001662                          BEQ     XFENDZ  ;YES - GO TO END ZONE TO RESTART
1358  004242  005367  177342                  DEC     TCEXPE  ;NO - DECREMENT BLOCK NUMBER
1359  004246  027767  174304  177334          CMP     @TCDT,TCEXPE    ;TEST SEQUENTAIL BLOCK IN REVERSE
1360  004254  001401                          BEQ     .+4
1361  004256  104006                          HLT             ;TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1362  004260  000403                          BR      TCRBK   ;THIS ROUTINE READ A BLOCK
1363  004262  105277  174264          TCR4:   INCB    @TCCM   ;SET DO
1364  004266  000002                          RTI             ;LETS TRY A NEW BLOCK
1365
1366                                  ;READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1367  004270  012777  004326  174266  TCRBK:  MOV     #TCRB1,@TCIV    ;SET UP INTERRUPT VECTOR
1368  004276  012777  177400  174254          MOV     #-400,@TCWC     ;READ ONE BLOCK
1369  004304  012777  004420  174250          MOV     #TCRBUF,@TCBA   ;WHERE BUFFER IS
1370  004312  112777  000505  174232          MOVB    #IE+RD+DO,@TCCM ;READ THE BLOCK
1371  004320  004767  000030                  JSR     %7,TC1  ;CHECK DATA BUFFER
1372  004324  000002                          RTI             ;EXIT - RETURN WHEN BLOCK IS READ
1373  004326  005777  174220          TCRB1:  TST     @TCCM   ;AND ERRORS
1374  004332  100001                          BPL     .+4
1375  004334  104006                          HLT             ;DECTAPE ERROR
1376  004336  012777  004214  174220          MOV     #TCR3,@TCIV     ;NEW VECTOR FOR BLOCK SEARCH
1377  004344  112777  000502  174200          MOVB    #IE+RB,@TCCM    ;READ BLOCK FUNCTION
1378  004352  000743                          BR      TCR4    ;RETURN TO BLOCK SEARCH
1379
1380                                  ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
1381                                  ;BY DOING A CHECK SUM ON THE DATA
```

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1382  004354  010146                    TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
1383  004356  010246                            MOV     %2,-(6)
1384  004360  010346                            MOV     %3,-(6)
1385  004362  005003                            CLR     %3              ;SUM OF DATA
1386  004364  012701  004420                    MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
1387  004370  012702  005420                    MOV     #TCRBUF+1000,%2 ;END OF READ BUFFER
1388  004374  062103                    TC2:    ADD     (1)+,%3         ;EVEN ADD
1389  004376  062103                            ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
1390  004400  001401                            BEQ     .+4
1391  004402  104006                            HLT                     ;DATA ERROR TC-11
1392  004404  020102                            CMP     %1,%2           ;AT END OF BUFFER?
1393  004406  001372                            BNE     TC2             ;NO - SUM THE REST
1394  004410  012603                            MOV     (6)+,%3         ;RESTORE THE REGISTERS
1395  004412  012602                            MOV     (6)+,%2
1396  004414  012601                            MOV     (6)+,%1
1397  004416  000207                            RTS     %7              ;EXIT
1398
1399                                    ;THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1400  004420                            TCWBUF:
1401  004420                            TCRBUF:
1402          000001                            N=1
1403  004420  000001                            N                       ;DECTAPE WRITE BUFFER
1404  004422  177777                            -N
1405          000002                            N=N+1
1406  004424  000002                            N                       ;DECTAPE WRITE BUFFER
1407  004426  177776                            -N
1408          000003                            N=N+1
1409  004430  000003                            N                       ;DECTAPE WRITE BUFFER
1410  004432  177775                            -N
1411          000004                            N=N+1
1412  004434  000004                            N                       ;DECTAPE WRITE BUFFER
1413  004436  177774                            -N
1414          000005                            N=N+1
1415  004440  000005                            N                       ;DECTAPE WRITE BUFFER
1416  004442  177773                            -N
1417          000006                            N=N+1
1418  004444  000006                            N                       ;DECTAPE WRITE BUFFER
1419  004446  177772                            -N
1420          000007                            N=N+1
1421  004450  000007                            N                       ;DECTAPE WRITE BUFFER
1422  004452  177771                            -N
1423          000010                            N=N+1
1424  004454  000010                            N                       ;DECTAPE WRITE BUFFER
1425  004456  177770                            -N
1426          000011                            N=N+1
1427  004460  000011                            N                       ;DECTAPE WRITE BUFFER
1428  004462  177767                            -N
1429          000012                            N=N+1
1430  004464  000012                            N                       ;DECTAPE WRITE BUFFER
1431  004466  177766                            -N
1432          000013                            N=N+1
1433  004470  000013                            N                       ;DECTAPE WRITE BUFFER
1434  004472  177765                            -N
1435          000014                            N=N+1
1436  004474  000014                            N                       ;DECTAPE WRITE BUFFER
1437  004476  177764                            -N
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1438                000015                          N=N+1
1439  004500        000015                          N               ;DECTAPE WRITE BUFFER
1440  004502        177763                          -N
1441                000016                          N=N+1
1442  004504        000016                          N               ;DECTAPE WRITE BUFFER
1443  004506        177762                          -N
1444                000017                          N=N+1
1445  004510        000017                          N               ;DECTAPE WRITE BUFFER
1446  004512        177761                          -N
1447                000020                          N=N+1
1448  004514        000020                          N               ;DECTAPE WRITE BUFFER
1449  004516        177760                          -N
1450                000021                          N=N+1
1451  004520        000021                          N               ;DECTAPE WRITE BUFFER
1452  004522        177757                          -N
1453                000022                          N=N+1
1454  004524        000022                          N               ;DECTAPE WRITE BUFFER
1455  004526        177756                          -N
1456                000023                          N=N+1
1457  004530        000023                          N               ;DECTAPE WRITE BUFFER
1458  004532        177755                          -N
1459                000024                          N=N+1
1460  004534        000024                          N               ;DECTAPE WRITE BUFFER
1461  004536        177754                          -N
1462                000025                          N=N+1
1463  004540        000025                          N               ;DECTAPE WRITE BUFFER
1464  004542        177753                          -N
1465                000026                          N=N+1
1466  004544        000026                          N               ;DECTAPE WRITE BUFFER
1467  004546        177752                          -N
1468                000027                          N=N+1
1469  004550        000027                          N               ;DECTAPE WRITE BUFFER
1470  004552        177751                          -N
1471                000030                          N=N+1
1472  004554        000030                          N               ;DECTAPE WRITE BUFFER
1473  004556        177750                          -N
1474                000031                          N=N+1
1475  004560        000031                          N               ;DECTAPE WRITE BUFFER
1476  004562        177747                          -N
1477                000032                          N=N+1
1478  004564        000032                          N               ;DECTAPE WRITE BUFFER
1479  004566        177746                          -N
1480                000033                          N=N+1
1481  004570        000033                          N               ;DECTAPE WRITE BUFFER
1482  004572        177745                          -N
1483                000034                          N=N+1
1484  004574        000034                          N               ;DECTAPE WRITE BUFFER
1485  004576        177744                          -N
1486                000035                          N=N+1
1487  004600        000035                          N               ;DECTAPE WRITE BUFFER
1488  004602        177743                          -N
1489                000036                          N=N+1
1490  004604        000036                          N               ;DECTAPE WRITE BUFFER
1491  004606        177742                          -N
1492                000037                          N=N+1
1493  004610        000037                          N               ;DECTAPE WRITE BUFFER
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1494  004612  177741                          -N
1495          000040                          N=N+1
1496  004614  000040                          N               ;DECTAPE WRITE BUFFER
1497  004616  177740                          -N
1498          000041                          N=N+1
1499  004620  000041                          N               ;DECTAPE WRITE BUFFER
1500  004622  177737                          -N
1501          000042                          N=N+1
1502  004624  000042                          N               ;DECTAPE WRITE BUFFER
1503  004626  177736                          -N
1504          000043                          N=N+1
1505  004630  000043                          N               ;DECTAPE WRITE BUFFER
1506  004632  177735                          -N
1507          000044                          N=N+1
1508  004634  000044                          N               ;DECTAPE WRITE BUFFER
1509  004636  177734                          -N
1510          000045                          N=N+1
1511  004640  000045                          N               ;DECTAPE WRITE BUFFER
1512  004642  177733                          -N
1513          000046                          N=N+1
1514  004644  000046                          N               ;DECTAPE WRITE BUFFER
1515  004646  177732                          -N
1516          000047                          N=N+1
1517  004650  000047                          N               ;DECTAPE WRITE BUFFER
1518  004652  177731                          -N
1519          000050                          N=N+1
1520  004654  000050                          N               ;DECTAPE WRITE BUFFER
1521  004656  177730                          -N
1522          000051                          N=N+1
1523  004660  000051                          N               ;DECTAPE WRITE BUFFER
1524  004662  177727                          -N
1525          000052                          N=N+1
1526  004664  000052                          N               ;DECTAPE WRITE BUFFER
1527  004666  177726                          -N
1528          000053                          N=N+1
1529  004670  000053                          N               ;DECTAPE WRITE BUFFER
1530  004672  177725                          -N
1531          000054                          N=N+1
1532  004674  000054                          N               ;DECTAPE WRITE BUFFER
1533  004676  177724                          -N
1534          000055                          N=N+1
1535  004700  000055                          N               ;DECTAPE WRITE BUFFER
1536  004702  177723                          -N
1537          000056                          N=N+1
1538  004704  000056                          N               ;DECTAPE WRITE BUFFER
1539  004706  177722                          -N
1540          000057                          N=N+1
1541  004710  000057                          N               ;DECTAPE WRITE BUFFER
1542  004712  177721                          -N
1543          000060                          N=N+1
1544  004714  000060                          N               ;DECTAPE WRITE BUFFER
1545  004716  177720                          -N
1546          000061                          N=N+1
1547  004720  000061                          N               ;DECTAPE WRITE BUFFER
1548  004722  177717                          -N
1549          000062                          N=N+1
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1550  004724  000062                          N                       ;DECTAPE WRITE BUFFER
1551  004726  177716                          -N
1552          000063                          N=N+1
1553  004730  000063                          N                       ;DECTAPE WRITE BUFFER
1554  004732  177715                          -N
1555          000064                          N=N+1
1556  004734  000064                          N                       ;DECTAPE WRITE BUFFER
1557  004736  177714                          -N
1558          000065                          N=N+1
1559  004740  000065                          N                       ;DECTAPE WRITE BUFFER
1560  004742  177713                          -N
1561          000066                          N=N+1
1562  004744  000066                          N                       ;DECTAPE WRITE BUFFER
1563  004746  177712                          -N
1564          000067                          N=N+1
1565  004750  000067                          N                       ;DECTAPE WRITE BUFFER
1566  004752  177711                          -N
1567          000070                          N=N+1
1568  004754  000070                          N                       ;DECTAPE WRITE BUFFER
1569  004756  177710                          -N
1570          000071                          N=N+1
1571  004760  000071                          N                       ;DECTAPE WRITE BUFFER
1572  004762  177707                          -N
1573          000072                          N=N+1
1574  004764  000072                          N                       ;DECTAPE WRITE BUFFER
1575  004766  177706                          -N
1576          000073                          N=N+1
1577  004770  000073                          N                       ;DECTAPE WRITE BUFFER
1578  004772  177705                          -N
1579          000074                          N=N+1
1580  004774  000074                          N                       ;DECTAPE WRITE BUFFER
1581  004776  177704                          -N
1582          000075                          N=N+1
1583  005000  000075                          N                       ;DECTAPE WRITE BUFFER
1584  005002  177703                          -N
1585          000076                          N=N+1
1586  005004  000076                          N                       ;DECTAPE WRITE BUFFER
1587  005006  177702                          -N
1588          000077                          N=N+1
1589  005010  000077                          N                       ;DECTAPE WRITE BUFFER
1590  005012  177701                          -N
1591          000100                          N=N+1
1592  005014  000100                          N                       ;DECTAPE WRITE BUFFER
1593  005016  177700                          -N
1594          000101                          N=N+1
1595          000100                          N=N-1
1596  005020  177700                          -N
1597  005022  000100                          N                       ;DEC TAPE WRITE BUFFER
1598          000077                          N=N-1
1599  005024  177701                          -N
1600  005026  000077                          N                       ;DEC TAPE WRITE BUFFER
1601          000076                          N=N-1
1602  005030  177702                          -N
1603  005032  000076                          N                       ;DEC TAPE WRITE BUFFER
1604          000075                          N=N-1
1605  005034  177703                          -N
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1606  005036  000075                    N                   ;DEC TAPE WRITE BUFFER
1607          000074                    N=N-1
1608  005040  177704                    -N
1609  005042  000074                    N                   ;DEC TAPE WRITE BUFFER
1610          000073                    N=N-1
1611  005044  177705                    -N
1612  005046  000073                    N                   ;DEC TAPE WRITE BUFFER
1613          000072                    N=N-1
1614  005050  177706                    -N
1615  005052  000072                    N                   ;DEC TAPE WRITE BUFFER
1616          000071                    N=N-1
1617  005054  177707                    -N
1618  005056  000071                    N                   ;DEC TAPE WRITE BUFFER
1619          000070                    N=N-1
1620  005060  177710                    -N
1621  005062  000070                    N                   ;DEC TAPE WRITE BUFFER
1622          000067                    N=N-1
1623  005064  177711                    -N
1624  005066  000067                    N                   ;DEC TAPE WRITE BUFFER
1625          000066                    N=N-1
1626  005070  177712                    -N
1627  005072  000066                    N                   ;DEC TAPE WRITE BUFFER
1628          000065                    N=N-1
1629  005074  177713                    -N
1630  005076  000065                    N                   ;DEC TAPE WRITE BUFFER
1631          000064                    N=N-1
1632  005100  177714                    -N
1633  005102  000064                    N                   ;DEC TAPE WRITE BUFFER
1634          000063                    N=N-1
1635  005104  177715                    -N
1636  005106  000063                    N                   ;DEC TAPE WRITE BUFFER
1637          000062                    N=N-1
1638  005110  177716                    -N
1639  005112  000062                    N                   ;DEC TAPE WRITE BUFFER
1640          000061                    N=N-1
1641  005114  177717                    -N
1642  005116  000061                    N                   ;DEC TAPE WRITE BUFFER
1643          000060                    N=N-1
1644  005120  177720                    -N
1645  005122  000060                    N                   ;DEC TAPE WRITE BUFFER
1646          000057                    N=N-1
1647  005124  177721                    -N
1648  005126  000057                    N                   ;DEC TAPE WRITE BUFFER
1649          000056                    N=N-1
1650  005130  177722                    -N
1651  005132  000056                    N                   ;DEC TAPE WRITE BUFFER
1652          000055                    N=N-1
1653  005134  177723                    -N
1654  005136  000055                    N                   ;DEC TAPE WRITE BUFFER
1655          000054                    N=N-1
1656  005140  177724                    -N
1657  005142  000054                    N                   ;DEC TAPE WRITE BUFFER
1658          000053                    N=N-1
1659  005144  177725                    -N
1660  005146  000053                    N                   ;DEC TAPE WRITE BUFFER
1661          000052                    N=N-1
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1662  005150  177726                          -N
1663  005152  000052                          N                   ;DEC TAPE WRITE BUFFER
1664          000051                          N=N-1
1665  005154  177727                          -N
1666  005156  000051                          N                   ;DEC TAPE WRITE BUFFER
1667          000050                          N=N-1
1668  005160  177730                          -N
1669  005162  000050                          N                   ;DEC TAPE WRITE BUFFER
1670          000047                          N=N-1
1671  005164  177731                          -N
1672  005166  000047                          N                   ;DEC TAPE WRITE BUFFER
1673          000046                          N=N-1
1674  005170  177732                          -N
1675  005172  000046                          N                   ;DEC TAPE WRITE BUFFER
1676          000045                          N=N-1
1677  005174  177733                          -N
1678  005176  000045                          N                   ;DEC TAPE WRITE BUFFER
1679          000044                          N=N-1
1680  005200  177734                          -N
1681  005202  000044                          N                   ;DEC TAPE WRITE BUFFER
1682          000043                          N=N-1
1683  005204  177735                          -N
1684  005206  000043                          N                   ;DEC TAPE WRITE BUFFER
1685          000042                          N=N-1
1686  005210  177736                          -N
1687  005212  000042                          N                   ;DEC TAPE WRITE BUFFER
1688          000041                          N=N-1
1689  005214  177737                          -N
1690  005216  000041                          N                   ;DEC TAPE WRITE BUFFER
1691          000040                          N=N-1
1692  005220  177740                          -N
1693  005222  000040                          N                   ;DEC TAPE WRITE BUFFER
1694          000037                          N=N-1
1695  005224  177741                          -N
1696  005226  000037                          N                   ;DEC TAPE WRITE BUFFER
1697          000036                          N=N-1
1698  005230  177742                          -N
1699  005232  000036                          N                   ;DEC TAPE WRITE BUFFER
1700          000035                          N=N-1
1701  005234  177743                          -N
1702  005236  000035                          N                   ;DEC TAPE WRITE BUFFER
1703          000034                          N=N-1
1704  005240  177744                          -N
1705  005242  000034                          N                   ;DEC TAPE WRITE BUFFER
1706          000033                          N=N-1
1707  005244  177745                          -N
1708  005246  000033                          N                   ;DEC TAPE WRITE BUFFER
1709          000032                          N=N-1
1710  005250  177746                          -N
1711  005252  000032                          N                   ;DEC TAPE WRITE BUFFER
1712          000031                          N=N-1
1713  005254  177747                          -N
1714  005256  000031                          N                   ;DEC TAPE WRITE BUFFER
1715          000030                          N=N-1
1716  005260  177750                          -N
1717  005262  000030                          N                   ;DEC TAPE WRITE BUFFER
```

```
1718            000027                          N=N-1
1719  005264    177751                          -N
1720  005266    000027                          N               ;DEC TAPE WRITE BUFFER
1721            000026                          N=N-1
1722  005270    177752                          -N
1723  005272    000026                          N               ;DEC TAPE WRITE BUFFER
1724            000025                          N=N-1
1725  005274    177753                          -N
1726  005276    000025                          N               ;DEC TAPE WRITE BUFFER
1727            000024                          N=N-1
1728  005300    177754                          -N
1729  005302    000024                          N               ;DEC TAPE WRITE BUFFER
1730            000023                          N=N-1
1731  005304    177755                          -N
1732  005306    000023                          N               ;DEC TAPE WRITE BUFFER
1733            000022                          N=N-1
1734  005310    177756                          -N
1735  005312    000022                          N               ;DEC TAPE WRITE BUFFER
1736            000021                          N=N-1
1737  005314    177757                          -N
1738  005316    000021                          N               ;DEC TAPE WRITE BUFFER
1739            000020                          N=N-1
1740  005320    177760                          -N
1741  005322    000020                          N               ;DEC TAPE WRITE BUFFER
1742            000017                          N=N-1
1743  005324    177761                          -N
1744  005326    000017                          N               ;DEC TAPE WRITE BUFFER
1745            000016                          N=N-1
1746  005330    177762                          -N
1747  005332    000016                          N               ;DEC TAPE WRITE BUFFER
1748            000015                          N=N-1
1749  005334    177762                          -N
1750  005336    000015                          N               ;DEC TAPE WRITE BUFFER
1751            000014                          N=N-1
1752  005340    177764                          -N
1753  005342    000014                          N               ;DEC TAPE WRITE BUFFER
1754            000013                          N=N-1
1755  005344    177765                          -N
1756  005346    000013                          N               ;DEC TAPE WRITE BUFFER
1757            000012                          N=N-1
1758  005350    177766                          -N
1759  005352    000012                          N               ;DEC TAPE WRITE BUFFER
1760            000011                          N=N-1
1761  005354    177767                          -N
1762  005356    000011                          N               ;DEC TAPE WRITE BUFFER
1763            000010                          N=N-1
1764  005360    177770                          -N
1765  005362    000010                          N               ;DEC TAPE WRITE BUFFER
1766            000007                          N=N-1
1767  005364    177771                          -N
1768  005366    000007                          N               ;DEC TAPE WRITE BUFFER
1769            000006                          N=N-1
1770  005370    177772                          -N
1771  005372    000006                          N               ;DEC TAPE WRITE BUFFER
1772            000005                          N=N-1
1773  005374    177773                          -N
```

```
1774  005376  000005                          N                       ;DEC TAPE WRITE BUFFER
1775          000004                          N=N-1
1776  005400  177774                          -N
1777  005402  000004                          N                       ;DEC TAPE WRITE BUFFER
1778          000003                          N=N-1
1779  005404  177775                          -N
1780  005406  000003                          N                       ;DEC TAPE WRITE BUFFER
1781          000002                          N=N-1
1782  005410  177776                          -N
1783  005412  000002                          N                       ;DEC TAPE WRITE BUFFER
1784          000001                          N=N-1
1785  005414  177777                          -N
1786  005416  000001                          N                       ;DEC TAPE WRITE BUFFER
1787
1788  005420  010701                  BEGINX: MOV     PC,R1           ;SET UP R1 TO SELECT CURBNK
1789  005422  042701  017777                  BIC     #17777,R1
1790  005426  042737  160000  000034        BIC     #160000,@#34            ;SET SCOPE RET TO CURRENT BANK
1791  005434  050137  000034                BIS     R1,@#34
1792  005440  000301                        SWAB    R1
1793  005442  006201                        ASR     R1
1794  005444  006201                        ASR     R1
1795  005446  010137  000570                MOV     R1,@#CURBNK
1796
1797                                  .SBTTL  BACKGROUND CPU TESTS
1798                          ;BINARY INSTRUCTIONS
1799                          ;INDEX, AND INDIRECT TEST OF PDP-11
1800  005452  010767  007262  BEGIN:  MOV     PC,RETURN               ;FOR SCOPING - SETUP ADDRESS OF BEGIN1 IN
1801  005456  062767  000014  007254        ADD     #14,RETURN              ;THIS BANK THRU CURRENT ASR
1802  005464  012767  000400  007242        MOV     #400,ICOUNT             ;ITERATION COUNT
1803                          ;TEST COMPARE INSTRUCTION INDEXED
1804  005472  012700  177770                MOV     #-10,%0                 ;MINUS 10 TO REG 0
1805  005476  026027  014752  125252        CMP     A(0),#125252            ;(A INDEX BY MINUS 10) TO #125252
1806  005504  001401                        BEQ     .+4
1807  005506  104006                        HLT                             ;COMPARE WITH INDEX FAILED
1808  005510  104400                        SCOPE
1809
1810  005512  012700  000010                MOV     #10,%0
1811  005516  022760  052525  014752        CMP     #052525,A(0)
1812  005524  001401                        BEQ     .+4
1813  005526  104006                        HLT
1814  005530  104400                        SCOPE
1815
1816  005532  012700  177770                MOV     #-10,%0
1817  005536  026060  014752  014752        CMP     A(0),A(0)
1818  005544  001401                        BEQ     .+4
1819  005546  104006                        HLT
1820  005550  104400                        SCOPE
1821
1822  005552  012700  000010                MOV     #+10,%0
1823  005556  026060  014752  014752        CMP     A(0),A(0)
1824  005564  001401                        BEQ     .+4
1825  005566  104006                        HLT
1826  005570  104400                        SCOPE
1827
1828  005572  012700  177774                MOV     #-4,%0
1829  005576  012701  000010                MOV     #+10,%1
```

```
1830   005602  026061  014752  014752          CMP     A(0),A(1)
1831   005610  001401                          BEQ     .+4
1832   005612  104006                          HLT
1833   005614  104400                          SCOPE
1834
1835   005616  012700  177774                  MOV     #-4,%0
1836   005622  012701  000010                  MOV     #10,%1
1837   005626  026160  014752  014752          CMP     A(1),A(0)
1838   005634  001401                          BEQ     .+4
1839   005636  104006                          HLT
1840   005640  104400                          SCOPE
1841
1842                                  ;TEST MOVE INSTRUCTION FOR INDEX
1843
1844   005642  012700  177770                  MOV     #-10,%0
1845   005646  016067  014752  007120          MOV     A(0),TEMP
1846   005654  026727  007114  125252          CMP     TEMP,#125252
1847   005662  001401                          BEQ     .+4
1848   005664  104006                          HLT
1849   005666  104400                          SCOPE
1850
1851   005670  012700  177770                  MOV     #-10,%0
1852   005674  012760  125252  014774          MOV     #125252,TEMP(0)
1853   005702  023727  014764  125252          CMP     @#C,#125252
1854   005710  001401                          BEQ     .+4
1855   005712  104006                          HLT
1856   005714  104400                          SCOPE
1857
1858                                  ;TEST BIC INSTRUCTION FOR INDEXING
1859   005716  012767  177777  007050          MOV     #-1,TEMP
1860   005724  012700  177770                  MOV     #-10,%0
1861   005730  046067  014752  007036          BIC     A(0),TEMP
1862   005736  026727  007032  052525          CMP     TEMP,#052525
1863   005744  001401                          BEQ     .+4
1864   005746  104006                          HLT
1865   005750  104400                          SCOPE
1866
1867   005752  012700  177770                  MOV     #-10,%0
1868   005756  012767  177777  007000          MOV     #-1,TEMP-10
1869   005764  042767  052525  006772          BIC     #052525,TEMP-10
1870   005772  026727  006766  125252          CMP     TEMP-10,#125252
1871   006000  001401                          BEQ     .+4
1872   006002  104006                          HLT
1873   006004  104400                          SCOPE
1874
1875   006006  012737  125252  014774          MOV     #125252,@#TEMP
1876   006014  012700  177770                  MOV     #-10,%0
1877   006020  166760  006716  015004          SUB     B,TEMP+10(0)
1878   006026  001401                          BEQ     .+4
1879   006030  104006                          HLT
1880   006032  104400                          SCOPE
1881
1882   006034  012737  052525  014774          MOV     #052525,@#TEMP
1883   006042  012700  000010                  MOV     #10,%0
1884   006046  166760  006710  014764          SUB     A+10,C(0)
1885   006054  001401                          BEQ     .+4
```

```
 1886  006056  104006                          HLT
 1887  006060  104400                          SCOPE
 1888
 1889                                  ;TEST UNARYS INDEXED
 1890
 1891  006062  012737  177777  014774          MOV     #-1,@#TEMP
 1892  006070  012700  000010                  MOV     #+10,%0
 1893  006074  005060  014764                  CLR     C(0)
 1894  006100  005737  014774                  TST     @#TEMP
 1895  006104  001401                          BEQ     .+4
 1896  006106  104006                          HLT
 1897  006110  104400                          SCOPE
 1898
 1899  006112  012737  177777  014774          MOV     #-1,@#TEMP
 1900  006120  012700  000010                  MOV     #10,%0
 1901  006124  005160  014764                  COM     C(0)
 1902  006130  005737  014774                  TST     @#TEMP
 1903  006134  001401                          BEQ     .+4
 1904  006136  104006                          HLT
 1905  006140  104400                          SCOPE
 1906
 1907  006142  012737  177777  014774          MOV     #-1,@#TEMP
 1908  006150  012700  177770                  MOV     #-10,%0
 1909  006154  005260  015004                  INC     D(0)
 1910  006160  005737  014774                  TST     @#TEMP
 1911  006164  001401                          BEQ     .+4
 1912  006166  104006                          HLT
 1913  006170  104400                          SCOPE
 1914
 1915  006172  012737  000001  014774          MOV     #1,@#TEMP
 1916  006200  012700  177770                  MOV     #-10,%0
 1917  006204  005360  015004                  DEC     D(0)
 1918  006210  005737  014774                  TST     @#TEMP
 1919  006214  001401                          BEQ     .+4
 1920  006216  104006                          HLT
 1921  006220  104400                          SCOPE
 1922
 1923  006222  012737  000001  014774          MOV     #1,@#TEMP
 1924  006230  012700  000010                  MOV     #10,%0
 1925  006234  005360  014764                  DEC     C(0)
 1926  006240  005737  014774                  TST     @#TEMP
 1927  006244  001401                          BEQ     .+4
 1928  006246  104006                          HLT
 1929  006250  104400                          SCOPE
 1930
 1931  006252  012737  000001  014774          MOV     #1,@#TEMP
 1932  006260  012700  177770                  MOV     #-10,%0
 1933  006264  005460  015004                  NEG     D(0)
 1934  006270  022737  177777  014774          CMP     #-1,@#TEMP
 1935  006276  001401                          BEQ     .+4
 1936  006300  104006                          HLT
 1937  006302  104400                          SCOPE
 1938
 1939  006304  012737  000001  014774          MOV     #1,@#TEMP
 1940  006312  012700  000010                  MOV     #+10,%0
 1941  006316  005460  014764                  NEG     C(0)
```

```
 1942  006322  022737  177777  014774          CMP     #-1,@#TEMP
 1943  006330  001401                          BEQ     .+4
 1944  006332  104006                          HLT
 1945  006334  104400                          SCOPE
 1946
 1947  006336  012737  177777  014774          MOV     #-1,@#TEMP
 1948  006344  012700  177770                  MOV     #-10,%0
 1949  006350  000261                          SEC
 1950  006352  005560  015004                  ADC     D(0)
 1951  006356  005737  014774                  TST     @#TEMP
 1952  006362  001401                          BEQ     .+4
 1953  006364  104006                          HLT
 1954  006366  104400                          SCOPE
 1955
 1956  006370  012737  177777  014774          MOV     #-1,@#TEMP
 1957  006376  012700  000010                  MOV     #+10,%0
 1958  006402  000261                          SEC
 1959  006404  005560  014764                  ADC     C(0)
 1960  006410  005737  014774                  TST     @#TEMP
 1961  006414  001401                          BEQ     .+4
 1962  006416  104006                          HLT
 1963  006420  104400                          SCOPE
 1964
 1965  006422  012737  000001  014774          MOV     #1,@#TEMP
 1966  006430  012700  177770                  MOV     #-10,%0
 1967  006434  000261                          SEC
 1968  006436  005660  015004                  SBC     D(0)
 1969  006442  005737  014774                  TST     @#TEMP
 1970  006446  001401                          BEQ     .+4
 1971  006450  104006                          HLT
 1972  006452  104400                          SCOPE
 1973
 1974  006454  012737  000001  014774          MOV     #1,@#TEMP
 1975  006462  012700  000010                  MOV     #+10,%0
 1976  006466  000261                          SEC
 1977  006470  005660  014764                  SBC     C(0)
 1978  006474  005737  014774                  TST     @#TEMP
 1979  006500  001401                          BEQ     .+4
 1980  006502  104006                          HLT
 1981  006504  104400                          SCOPE
 1982
 1983                          ;TEST JMP INDIRECT
 1984  006506  010700                          MOV     %7,%0
 1985  006510  062700  000010                  ADD     #10,%0
 1986  006514  000110                          JMP     @%0
 1987  006516  104006                          HLT
 1988  006520  000240                          NOP
 1989  006522  104400                          SCOPE
 1990
 1991  006524  010700                          MOV     %7,%0
 1992  006526  062700  000010                  ADD     #10,%0
 1993  006532  000110                          JMP     @%0
 1994  006534  104006                          HLT
 1995  006536  000240                          NOP
 1996  006540  104400                          SCOPE
 1997
```

```
1998                                            ;TEST INDIRECT ADDRESSING
1999                                            ;TEST COMPARE INSTRUCTION
2000  006542  023727  014742  125252            CMP     @#B,#125252
2001  006550  001401                            BEQ     .+4
2002  006552  104006                            HLT
2003  006554  104400                            SCOPE
2004
2005  006556  022737  125252  014742            CMP     #125252,@#B
2006  006564  001401                            BEQ     .+4
2007  006566  104006                            HLT
2008  006570  104400                            SCOPE
2009
2010  006572  023737  014742  014742            CMP     @#B,@#B
2011  006600  001401                            BEQ     .+4
2012  006602  104006                            HLT
2013  006604  104400                            SCOPE
2014
2015                                            ;TEST MOVE INSTRUCTIONS
2016  006606  013700  014742                    MOV     @#B,%0
2017  006612  022700  125252                    CMP     #125252,%0
2018  006616  001401                            BEQ     .+4
2019  006620  104006                            HLT
2020  006622  104400                            SCOPE
2021
2022  006624  012737  125252  014774            MOV     #125252,@#TEMP
2023  006632  023737  014742  014774            CMP     @#B,@#TEMP
2024  006640  001401                            BEQ     .+4
2025  006642  104006                            HLT
2026  006644  104400                            SCOPE
2027
2028  006646  013737  014742  014764            MOV     @#B,@#C
2029  006654  023737  014742  014764            CMP     @#B,@#C
2030  006662  001401                            BEQ     .+4
```

```
  2031  006664  104006                          HLT
```

```
  2032  006666  104400                          SCOPE
  2033
  2034                                  ;TEST BIC INSTRUCTION INDIRECT
  2035  006670  012700  177777                  MOV     #-1,%0
```

```
 2036  006674  043700  014742                  BIC     @#B,%0
 2037  006700  020027  052525                  CMP     %0,#052525
 2038  006704  001401                          BEQ     .+4
 2039  006706  104006                          HLT
 2040  006710  104400                          SCOPE
 2041
 2042  006712  012737  177777  014774          MOV     #-1,@#TEMP
 2043  006720  042737  125252  014774          BIC     #125252,@#TEMP
 2044  006726  022737  052525  014774          CMP     #052525,@#TEMP
 2045  006734  001401                          BEQ     .+4
 2046  006736  104006                          HLT
 2047  006740  104400                          SCOPE
```

```
2048
2049  006742  012737  177777  014764          MOV     #-1,@#C
2050  006750  043737  014742  014764          BIC     @#B,@#C
2051  006756  023727  014764  052525          CMP     @#C,#52525
2052  006764  001401                          BEQ     .+4
2053  006766  104006                          HLT
2054  006770  104400                          SCOPE
2055
2056                                  ;TEST SUBTRACT INSTRUCTION
2057  006772  012700  125252                  MOV     #125252,%0
2058  006776  163700  014742                  SUB     @#B,%0
2059  007002  020027  000000                  CMP     %0,#0
2060  007006  001401                          BEQ     .+4
2061  007010  104006                          HLT
2062  007012  104400                          SCOPE
2063
2064  007014  012737  125252  014774          MOV     #125252,@#TEMP
2065  007022  166737  005714  014774          SUB     B,@#TEMP
2066  007030  001401                          BEQ     .+4
2067  007032  104006                          HLT
2068  007034  104400                          SCOPE
2069
2070  007036  012767  125252  005730          MOV     #125252,TEMP
2071  007044  163767  014742  005722          SUB     @#B,TEMP
2072  007052  005767  005716                  TST     TEMP
2073  007056  001401                          BEQ     .+4
2074  007060  104006                          HLT
2075  007062  104400                          SCOPE
2076
2077                                  ;TEST ADD INDIRECT
2078  007064  005000                          CLR     %0
2079  007066  063700  014742                  ADD     @#B,%0
2080  007072  022700  125252                  CMP     #125252,%0
2081  007076  001401                          BEQ     .+4
2082  007100  104006                          HLT
2083  007102  104400                          SCOPE
2084
2085  007104  005037  014774                  CLR     @#TEMP
2086  007110  062737  125252  014774          ADD     #125252,@#TEMP
2087  007116  022737  125252  014774          CMP     #125252,@#TEMP
2088  007124  001401                          BEQ     .+4
2089  007126  104006                          HLT
2090  007130  104400                          SCOPE
2091
2092  007132  012737  125252  014774          MOV     #125252,@#TEMP
2093  007140  067737  005614  014774          ADD     @A+6,@#TEMP
2094  007146  023727  014774  177777          CMP     @#TEMP,#-1
2095  007154  001401                          BEQ     .+4
2096  007156  104006                          HLT
2097  007160  104400                          SCOPE
2098
2099                                  ;TEST UNARYS INDIRECT
2100  007162  012737  177777  014774          MOV     #-1,@#TEMP
2101  007170  005037  014774                  CLR     @#TEMP
2102  007174  005737  014774                  TST     @#TEMP
2103  007200  001401                          BEQ     .+4
```

```
 2104  007202  104006                          HLT
 2105  007204  104400                          SCOPE
 2106
 2107  007206  012737  125252  014774          MOV     #125252,@#TEMP
 2108  007214  005137  014774                  COM     @#TEMP
 2109  007220  022737  052525  014774          CMP     #052525,@#TEMP
 2110  007226  001401                          BEQ     .+4
 2111  007230  104006                          HLT
 2112  007232  104400                          SCOPE
 2113
 2114  007234  005037  014774                  CLR     @#TEMP
 2115  007240  005237  014774                  INC     @#TEMP
 2116  007244  022737  000001  014774          CMP     #1,@#TEMP
 2117  007252  001401                          BEQ     .+4
 2118  007254  104006                          HLT
 2119  007256  104400                          SCOPE
 2120
 2121  007260  005037  014774                  CLR     @#TEMP
 2122  007264  005377  005506                  DEC     @TEMP+2
 2123  007270  023727  014774  177777          CMP     @#TEMP,#-1
 2124  007276  001401                          BEQ     .+4
 2125  007300  104006                          HLT
 2126  007302  104400                          SCOPE
 2127
 2128  007304  012737  000001  014774          MOV     #1,@#TEMP
 2129  007312  005437  014774                  NEG     @#TEMP
 2130  007316  022737  177777  014774          CMP     #-1,@#TEMP
 2131  007324  001401                          BEQ     .+4
 2132  007326  104006                          HLT
 2133  007330  104400                          SCOPE
 2134
 2135                                  ;TEST INDIRECT ADDRESSING WITH INDEXING
 2136                                  ;TEST COMPARE INSTRUCTION
 2137  007332  027727  005406  125252            CMP     @B+2,#125252
 2138  007340  001401                            BEQ     .+4
 2139  007342  104006                            HLT
 2140  007344  104400                            SCOPE
 2141
 2142  007346  022777  125252  005370            CMP     #125252,@B+2
 2143  007354  001401                            BEQ     .+4
 2144  007356  104006                            HLT
 2145  007360  104400                            SCOPE
 2146
 2147  007362  027777  005356  005354            CMP     @B+2,@B+2
 2148  007370  001401                            BEQ     .+4
 2149  007372  104006                            HLT
 2150  007374  104400                            SCOPE
 2151
 2152                                  ;TEST MOVE INSTRUCTIONS
 2153  007376  017700  005342                    MOV     @B+2,%0
 2154  007402  022700  125252                    CMP     #125252,%0
 2155  007406  001401                            BEQ     .+4
 2156  007410  104006                            HLT
 2157  007412  104400                            SCOPE
 2158
 2159  007414  012777  125252  005354            MOV     #125252,@TEMP+2
```

```
 2160  007422  023737  014742  014774          CMP     @#B,@#TEMP
 2161  007430  001401                          BEQ     .+4
 2162  007432  104006                          HLT
 2163  007434  104400                          SCOPE
 2164
 2165  007436  017777  005302  005322          MOV     @B+2,@C+2
 2166  007444  023737  014742  014764          CMP     @#B,@#C
 2167  007452  001401                          BEQ     .+4
 2168  007454  104006                          HLT
 2169  007456  104400                          SCOPE
 2170
 2171                          ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
 2172  007460  012700  177777                  MOV     #-1,%0
 2173  007464  047700  005254                  BIC     @B+2,%0
 2174  007470  020027  052525                  CMP     %0,#52525
 2175  007474  001401                          BEQ     .+4
 2176  007476  104006                          HLT
 2177  007500  104400                          SCOPE
 2178
 2179  007502  012737  177777  014774          MOV     #-1,@#TEMP
 2180  007510  042777  125252  005260          BIC     #125252,@TEMP+2
 2181  007516  022737  052525  014774          CMP     #52525,@#TEMP
 2182  007524  001401                          BEQ     .+4
 2183  007526  104006                          HLT
 2184  007530  104400                          SCOPE
 2185
 2186  007532  012737  177777  014764          MOV     #-1,@#C
 2187  007540  047777  005200  005220          BIC     @B+2,@C+2
 2188  007546  026737  005210  014764          CMP     A+10,@#C
 2189  007554  001401                          BEQ     .+4
 2190  007556  104006                          HLT
 2191  007560  104400                          SCOPE
 2192
 2193  007562  012700  125252                  MOV     #125252,%0
 2194  007566  167700  005152                  SUB     @B+2,%0
 2195  007572  020027  000000                  CMP     %0,#0
 2196  007576  001401                          BEQ     .+4
 2197  007600  104006                          HLT
 2198  007602  104400                          SCOPE
 2199
 2200  007604  012737  125252  014774          MOV     #125252,@#TEMP
 2201  007612  166777  005124  005156          SUB     B,@TEMP+2
 2202  007620  001401                          BEQ     .+4
 2203  007622  104006                          HLT
 2204  007624  104400                          SCOPE
 2205
 2206  007626  012737  125252  014774          MOV     #125252,@#TEMP
 2207  007634  167777  005104  005134          SUB     @B+2,@TEMP+2
 2208  007642  005737  014774                  TST     @#TEMP
 2209  007646  001401                          BEQ     .+4
 2210  007650  104006                          HLT
 2211  007652  104400                          SCOPE
 2212
 2213                          ;TEST ADD INDIRECT WITH INDEXING
 2214  007654  005000                          CLR     %0
 2215  007656  067700  005062                  ADD     @B+2,%0
```

```
 2216  007662  022700  125252                  CMP     #125252,%0
 2217  007666  001401                          BEQ     .+4
 2218  007670  104006                          HLT
 2219  007672  104400                          SCOPE
 2220
 2221  007674  005037  014774                  CLR     @#TEMP
 2222  007700  062777  125252  005070          ADD     #125252,@TEMP+2
 2223  007706  022737  125252  014774          CMP     #125252,@#TEMP
 2224  007714  001401                          BEQ     .+4
 2225  007716  104006                          HLT
 2226  007720  104400                          SCOPE
 2227
 2228  007722  012737  125252  014774          MOV     #125252,@#TEMP
 2229  007730  067777  005024  005040          ADD     @A+6,@TEMP+2
 2230  007736  023727  014774  177777          CMP     @#TEMP,#-1
 2231  007744  001401                          BEQ     .+4
 2232  007746  104006                          HLT
 2233  007750  104400                          SCOPE
 2234
 2235                                  ;TEST UNARYS INDIRECT WITH INDEXING
 2236  007752  012737  177777  014774          MOV     #-1,@#TEMP
 2237  007760  005077  005012                  CLR     @TEMP+2
 2238  007764  005737  014774                  TST     @#TEMP
 2239  007770  001401                          BEQ     .+4
 2240  007772  104006                          HLT
 2241  007774  104400                          SCOPE
 2242
 2243  007776  012737  125252  014774          MOV     #125252,@#TEMP
 2244  010004  005177  004766                  COM     @TEMP+2
 2245  010010  022737  052525  014774          CMP     #052525,@#TEMP
 2246  010016  001401                          BEQ     .+4
 2247  010020  104006                          HLT
 2248  010022  104400                          SCOPE
 2249
 2250  010024  005037  014774                  CLR     @#TEMP
 2251  010030  005277  004742                  INC     @TEMP+2
 2252  010034  022737  000001  014774          CMP     #1,@#TEMP
 2253  010042  001401                          BEQ     .+4
 2254  010044  104006                          HLT
 2255  010046  104400                          SCOPE
 2256
 2257  010050  005037  014774                  CLR     @#TEMP
 2258  010054  005377  004716                  DEC     @TEMP+2
 2259  010060  023727  014774  177777          CMP     @#TEMP,#-1
 2260  010066  001401                          BEQ     .+4
 2261  010070  104006                          HLT
 2262  010072  104400                          SCOPE
 2263
 2264  010074  012737  000001  014774          MOV     #1,@#TEMP
 2265  010102  005477  004670                  NEG     @TEMP+2
 2266  010106  022737  177777  014774          CMP     #-1,@#TEMP
 2267  010114  001401                          BEQ     .+4
 2268  010116  104006                          HLT
 2269  010120  104400                          SCOPE
 2270
 2271  010122  012737  177777  014774          MOV     #-1,@#TEMP
```

```
 2272  010130  000261                          SEC
 2273  010132  005577  004640                 ADC     @TEMP+2
 2274  010136  005737  014774                 TST     @#TEMP
 2275  010142  001401                          BEQ     .+4
 2276  010144  104006                          HLT
 2277  010146  104400                          SCOPE
 2278
 2279  010150  012737  000001  014774          MOV     #1,@#TEMP
 2280  010156  000261                          SEC
 2281  010160  005677  004612                 SBC     @TEMP+2
 2282  010164  005737  014774                 TST     @#TEMP
 2283  010170  001401                          BEQ     .+4
 2284  010172  104006                          HLT
 2285  010174  104400                          SCOPE
 2286
 2287                                  ;TEST OF COMBINED INDEXING AND INDIRECT
 2288  010176  012700  177772                 MOV     #-6,%0
 2289  010202  027027  014752  125252          CMP     @A(0),#125252
 2290  010210  001401                          BEQ     .+4
 2291  010212  104006                          HLT
 2292  010214  104400                          SCOPE
 2293
 2294  010216  012700  177772                 MOV     #-6,%0
 2295  010222  022770  125252  014752          CMP     #125252,@A(0)
 2296  010230  001401                          BEQ     .+4
 2297  010232  104006                          HLT
 2298  010234  104400                          SCOPE
 2299
 2300  010236  012700  177772                 MOV     #-6,%0
 2301  010242  012701  000002                 MOV     #+2,%1
 2302  010246  027071  014752  014752          CMP     @A(0),@A(1)
 2303  010254  001401                          BEQ     .+4
 2304  010256  104006                          HLT
 2305  010260  104400                          SCOPE
 2306
 2307                                  ;TEST BIC INSTRUCTION
 2308  010262  012700  000006                 MOV     #+6,%0
 2309  010266  012767  177777  004500          MOV     #-1,TEMP
 2310  010274  047067  014752  004472          BIC     @A(0),TEMP
 2311  010302  022767  125252  004464          CMP     #125252,TEMP
 2312  010310  001401                          BEQ     .+4
 2313  010312  104006                          HLT
 2314  010314  104400                          SCOPE
 2315
 2316  010316  012700  177772                 MOV     #-6,%0
 2317  010322  012737  177777  014764          MOV     #-1,@#C
 2318  010330  042770  125252  014774          BIC     #125252,@TEMP(0)
 2319  010336  023727  014764  052525          CMP     @#C,#052525
 2320  010344  001401                          BEQ     .+4
 2321  010346  104006                          HLT
 2322  010350  104400                          SCOPE
 2323
 2324  010352  012737  177777  014764          MOV     #-1,@#C
 2325  010360  012700  177772                 MOV     #-6,%0
 2326  010364  012701  177772                 MOV     #-6,%1
 2327  010370  047071  014752  014774          BIC     @A(0),@TEMP(1)
```

```
2328  010376  022737  052525  014764          CMP     #052525,@#C
2329  010404  001401                          BEQ     .+4
2330  010406  104006                          HLT
2331  010410  104400                          SCOPE
2332
2333                                  ;BINARY INSTRUCTIONS
2334                                  ;INDEX, AND INDIRECT TEST OF PDP-11
2335                                  ;TEST COMPARE INSTRUCTION INDEXED
2336  010412  012700  177770                  MOV     #-10,%0                 ;MINUS 10 TO REG 0
2337  010416  126027  014752  000252          CMPB    A(0),#000252            ;(A INDEX BY MINUS 10) TO #125252
2338  010424  001401                          BEQ     .+4
2339  010426  104006                          HLT                             ;COMPARE WITH INDEX FAILED
2340  010430  104400                          SCOPE
2341
2342  010432  012700  177770                  MOV     #-10,%0                 ;FOR INDEX
2343  010436  122760  000252  014752          CMPB    #000252,A(0)            ;A INDEXED
2344  010444  001401                          BEQ     .+4
2345  010446  104006                          HLT
2346  010450  104400                          SCOPE
2347
2348  010452  012700  000010                  MOV     #10,%0                  ;INDEX
2349  010456  126027  014752  000125          CMPB    A(0),#000125
2350  010464  001401                          BEQ     .+4
2351  010466  104006                          HLT
2352  010470  104400                          SCOPE
2353
2354  010472  012700  000010                  MOV     #10,%0
2355  010476  122760  000125  014752          CMPB    #000125,A(0)
2356  010504  001401                          BEQ     .+4
2357  010506  104006                          HLT
2358  010510  104400                          SCOPE
2359
2360  010512  012700  177770                  MOV     #-10,%0
2361  010516  126060  014752  014752          CMPB    A(0),A(0)
2362  010524  001401                          BEQ     .+4
2363  010526  104006                          HLT
2364  010530  104400                          SCOPE
2365
2366  010532  012700  000010                  MOV     #+10,%0
2367  010536  126060  014752  014752          CMPB    A(0),A(0)
2368  010544  001401                          BEQ     .+4
2369  010546  104006                          HLT
2370  010550  104400                          SCOPE
2371
2372  010552  012700  177770                  MOV     #-10,%0
2373  010556  012701  000004                  MOV     #+4,%1
2374  010562  126061  014752  014752          CMPB    A(0),A(1)
2375  010570  001401                          BEQ     .+4
2376  010572  104006                          HLT
2377  010574  104400                          SCOPE
2378
2379  010576  126160  014752  014752          CMPB    A(1),A(0)
2380  010604  001401                          BEQ     .+4
2381  010606  104006                          HLT
2382  010610  104400                          SCOPE
2383
```

```
 2384  010612  012700  177774                  MOV     #-4,%0
 2385  010616  012701  000010                  MOV     #+10,%1
 2386  010622  126061  014752  014752          CMPB    A(0),A(1)
 2387  010630  001401                          BEQ     .+4
 2388  010632  104006                          HLT
 2389  010634  104400                          SCOPE
 2390
 2391  010636  012700  177774                  MOV     #-4,%0
 2392  010642  012701  000010                  MOV     #10,%1
 2393  010646  126160  014752  014752          CMPB    A(1),A(0)
 2394  010654  001401                          BEQ     .+4
 2395  010656  104006                          HLT
 2396  010660  104400                          SCOPE
 2397
 2398                                  ;TEST MOVE INSTRUCTION FOR INDEX
 2399  010662  012700  177770                  MOV     #-10,%0
 2400  010666  116067  014752  004100          MOVB    A(0),TEMP
 2401  010674  126727  004074  000252          CMPB    TEMP,#000252
 2402  010702  001401                          BEQ     .+4
 2403  010704  104006                          HLT
 2404  010706  104400                          SCOPE
 2405
 2406  010710  012700  000010                  MOV     #+10,%0
 2407  010714  116067  014752  004052          MOVB    A(0),TEMP
 2408  010722  126727  004046  000125          CMPB    TEMP,#000125
 2409  010730  001401                          BEQ     .+4
 2410  010732  104006                          HLT
 2411  010734  104400                          SCOPE
 2412
 2413  010736  012700  177770                  MOV     #-10,%0
 2414  010742  112760  125252  014774          MOVB    #125252,TEMP(0)
 2415  010750  123727  014764  125252          CMPB    @#C,#125252
 2416  010756  001401                          BEQ     .+4
 2417  010760  104006                          HLT
 2418  010762  104400                          SCOPE
 2419
 2420  010764  012700  000010                  MOV     #+10,%0
 2421  010770  112760  052525  014774          MOVB    #052525,TEMP(0)
 2422  010776  123727  015004  052525          CMPB    @#TEMP+10,#052525
 2423  011004  001401                          BEQ     .+4
 2424  011006  104006                          HLT
 2425  011010  104400                          SCOPE
 2426
 2427                                  ;TEST BIC INSTRUCTION FOR INDEXING
 2428  011012  012767  177777  003754          MOV     #-1,TEMP
 2429  011020  012700  177770                  MOV     #-10,%0
 2430  011024  146067  014752  003742          BICB    A(0),TEMP
 2431  011032  126727  003736  177525          CMPB    TEMP,#177525
 2432  011040  001401                          BEQ     .+4
 2433  011042  104006                          HLT
 2434  011044  104400                          SCOPE
 2435
 2436  011046  012767  177777  003720          MOV     #-1,TEMP
 2437  011054  012700  000010                  MOV     #10,%0
 2438  011060  146067  014752  003706          BICB    A(0),TEMP
 2439  011066  126727  003702  007652          CMPB    TEMP,#007652
```

```
 2440  011074  001401                          BEQ     .+4
 2441  011076  104006                          HLT
 2442  011100  104400                          SCOPE
 2443
 2444  011102  012737  177777  015004          MOV     #-1,@#TEMP+10
 2445  011110  012700  000010                  MOV     #10,%0
 2446  011114  142760  125252  014774          BICB    #125252,TEMP(0)
 2447  011122  123727  015004  002525          CMPB    @#TEMP+10,#2525
 2448  011130  001401                          BEQ     .+4
 2449  011132  104006                          HLT
 2450  011134  104400                          SCOPE
 2451
 2452  011136  012700  177770                  MOV     #-10,%0
 2453  011142  012767  177777  003614          MOV     #-1,TEMP-10
 2454  011150  142767  052525  003606          BICB    #052525,TEMP-10
 2455  011156  126727  003602  125252          CMPB    TEMP-10,#125252
 2456  011164  001401                          BEQ     .+4
 2457  011166  104006                          HLT
 2458  011170  104400                          SCOPE
 2459
 2460                          ;TEST UNARYS INDEXED
 2461  011172  012737  177777  014774          MOV     #-1,@#TEMP
 2462  011200  012700  177770                  MOV     #-10,%0
 2463  011204  105060  015004                  CLRB    D(0)
 2464  011210  105737  014774                  TSTB    @#TEMP
 2465  011214  001401                          BEQ     .+4
 2466  011216  104006                          HLT
 2467  011220  104400                          SCOPE
 2468
 2469  011222  012737  177777  014774          MOV     #-1,@#TEMP
 2470  011230  012700  177770                  MOV     #-10,%0
 2471  011234  105060  015004                  CLRB    D(0)
 2472  011240  023727  014774  177400          CMP     @#TEMP,#177400
 2473  011246  001401                          BEQ     .+4
 2474  011250  104006                          HLT
 2475  011252  104400                          SCOPE
 2476
 2477  011254  012737  177777  014774          MOV     #-1,@#TEMP
 2478  011262  012700  177771                  MOV     #-7,%0
 2479  011266  105060  015004                  CLRB    D(0)
 2480  011272  023727  014774  000377          CMP     @#TEMP,#000377
 2481  011300  001401                          BEQ     .+4
 2482  011302  104006                          HLT
 2483  011304  104400                          SCOPE
 2484
 2485  011306  012737  177777  014774          MOV     #-1,@#TEMP
 2486  011314  012700  000010                  MOV     #+10,%0
 2487  011320  105060  014764                  CLRB    C(0)
 2488  011324  105737  014774                  TSTB    @#TEMP
 2489  011330  001401                          BEQ     .+4
 2490  011332  104006                          HLT
 2491  011334  104400                          SCOPE
 2492
 2493  011336  012737  177777  014774          MOV     #-1,@#TEMP
 2494  011344  012700  177770                  MOV     #-10,%0
 2495  011350  105160  015004                  COMB    D(0)
```

```
2496  011354  105737  014774                  TSTB    @#TEMP
2497  011360  001401                          BEQ     .+4
2498  011362  104006                          HLT
2499  011364  104400                          SCOPE
2500
2501  011366  012737  177777  014774          MOV     #-1,@#TEMP
2502  011374  012700  000010                  MOV     #+10,%0
2503  011400  105260  014764                  INCB    C(0)
2504  011404  105737  014774                  TSTB    @#TEMP
2505  011410  001401                          BEQ     .+4
2506  011412  104006                          HLT
2507  011414  104400                          SCOPE
2508
2509  011416  012737  000001  014774          MOV     #1,@#TEMP
2510  011424  012700  177770                  MOV     #-10,%0
2511  011430  105360  015004                  DECB    D(0)
2512  011434  105737  014774                  TSTB    @#TEMP
2513  011440  001401                          BEQ     .+4
2514  011442  104006                          HLT
2515  011444  104400                          SCOPE
2516
2517  011446  012737  000001  014774          MOV     #1,@#TEMP
2518  011454  012700  000010                  MOV     #+10,%0
2519  011460  105460  014764                  NEGB    C(0)
2520  011464  023727  014774  000377          CMP     @#TEMP,#377
2521  011472  001401                          BEQ     .+4
2522  011474  104006                          HLT
2523  011476  104400                          SCOPE
2524
2525  011500  012737  177777  014774          MOV     #-1,@#TEMP
2526  011506  012700  177770                  MOV     #-10,%0
2527  011512  000261                          SEC
2528  011514  105560  015004                  ADCB    D(0)
2529  011520  023727  014774  177400          CMP     @#TEMP,#177400
2530  011526  001401                          BEQ     .+4
2531  011530  104006                          HLT
2532  011532  104400                          SCOPE
2533
2534  011534  012737  000001  014774          MOV     #1,@#TEMP
2535  011542  012700  000010                  MOV     #+10,%0
2536  011546  000261                          SEC
2537  011550  105660  014764                  SBCB    C(0)
2538  011554  005737  014774                  TST     @#TEMP
2539  011560  001401                          BEQ     .+4
2540  011562  104006                          HLT
2541  011564  104400                          SCOPE
2542
2543                                  ;TEST INDIRECT ADDRESSING
2544                                  ;TEST COMPARE INSTRUCTION
2545  011566  123727  014742  000252          CMPB    @#8,#000252
2546  011574  001401                          BEQ     .+4
2547  011576  104006                          HLT
2548  011600  104400                          SCOPE
2549
2550  011602  122737  125252  014742          CMPB    #125252,@#8
2551  011610  001401                          BEQ     .+4
```

```
2552  011612  104006                          HLT
2553  011614  104400                          SCOPE
2554
2555                                  ;TEST MOVE INSTRUCTIONS
2556  011616  113700  014742                  MOVB    @#B,%0
2557  011622  122700  000252                  CMPB    #000252,%0
2558  011626  001401                          BEQ     .+4
2559  011630  104006                          HLT
2560  011632  104400                          SCOPE
2561
2562  011634  112737  125252  014774          MOVB    #125252,@#TEMP
2563  011642  126737  003074  014774          CMPB    B,@#TEMP
2564  011650  001401                          BEQ     .+4
2565  011652  104006                          HLT
2566  011654  104400                          SCOPE
2567
2568                                  ;TEST UNARYS INDIRECT
2569  011656  012737  177777  014774          MOV     #-1,@#TEMP
2570  011664  105037  014774                  CLRB    @#TEMP
2571  011670  023727  014774  177400          CMP     @#TEMP,#177400
2572  011676  001401                          BEQ     .+4
2573  011700  104006                          HLT
2574  011702  104400                          SCOPE
2575
2576  011704  012737  125252  014774          MOV     #125252,@#TEMP
2577  011712  105137  014775                  COMB    @#TEMP+1
2578  011716  022737  052652  014774          CMP     #052652,@#TEMP
2579  011724  001401                          BEQ     .+4
2580  011726  104006                          HLT
2581  011730  104400                          SCOPE
2582
2583  011732  005037  014774                  CLR     @#TEMP
2584  011736  105237  014775                  INCB    @#TEMP+1
2585  011742  022737  000400  014774          CMP     #400,@#TEMP
2586  011750  001401                          BEQ     .+4
2587  011752  104006                          HLT
2588  011754  104400                          SCOPE
2589
2590  011756  005037  014774                  CLR     @#TEMP
2591  011762  105377  003010                  DECB    @TEMP+2
2592  011766  023727  014774  000377          CMP     @#TEMP,#377
2593  011774  001401                          BEQ     .+4
2594  011776  104006                          HLT
2595  012000  104400                          SCOPE
2596
2597  012002  005037  014774                  CLR     @#TEMP
2598  012006  112737  000001  014775          MOVB    #1,@#TEMP+1
2599  012014  105437  014775                  NEGB    @#TEMP+1
2600  012020  022737  177400  014774          CMP     #177400,@#TEMP
2601  012026  001401                          BEQ     .+4
2602  012030  104006                          HLT
2603  012032  104400                          SCOPE
2604
2605                                  ;TEST INDIRECT ADDRESSING WITH INDEXING
2606                                  ;TEST COMPARE INSTRUCTION
2607
```

```
 2608  012034  122777  125252  002702          CMPB    #125252,@B+2
 2609  012042  001401                          BEQ     .+4
 2610  012044  104006                          HLT
 2611  012046  104400                          SCOPE
 2612
 2613  012050  127777  002670  002666          CMPB    @B+2,@B+2
 2614  012056  001401                          BEQ     .+4
 2615  012060  104006                          HLT
 2616  012062  104400                          SCOPE
 2617
 2618                                  ;TEST MOVE INSTRUCTIONS
 2619  012064  117700  002654                  MOVB    @B+2,%0
 2620  012070  122700  125252                  CMPB    #125252,%0
 2621  012074  001401                          BEQ     .+4
 2622  012076  104006                          HLT
 2623  012100  104400                          SCOPE
 2624
 2625  012102  112777  125252  002666          MOVB    #125252,@TEMP+2
 2626  012110  126737  002626  014774          CMPB    B,@#TEMP
 2627  012116  001401                          BEQ     .+4
 2628  012120  104006                          HLT
 2629  012122  104400                          SCOPE
 2630
 2631  012124  117777  002614  002634          MOVB    @B+2,@C+2
 2632  012132  126737  002604  014764          CMPB    B,@#C
 2633  012140  001401                          BEQ     .+4
 2634  012142  104006                          HLT
 2635  012144  104400                          SCOPE
 2636
 2637                                  ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
 2638  012146  012700  177777                  MOV     #-1,%0
 2639  012152  147700  002566                  BICB    @B+2,%0
 2640  012156  120027  052525                  CMPB    %0,#52525
 2641  012162  001401                          BEQ     .+4
 2642  012164  104006                          HLT
 2643  012166  104400                          SCOPE
 2644
 2645  012170  012737  177777  014774          MOV     #-1,@#TEMP
 2646  012176  142777  125252  002572          BICB    #125252,@TEMP+2
 2647  012204  122737  052525  014774          CMPB    #52525,@#TEMP
 2648  012212  001401                          BEQ     .+4
 2649  012214  104006                          HLT
 2650  012216  104400                          SCOPE
 2651
 2652  012220  012737  177777  014764          MOV     #-1,@#C
 2653  012226  147777  002512  002532          BICB    @B+2,@C+2
 2654  012234  126737  002522  014764          CMPB    A+10,@#C
 2655  012242  001401                          BEQ     .+4
 2656  012244  104006                          HLT
 2657  012246  104400                          SCOPE
 2658
 2659                                  ;TEST UNARYS INDIRECT WITH INDEXING
 2660  012250  012737  177777  014774          MOV     #-1,@#TEMP
 2661  012256  105077  002514                  CLRB    @TEMP+2
 2662  012262  105737  014774                  TSTB    @#TEMP
 2663  012266  001401                          BEQ     .+4
```

```
2664  012270  104006                          HLT
2665  012272  104400                          SCOPE
2666
2667  012274  005037  014774                  CLR     @#TEMP
2668  012300  105277  002472                  INCB    @TEMP+2
2669  012304  122737  000001  014774          CMPB    #1,@#TEMP
2670  012312  001401                          BEQ     .+4
2671  012314  104006                          HLT
2672  012316  104400                          SCOPE
2673
2674  012320  005037  014774                  CLR     @#TEMP
2675  012324  105377  002446                  DECB    @TEMP+2
2676  012330  123727  014774  177777          CMPB    @#TEMP,#-1
2677  012336  001401                          BEQ     .+4
2678  012340  104006                          HLT
2679  012342  104400                          SCOPE
2680
2681  012344  012737  000001  014774          MOV     #1,@#TEMP
2682  012352  105477  002420                  NEGB    @TEMP+2
2683  012356  122737  177777  014774          CMPB    #-1,@#TEMP
2684  012364  001401                          BEQ     .+4
2685  012366  104006                          HLT
2686  012370  104400                          SCOPE
2687
2688  012372  012737  177777  014774          MOV     #-1,@#TEMP
2689  012400  000261                          SEC
2690  012402  105577  002370                  ADCB    @TEMP+2
2691  012406  022737  177400  014774          CMP     #177400,@#TEMP
2692  012414  001401                          BEQ     .+4
2693  012416  104006                          HLT
2694  012420  105737  014774                  TSTB    @#TEMP
2695  012424  001401                          BEQ     .+4
2696  012426  104006                          HLT
2697  012430  104400                          SCOPE
2698
2699  012432  012737  000001  014774          MOV     #1,@#TEMP
2700  012440  000261                          SEC
2701  012442  105377  002330                  DECB    @TEMP+2
2702  012446  005737  014774                  TST     @#TEMP
2703  012452  001401                          BEQ     .+4
2704  012454  104006                          HLT
2705  012456  104400                          SCOPE
2706
2707                          ;TEST OF COMBINED INDEXING AND INDIRECT
2708  012460  012700  177772                  MOV     #-6,%0
2709  012464  127027  014752  125252          CMPB    @A(0),#125252
2710  012472  001401                          BEQ     .+4
2711  012474  104006                          HLT
2712  012476  104400                          SCOPE
2713
2714  012500  012700  177772                  MOV     #-6,%0
2715  012504  012701  000002                  MOV     #+2,%1
2716  012510  127071  014752  014752          CMPB    @A(0),@A(1)
2717  012516  001401                          BEQ     .+4
2718  012520  104006                          HLT
2719  012522  104400                          SCOPE
```

```
2720
2721                                            ;TEST BIC INSTRUCTION
2722  012524  012700  000006                          MOV     #+6,%0
2723  012530  012767  177777  002236                  MOV     #-1,TEMP
2724  012536  147067  014752  002230                  BICB    @A(0),TEMP
2725  012544  122767  125252  002222                  CMPB    #125252,TEMP
2726  012552  001401                                  BEQ     .+4
2727  012554  104006                                  HLT
2728  012556  104400                                  SCOPE
2729
2730  012560  012700  177772                          MOV     #-6,%0
2731  012564  012737  177777  014764                  MOV     #-1,@#C
2732  012572  142770  125252  014774                  BICB    #125252,@TEMP(0)
2733  012600  123727  014764  000125                  CMPB    @#C,#000125
2734  012606  001401                                  BEQ     .+4
2735  012610  104006                                  HLT
2736  012612  104400                                  SCOPE
2737
2738  012614  012700  014744                          MOV     #B+2,%0         ;ADDRESS OF ADDRESS OF B
2739  012620  023067  002116                          CMP     @(0)+,B
2740  012624  001401                                  BEQ     .+4
2741  012626  104006                                  HLT
2742  012630  104400                                  SCOPE
2743
2744  012632  012700  014746                          MOV     #B+4,%0
2745  012636  025067  002100                          CMP     @-(0),B
2746  012642  001401                                  BEQ     .+4
2747  012644  104006                                  HLT
2748  012646  104400                                  SCOPE
2749
2750  012650  012700  014746                          MOV     #B+4,%0
2751  012654  125067  002062                          CMPB    @-(0),B
2752  012660  001401                                  BEQ     .+4
2753  012662  104006                                  HLT
2754  012664  104400                                  SCOPE
2755
2756  012666  012700  014770                          MOV     #C+4,%0
2757  012672  012737  177777  014764                  MOV     #-1,@#C
2758  012700  105050                                  CLRB    @-(0)
2759  012702  023727  014764  177400                  CMP     @#C,#177400
2760  012710  001401                                  BEQ     .+4
2761  012712  104006                                  HLT
2762  012714  104400                                  SCOPE
2763
2764  012716  012737  177777  014764                  MOV     #-1,@#C
2765  012724  012700  177772                          MOV     #-6,%0
2766  012730  012701  177772                          MOV     #-6,%1
2767  012734  147071  014752  014774                  BICB    @A(0),@TEMP(1)
2768  012742  022737  177525  014764                  CMP     #177525,@#C
2769  012750  001401                                  BEQ     .+4
2770  012752  104006                                  HLT
2771  012754  104400                                  SCOPE
2772
2773                                    ;SET UP TO TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
2774  012756  012700  052525                          MOV     #52525,%0       ;THIS IS CHECKED LATER IN PROGRAM
2775
```

```
2776
2777  012762  004767  000002          ;TEST JSR INSTRUCTION
                        JSR     %7, TJSR2       ;PLACE PC ON STACK
2778  012766  000405                   BR      TJSR3           ;RETURN HERE ON RTS %19
2779  012770  121627  012766  TJSR1:  CMPB    @%6,#TJSR1      ;CHECK FOR CORRECT PC ON STACK
2780  012774  001401                   BEQ     .+4
2781  012776  104006                   HLT                     ;INCORRECT PC ON STACK
2782  013000  000207                   RTS     %7              ;RETURN TO IMST AFTER JSR
2783  013002  104400  TJSR3:  SCOPE
2784
2785  013004  000257                   CCC
2786  013006  004717                   JSR     %7,@%7          ;INSTRUCTION UNDER TEST
2787  013010  121627  013010           CMPB    @%6,#TJSR3+6            ;TEST THE STACK
2788  013014  001401                   BEQ     .+4
2789  013016  104006                   HLT                     ;PC OF JSR DID NOT GO TO STACK
2790  013020  005726                   TST     (6)+            ;REPOSITION THE STACK
2791  013022  104400                   SCOPE
2792
2793                          ;TEST NESTED SUBROUTINES
2794  013024  000257                   CCC                     ;CLEAR CONDITION CODES
2795  013026  004767  001602           JSR     %7,SUBR6
2796  013032  100401                   BMI     .+4
2797  013034  104006                   HLT                     ;JSR OR RTS FAILED
2798  013036  001401                   BEQ     .+4
2799  013040  104006                   HLT                     ;JSR OR RTS FAILED
2800  013042  102401                   BVS     .+4
2801  013044  104006                   HLT                     ;JSR OR RTS FAILED
2802  013046  103401                   BCS     .+4
2803  013050  104006                   HLT                     ;JSR OR RTS FAILED
2804  013052  104400                   SCOPE
2805
2806                          ;TEST ROTATE ODD BYTE
2807  013054  104400                   SCOPE
2808  013056  000257                   CCC                     ;CLEAR "C"
2809  013060  012767  123456  001706   MOV     #123456,TEMP
2810  013066  106067  001703           RORB    TEMP+1          ;ROTATE ODD BYTE
2811  013072  103401                   BCS     .+4
2812  013074  104006                   HLT                     ;C NOT SET
2813  013076  102401                   BVS     .+4
2814  013100  104006                   HLT                     ;V NOT SET
2815  013102  022767  051456  001664   CMP     #051456,TEMP
2816  013110  001401                   BEQ     .+4
2817  013112  104006                   HLT                     ;ROTATE FAILED
2818  013114  104400                   SCOPE
2819
2820  013116  000277                   SCC                     ;SET C
2821  013120  012767  123456  001646   MOV     #123456,TEMP
2822  013126  106067  001643           RORB    TEMP+1
2823  013132  103401                   BCS     .+4
2824  013134  104006                   HLT                     ;C NOT SET
2825  013136  102001                   BVC     .+4
2826  013140  104006                   HLT                     ;V NOT CLEARED
2827  013142  022767  151456  001624   CMP     #151456,TEMP
2828  013150  001401                   BEQ     .+4
2829  013152  104006                   HLT                     ;ROTATE FAILED
2830  013154  104400                   SCOPE
2831
```

```
2832  013156  000257                          CCC
2833  013160  012767  123456  001606          MOV     #123456,TEMP
2834  013166  106167  001603                  ROLB    TEMP+1
2835  013172  103401                          BCS     .+4
2836  013174  104006                          HLT                     ;C NOT SET
2837  013176  102401                          BVS     .+4
2838  013200  104006                          HLT                     ;V NOT SET
2839  013202  022767  047056  001564          CMP     #047056,TEMP
2840  013210  001401                          BEQ     .+4
2841  013212  104006                          HLT                     ;ROTATE BYTE FAILED
2842  013214  104400                          SCOPE
2843
2844  013216  000277                          SCC                     ;SET C
2845  013220  012767  123456  001546          MOV     #123456,TEMP
2846  013226  106167  001543                  ROLB    TEMP+1
2847  013232  103401                          BCS     .+4
2848  013234  104006                          HLT                     ;C NOT SET
2849  013236  102401                          BVS     .+4
2850  013240  104006                          HLT                     ;V NOT SET
2851  013242  022767  047456  001524          CMP     #047456,TEMP
2852  013250  001401                          BEQ     .+4
2853  013252  104006                          HLT                     ;ROTATE ODD BYTE FAILED
2854  013254  104400                          SCOPE
2855
2856  013256  000257                          CCC                     ;CLEAR C
2857  013260  012767  177777  001506          MOV     #-1,TEMP
2858  013266  106267  001503                  ASRB    TEMP+1
2859  013272  103401                          BCS     .+4
2860  013274  104006                          HLT                     ;C NOT SET
2861  013276  102001                          BVC     .+4
2862  013300  104006                          HLT                     ;V NOT CLEARED
2863  013302  026727  001466  177777          CMP     TEMP,#-1
2864  013310  001401                          BEQ     .+4
2865  013312  104006                          HLT                     ;SHIFT FAILED
2866  013314  104400                          SCOPE
2867
2868  013316  000277                          SCC
2869  013320  012767  177777  001446          MOV     #-1,TEMP
2870  013326  106367  001443                  ASLB    TEMP+1
2871  013332  103401                          BCS     .+4
2872  013334  104006                          HLT                     ;C NOT SET
2873  013336  102001                          BVC     .+4
2874  013340  104006                          HLT                     ;V NOT CLEARED
2875  013342  026727  001426  177377          CMP     TEMP,#177377
2876  013350  001401                          BEQ     .+4
2877  013352  104006                          HLT                     ;SHIFT BYTE FAILED
2878  013354  104400                          SCOPE
2879
2880
2881                          ;TEST THAT R0 WASN'T CLEARED BY FALSE SELECTION
2882  013356  022700  052525                  CMP     #52525,R0
2883  013362  001401                          BEQ     .+4
2884  013364  104006                          HLT
2885  013366  104400                          SCOPE
2886
2887                          ;TEST COMBINATION OF N, C AND V
```

```
                                                CLR     ICOUNT                  ;NO ITERATION

                                        ;INHIBIT TESTS WHICH USE ALL NUMBERS WHEN SW11 IS SET
                                                BIT     #4000,@#SREG2
                                                BEQ     COMPAR
                                                JMP     DONE

                                        ;TEST ALL COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
                                        COMPAR: CLR     %0                      ;INIT %0
                                                CLR     %1                      ;INIT %1
                                        CMP1:   CMP     %0,%1                   ;ARE THE EQUAL
                                                BEQ     .+4
                                                HLT                             ;R0 AND R1 DID NOT COMPARE
                                                CMP     %0,#-1                  ;AT UPPER LIMIT
                                                BEQ     CMP2                    ;YES EXIT
                                                INC     %0                      ;INCREMENT TO NEXT NUMBER
                                                INC     %1
                                                BR      CMP1
                                        CMP2:   SCOPE

                                        ;TEST ROTATING ALL NUMBERS
                                                SCOPE
                                                MOV     #-1,REFF                ;INITIALIZE BASE NUMBER
                                        TSROT:  INC     REFF                    ;INCREMENT NUMBER
                                                JSR     %7,ROTALL               ;GO TO COMPARE ROUTINE
                                                CMP     REFF,#-1                ;TEST ALL VALUES
                                                BNE     TSROT                   ;NO TEST THEM ALL
                                                BR      TSRT2A                  ;WE ARE DONE

                                        ROTALL: MOV     REFF,TEST
                                                ROR     TEST
                                                ROR     TEST
                                                ROR     TEST
                                                ROL     TEST
                                                ROL     TEST
                                                ROL     TEST
                                                BPL     .+12
                                                BCC     .+20                    ;Z=1
                                                BVC     .+30                    ;Z=1, C=1
                                                HLT                             ;Z=C, BUT V=1
                                                BR      .+24
                                                BCC     .+16                    ;Z=0
                                                BVS     .+20                    ;Z=0, C=1
                                                HLT                             ;Z NOT EQUAL C, V=1
                                                BR      .+14
                                                BVS     .+12                    ;Z=1, C=0
                                                HLT                             ;Z NOT EQUAL C, V=1
                                                BR      .+6
                                                BVC     .+4                     ;Z=0, C=0
                                                HLT                             ;Z=C, BUT V=1
                                                SCOPE
                                                CMP     TEST,REFF
                                                BEQ     .+4
                                                HLT                             ;INITIAL NOT EQUAL TO FINAL
                                                RTS     %7
                                        REFF:   0
```

```
 2944  013604  000000                    TEST:   0
 2945          013602                            REF=REFF
 2946
 2947                                    ;TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS
 2948  013606  012767  177777  177766    TSRT2A: MOV     #-1,REFF
 2949  013614  005267  177762            TSROT2: INC     REFF
 2950  013620  004767  000016                    JSR     %7,ROTBE
 2951  013624  004767  000122                    JSR     %7,ROTBO
 2952  013630  022767  177777  177744            CMP     #-1,REFF
 2953  013636  001366                            BNE     TSROT2
 2954  013640  000505                            BR      ROTEN1
 2955  013642  016767  177734  177734    ROTBE:  MOV     REFF,TEST
 2956  013650  106067  177730                    RORB    TEST                    ;ROTATE BYTE EVEN
 2957  013654  106067  177724                    RORB    TEST
 2958  013660  106067  177720                    RORB    TEST
 2959  013664  106167  177714                    ROLB    TEST
 2960  013670  106167  177710                    ROLB    TEST
 2961  013674  106167  177704                    ROLB    TEST
 2962  013700  100004                            BPL     .+12
 2963  013702  103007                            BCC     .+20                    ;Z=1
 2964  013704  102013                            BVC     .+30                    ;Z=1, C=1
 2965  013706  104006                            HLT                             ;Z=C, BUT V=1
 2966  013710  000411                            BR      .+24
 2967  013712  103006                            BCC     .+16                    ;Z=0
 2968  013714  102407                            BVS     .+20                    ;Z=0, C=1
 2969  013716  104006                            HLT                             ;Z NOT EQUAL C, V=1
 2970  013720  000405                            BR      .+14
 2971  013722  102404                            BVS     .+12                    ;Z=1, C=0
 2972  013724  104006                            HLT                             ;Z NOT EQUAL C, V=1
 2973  013726  000402                            BR      .+6
 2974  013730  102001                            BVC     .+4                     ;Z=0, C=0
 2975  013732  104006                            HLT                             ;Z=C, BUT V=1
 2976  013734  104400                            SCOPE
 2977  013736  026767  177642  177636            CMP     TEST,REFF
 2978  013744  001401                            BEQ     .+4
 2979  013746  104006                            HLT
 2980  013750  000207                            RTS     %7
 2981  013752  106067  177627            ROTBO:  RORB    TEST+1                  ;ROTATE BYTE ODD
 2982  013756  106067  177623                    RORB    TEST+1
 2983  013762  106067  177617                    RORB    TEST+1
 2984  013766  106167  177613                    ROLB    TEST+1
 2985  013772  106167  177607                    ROLB    TEST+1
 2986  013776  106167  177603                    ROLB    TEST+1
 2987  014002  100004                            BPL     .+12
 2988  014004  103007                            BCC     .+20                    ;Z=1
 2989  014006  102013                            BVC     .+30                    ;Z=1, C=1
 2990  014010  104006                            HLT                             ;Z=C, BUT V=1
 2991  014012  000411                            BR      .+24
 2992  014014  103006                            BCC     .+16                    ;Z=0
 2993  014016  102407                            BVS     .+20                    ;Z=0, C=1
 2994  014020  104006                            HLT                             ;Z NOT EQUAL C, V=1
 2995  014022  000405                            BR      .+14
 2996  014024  102404                            BVS     .+12                    ;Z=1, C=0
 2997  014026  104006                            HLT                             ;Z NOT EQUAL C, V=1
 2998  014030  000402                            BR      .+6
 2999  014032  102001                            BVC     .+4                     ;Z=0, C=0
```

```
3000  014034  104006                          HLT                             ;Z=C, BUT V=1
3001  014036  104400                          SCOPE
3002  014040  026767  177540  177534          CMP     TEST,REFF
3003  014046  001401                          BEQ     .+4
3004  014050  104006                          HLT
3005  014052  000207                          RTS     %7
3006  014054  104400                ROTEN1:   SCOPE
3007
3008                                          ;ADD AND SUBTRACT ALL NUMBERS AGAINST FIXED NUMBERS
3009                                          ;A+B=C, C-A=B, BF SHOULD EQUAL BI
3010  014056  011667  000072                  MOV     @%6,NUMA
3011  014062  012767  000001  177512          MOV     #1,REF
3012  014070  005267  177506          ARITST: INC     REF
3013  014074  004767  000014                  JSR     %7,ADSUB
3014  014100  022767  177777  177474          CMP     #-1,REFF
3015  014106  001370                          BNE     ARITST
3016  014110  000422                          BR      ARIEND
3017  014112  104400                          SCOPE
3018  014114  016767  177462  177462  ADSUB:  MOV     REF,TEST
3019  014122  066767  000026  177454          ADD     NUMA,TEST
3020  014130  166767  000020  177446          SUB     NUMA,TEST
3021  014136  026767  177440  177440          CMP     REF,TEST
3022  014144  001401                          BEQ     .+4
3023  014146  104006                          HLT
3024  014150  104400                          SCOPE
3025  014152  000207                          RTS     %7
3026  014154  000000                NUMA:     0
3027  014156  104400                ARIEND:   SCOPE
3028
3029                                          ;TEST COMPLIMENTING ALL NUMBERS
3030  014160  005067  000610                  CLR     TEMP            ;BASE DATA
3031  014164  005067  000610                  CLR     TEMP+4          ;BASE REFERENCE
3032  014170  005167  000600          TCOM:   COM     TEMP            ;COMPLIMENT DATA
3033  014174  005367  000600                  DEC     TEMP+4          ;DECREMENT REFERENCE
3034  014200  026767  000570  000572          CMP     TEMP,TEMP+4     ;COMPARE
3035  014206  001401                          BEQ     .+4             ;TEST
3036  014210  104006                          HLT                     ;COMPLIMENT OR DECREMENT FAILED
3037  014212  005167  000556                  COM     TEMP
3038  014216  005267  000552                  INC     TEMP            ;INCREMENT AND TEST FOR DONE
3039  014222  001362                          BNE     TCOM            ;NOT FINISHED GO LOOP
3040  014224  104400                          SCOPE
3041
3042                                          ;TEST COMB (EVEN BYTE)
3043  014226  005067  000542                  CLR     TEMP            ;BASE DATA
3044  014232  005067  000542                  CLR     TEMP+4          ;REFERENCE DATA
3045  014236  105167  000532          TCOM2:  COMB    TEMP
3046  014242  005367  000532                  DEC     TEMP+4
3047  014246  126767  000522  000524          CMPB    TEMP,TEMP+4     ;COMPARE
3048  014254  001401                          BEQ     .+4
3049  014256  104006                          HLT                     ;COMPLIMENT OR INCREMENT BYTE FAILED
3050  014260  105167  000510                  COMB    TEMP
3051  014264  105267  000504                  INCB    TEMP
3052  014270  001362                          BNE     TCOM2
3053  014272  104400                          SCOPE
3054
3055                                          ;TEST COMB (ODD BYTE)
```

```
  3056  014274  005067  000474                    CLR     TEMP            ;BASE DATA
  3057  014300  005067  000474                    CLR     TEMP+4          ;REFERENCE DATA
  3058  014304  105167  000465          TCOM3:    COMB    TEMP+1          ;ODD BYTE
  3059  014310  005367  000464                    DEC     TEMP+4
  3060  014314  126767  000455  000456            CMPB    TEMP+1,TEMP+4
  3061  014322  001401                            BEQ     .+4
  3062  014324  104006                            HLT                     ;COMPLIMENT BYTE FAILED
  3063  014326  105167  000443                    COMB    TEMP+1
  3064  014332  105267  000437                    INCB    TEMP+1
  3065  014336  001362                            BNE     TCOM3
  3066  014340  104400                            SCOPE
  3067
  3068                          ;TEST COMPARE ALL VALUE EVEN BYTE WITH ODD
  3069  014342  005067  000426                    CLR     TEMP            ;BASE VALUE
  3070  014346  126767  000422  000421  TSCOMB:   CMPB    TEMP,TEMP+1     ;COMPARE
  3071  014354  001401                            BEQ     .+4
```

```
3072  014356  104006                          HLT                     ;COMPARE FAILED
3073  014360  002001                          BGE     .+4
3074  014362  104006                          HLT                     ;V IS NOT = TO N
3075  014364  003401                          BLE     .+4
3076  014366  104006                          HLT                     ;V IS SET
3077  014370  062767  000401  000376          ADD     #401,TEMP
3078  014376  022767  177777  000370          CMP     #-1,TEMP
3079  014404  001360                          BNE     TSCOMB
3080  014406  104400                          SCOPE
3081
3082  014410  012767  000010  000316          MOV     #10,ICOUNT
3083
3084                          ;TEST TO SEE IF I/O DEVICES WERE SELECTED
3085  014416  016767  164126  000026          MOV     SREG2,CKWAIT
3086  014424  005167  000022                  COM     CKWAIT
3087  014430  032767  000371  000014          BIT     #371,CKWAIT
3088  014436  001406                          BEQ     WAIT4           ;BRANCH IF NO DEVICES SELECTED
3089  014440  000001                          WAIT                    ;INTERRUPTS WILL OCCUR
3090  014442  000001                          WAIT                    ;IF DEVICES ARE SELECTED
3091  014444  000001                          WAIT
3092  014446  000001                          WAIT
3093  014450  000401                          BR      .+4
3094  014452  000000                  CKWAIT: 0
3095  014454  104400              WAIT4:      SCOPE
3096  014456  012767  000400  000250          MOV     #400,ICOUNT
3097
3098                          ;TEST SWAB
3099  014464  012767  000200  177112          MOV     #0200,TEST
3100  014472  000367  177106                  SWAB    TEST
3101  014476  100001                          BPL     .+4
3102  014500  104006                          HLT
3103  014502  001401                          BEQ     .+4
3104  014504  104006                          HLT
3105  014506  000367  177072                  SWAB    TEST
3106  014512  100401                          BMI     .+4
3107  014514  104006                          HLT
3108  014516  001001                          BNE     .+4
3109  014520  104006                          HLT
3110  014522  104400                          SCOPE
3111
3112                          ;TEST ALL COMBINATIONS OF SWAB
3113  014524  005067  177054                  CLR     TEST            ;NUMBER UNDER TEST
3114  014530  005067  177046                  CLR     REF             ;REFERENCE NUMBER
3115  014534  000367  177044          SWABA:  SWAB    TEST            ;OPERATION UNDER TEST
3116  014540  026767  177040  177034          CMP     TEST,REF        ;TEST SWAB INSTRUCTION
3117  014546  001401                          BEQ     .+4
3118  014550  104006                          HLT                     ;SWAB FAILED
3119  014552  000367  177026                  SWAB    TEST
3120  014556  005267  177020                  INC     REF             ;INCREMENT REFERENCE NUMBER
3121  014562  105267  177017                  INCB    TEST+1          ;INC TEST NUMBER
3122  014566  001362                          BNE     SWABA           ;LOOP TILL DONE
3123  014570  104400                          SCOPE
3124  014572  012767  004000  000134          MOV     #4000,ICOUNT
3125
3126
3127                          ;#################################################################
```

```
3128                                    ;END OF USER CODE IN BANK/
3129                                    ;CALL KERNEL/
3130                                    ;ALTERRED IN CORE EXPANSION/
3131  014600  104010                    DONE:   EOB
3132  014602  000240                            NOP                     ;TO ALLOW CORE EXPANSION TO PATCH IN JMP
3133
3134                                    ;GROUP OF NESTED SUBROUTINES/
3135  014604  000207                    SUBR1:  RTS     %7              ;ONE INSTRUCTION
3136  014606  000277                    SUBR2:  SCC                     ;ONE DEEP
3137  014610  000207                            RTS     %7
3138  014612  004767  177770            SUBR3:  JSR     %7,SUBR2        ;TWO DEEP
3139  014616  000207                            RTS     %7
3140  014620  004767  177766            SUBR4:  JSR     %7,SUBR3        ;THREE DEEP
3141  014624  000207                            RTS     %7
3142  014626  004767  177766            SUBR5:  JSR     %7,SUBR4        ;FOUR DEEP
3143  014632  000207                            RTS     %7
3144  014634  004767  177766            SUBR6:  JSR     %7,SUBR5        ;FIVE DEEP
3145  014640  000207                            RTS     %7
3146
3147                                    ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST TIMES/
3148  014642  032767  002000  163700    SCOPEC: BIT     #2000,SREG2     ;INHIBIT PROCESSOR TESTS?
3149  014650  001403                            BEQ     .+10            ;NO
3150  014652  022626                            CMP     (SP)+,(SP)+
3151  014654  000167  165416                    JMP     MAIN            ;YES
3152  014660  032767  040000  163662            BIT     #40000,SREG2    ;TEST SR FOR SCOPE
3153  014666  001012                            BNE     SCOPEB          ;YES, SCOPE
3154  014670  032767  004000  163652            BIT     #4000,SREG2     ;NO-TEST FOR ITERATION
3155  014676  001011                            BNE     SCOPEG          ;INHIBIT ITERATION
3156  014700  026767  000032  000026            CMP     SCOPEF,ICOUNT   ;COMPARE CURRENT COUNT TO MAX NUMBER
3157  014706  100005                            BPL     SCOPEG          ;EXIT-DONE
3158  014710  005267  000022                    INC     SCOPEF          ;INCREMENT COUNT
3159  014714  016716  000020            SCOPEB: MOV     RETURN,@SP
3160  014720  000002                            RTI
3161  014722  005067  000010            SCOPEG: CLR     SCOPEF          ;CLEAR COUNT
3162  014726  011667  000006                    MOV     @%6,RETURN      ;SAVE SCOPE RETURN POINTER
3163  014732  000002                            RTI                     ;RETURN INLINE-NEXT TEST
3164  014734  000400            ICOUNT: 400                             ;ITERATION COUNT
3165  014736  000000            SCOPEF: 0                               ;COUNT LOCATION FOR ITERATION LOOP
3166  014740  000000            RETURN: 0                               ;ADDRESS OF LAST TEST
3167
3168                                    ;FIXED VALUES FOR USE IN TEST/
3169  014742  125252            B:      125252
3170  014744  014742                    B                               ;ADDRESS OF B
3171  014746  052525                    052525
3172          014752                    .=B+10
3173  014752  177777            A:      -1
3174  014754  014756                    A+4
3175          014756                    .=A+4
3176  014756  125252                    125252
3177  014760  014762                    A+10                            ;ADDRESS OF A+10
3178  014762  052525                    052525
3179
3180                                    ;FOR STORAGE
3181  014764  000000            C:      0
3182  014766  014764                    C                               ;ADDRESS OF C
3183          014774                    .=C+10
```

```
3184  014774  000000                  TEMP:   0
3185  014776  014774                          TEMP                            ;ADDRESS OF TEMP
3186          015002                          .=TEMP+6
3187  015002  015004                          TEMP+10                         ;ADDRESS OF TEMP+10 OR "D"
3188  015004  000000                  D:      0
3189
3190                                  ;SUBROUTINE TO INITIALIZE ALL PAGES TO NR, BANK 0, 1 PAGE, UP/
3191  015006  010146                  NRALL:  MOV     R1,-(R6)        ;SAVE REGISTERS
3192  015010  010246                          MOV     R2,-(R6)
3193  015012  010346                          MOV     R3,-(R6)
3194  015014  012701  000536                  MOV     #IPDRTAB,R1     ;R1 HOLDS ADDRESS OF CURRENT POSITION
3195                                                                  ;IN TABLE OF ADDRESSES
3196  015020  012703  000010          NRLOOP: MOV     #8.,R3          ;R3 USED AS COUNTER
3197  015024  012102                          MOV     (R1)+,R2        ;R2 CONTAINS ADDRESS OF PDR OR
3198                                                                  ;PAR TO BE CLEARED
3199  015026  005022                          CLR     (R2)+           ;CLEAR ALL ASR'S FOR THIS MODE
3200  015030  077302                          SOB     R3,.-2
3201  015032  020127  000544                  CMP     R1,#IPDREND     ;CHECK FOR DONE
3202  015036  003770                          BLE     NRLOOP          ;CLEAR ALL IN NEXT MODE IF NOT DONE
3203  015040  012603                          MOV     (R6)+,R3
3204  015042  012602                          MOV     (R6)+,R2
3205  015044  012601                          MOV     (R6)+,R1
3206  015046  000207                          RTS     %7
3207
3208                                  ;EMT HANDLER/
3209                                  ;FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES/
3210  015050  162716  000002          EMTSRV: SUB     #2,@SP                  ;GET CALL
3211  015054  006576  000000                  MFPI    @(SP)
3212  015060  012667  000022                  MOV     (SP)+,EPC
3213  015064  062716  000002                  ADD     #2,@SP
3214  015070  105067  000013                  CLRB    EPC+1                   ;SAVE OFFSET ONLY
3215  015074  062767  015110  000004          ADD     #EMTAB,EPC              ;POINT TO TABLE OF ADDRESSES
3216  015102  017707  000000                  MOV     @EPC,PC                 ;JUMP TO DESIRED ROUTINE
3217  015106  000000                  EPC:    0
3218          000000                          PATCH1=0
3219          000000                          PATCH2=0
3220          000000                          PATCH3=0
3221  015110  000000                  EMTAB:  PATCH1                          ;PATCH IN ADDRESS OF ROUTINE
3222  015112  000000                          PATCH2
3223  015114  000000                          PATCH3
3224  015116  016164                          PRINT                           ;ERROR PRINTOUT
3225  015120  015122                          EOBSRV                          ;END OF BANK
3226
3227                                  ;END OF BANK SERVICE
3228  015122  113737  177571  000551  EOBSRV: MOVB    @#SR+1,@#SREG2+1        ;READ SWITCHES AGAIN
3229  015130  032767  000001  163410          BIT     #1,SREG1        ;KT11-D INHIBITED?
3230  015136  001507                          BEQ     EOB2            ;NO - CONTINUE
3231  015140  004767  001410          EOB1:   JSR     %7,BELL         ;SIGNAL END OF PASS
3232  015144  042766  000020  000002          BIC     #20,2(SP)       ;CLEAR TRACE BIT OF STATUS ON STACK
3233  015152  012737  000016  000014          MOV     #16,@#14        ;SETUP TRACE RETURN TO CAUSE HALT
3234  015160  005037  000016                  CLR     @#16            ;IF A TRACE TRAP OCCURS
3235  015164  032737  010000  000550          BIT     #10000,@#SREG2  ;INHIBIT TRACE TRAPPING?
3236  015172  001011                          BNE     EOB1A           ;YES - BRANCH
3237  015174  005167  163402                  COM     TRPB            ;SWITCH TRACE FLAG
3238  015200  100006                          BPL     EOB1A           ;IF NOT SET, LEAVE TRACE OFF
3239  015202  052766  000020  000002          BIS     #20,2(SP)       ;IF SET, SET TRACE BIT OF STATUS ON STACK
```

```
3240  015210  012737  016162  000014          MOV     #TRTRP,@#14
3241  015216  032737  000040  000546  E0B1A:  BIT     #40,@#SREG1     ;CORE EXPANSION INHIBITED?
3242  015224  001051                          BNE     E0B1C           ;YES, SKIP
3243  015226  013701  000550                  MOV     @#SREG2,R1
3244  015232  032767  000002  163344          BIT     #2,MEMO
3245  015240  001402                          BEQ     DSW1
3246  015242  010137  020550                  MOV     R1,@#SREG2+20000
3247  015246  032767  000004  163330  DSW1:   BIT     #4,MEMO
3248  015254  001402                          BEQ     DSW2
3249  015256  010137  040550                  MOV     R1,@#SREG2+40000
3250  015262  032767  000010  163314  DSW2:   BIT     #10,MEMO
3251  015270  001402                          BEQ     DSW3
3252  015272  010137  060550                  MOV     R1,@#SREG2+60000
3253  015276  032767  000020  163300  DSW3:   BIT     #20,MEMO
3254  015304  001402                          BEQ     DSW4
3255  015306  010137  100550                  MOV     R1,@#SREG2+100000
3256  015312  032767  000040  163264  DSW4:   BIT     #40,MEMO
3257  015320  001402                          BEQ     DSW5
3258  015322  010137  120550                  MOV     R1,@#SREG2+120000
3259  015326  032767  000100  163250  DSW5:   BIT     #100,MEMO
3260  015334  001402                          BEQ     E0B1B
3261  015336  010137  140550                  MOV     R1,@#SREG2+140000
3262  015342  012716  005420          E0B1B:  MOV     #BEGINX,(SP)
3263  015346  000002                          RTI
3264  015350  012716  005452          E0B1C:  MOV     #BEGIN,(SP)
3265  015354  000002                          RTI
3266  015356  042737  000340  177776  E0B2:   BIC     #340,@#PSR
3267  015364  032767  000002  163154          BIT     #2,SREG1        ;USER/KERNEL INHIBITED?
3268  015372  001262                          BNE     E0B1            ;YES - SET PC AND RETURN
3269  015374  032767  000004  163144          BIT     #4,SREG1        ;NO--INHIBIT 4K AS 32K?
3270  015402  001256                          BNE     E0B1            ;YES - SET PC AND RETURN
3271  015404  026767  163164  163102          CMP     CURPAR,UPAR7    ;LAST USER ASR DONE?
3272  015412  001444                          BEQ     NXTBNK          ;YES - GO FIND NEXT BANK
3273  015414  062737  020000  000034          ADD     #20000,@#34     ;UPDATE SCOPE VECTOR ADDRESS IN BANK 0
3274  015422  062767  020000  163150          ADD     #20000,BNKSTR   ;UPDATE BANK START TO REFERENCE CURRENT ASR
3275  015430  016716  163144                  MOV     BNKSTR,(SP)
3276  015434  026767  163050  163132          CMP     UPAR0,CURPAR
3277  015442  001404                          BEQ     NXTSEG
3278  015444  005077  163124                  CLR     @CURPAR         ;SET PREVIOUS ASR TO NR, BANK 0
3279  015450  005077  163122                  CLR     @CURPDR
3280  015454  062767  000002  163112  NXTSEG: ADD     #2,CURPAR       ;UPDATE POINTERS TO NEXT SEGMENT
3281  015462  062767  000002  163106          ADD     #2,CURPDR
3282  015470  012777  077406  163100          MOV     #77406,@CURPDR  ;SET NEXT SEGMENT RW, 4K
3283  015476  016777  163066  163070          MOV     CURBNK,@CURPAR  ;MAP NEXT SEGMENT TO CURRENT BANK
3284  015504  052737  030000  177776          BIS     #30000,@#PSR    ;SET PREVIOUS MODE TO USER
3285  015512  006506                          MFPI    R6              ;PICK UP USER STACK POINTER
3286  015514  062716  020000                  ADD     #20000,R6       ;MAP IT TO NEXT ASR
3287  015520  006606                          MTPI    R6              ;PUT IT BACK
3288  015522  000002                          RTI                     ;GO BACK TO MAINLINE
3289  015524  005327  000000          NXTBNK: DEC     #0              ;STALL SO DOUBLE BELL NOTED
3290  015530  001375                          BNE     .-4
3291  015532  004767  001016                  JSR     %7,BELL
3292  015536  012746  000400                  MOV     #UBUFF,-(SP)
3293  015542  052737  030000  177776          BIS     #30000,@#PSR
3294  015550  006606                          MTPI    R6
3295  015552  013737  000570  000572          MOV     @#CURBNK,@#OLDBNK       ;SAVE PREV BANK ADDRESS
```

```
3296  015560  062767  000200  163002  BNKTST: ADD     #200,CURBNK
3297  015566  006367  163016                  ASL     COREPT
3298  015572  103006                          BCC     1$
3299  015574  012767  000001  163006          MOV     #1,COREPT
3300  015602  012767  000606  163002          MOV     #MEM1,MEMUT
3301  015610  022767  007600  162752  1$:     CMP     #7600,CURBNK    ;CHECK FOR EXTERNAL BANK
3302  015616  001067                          BNE     EOB3            ;IF NOT, TEST FOR ITS PRESENCE
3303  015620  012767  000000  162742          MOV     #0,CURBNK       ;START OVER, TESTING BANK 0
3304  015626  012767  000001  162754          MOV     #1,COREPT
3305  015634  012767  000604  162750          MOV     #MEM0,MEMUT
3306  015642  013701  000042          LOGIC:  MOV     @#42,R1
3307  015646  001412                          BEQ     BNKT
3308  015650  000005                          RESET
3309  015652  005046                          CLR     -(SP)           ;CLEAR TBTT VIA RTI
3310  015654  012746  015662                  MOV     #LOGICAL,-(SP)
3311  015660  000002                          RTI
3312  015662  004711                  LOGICAL:JSR     %7,@R1
3313  015664  000240                          NOP
3314  015666  000240                          NOP
3315  015670  000240                          NOP
3316  015672  000000                          HALT
3317  015674  032737  000001  000550  BNKT:   BIT     #1,@#SREG2      ;TTY OUT SELECTED
3318  015702  001410                          BEQ     BNKT1           ;YES, NO ASTERISK
3319  015704  004767  000672                  JSR     %7,CRLF
3320  015710  105777  162474                  TSTB    @TCSR           ;WAIT FOR TELETYPE
3321  015714  100375                          BPL     .-4
3322  015716  012777  000252  162466          MOV     #252,@TDBR      ;OUTPUT ASTERISK TO SIGNAL END OF PASS
3323  015724  042766  000020  000006  BNKT1:  BIC     #20,6(SP)       ;CLEAR TRACE BIT OF STATUS ON STACK
3324  015732  012737  000016  000014          MOV     #16,@#14
3325  015740  005037  000016                  CLR     @#16
3326  015744  032737  010000  177570          BIT     #10000,@#SR
3327  015752  001011                          BNE     EOB3
3328  015754  005167  162622                  COM     TRPB
3329  015760  100006                          BPL     EOB3
3330  015762  052766  000020  000006          BIS     #20,6(SP)
3331  015770  012737  016162  000014          MOV     #TRTRP,@#14
3332  015776  016777  162566  162526  EOB3:   MOV     CURBNK,@KPAR2   ;MAP KERNEL SEGMENT 2 TO BANK BEING LOOKED FOR
3333  016004  012777  077406  162510          MOV     #77406,@KPDR2
3334  016012  036777  162572  162572          BIT     COREPT,@MEMUT
3335  016020  001657                          BEQ     BNKTST
3336  016022  042737  160000  000034          BIC     #160000,@#34    ;INITIALIZE SCOPE VECTOR ADDRESS
3337  016030  005001                          CLR     R1              ;R1 ADDRESSES BANK 0 THRU KERNEL ASR0
3338  016032  012702  040000                  MOV     #40000,R2       ;R2 ADDRESSES NEW BANK THRU KERNEL ASR2
3339  016036  012703  015004                  MOV     #0,R3
3340  016042  006203                          ASR     R3
3341  016044  012122                  CORMOV: MOV     (R1)+,(R2)+
3342  016046  077302                          SOB     R3,CORMOV
3343  016050  016767  162434  162516          MOV     UPAR0,CURPAR    ;FIRST ASR CHECKED IS USER ASR0
3344  016056  016767  162420  162512          MOV     UPDR0,CURPDR
3345  016064  016777  162500  162502          MOV     CURBNK,@CURPAR
3346  016072  012777  077406  162476          MOV     #77406,@CURPDR
3347  016100  005077  162410                  CLR     @UPAR7
3348  016104  005077  162376                  CLR     @UPDR7
3349  016110  026727  162456  000000          CMP     OLDBNK,#0               ;PREV BANK = 0
3350  016116  001414                          BEQ     EOB6            ;YES, DO NOT CLEAR
3351  016120  016777  162446  162404          MOV     OLDBNK,@KPAR2
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3352  016126  012777  077406  162366          MOV     #77406,@KPDR2
3353  016134  012701  040000                  MOV     #40000,R1
3354  016140  012703  007630                  MOV     #7630,R3
3355  016144  005021                  BNKLP:  CLR     (R1)+
3356  016146  077302                          SOB     R3,BNKLP
3357  016150  012716  005452          EOB6:   MOV     #BEGIN,(SP)
3358  016154  011667  162420                  MOV     (SP),BNKSTR
3359  016160  000002                          RTI
3360
3361                                  ;RTT EXECUTED WHEN TRACE IS ON/
3362  016162  000006                  TRTRP:  RTT
3363
3364                                  ;ENTERED WITH SYSTEM TRAP CALL (HLT)
3365                                  ;PRINT OUT THE ERROR PC+2, STATUS REGISTER, AND LOCATION IN BACKGROUND
3366  016164  005767  000162          PRINT:  TST     PRTON           ;CHECK PRINT ON FLAG
3367  016170  001401                          BEQ     .+4
3368  016172  000002                          RTI                     ;IF ANOTHER HALT IS BEING PRINTED, SKIP THIS ONE
3369  016174  005267  000152                  INC     PRTON
3370  016200  012767  000340  161570          MOV     #340,PSR        ;SET PRIORITY TO 7
3371  016206  036727  161356  020000          BIT     SR,#20000       ;TEST FOR INHIBIT PRINT OUT
3372  016214  001401                          BEQ     .+4             ;BRANCH TO PRINT
3373  016216  000444                          BR      CK              ;INHIBIT, CHECK FOR HALT
3374  016220  012667  000122                  MOV     (6)+,SAVPC      ;PC OF FAILING ROUTINE
3375  016224  012667  000120                  MOV     (6)+,SAVPSR     ;PSR OF ERROR CONDITION
3376  016230  024646                          CMP     -(6),-(6)       ;RESTORE STACK
3377  016232  012767  000200  161536          MOV     #200,PSR
3378  016240  004767  000336                  JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN AND LINE FEED
3379  016244  016767  000076  000260          MOV     SAVPC,PTEMP1    ;LOAD WITH FAILING PC+2
3380  016252  004767  000076                  JSR     %7,PROCT        ;PRINT FAILING PC+2
3381  016256  004767  000254                  JSR     %7,SPACE
3382  016262  016767  000062  000242          MOV     SAVPSR,PTEMP1   ;LOAD PROCESSOR STATUS
3383  016270  004767  000060                  JSR     %7,PROCT        ;PRINT PROCESSOR STATUS
3384  016274  004767  000236                  JSR     %7,SPACE
3385  016300  016767  162264  000224          MOV     CURBNK,PTEMP1
3386  016306  004767  000042                  JSR     %7,PROCT
3387  016312  004767  000220                  JSR     %7,SPACE
3388  016316  016767  176416  000206          MOV     RETURN,PTEMP1
3389  016324  004767  000024                  JSR     %7,PROCT
3390  016330  005767  161234          CK:     TST     SR              ;CHECK SR FOR HALT SWITCH
3391  016334  100001                          BPL     .+4             ;BRANCH IF NOT SET
3392  016336  000000                          HALT                    ;HALT ON ERROR UP
3393  016340  005067  000006                  CLR     PRTON           ;ROUTINE DONE - CLEAR FLAG
3394  016344  000002                          RTI                     ;RETURN TO MAIN LINE
3395  016346  000000          SAVPC:  0
3396  016350  000000          SAVPSR: 0
3397  016352  000000          PRTON:  0
3398
3399                                  ;SUBROUTINE TO PRINT OUT OCTAL NUMBER/
3400  016354  012727  000006  016360  PROCT:  MOV     #6,#PTEMP3      ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
3401          016360                  PTEMP3=.-2
3402  016362  005067  000142                  CLR     PRFLG           ;INITIALIZE CARRY FLAG FOR ROTATES
3403  016366  012767  000260  000140          MOV     #260,PTEMP2     ;SETUP R3
3404  016374  005767  000132                  TST     PTEMP1          ;CHECK BIT 15 OF NUMBER
3405  016400  100002                          BPL     .+6             ;BRANCH IF ZERO
3406  016402  005267  000126                  INC     PTEMP2          ;INCREMENT R3 IF ONE
3407  016406  006167  000120                  ROL     PTEMP1          ;ROTATE LEFT MOST OCTAL TO RIGHT END
```

```
3408  016412  006167  000114                  ROL     PTEMP1
3409  016416  005567  000106                  ADC     PRFLG           ;STORE CARRY
3410  016422  105777  161762          P.WAIT: TSTB    @TCSR           ;WAIT FOR TTY READY
3411  016426  100375                          BPL     P.WAIT
3412  016430  016777  000100  161754          MOV     PTEMP2,@TDBR    ;OUTPUT NEXT CHARACTER
3413  016436  005367  177716                  DEC     PTEMP3          ;COUNT
3414  016442  001001                          BNE     P.CNT1          ;BRANCH IF NOT DONE
3415  016444  000207                          RTS     %7              ;BRANCH IF NOT DONE
3416  016446  000241          P.CNT1: CLC                             ;CLEAR CARRY
3417  016450  005767  000054                  TST     PRFLG           ;CHECK FOR PREVIOUS CARRY
3418  016454  001403                          BEQ     .+10            ;BRANCH IF PREVIOUSLY ZERO
3419  016456  005067  000046                  CLR     PRFLG           ;INITIALIZE FLAG
3420  016462  000261                          SEC                     ;SET CARRY
3421  016464  006167  000042                  ROL     PTEMP1          ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
3422  016470  006167  000036                  ROL     PTEMP1
3423  016474  006167  000032                  ROL     PTEMP1
3424  016500  005567  000024                  ADC     PRFLG           ;STORE CARRY
3425  016504  016767  000022  000022          MOV     PTEMP1,PTEMP2   ;LOAD DATA INTO R3
3426  016512  042767  177770  000014          BIC     #177770,PTEMP2  ;CLEAR ALL BUT LOWEST OCTAL DIGIT
3427  016520  052767  000260  000006          BIS     #260,PTEMP2     ;SET TO ASCII EQUIVALENT
3428  016526  000735                          BR      P.WAIT          ;LOOP
3429  016530  000000          PRFLG:  0
3430  016532  000000          PTEMP1: 0                               ;CONTAINS VALUE TO BE OUTPUT
3431  016534  000000          PTEMP2: 0                               ;SCRATCH
3432
3433                          ;SUBROUTINE TO ISSUE SPACE/
3434  016536  105777  161646  SPACE:  TSTB    @TCSR           ;WAIT FOR TTY READY
3435  016542  100375                  BPL     .-4
3436  016544  012777  000240  161640          MOV     #240,@TDBR      ;OUTPUT A SPACE
3437  016552  000207                          RTS     %7              ;RETURN
3438
3439                          ;BELL ON PASS COMPLETE
3440  016554  032737  000001  000550  BELL:   BIT     #1,@#SREG2
3441  016562  001406                          BEQ     1$
3442  016564  105777  161620                  TSTB    @TCSR
3443  016570  100375                          BPL     .-4
3444  016572  012777  000207  161612          MOV     #207,@TDBR
3445  016600  000207          1$:     RTS     %7
3446
3447                          ;SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED/
3448  016602  105777  161602  CRLF:   TSTB    @TCSR           ;WAIT FOR TTY READY
3449  016606  100375                  BPL     .-4
3450  016610  012777  000215  161574          MOV     #215,@TDBR      ;OUTPUT CARRIAGE RETURN
3451  016616  105777  161566                  TSTB    @TCSR           ;WAIT FOR TTY READY
3452  016622  100375                  BPL     .-4
3453  016624  012777  000212  161560          MOV     #212,@TDBR      ;OUTPUT LINEFEED
3454  016632  000207                          RTS     %7              ;RETURN
3455
3456                          ;ENTER HERE ON POWER FAIL/
3457  016634  013746  000024  PFAIL:  MOV     @#24,-(6)
3458  016640  010667  000010                  MOV     %6,SAVR6                ;STORE STACK POSITION
3459  016644  012737  016656  000024          MOV     #RESTRT,@#24
3460  016652  000000                          HALT                            ;HALT ON POWER DOWN NORMAL
3461  016654  000000          SAVR6:  0                               ;STACK IS SAVED HERE
3462  016656  016706  177772  RESTRT: MOV     SAVR6,%6                ;RESTORE STACK WHEN POWERING UP
3463  016662  012637  000024                  MOV     (6)+,@#24
```

```
 3464  016666  022626                          CMP     (SP)+,(SP)+          ;RESTORE STACK
 3465  016670  104006                          HLT                          ;POWER FAIL OCCURRED
 3466  016672  000167  161720                  JMP     RSTRT
 3467                                                                       ;RETURN TO MAIN LINE
 3468
 3469  016676  000207                  USER:   RTS     %7                   ;OVERLAY USER ROUTINE HERE IF 4KW
 3470                                                                       ;USE BANK1 IF 8KW
 3471          017760                          .=17760
 3472  017760  000000                  KSTACK: 0
 3473          000001                          .END
```

```
A       014752  1805  1811  1817  1823  1830  1837  1845  1861  1884  2093  2188  2229  2289
                2295  2302  2310  2327  2337  2343  2349  2355  2361  2367  2374  2379  2386
                2393  2400  2407  2430  2438  2654  2709  2716  2724  2767  3173#  3174  3175
                3177
ADSUB   014114  3013  3018#
ARIEND  014156  3016  3027#
ARITST  014070  3012#  3015
B       014742  1877  2000  2005  2010  2016  2023  2028  2029  2036  2050  2058  2065  2071
                2079  2137  2142  2147  2153  2160  2165  2166  2173  2187  2194  2201  2207
                2215  2545  2550  2556  2563  2608  2613  2619  2626  2631  2632  2639  2653
                2738  2739  2744  2745  2750  2751  3169#  3170  3172
BEGIN   005452  903  1007  1021  1234  1800#  3264  3357
BEGINX  005420  1096  1098  1100  1102  1104  1106  1788#  3262
BELL    016554  3231  3291  3440#
BNKLP   016144  3355#  3356
BNKSTR  000600  822#  1007*  3274*  3275  3358*
BNKT    015674  3307  3317#
BNKTST  015560  3296#  3335
BNKTI   015724  3318  3323#
C       014764  1853  1884*  1893*  1901*  1925*  1941*  1959*  1977*  2028*  2029  2049*  2050*  2051
                2165*  2166  2186*  2187*  2188  2317*  2319  2324*  2328  2415  2487*  2503*  2519*
                2537*  2631*  2632  2652*  2653*  2654  2731*  2733  2756  2757*  2759  2764*  2768
                3181#  3182  3183
CK      016330  3373  3390#
CKWAIT  014452  3085*  3086*  3087  3094#
CLINCT= 003250  963*  1165  1168#  1175*
CMP1    013414  2898#  2905
CMP2    013436  2902  2906#
COMPAR  013410  2892  2896#
CREPT   000610  830#  873*  885  888*  890*  894*  1003*  3297*  3299*  3304*  3334
CRMOV   016044  3341#  3342
CRLF    016602  898  3319  3378  3448#
CURBNK  000570  818#  1002*  1795*  3283  3295  3296*  3301  3303*  3332  3345  3385
CURPAR  000574  820#  1005*  3271  3276  3278*  3280*  3283*  3343*  3345*
CURPAT= 003160  964*  1150#  1152  1169  1171*  1173*
CURPDR  000576  821#  1006*  3279*  3281*  3282*  3344*  3346*
D       015004  1062  1909*  1917*  1933*  1950*  1968*  2463*  2471*  2479*  2495*  2511*  2528*  3188#
                3339
DATA2 = 002766  910*  1113#  1114  1120*  1121
DET1    002334  973  1031#
DET2    002452  1039  1055#
DET3    002750  1067  1107#
DET4    002366  1037  1039#
D0    = 000001  953  1261#  1317  1325  1370
DONE    014600  1031*  1095*  1096*  1097*  1098*  1099*  1100*  1101*  1102*  1103*  1104*  1105*  1106*
                2893  3131#
DSW1    015246  3245  3247#
DSW2    015262  3248  3250#
DSW3    015276  3251  3253#
DSW4    015312  3254  3256#
DSW5    015326  3257  3259#
EIGHT   002404  1042#  1057
EMTAB   015110  3215  3221#
EMTSRV  015050  741  901  3210#
EOB   = 104010  593#  1031  3131
EOBSRV  015122  3225  3228#
```

```
EOB1    015140          3231#   3268    3270
EOB1A   015216          3236    3238    3241#
EOB1B   015342          3260    3262#
EOB1C   015350          3242    3264#
EOB2    015356          3230    3266#
EOB3    015776          3302    3327    3329    3332#
EOB6    016150          3350    3357#
EPC     015106          3212*   3214*   3215*   3216    3217#
ERROK   003536          1215    1223#
ERRSET  003532          1217    1221#
FENDZ   003612           951    1269#   1308
FENDI   003634          1271    1274#
HLT   = 104006           592#   1119    1132    1164    1194    1212    1218    1221    1225    1281    1283    1287    1296
                        1298    1304    1329    1336    1338    1342    1353    1355    1361    1375    1391    1807    1813
                        1819    1825    1832    1839    1848    1855    1864    1872    1879    1886    1896    1904    1912
                        1920    1928    1936    1944    1953    1962    1971    1980    1987    1994    2002    2007    2012
                        2019    2025    2031    2039    2046    2053    2061    2067    2074    2082    2089    2096    2104
                        2111    2118    2125    2132    2139    2144    2149    2156    2162    2168    2176    2183    2190
                        2197    2203    2210    2218    2225    2232    2240    2247    2254    2261    2268    2276    2284
                        2291    2297    2304    2313    2321    2330    2339    2345    2351    2357    2363    2369    2376
                        2381    2388    2395    2403    2410    2417    2424    2433    2441    2449    2457    2466    2474
                        2482    2490    2498    2506    2514    2522    2531    2540    2547    2552    2559    2565    2573
                        2580    2587    2594    2602    2610    2615    2622    2628    2634    2642    2649    2656    2664
                        2671    2678    2685    2693    2696    2704    2711    2718    2727    2735    2741    2747    2753
                        2761    2770    2781    2789    2797    2799    2801    2803    2812    2814    2817    2824    2826
                        2829    2836    2838    2841    2848    2850    2853    2860    2862    2865    2872    2874    2877
                        2884    2900    2927    2931    2934    2937    2941    2965    2969    2972    2975    2979    2990
                        2994    2997    3000    3004    3023    3036    3049    3062    3072    3074    3076    3102    3104
                        3107    3109    3118    3465
ICOUNT  014734           897*   1802*   2888*   3082*   3096*   3124*   3156    3164#
IE    = 000500           953    1260#   1317    1325    1331    1370    1377
IPDREN  000544           808#   3201
IPDRTA  000536           805#   3194
IRF     003472           940    1210#
IRK     003376           921    1192#
KPAR0   000526           800#    982
KPAR1   000530           801#
KPAR2   000532           802#    879*   3332*   3351*
KPAR7   000534           803#    868*    978*
KPDR0   000516           796#    867*    989*
KPDR1   000520           797#
KPDR2   000522           798#    875*   3333*   3352*
KPDR7   000524           799#    869*    977*
KSTACK  017760           835     842    3472#
KWLST   000424           767#    933*
KWLVC   000422           766#    932*
LKCSR   000426           768#    931     935*   1127*   1130    1133*   1137*   1141    1143*
LK1     003034          1126#   1140
LK2     003054          1129#   1136
LK3     003056           932    1130#
LK4     003074          1134#   1144
LLIMIT  003600           925     945    1188    1206    1234#
LOGIC   015642           859    3306#
LOGICA  015662          3310    3312#
LPCSR   000430           769#    960     968*   1153    1156    1160    1162*   1177
LPDBR   000432           770#    965*   1152*   1176*
```

```
LPINTR  003200             966    1156#
LPST    000436             772#    967*
LPVC    000434             771#    966*
LP1     003154            1149#   1182    1184
LP2     003162            1152#   1172    1174
LP3     003270            1170    1173#
LP4     003300            1166    1175#
LP5     003336            1180    1183#
LP6     003236            1154    1157    1165#
LP7     003234            1159    1161    1164#
MAIN    002276            1011    1018#   1020    3151
MAP1    001102             879#    893
MAP2    001172             889     892#
MEMUT   000612             831#    874*    885*    891*    895*    1004*   3300*   3305*   3334
MEMO    000604             828#    831     871*    874     895     1004    3244    3247    3250    3253    3256    3259    3305
MEM1    000606             829#    872*    891     3300
MODE    002226             975    1009#
MOD12   002704            1075    1101#
MOD16   002670            1077    1099#
MOD20   002654            1079    1097#
MOD24   002640            1081    1095#
MOD4    002734            1071    1105#
MOD8    002720            1073    1103#
MOVE    002464            1060#   1083    1085    1087    1089    1091    1093
MOVEPT  001142             884     887#
N     = 000001            1402#   1403    1404    1405#   1406    1407    1408#   1409    1410    1411#   1412    1413    1414#
                          1415    1416    1417#   1418    1419    1420#   1421    1422    1423#   1424    1425    1426#   1427
                          1428    1429#   1430    1431    1432#   1433    1434    1435#   1436    1437    1438#   1439    1440
                          1441#   1442    1443    1444#   1445    1446    1447#   1448    1449    1450#   1451    1452    1453#
                          1454    1455    1456#   1457    1458    1459#   1460    1461    1462#   1463    1464    1465#   1466
                          1467    1468#   1469    1470    1471#   1472    1473    1474#   1475    1476    1477#   1478    1479
                          1480#   1481    1482    1483#   1484    1485    1486#   1487    1488    1489#   1490    1491    1492#
                          1493    1494    1495#   1496    1497    1498#   1499    1500    1501#   1502    1503    1504#   1505
                          1506    1507#   1508    1509    1510#   1511    1512    1513#   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    1578    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
NODEV   002314             908    1024#
```

```
NOP    = 000240            586#
NRALL    015006            866     976    3191#
NRLOOP   015020           3196#   3202
NUMA     014154           3010*   3019    3020    3026#
NXTBNK   015524           3272    3289#
NXTSEG   015454           3277    3280#
OLDBNK   000572            819#   3295*   3349    3351
PATCH1=  000000           3218#   3221
PATCH2=  000000           3219#   3222
PATCH3=  000000           3220#   3223
PC     =%000007            602#   1788    1800    3216*
PFAIL    016634            738     836    3457#
PRFLG    016530           3402*   3409*   3417    3419*   3424*   3429#
PRINT    016164           3224    3366#
PROCT    016354           3380    3383    3386    3389    3400#
PRTON    016352            906*   3366    3369*   3393*   3397#
PSR    = 177776            591#    853     905*   1009*   1014*   1016*   1128*   1138*   3266*   3284*   3293*   3370*   3377*
PTEMP1   016532           3379*   3382*   3385*   3388*   3404    3407*   3408*   3421*   3422*   3423*   3425    3430#
PTEMP2   016534           3403*   3406*   3412    3425*   3426*   3427*   3431#
PTEMP3=  016360           3400*   3401#   3413*
P.CNT1   016446           3414    3416#
P.WAIT   016422           3410#   3411    3428
R      = 004000            953    1262#   1317
RB     = 000002            953    1259#   1317    1331    1377
RD     = 000004           1257#   1370
REF    = 013602           2945#   3011*   3012*   3018    3021    3114*   3116    3120*
REFF     013602           2910*   2911*   2913    2917    2939    2943#   2945    2948*   2949*   2952    2955    2977    3002
                          3014
RENDZ    004010           1300    1311#   1343
REND1    004040           1314    1317#
RESTRT   016656           3459    3462#
RETURN   014740            903*   1800*   1801*   3159    3162*   3166#   3388
RFCAR    000446            776#    945*   1206*
RFCSR    000450            777#    939     946*   1208*   1210    1214    1216
RFCSRH   000452            778#    943*   1205*
RFDAE    000440            773#   1227
RFDAR    000442            774#   1229
RFFUNC   003576            942*    946    1208    1219*   1231*   1233#
RFST     000456            780#    941*
RFSTAR   003442           1205#   1213    1220    1222    1226    1232
RFVC     000454            779#    940*
RFWC     000444            775#    944*   1207*   1223
RF1      003446           1206#   1228    1230
RKBAR    000466            784#    925*   1188*
RKCSR    000470            785#    920     927*   1190*   1192
RKCSRH   000472            786#
RKDAE    000462            782#    924*   1187*   1196
RKDAH    000460            781#   1198
RKFUNC   003440            923*    927    1190    1200*   1202#
RKST     000476            788#    922*
RKSTAR   003346           1187#   1195    1201
RKVC     000474            787#    921*
RKWC     000464            783#    926*   1189*
RK1      003352           1188#   1197    1199
ROTALL   013472           2912    2917#
ROTBE    013642           2950    2955#
```

```
ROTBO    013752          2951    2981#
ROTEN1   014054          2954    3006#
RSTRT    000616           754     835#  3466
R0     =%000000           594#    848#   851*   854*   857    917*   928*   936*   947*   954*   957    1024   2882
R1     =%000001           595#    981*   988*   992*   999*  1788*  1789*  1791   1792*  1793*  1794*  1795   3191
                         3194*   3197   3201   3205*  3243*  3246   3249   3252   3255   3258   3261   3306*  3312
                         3337*   3341   3353*  3355*
R2     =%000002           596#    982*   984*   985*   986    993*   995*   997*   998    1057*  1058   3192   3197*
R3     =%000003           597#    983*   984    987*   994*   995    996*   3193   3196*  3200*  3203*  3339*  3340*
                         3342*   3354*  3356*
R4     =%000004           598#
R5     =%000005           599#
R6     =%000006           601#    835*   842*  1013*  3191*  3192*  3193*  3203   3204   3205   3285   3286*  3287*
                         3294*
SAVPC    016346          3374*   3379    3395#
SAVPSR   016350          3375*   3382    3396#
SAVR6    016654          3458*   3461#   3462
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                         1897    1905    1913   1921   1929   1937   1945   1954   1963   1972   1981   1989   1996
                         2003    2008    2013   2020   2026   2032   2040   2047   2054   2062   2068   2075   2083
                         2090    2097    2105   2112   2119   2126   2133   2140   2145   2150   2157   2163   2169
                         2177    2184    2191   2198   2204   2211   2219   2226   2233   2241   2248   2255   2262
                         2269    2277    2285   2292   2298   2305   2314   2322   2331   2340   2346   2352   2358
                         2364    2370    2377   2382   2389   2396   2404   2411   2418   2425   2434   2442   2450
                         2458    2467    2475   2483   2491   2499   2507   2515   2523   2532   2541   2548   2553
                         2560    2566    2574   2581   2588   2595   2603   2611   2616   2623   2629   2635   2643
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                         2748    2754    2762   2771   2783   2791   2804   2807   2818   2830   2842   2854   2866
                         2878    2885    2906   2909   2938   2976   3001   3006   3017   3024   3027   3040   3053
                         3066    3080    3095   3110   3123
SCOPEB   014714          3153    3159#
SCOPEC   014642           744     899    3148#
SCOPEF   014736           904*   3156    3158*  3161*  3165#
SCOPEG   014722          3155    3157    3161#
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SETEX    002054           984#    988
SETSEG   002220          1000    1008#
SETUSE   002124           995#    999
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SP     =%000006           600#    601     886   1015*  1025*  1026*  3150   3159*  3210*  3211   3212   3213*  3232*
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SPACE    016536          3381    3384    3387   3434#
SR     = 177570           590#    837     863    865   3228   3326   3371   3390
SREG1    000546           809#    860*   863*   974    979    990   1010   1032   1036   3229   3241   3267   3269
SREG2    000550           810#    837*   861*   865*   913    918    929    937    948    957*   958   1019   1024*
                         2891    3085   3148   3152   3154   3228*  3235   3243   3246*  3249*  3252*  3255*  3258*
                         3261*   3317   3440
SR0      000500           789#    878*   896*  1008*
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STARTX   000754           846     863#
START1   000772           838     862    866#
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STRT4    002504          1057    1067#
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ST4      001452           919     928#
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SUBR2   014606           3136#   3138
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SUBR6   014634           2795    3144#
SWABA   014534           3115#   3122
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TCBA    000562            815#   1324*   1369*
TCCM    000552            811#    953*   1272*   1275*   1277*   1279    1290*   1294    1306*   1315*   1317*   1325*   1327
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TCEXPE  003610           1266#   1276*   1284    1301*   1302    1312*   1339    1358*   1359
TCFIRS  003604           1264#   1276    1356
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TCF2    003716           1286    1289#
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TCF4    004000           1306#   1332
TCIV    000564            816#    951*   1269*   1274*   1289*   1311*   1318*   1322*   1330*   1346*   1367*   1376*
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TCOM    014170           3032#   3039
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TCR1A   004172           1341    1344#
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TCR3    004214           1346    1351#   1376
TCR4    004262           1363#   1378
TCSR  = 000410            588#   3320    3410    3434    3442    3448    3451
TCST    000554            812#    950    1270    1313
TCSTA   000566            817#    952*
TCWBK   004056           1305    1322#
TCWBUF  004420           1324    1400#
TCWB1   004110           1322    1327#
TCWC    000560            814#   1323*   1368*
TC1     004354           1371    1382#
TC2     004374           1388#   1393
TDBR  = 000412            589#   3322*   3412*   3436*   3444*   3450*   3453*
TEMP    014774           1845*   1846    1852*   1859*   1861*   1862    1868*   1869*   1870    1875*   1877*   1882*   1891*
                         1894    1899*   1902    1907*   1910    1915*   1918    1923*   1926    1931*   1934    1939*   1942
                         1947*   1951    1956*   1960    1965*   1969    1974*   1978    2022*   2023    2042*   2043*   2044
                         2064*   2065*   2070*   2071*   2072    2085*   2086*   2087    2092*   2093*   2094    2100*   2101*
                         2102    2107*   2108*   2109    2114*   2115*   2116    2121*   2122*   2123    2128*   2129*   2130
                         2159*   2160    2179*   2180*   2181    2200*   2201*   2206*   2207*   2208    2221*   2222*   2223
                         2228*   2229*   2230    2236*   2237*   2238    2243*   2244*   2245    2250*   2251*   2252    2257*
                         2258*   2259    2264*   2265*   2266    2271*   2273*   2274    2279*   2281*   2282    2309*   2310*
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                         2436*   2438*   2439    2444*   2446*   2447    2453*   2454*   2455    2461*   2464    2469*   2472
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                    3046*   3047    3050*   3051*   3056*   3057*   3058*   3059*   3060    3063*   3064*   3069*   3070
                    3077*   3078    3184#   3185    3186    3187
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                    2959*   2960*   2961*   2977    2981*   2982*   2983*   2984*   2985*   2986*   3002    3018*   3019*
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TJSR2   012770      2777    2779#
TJSR3   013002      2778    2783#   2787
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TSCOMB  014346      3070#   3079
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TSROT2  013614      2949#   2953
TSRT2A  013606      2915    2948#
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TTDBR   000412       589     762#   1114*
TTPST   000416       764#
TTPVC   000414       763#    915*
TTSAV   000420       765#   1116*   1117
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TYOUTR  003000       915    1116#
TYOUT1  002770      1114#   1123
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UPAR1   000512       794#
UPAR7   000514       795#   3271    3347*
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UPDR1   000504       791#
UPDR7   000506       792#   3348*
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USER    016676       972    3469#
WAIT4   014454      3088    3095#
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XFER28  002556      1080    1082#
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                     683     685     687     689     691     693     695     697     699     701     703     705     707
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1924	1831	1838	1847	1854	1863	1871	1878	1885	1895	1903	1911	1919
1927	1935	1943	1952	1961	1970	1979	2001	2006	2011	2018	2024	2030
2038	2045	2052	2060	2066	2073	2081	2088	2095	2103	2110	2117	2124
2131	2138	2143	2148	2155	2161	2167	2175	2182	2189	2196	2202	2209
2217	2224	2231	2237	2246	2253	2260	2267	2275	2283	2290	2296	2303
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2993	2995	2996	2998	2999	3003	3022	3035	3048	3061	3071	3073	3075
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DBKTG.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

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ASL 888 928 936 947 954 3297
ASLB 2870
ASR 1793 1794 3340
ASRB 2858
BCC 889 2925 2929 2963 2967 2988 2992 3298
BCS 2802 2811 2823 2835 2847 2859 2871
BEQ 846 858 956 980 991 1037 1122 1140 1159 1161 1166 1170 1180 1217 1286
1300 1303 1340 1357 1360 1390 1806 1812 1818 1824 1831 1838 1847 1854 1863
1871 1878 1885 1895 1903 1911 1919 1927 1935 1943 1952 1961 1970 1979 2001
2006 2011 2018 2024 2030 2038 2045 2052 2060 2066 2073 2081 2088 2095 2103
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2752 2760 2769 2780 2788 2798 2816 2828 2840 2852 2864 2876 2883 2892 2899
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BGT 1193
BHIS 1136
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3347 3348 3355 3393 3402 3419

F07

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1966 1974 1975 1984 1991 2016 2022 2028 2035 2042 2049 2057 2064 2070 2092
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2342 2348 2354 2360 2366 2372 2373 2384 2385 2391 2392 2399 2406 2413 2420
2428 2429 2436 2437 2444 2445 2452 2453 2461 2462 2469 2470 2477 2478 2485
2486 2493 2494 2501 2502 2509 2510 2517 2518 2525 2526 2534 2535 2569 2576
2638 2645 2652 2660 2681 2688 2699 2708 2714 2715 2722 2723 2730 2731 2738
2744 2750 2756 2757 2764 2765 2766 2774 2809 2821 2833 2845 2857 2869 2910
2917 2948 2955 3010 3011 3018 3082 3085 3096 3099 3124 3159 3162 3191 3192
3193 3194 3196 3197 3203 3204 3205 3212 3216 3233 3240 3243 3246 3249 3252
3255 3258 3261 3262 3264 3275 3282 3283 3292 3295 3299 3300 3303 3304 3305
3306 3310 3322 3324 3331 3332 3333 3338 3339 3341 3343 3344 3345 3346 3351
3352 3353 3354 3357 3358 3370 3374 3375 3377 3379 3382 3385 3388 3400 3403
3412 3425 3436 3444 3450 3453 3457 3458 3459 3462 3463

G07

DBKTG.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
MOVB     837   927   946  1190  1208  1325  1331  1370  1377  2400  2407  2414  2421  2556  2562
        2598  2619  2625  2631  3228
MTPI    1015  3287  3294
NEG     1933  1941  2129  2265
NEGB    2519  2599  2682
NOP     1043  1045  1047  1049  1051  1053  1068  1069  1988  1995  3132  3313  3314  3315
RESET    907  3308
ROL     2921  2922  2923  3407  3408  3421  3422  3423
ROLB    2834  2846  2959  2960  2961  2984  2985  2986
ROR     2918  2919  2920
RORB    2810  2822  2956  2957  2958  2981  2982  2983
RTI      847  1027  1115  1129  1155  1163  1191  1209  1273  1278  1291  1307  1316  1319  1326
        1345  1348  1364  1372  3160  3163  3263  3265  3288  3311  3359  3368  3394
RTS     1035  1038  1066  1094  1109  1397  2782  2942  2980  3005  3025  3135  3137  3139  3141
        3143  3145  3206  3415  3437  3445  3454  3469
RTT     3362
SBC      851   854  1968  1977  2281
SBCB    2537
SCC     2820  2844  2868  3136
SEC      849   852  1949  1958  1967  1976  2272  2280  2527  2536  2689  2700  3420
SOB      988   999  3200  3342  3356
SUB     1025  1877  1884  2058  2065  2071  2194  2201  2207  3020  3210
SWAB    1200  1219  1231  1792  3100  3105  3115  3119
TRAP     587
TST      845   850   880   881   882   883   911   920   931   939   950   955   960   986   998
        1056  1158  1214  1223  1270  1313  1327  1373  1894  1902  1910  1918  1926  1951  1960
        1969  1978  2072  2102  2208  2238  2274  2282  2538  2702  2790  3366  3390  3404  3417
TSTB     853  1117  1130  1141  1153  1156  1177  1210  2464  2488  2496  2504  2512  2662  2694
        3320  3410  3434  3442  3448  3451
WAIT    1018  3089  3090  3091  3092
.ABS     544
.DSABL   544
.ENABL     1
.END    3473
.LIST      1   544
.MACR   2888
.MACRO     1
.NLIST     1   544
.REM       1
.REPT    607  1403  1595
.SBTTL   544   604  1797
.TITLE   544

ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

*,DBKTGC.SEQ/SOL/CRF/PAGNUM/NL:TOC/DS:ERFZ=SYSMAC.CO,DBKTG.P11
RUN-TIME: 27 38 4 SECONDS
RUN-TIME RATIO: 223/71=3.1
CORE USED:  33K  (65 PAGES)
```

Spooler runtime 12 Seconds, 53 KCS, 308 disk reads, 4 disk writes, 84 pages