KT11

11/34 MEM MGMT
CFKTGC0

AH-8052C-MC

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MAY 1979
digital
MADE IN USA

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IDENTIFICATION

PRODUCT CODE:	AC-8050C-MC
PRODUCT NAME:	CFKTGCO 11/34 MEM MGMT
PRODUCT DATE:	26 MAR 79
MAINTAINER:	DIAGNOSTIC ENGINEERING

ABSTRACT

THIS PROGRAM IS AN INTERACTIVE EXERCISER FOR THE MEMORY MANAGEMENT
PORTION OF A PDP 11/34. IT PERFORMS A TEST OF INSTRUCTIONS AND
CONCURRENT OPERATIONS OF I/O EQUIPMENT WHILE RELOCATING THRU MEMORY.
IT PROVIDES NUMEROUS MODES OF TESTING, FROM 4K EXECUTION WITH
THE MEMORY MANAGEMENT TURNED OFF AND ONLY KERNEL MODE IN USE, TO 128K EXECUTION
WITH EACH USER PAGE MAPPED SEQUENTIALLY TO EVERY 4K BANK OF MEMORY.

THIS PROGRAM IS NOT TO BE CONSIDERED A TOTAL CHECK OF THE
SYSTEM. IF AN ERROR IS DETECTED IN AN I/O DEVICE,
IT WILL PROBABLY BE NECESSARY TO CORRECT THE MALFUNCTION WITH THE
RESPECTIVE DIAGNOSTIC FOR THAT DEVICE.

2.0 REQUIREMENTS

2.1 EQUIPMENT

PDP-11/34 STANDARD COMPUTER
TELETYPE OR EQUIVALENT

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE

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

2.2 STORAGE

THIS PROGRAM USES MEMORY FROM 00000 TO 17760.

3.0 LOADING PROCEDURE

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4.0 STARTING PROCEDURE AND SWITCH SETTINGS

4.1 NORMAL STARTING PROCEDURE

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

4.1 NORMAL STARTING PROCEDURE (CONTINUED)

THE PROGRAM WILL RING THE BELL (UNLESS THE TTY OUTPUT IS INHIBITED) 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 INHIBITED).

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

THE SWITCHES SET BEFORE STARTUP DETERMINE THE WAY IN

WHICH MEMORY IS MAPPED AND EXERCISED: (USE LOC 174 FOR SETTING SWITCHES)

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

4.3 DEVICE SELECTION SWITCHES

THE DEVICE SELECTION SWITCHES ARE SET IN THE SWITCH REGISTER
(USE LOC. 176 FOR SOFTWARE SW. REG. IF NECESSARY) ALSO SEE
SEC. 5.1.2. EACH SWITCH INHIBITS A SINGLE I/O DEVICE FROM
BEING EXERCISED.

SW0=1 OR UP---INHIBIT TTY OUTPUT
SW3=0 OR DOWN---INHIBIT RK11 DISK
SW4=0 OR DOWN---INHIBIT LINE CLOCK
SW5=0 OR DOWN---INHIBIT RF11 DISK
SW6=0 OR DOWN---INHIBIT TC11 DECTAPE
SW7=0 OR DOWN---INHIBIT LINE PRINTER (USE SA310 IF LP11 IS SELECTED)

4.4 RESTART PROCEDURE

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

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

5.1.1 BASIC SWITCH SETTINGS-STARTUP

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

5.1.2 DYNAMIC SWITCH SETTINGS

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

THE FOLLOWING SWITCHES ARE RECHECKED PERIODICALLY DURING PROGRAM
EXECUTION:

SW15=1 OR UP---HALT ON ERROR
SW14=1 OR UP---SCOPE LOOP
SW13=1 OR UP---INHIBIT PRINT OUT
SW12=1 OR UP---INHIBIT TRACE TRAPPING

SW11=1 OR UP---INHIBIT SUB-PROGRAM ITERATION AND INHIBIT
TESTS WHICH USE ALL COMBINATIONS OF
NUMBERS
SW10=1 OR UP---INHIBIT PROCESSOR TEST (ONCE SET, PROCESSOR
TEST IS PERMANENTLY INHIBITED)

5.2 SUBROUTINE ABSTRACTS

5.2.1 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST. IT RECORDS THE STARTING ADDRESS OF EACH SUBTEST AS IT IS BEING ENTERED. IF A SCOPE LOOP IS REQUESTED, IT WILL JUMP TO THE START OF THE SUBTEST THAT THE SCOPE LOOP IS REQUESTED FOR. IF A SCOPE LOOP IS NOT REQUESTED, THERE WILL BE 256 ITERATIONS ON THAT SUBTEST BEFORE THE NEXT SUBTEST IS ENTERED. SWITCH 11 ON A 1 INHIBITS ITERATION OF SUBTESTS.

5.2.2 HLT

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

5.2.3 TRAPCATCHER

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

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

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

5.2.4 EMTSRV (EMT HANDLER)

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

5.2.6 EOBSRV (END OF BANK SERVICE)

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

5.2.7 BEGINX (CORE EXPANSION SPECIAL HANDLER)

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

5.2.9 PFAIL (POWER FAIL)

IN THIS VERSION THE POWER FAIL ROUTINE IS NOT OPERABLE.

5.2.11 TYOUT (TTY OUTPUT)

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

5.2.12 RFSTART (RF11 DISK)

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

5.2.13 ENDZ (TC11 END ZONE HANDLER)

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

5.2.14 REGEN (TC11 WRITE BUFFER REGENERATE ROUTINE)

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

5.2.15 RBN (TC11 READ BLOCK NUMBER SERVICE ROUTINE)

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

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

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

5.2.17 TCCK (TC11 CHECK DATA ROUTINE)

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

5.2.18 LCLK (LINE CLOCK)

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

5.2.19 LP1 (LINE PRINTER)

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

5.2.20 RKSTART (RK-11 DISK)

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

5.2.22 CORE EXPANSION (DET1)

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

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

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1 PROCESSOR TEST EXECUTION - 4K AS 32K

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

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

5.3.3 PROCESSOR TEST EXECUTION - BANK 0 ONLY

IF BITS 0, 1 OR 2 IS UP AND BIT5 IS UP AT STARTUP, ONLY BANK 0 IS UTILIZED. IN THIS CASE, IF BIT0 AND BIT1 WERE ZERO THE PROCESSOR TESTS ARE EXECUTED IN USER, WITH USER PAGE 0

MAPPED TO BANK 0. IF BIT0 WAS ZERO AND BIT1 WAS ONE, THE
PROCESSOR TESTS ARE EXECUTED IN KERNEL, WITH KERNEL PAGE 0
MAPPED TO BANK 0. IF BIT0 WAS ONE, THE MEMORY MGMT. IS TURNED OFF
AND THE PROCESSOR TESTS ARE EXECUTED IN KERNEL MODE OR USER
MODE (DEPENDING ON BIT1) IN BANK 0 ONLY.

6.0 ERRORS

6.1 ERROR PRINTOUT

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

6.2 ERROR RECOVERY

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

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

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

BANK 0 AND YOU HAVE THE ADDRESS OF RETURN IN THE CURRENT BANK OF MEMORY. THE CONTENTS OF RETURN IN THE CURRENT BANK OF MEMORY IS THE VIRTUAL ADDRESS OF THE START OF THE CURRENT PROCESSOR TEST.

7.0 RESTRICTIONS

PROGRAM MUST BE LOADED INTO LOWER 4K OF MEMORY.

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

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

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

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

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

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

ACT11 WITH OPTIONS SET AS DESCRIBED IN SECTION 8.3:

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

XXDP WITH OPTIONS SET AS DESCRIBED IN SECTION 8.3:

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

8.2 STACK POINTERS

THE KERNEL STACK POINTER IS INITIALIZED TO 17760.

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

8.3 ACT11/XXDP OPERATION

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

THE ACT11/XXDP SOFTWARE SWITCHES ARE:

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

XDPSW1: 46      ;INHIBIT KT11D, NO CORE EXPANSION,NO 4K AS 32
XDPSW2: 1       ;INHIBIT TTY WHILE IN XXDP CHAIN MODE.
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SWITCH XDPSW1 MUST ALWAYS BE LEFT WITH THE VALUE 46, AS IF CHANGED,
THE PROGRAM WILL NOT FUNCTION UNDER CHAIN MODE.

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

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

9.0 PROGRAM DESCRIPTION

THIS MEMORY MANAGEMENT EXERCISER IS DESIGNED TO RUN BACKGROUND
PROCESSOR TESTS AND FOREGROUND CONCURRENT I/O WITH MEMORY
MANAGEMENT UTILIZED IN ANY OF SEVERAL DIFFERENT MODES. THE VARIOUS
MODES AVAILABLE FOR UTILIZING MEMORY MANAGEMENT ARE INCLUDED TO AID
IN FAULT ISOLATION BY PROVIDING A SERIES OF STEPS FROM SIMPLE TO COMPLEX.
MEMORY MANAGEMENT CAN BE LEFT TURNED OFF AND THE PROCESSOR TESTS
CAN STILL BE RUN IN 4K ONLY OR CORE EXPANDED UP TO 28K.
WITH MEMORY MANAGEMENT ON, THE PROGRAM CAN
BE RUN USING ONLY 4K, WITH EVERYTHING MAPPED IN KERNEL SPACE
OR WITH USER AND KERNEL BOTH USED. AT THE NEXT LEVEL
OF COMPLEXITY, CORE EXPANSION CAN BE RUN WITH MEMORY MANAGEMENT
ON, USING KERNEL ONLY OR USING BOTH MODES AS DESIRED.
FINALLY, ALL AVAILABLE MEMORY (IN 4K PIECES) CAN BE UTILIZED BY
RUNNING 4K AS 32K.
THERE IS NO MONITOR IN THE CONVENTIONAL SENSE. EACH DEVICE THAT
IS TO BE EXERCISED HAS ITS OWN STAND ALONE ROUTINE THAT OPERATES
IN THE INTERRUPT MODE. THESE ROUTINES NEED NO SUPERVISION OR
MONITORING AFTER THEY ARE INITIATED. THERE IS A PRIMER AREA
THAT CHECKS THE SWITCH REGISTER TO SEE WHAT DEVICES ARE TO BE
INITIATED. IT SETS THE INTERRUPT ENABLE BIT IN THE DEVICE STATUS
REGISTER, INITIALIZES THE DATA PATTERN, AND INITIATES AN OPERATION
TO RAISE DATA FLAGS ON DEVICES THAT CAN NOT INITIATE THEM THEMSELVES.
THE PRIMER CODE THEN ENTERS THE MEMORY MANAGEMENT SETUP CODE.
THE RF11 AND TC11 PRIMER CODE IS IN WITH THE MEMORY MANAGEMENT SETUP
CODE SINCE THEY REQUIRE CERTAIN PARTS OF THE MEMORY MANAGEMENT CODE TO
BE RUN FIRST. AFTER MEMORY MANAGEMENT IS TURNED ON, EXECUTION
OF THE BACKGROUND PROCESSOR TESTS BEGINS, AND THE I/O DEVICES ARE
SERVICED WHEN THEY INTERRUPT.

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.LIST   ME,SEQ,BIN
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                        .NLIST  MC,CND,MD,TOC
                        .TITLE  CFKTGC 11/34 MEM MGMT
                        .ABS
                        .DSABL  ERFZ


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

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

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

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

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

                ;SPECIAL DELETE SWITCHES-SET RESPECTIVE SWITCH TO INHIBIT
                ;INITIATION OF DEVICE
                ;SW 0=1 INHIBIT TTY OUTPUT
                ;SW 3=0 INHIBIT RK11 DISK
                ;SW 4=0 INHIBIT LINE CLOCK
                ;SW 5=0 INHIBIT RF11 DISK
                ;SW 6=0 INHIBIT TC11 DECTAPE
                ;SW 7=0 INHIBIT LINE PRINTER
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                        ;                REVISION HISTORY
                        ;*****************************************************************************
                        ;1.  TITLE CHANGED FROM DFKTGB TO CFKTGC
                        ;2.  LOCATION CHGC6 INSTRUCTION CHANGED FROM (BIT SR,#20000) TO (BIT @SR,#20000)
                        ;    TEST FOR INHIBIT PRINTOUT.  LOOKS AT SWITCH REGISTER SETTINGS.
                        ;3.  LOCATION CHGC7 INSTRUCTION CHANGED FROM (TST SR) TO (TST @SR)
                        ;    TEST FOR HALT ON ERROR.  LOOKS AT SWITCH REGISTER SETTINGS.
                        ;4.  LOCATIONS CHGC1 THRU CHGC5 CHANGED FROM BNE TO BEQ INSTRUCTION.
                        ;5.  INSTRUCTIONS ON SETTING SR CHANGED FROM 1 TO 0 ON BITS 3,4,5,6,7
                        ;    TO INHIBIT OPERATION OF THE DEVICE EACH BIT CONTROLS.
                        ;*****************************************************************************
000000  001440                CHGC1
000002  001526                CHGC2
000004  001572                CHGC3
000006  001670                CHGC4
000010  001730                CHGC5
000012  015706                CHGC6
000014  016036                CHGC7

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

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

```
  710  000150  000152                .+2          ;TRAP ENTRANCE
  711  000152  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  712  000154  000156                .+2          ;TRAP ENTRANCE
  713  000156  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  714  000160  000162                .+2          ;TRAP ENTRANCE
  715  000162  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  716  000164  000166                .+2          ;TRAP ENTRANCE
  717  000166  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  718  000170  000172                .+2          ;TRAP ENTRANCE
  719  000172  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  720  000174  000176                .+2          ;TRAP ENTRANCE
  721  000176  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  722  000200  000202                .+2          ;TRAP ENTRANCE
  723  000202  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  724  000204  000206                .+2          ;TRAP ENTRANCE
  725  000206  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  726  000210  000212                .+2          ;TRAP ENTRANCE
  727  000212  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  728  000214  000216                .+2          ;TRAP ENTRANCE
  729  000216  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  730  000220  000222                .+2          ;TRAP ENTRANCE
  731  000222  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  732  000224  000226                .+2          ;TRAP ENTRANCE
  733  000226  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  734  000230  000232                .+2          ;TRAP ENTRANCE
  735  000232  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  736  000234  000236                .+2          ;TRAP ENTRANCE
  737  000236  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  738  000240  000242                .+2          ;TRAP ENTRANCE
  739  000242  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  740  000244  000246                .+2          ;TRAP ENTRANCE
  741  000246  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  742  000250  000252                .+2          ;TRAP ENTRANCE
  743  000252  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  744  000254  000256                .+2          ;TRAP ENTRANCE
  745  000256  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  746  000260  000262                .+2          ;TRAP ENTRANCE
  747  000262  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  748  000264  000266                .+2          ;TRAP ENTRANCE
  749  000266  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  750  000270  000272                .+2          ;TRAP ENTRANCE
  751  000272  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  752  000274  000276                .+2          ;TRAP ENTRANCE
  753  000276  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  754  000300  000302                .+2          ;TRAP ENTRANCE
  755  000302  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  756  000304  000306                .+2          ;TRAP ENTRANCE
  757  000306  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  758  000310  000312                .+2          ;TRAP ENTRANCE
  759  000312  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  760  000314  000316                .+2          ;TRAP ENTRANCE
  761  000316  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  762  000320  000322                .+2          ;TRAP ENTRANCE
  763  000322  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
  764  000324  000326                .+2          ;TRAP ENTRANCE
  765  000326  000000                HALT         ;TRAPPED TO PREVIOUS LOCATION
```

```
000330  000332                  .+2                     ;TRAP ENTRANCE
000332  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000334  000336                  .+2                     ;TRAP ENTRANCE
000336  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000340  000342                  .+2                     ;TRAP ENTRANCE
000342  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000344  000346                  .+2                     ;TRAP ENTRANCE
000346  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000350  000352                  .+2                     ;TRAP ENTRANCE
000352  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000354  000356                  .+2                     ;TRAP ENTRANCE
000356  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000360  000362                  .+2                     ;TRAP ENTRANCE
000362  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000364  000366                  .+2                     ;TRAP ENTRANCE
000366  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000370  000372                  .+2                     ;TRAP ENTRANCE
000372  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION
000374  000376                  .+2                     ;TRAP ENTRANCE
000376  000000                  HALT                    ;TRAPPED TO PREVIOUS LOCATION

                        ;******************************************************************
                        .SBTTL  LOAD VECTOR AREA
                        ;******************************************************************
        000024                  .=24
000024  016370                  PFAIL                   ;POWER FAIL TRAP
000026  000340                  340
        000030                  .=30
000030  015072                  EMTSRV                  ;EMT CALLS
000032  000340                  340                     ;HIGHEST PRIORITY
        000034                  .=34
000034  014570                  SCOPEC                  ;USER TRAP
000036  000000                  0
        000040                  .=40                    ;LOAD MEDIUM INDICATOR.
000040  000000                  0                       ;LOADS AS 0.
        000042                  .=42                    ;AUTOMATIC MODE INDICATOR.(ACT11/XXDP).
000042  000000                  0                       ;ZERO AT LOAD TIME.
        000046                  .=46                    ;POINTER TO LOGICAL END.
000046  015640                  $ENDAD
        000052                  .=52                    ;PROGRAM ATTRIBUTES WORD.
000052  040000                  40000
        000174                  .=174
000174  000000          MMOPT:  0                       ;MEMORY MANAGEMENT OPTION SEL.
000176  000000          SWREG:  0                       ;SOFTWARE SWITCH REG.
        000176                  SREG2=SWREG


                        ;******************************************************************
                        .SBTTL  LOAD STARTING AREA
                        ;******************************************************************
        000200                  .=200
000200  000137  000664          JMP     @#START
        000300                  .=300
000300  000137  000664          JMP     @#START
        000310                  .=310
000310  000137  000634          JMP     @#RSTRT
```

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

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

```
                                SR:     177570                  ;SWITCH REGISTER POINTER
                                SRH:    177571                  ;HIGH BYTE OF SW. REG. POINTER
                                TCCM:   177342                  ;CONTROL AND FUNCTION
                                TCST:   177340                  ;GENERAL STATUS
                                TCDT:   177350                  ;DATA
                                TCWC:   177344                  ;WORD COUNT
                                TCBA:   177346                  ;BUS ADDRESS
                                TCIV:   214                     ;DECTAPE INTERRUPT VECTOR
                                TCSTA:  216
                                CURBNK: 0                       ;SAF TO POINT TO CURRENT BANK
                                OLDBNK: 0
                                CURPAR: 0                       ;ADDRESS OF CURRENT ISAR
                                CURPDR:0
                                BNKSTR: 0                       ; PC TO POINT TO BEGIN THRU CURRENT SEGMENT
                                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.
                                MEM0:   177777                  ;0-64K
                                MEM1:   77777                   ;64-124K
                                COREPT: 1
                                MEMUT:  MEM0
                                TBANK:  0
                                REFF:   0
                                TEST:   0

                                ;******************************************************************
                                .SBTTL  FILLCT, ACT11, XXDP SOFTWARE SWITCHES
                                ;******************************************************************
                                FILLCT: 14                      ;CONSOLE FILL COUNT.
                                ACTSW1: 40                      ;NO CORE EXPANSION.
                                ACTSW2: 201                     ;NO LP, NO  TTY.
                                XDPSW1: 46                      ;NO CORE EXPANSION, NO 4 AS 32, ETC.
                                XDPSW2: 1                       ;NO TTY.

                                ;******************************************************************
                                .SBTTL  RESTART ADD USING INITIAL SR SETTINGS
                                ;******************************************************************
                                RSTRT:  MOV     #KSTACK,R6
                                        MOV     #PFAIL,@#24
                                        TST     @#42            ;IN AUTO MODE? (ACT11/XXDP)
                                        BNE     START2          ;BR IF YES.
                                        MOVB    @SRH,@#SREG2+1  ;UPDATE DYNAMIC SWITCH SETTINGS.
                                        BR      START2

                                ;******************************************************************
                                .SBTTL  START UP FOR MINI MONITOR - NORMAL START FROM LOC 000200
                                ;******************************************************************

                                START:  MOV     #KSTACK,R6      ;SET UP STACK
                                        MOV     #137,@#200      ;RESTORE 200 IF START AT 300
                                        MOV     #START,@#202
                                        CLR     TRPB            ;NO TRACE IN FIRST PASS.
                                        CLR     PASCNT          ;CLEAR THE PASS COUNTER.
                                        MOV     @#4,-(SP)       ;SAVE ERROR VECTOR
```

```
  934  000720  013746  000006                 MOV     @#6,-(SP)
  935  000724  012767  000740  177052         MOV     #1$,4                   ;SET UP TIME OUT VECTOR
  936  000732  005777  177610                 TST     @SR                     ;TRY TO REFERENCE HARDWARE SW. REG.
  937  000736  000404                         BR      2$                      ;BRANCH IF NO TIMEOUT TRAP OCCURS
  938  000740  012767  000176  177600  1$:    MOV     #SWREG,SR               ;POINT TO SOFTWARE SW. REG.
  939  000746  022626                         CMP     (SP)+,(SP)+             ;RESTORE STACK
  940  000750  016767  177572  177572  2$:    MOV     SR,SRH
  941  000756  005267  177566                 INC     SRH
  942  000762  012637  000006                 MOV     (SP)+,@#6               ;RESTORE ERROR VECTOR
  943  000766  012637  000004                 MOV     (SP)+,@#4
  944  000772  005737  000042                 TST     @#42                    ;IN AUTOMATIC TEST MODE?
  945  000776  001422                         BEQ     STARTX                  ;BR IF NOT IN AUTOMATIC MODE.
  946  001000  023727  000042  015640         CMP     @#42,#$ENDAD            ;IN ACT11 MODE?
  947  001006  001007                         BNE     3$                      ;BR IF NOT.
  948  001010  016737  177610  000174         MOV     ACTSW1,@#MMOPT          ;YES. SET MMOPT FROM ACTSW1.
  949  001016  016737  177604  000176         MOV     ACTSW2,@#SREG2          ;SET SREG2 FROM ACTSW2.
  950  001024  000412                         BR      START1
  951  001026  016737  177576  000174  3$:    MOV     XDPSW1,@#MMOPT          ;XXDP MODE. SET MMOPT FROM XDPSW1.
  952  001034  016737  177572  000176         MOV     XDPSW2,@#SREG2          ;SET SREG2 FROM XDPSW2.
  953  001042  000403                         BR      START1
  954  001044                          STARTX:
  955  001044  017737  177476  000176         MOV     @SR,@#SREG2
  956  001052                          START1:
  957  001052  004767  013752          START2: JSR     %7,NRALL
  958  001056  012777  077406  177432         MOV     #77406,@KPDR0
  959  001064  012777  007600  177442         MOV     #7600,@KPAR7    ;MAP PAGE 7 TO EXT BANK
  960  001072  012777  077406  177424         MOV     #77406,@KPDR7
  961  001100  005067  177510                 CLR     TBANK
  962  001104  012767  177777  177472         MOV     #177777,MEM0    ;SET UP CORE MAPS
  963  001112  012767  077777  177466         MOV     #77777,MEM1
  964  001120  012767  000001  177462         MOV     #1,COREPT       ;SET UP 4K POINTER
  965  001126  012767  000604  177456         MOV     #MEM0,MEMUT
  966  001134  012777  077406  177360         MOV     #77406,@KPDR2   ;BEING CHECKED FOR
  967  001142  012737  001212  000004         MOV     #TMEMEX,@#4     ;SET UP FOR TIME OUTS
  968  001150  005037  000006                 CLR     @#6
  969  001154  052777  000001  177316         BIS     #1,@SR0
  970  001162  016777  177426  177342  MAP1:  MOV     TBANK,@KPAR2    ;MAP KERNEL PAGE 2 TO BANK
  971  001170  005737  041000                 TST     @#41000         ;1ST K PRESENT
  972  001174  005737  045000                 TST     @#45000         ;2ND K PRESENT
  973  001200  005737  051000                 TST     @#51000         ;3RD K PRESENT
  974  001204  005737  055000                 TST     @#55000         ;4TH K PRESENT
  975  001210  000404                         BR      MOVEPT          ;OK. FULL 4K BLOCK PRESENT
  976  001212  046777  177372  177372  TMEMEX: BIC     COREPT,@MEMUT   ;NO. BLOCK NOT PRESENT
  977  001220  022626                         CMP     (SP)+,(SP)+     ;ADJUST STACK POINTER
  978  001222  062767  000200  177364  MOVEPT: ADD     #200,TBANK      ;UPDATE BANK POINTER
  979  001230  006367  177354                 ASL     COREPT
  980  001234  103006                         BCC     MAP2            ;THIS 1ST MEM WORD DONE
  981  001236  012767  000001  177344         MOV     #1,COREPT
  982  001244  012767  000606  177340         MOV     #MEM1,MEMUT
  983  001252  022767  007600  177334  MAP2:  CMP     #7600,TBANK     ;EXTERNAL BANK YET
  984  001260  001340                         BNE     MAP1            ;NO,NOT YET?
  985  001262  012767  000001  177320         MOV     #1,COREPT       ;RE-INIT
  986  001270  012767  000604  177314         MOV     #MEM0,MEMUT
  987  001276  042777  000001  177174         BIC     #1,@SR0
  988  001304  012737  014570  000034         MOV     #SCOPEC,@#34
  989  001312  005037  000036                 CLR     @#36                    ;INITIALIZE SCOPE CALL TO KERNEL ADDR
```

```
 990  001316  012737  015072  000030          MOV     #EMTSRV,@#30
 991  001324  012737  000340  000032          MOV     #340,@#32
 992  001332  012737  005542  014704          MOV     #BEGIN,@#RETURN
 993  001340  012737  000340  177776          MOV     #340,@#PSR              ;LOCK OUT INTERRUPTS
 994  001346  005037  016060                  CLR     @#PRTON                 ;PRINT ROUTINE BUSY FLAG
 995  001352  000005                          RESET
 996  001354  012737  002404  000004          MOV     #NODEV,@#4              ;RETURN FOR NO DEVICE
 997  001362  005037  000006                  CLR     @#6
 998                                  ;*****************************************************************
 999                                  .SBTTL  TTY INIT
1000                                  ;*****************************************************************
1001  001366  005067  001464                  CLR     DATA2                   ;BASE DATA FOR TTY TELEPRINTER
1002  001372  033727  000176  000001          BIT     @#SREG2,#1              ;INHIBIT TTY OUTPUT?
1003  001400  001006                          BNE     ST3                     ;YES, GO CHECK NEXT.
1004  001402  012777  003070  177004          MOV     #TYOUTR,@TTPVC          ;NO, SETUP INTERRUPT VECTOR
1005  001410  052777  000100  176772          BIS     #100,@TTCSR             ;START TTY OUTPUT
1006                                  ;*****************************************************************
1007                                  .SBTTL  RK11 INIT
1008                                  ;*****************************************************************
1009  001416  012700  000010          ST3:    MOV     #10,R0
1010  001422  122737  000002  000041          CMPB    #2,@#41                 ;LOAD MEDIUM RK11?
1011  001430  001432                          BEQ     ST4                     ;BR IF YES. DON'T USE RK11 THEN.
1012  001432  032737  000010  000176          BIT     #10,@#SREG2             ;INHIBIT RK DISK
1013                                  ;*****************************************************************
1014  001440  001426                  CHGC1:  BEQ     ST4                     ;YES, SKIP OVER
1015                                  ;*****************************************************************
1016  001442  005777  177022                  TST     @RKCSR                  ;PRESENT
1017  001446  012777  003466  177020          MOV     #IRK,@RKVC              ;SETUP VECTOR RETURNS
1018  001454  012777  000240  177014          MOV     #240,@RKST              ;PRIORITY 5 SERVICE.
1019  001462  012767  043503  002040          MOV     #43503,RKFUNCT
1020  001470  005077  176766                  CLR     @RKDAE                  ;INIT
1021  001474  016777  002170  176764          MOV     LLIMIT,@RKBAR           ;CORE BASE
1022  001502  016777  002164  176754          MOV     WORDCT,@RKWC            ;TRANSFER LENGTH
1023  001510  116777  002014  176752          MOVB    RKFUNCT,@RKCSR
1024                                  ;*****************************************************************
1025                                  .SBTTL  LINE CLOCK INIT
1026                                  ;*****************************************************************
1027  001516  006300                  ST4:    ASL     R0
1028  001520  033727  000176  000020          BIT     @#SREG2,#20             ;INHIBIT LINE CLOCK?
1029                                  ;*****************************************************************
1030  001526  001415                  CHGC2:  BEQ     ST5                     ;YES, GO CK NEXT
1031                                  ;*****************************************************************
1032  001530  005777  176672                  TST     @LKCSR                  ;PRESENT
1033  001534  012777  003146  176660          MOV     #LK3,@KWLVC
1034  001542  012777  000300  176654          MOV     #300,@KWLST
1035  001550  005067  001466                  CLR     TIME                    ;NO, INITIALIZE COUNT
1036  001554  052777  000100  176644          BIS     #100,@LKCSR             ;START LINE CLOCK
1037                                  ;*****************************************************************
1038                                  .SBTTL  RF11 INIT
1039                                  ;*****************************************************************
1040  001562  006300                  ST5:    ASL     R0
1041  001564  033727  000176  000040          BIT     @#SREG2,#40             ;TEST FOR INHIBITING RF11 DISK
1042                                  ;*****************************************************************
1043  001572  001426                  CHGC3:  BEQ     ST6                     ;SKIP IF SET
1044                                  ;*****************************************************************
1045  001574  005777  176650                  TST     @RFCSR                  ;PRESENT?
```

```
1046  001600  012777  003562  176646          MOV     #IRF,@RFVC              ;SET UP TRAP RETURN
1047  001606  012777  000240  176642          MOV     #240,@RFST
1048  001614  012767  043503  002044          MOV     #43503,RFFUNCT          ;WRITE CHECK/WRITE
1049  001622  105277  176624                  INCB    @RFCSRH                 ;INITIALIZE DISK-DAR,DAE
1050  001626  016777  002040  176610          MOV     WORDCT,@RFWC            ;LENGTH OF TRANSFER
1051  001634  016777  002030  176604          MOV     LLIMIT,@RFCAR           ;CORE ADDRESS OF START OF TRANSFER
1052  001642  116777  002020  176600          MOVB    RFFUNCT,@RFCSR          ;START RF11 READ OR WRITE
1053                                  ;******************************************************************
1054                                  .SBTTL  TC11 INIT
1055                                  ;******************************************************************
1056  001650  006300                  ST6:    ASL     R0
1057  001652  122737  000001  000041          CMPB    #1,@#41                 ;LOAD MEDIUM DECTAPE?
1058  001660  001417                          BEQ     ST7                     ;BR IF YES. DON'T USE IT THEN.
1059  001662  033727  000176  000100          BIT     @#SREG2,#100            ;CHECK FOR INHIBITING TC11 DECTAPE
1060                                  ;******************************************************************
1061  001670  001413                  CHGC4:  BEQ     ST7                     ;SKIP IF SET
1062                                  ;******************************************************************
1063  001672  005777  176656                  TST     @TCST                   ;PRESENT?
1064  001676  012777  003702  176660          MOV     #FENDZ,@TC1V            ;GO TO END ZONE ON INTERRUPT
1065  001704  012777  000300  176654          MOV     #300,@TCSTA
1066  001712  012777  004503  176632          MOV     #R+IE+RB+DO,@TCCM       ;START REVERSE READ BLOCK NUMBER
1067                                  ;******************************************************************
1068                                  .SBTTL  LINE PRINTER INIT
1069                                  ;******************************************************************
1070  001720  006300                  ST7:    ASL     R0
1071  001722  033727  000176  000200          BIT     @#SREG2,#200            ;INHIBIT LINE PRINTER?
1072                                  ;******************************************************************
1073  001730  001432                  CHGC5:  BEQ     ST8                     ;YES, GO CK NEXT
1074                                  ;******************************************************************
1075  001732  005777  176472                  TST     @LPCSR                  ;PRESENT?
1076  001736  012737  002016  000004          MOV     #ST8,@#4                ;DON'T CHANGE 200 IF NO SUCH DEVICE
1077  001744  012767  000137  001274          MOV     #137,SOLPAT             ;RESET FOR START OF LINE PATTERN
1078  001752  012767  000117  001360          MOV     #79.,CLINCT             ;LINE COUNT
1079  001760  012767  000137  001262          MOV     #137,CURPAT
1080  001766  012777  000014  176436          MOV     #14,@LPDBR              ;LINE FEED TO POSITION BUFFER
1081  001774  012777  003270  176432          MOV     #LPINTR,@LPVC           ;INTERRUPT ENABLE
1082  002002  012777  000200  176426          MOV     #200,@LPST              ;PROCESSOR LEVEL 4
1083  002010  012777  000100  176412          MOV     #100,@LPCSR             ;INTERRUPT ENABLE
1084                                  ;******************************************************************
1085                                  .SBTTL  PRE-PASS SETUP
1086                                  ;******************************************************************
1087  002016  005037  000006          ST8:    CLR     @#6                     ;CHANGE ADDRESS ERROR VECTOR TO CAUSE
1088  002022  012737  000006  000004          MOV     #6,@#4                  ;HALT ON A TRAP TO 4
1089  002030  004767  000370                  JSR     %7,DET1                 ;CHECK FOR CORE EXPANSION
1090  002034  032737  000001  000174          BIT     #1,@#MMOPT              ;INHIBIT MEMORY MGMT?
1091  002042  001106                          BNE     MODE                    ;YES - GO SETUP USER
1092  002044  004767  012760                  JSR     %7,NRALL                ;NO - MAKE ALL SEGMENTS INITIALLY NON-RESIDENT
1093  002050  012777  077406  176446          MOV     #77406,@KPDR7
1094  002056  012777  007600  176450          MOV     #7600,@KPAR7
1095  002064  032737  000006  000174          BIT     #6,@#MMOPT              ;INHIBIT USER/KERNEL OR 4K AS 32K?
1096  002072  001415                          BEQ     SEGM1                   ;NO - BRANCH
1097  002074  012701  000007                  MOV     #7,R1                   ;YES - MAP KERNEL ASR'S 0-6 TO PA
1098  002100  016702  176422                  MOV     KPAR0,R2
1099  002104  005003                          CLR     R3
1100  002106  010312                  SETEX:  MOV     R3,@R2
1101  002110  012762  077406  177740          MOV     #77406,-40(R2)
```

```
1102  002116  005722                          TST     (R2)+
1103  002120  062703  000200                  ADD     #200,R3
1104  002124  077110                          SOB     R1,SETEX
1105  002126  012777  077406  176362  SEGM1:  MOV     #77406,@KPDR0           ;MAP KERNEL 0 TO BANK 0, RW
1106  002134  032737  000004  000174          BIT     #4,@#MMOPT              ;INHIBIT RUNNING 4K AS 32K?
1107  002142  001416                          BEQ     USEALL                  ;NO, SETUP FOR RUNNING 4K AS 32K
1108  002144  012701  000010                  MOV     #10,R1                  ;YES, MAP ALL USER ASR'S TO PA
1109  002150  016702  176334                  MOV     UPAR0,R2
1110  002154  005003                          CLR     R3
1111  002156  010312                  SETUSE: MOV     R3,(R2)
1112  002160  062703  000200                  ADD     #200,R3
1113  002164  012762  077406  177740          MOV     #77406,-40(R2)
1114  002172  005722                          TST     (R2)+
1115  002174  077110                          SOB     R1,SETUSE
1116  002176  000425                          BR      SETSEG
1117  002200  012777  077406  176274  USEALL: MOV     #77406,@UPDR0           ;MAP USER ASR0 TO BANK 0, RW
1118  002206  012737  000000  000570          MOV     #0,@#CURBNK             ;CURRENT SAR CONTENTS
1119  002214  012767  000001  176366          MOV     #1,COREPT               ;INIT MAP POINTERS
1120  002222  012767  000604  176362          MOV     #MEM0,MEMUT
1121  002230  016767  176254  176336          MOV     UPAR0,CURPAR            ;CURRENT SEGMENT REGISTER ADDRESSES
1122  002236  016767  176240  176332          MOV     UPDR0,CURPDR
1123  002244  012767  005542  176326          MOV     #BEGIN,BNKSTR           ;CURRENT STARTING PC
1124  002252  052777  000001  176220  SETSEG: BIS     #1,@SR0                 ;SET MEM MGMT ENABLE BIT
1125  002260  005767  176316          MODE:   TST     TRPB                    ;USE TRACE MODE?
1126  002264  001406                          BEQ     1$                      ;BR IF NOT.
1127  002266  012737  015662  000014          MOV     #TRTRP,@#14             ;SET UP TRACE TRAP VECTOR.
1128  002274  012746  000020                  MOV     #20,-(SP)               ;ALLOW TRACE MODE.
1129  002300  000406                          BR      2$
1130  002302  012737  000016  000014  1$:     MOV     #16,@#14                ;NO TRACE MODE . RESET THE VECTOR.
1131  002310  005037  000016                  CLR     @#16
1132  002314  005046                          CLR     -(SP)                   ;INSURE NO TRACE WILL BE ENABLED.
1133  002316  012746  002324          2$:     MOV     #3$,-(SP)               ;CONTINUE AT 3$.
1134  002322  000002                          RTI                             ; DO IT NOW.
1135  002324  032737  000002  000174  3$:     BIT     #2,@#MMOPT              ;INHIBIT USER/KERNEL?
1136  002332  001016                          BNE     MAIN+2                  ;YES - SKIP OVER
1137  002334  052737  140000  000036          BIS     #140000,@#36            ;SET USER BIT IN SCOPE STATUS
1138  002342  012746  000400                  MOV     #UBUFF,-(R6)
1139  002346  052737  030000  177776          BIS     #30000,@#PSR
1140  002354  006606                          MTPI    SP                      ;SET UP USER STACK
1141  002356  012737  140000  177776          MOV     #140000,@#PSR           ;CHANGE TO USER
1142  002364  000401                          BR      .+4
1143  002366  000001                  MAIN:   WAIT
1144  002370  033727  000176  002000          BIT     @#SREG2,#2000           ;INHIBIT PROCESSOR TEST
1145  002376  001373                          BNE     MAIN
1146  002400  000167  003136                  JMP     BEGIN
1147
1148                                  ;******************************************************************************
1149                                  .SBTTL  NON-EXISTING DEVICE SERVICE
1150                                  ;******************************************************************************
1151  002404  050037  000176          NODEV:  BIS     R0,@#SREG2              ;SET INHIBIT BIT
1152  002410  162716  000006                  SUB     #6,(SP)                 ;ALTER PC RETURN
1153  002414  042766  000017  000002          BIC     #17,2(SP)               ;CLEAR Z BIT ON STACK
1154  002422  000002                          RTI
1155
1156                                  ;******************************************************************************
1157                                  .SBTTL  PDP-11 MEMORY DETERMINATION AND SETUP
```

```
1158                                    ;*****************************************************************************
1159                                    ;USE WITH VARIABLE CORE QUANTITY SYSTEMS/
1160  002424  012767  104610  012074    DET1:   MOV     #EOB,DONE               ;RESTORE INITIAL CODE
1161  002432  032737  000007  000174            BIT     #7,@#MMOPT              ;INHIBIT RUNNING 4K AS 32K USER?
1162                                                                            ;OR INHIBIT SEGMENTATION?
1163  002440  001001                            BNE     .+4                     ;YES - ALLOW CORE EXPANSION
1164  002442  000207                            RTS     %7                      ;NO - INHIBIT CORE EXPANSION
1165  002444  032737  000040  000174            BIT     #40,@#MMOPT             ;CHECK VARIABLE CORE SWITCH
1166  002452  001401                            BEQ     DET4                    ;USE VARIABLE CORE ROUTINE
1167  002454  000207                            RTS     %7                      ;4K ONLY (SWITCH SET)
1168  002456  012737  002542  000004    DET4:   MOV     #DET2,@#4               ;TRAP VECTOR SETUP
1169  002464  012737  000340  000006            MOV     #340,@#6                ;TRAP STATUS SETUP
1170  002472  000241                            CLC
1171  002474  005537  037770            EIGHT:  ADC     @#37770                 ;CHECK FOR 8K
1172  002500  000240                            NOP
1173  002502  005537  057770                    ADC     @#57770                 ;CHECK FOR 12K
1174  002506  000240                            NOP
1175  002510  005537  077770                    ADC     @#077770                ;CHECK FOR 16K
1176  002514  000240                            NOP
1177  002516  005537  117770                    ADC     @#117770                ;CHECK FOR 20K
1178  002522  000240                            NOP
1179  002524  005537  137770                    ADC     @#137770                ;CHECK FOR 24K
1180  002530  000240                            NOP
1181  002532  005537  157770                    ADC     @#157770                ;CHECK FOR 28K
1182  002536  000240                            NOP
1183  002540  000437                            BR      STRT28
1184  002542  012602                    DET2:   MOV     (6)+,%2                 ;RETRIEVE TRAP PC
1185  002544  005726                            TST     (6)+                    ;DISCARD TRAP STATUS WORD
1186  002546  062702  000074                    ADD     #STRT4-EIGHT-4,R2
1187  002552  000112                            JMP     @R2
1188
1189  002554  005000                    MOVE:   CLR     %0                      ;SET UP MAIN CORE POINTER
1190  002556  010102                            MOV     %1,%2
1191  002560  062702  015030                    ADD     #D+2,%2                 ;SET UP MAX CORE MOVE
1192  002564  012021                            MOV     (0)+,(1)+               ;MOVE WORD
1193  002566  020201                            CMP     %2,%1                   ;MOVE COMPLETE?
1194  002570  001375                            BNE     .-4                     ;MOVE ANOTHER WORD
1195  002572  000207                            RTS     %7                      ;MOVE COMPLETE
1196  002574  000521                    STRT4:  BR      DET3
1197  002576  000240                            NOP
1198  002600  000240                            NOP
1199  002602  004767  000110                    JSR     %7,XFER8                ;START 8K TRANSFER
1200  002606  000506                            BP      MOD4                    ;START 4K MODIFY
1201  002610  004767  000072                    JSR     %7,XFER12               ;START 12K TRANSFER
1202  002614  000475                            BR      MOD8                    ;START 8K MODIFY
1203  002616  004767  000054                    JSR     %7,XFER16               ;START 16K TRANSFER
1204  002622  000464                            BR      MOD12                   ;START 12K MODIFY
1205  002624  004767  000036                    JSR     %7,XFER20               ;START 20K TRANSFER
1206  002630  000453                            BR      MOD16                   ;START 16K MODIFY
1207  002632  004767  000020                    JSR     %7,XFER24               ;START 24K TRANSFER
1208  002636  000442                            BR      MOD20                   ;START 20K MODIFY
1209  002640  004767  000002            STRT28: JSR     %7,XFER28               ;START 28K TRANSFER
1210  002644  000431                            BR      MOD24                   ;START 24K MODIFY
1211  002646  012701  140000            XFER28: MOV     #140000,%1              ;SET UP MOVE START LOCATION
1212  002652  004767  177676                    JSR     %7,MOVE                 ;GO TO MOVE SUBROUTINE
1213  002656  012701  120000            XFER24: MOV     #120000,%1
```

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1214  002662  004767  177666              JSR     %7,MOVE
1215  002666  012701  100000      XFER20: MOV     #100000,%1
1216  002672  004767  177656              JSR     %7,MOVE
1217  002676  012701  060000      XFER16: MOV     #60000,%1
1218  002702  004767  177646              JSR     %7,MOVE
1219  002706  012701  040000      XFER12: MOV     #40000,%1
1220  002712  004767  177636              JSR     %7,MOVE
1221  002716  012701  020000      XFER8:  MOV     #20000,%1
1222  002722  004767  177626              JSR     %7,MOVE
1223  002726  000207                      RTS     %7                      ;RETURN FROM TRANSFERS
1224  002730  012767  000137  131570 MOD24:  MOV     #137,DONE+120000
1225  002736  01276.  145510  131564        MOV     #BEGINX+140000,DONE+120002
1226  002744  012767  000137  111554 MOD20:  MOV     #137,DONE+100000
1227  002752  012767  125510  111550        MOV     #BEGINX+120000,DONE+100002
1228  002760  012767  000137  071540 MOD16:  MOV     #137,DONE+60000
1229  002766  012767  105510  071534        MOV     #BEGINX+100000,DONE+60002
1230  002774  012767  000137  051524 MOD12:  MOV     #137,DONE+40000
1231  003002  012767  065510  051520        MOV     #BEGINX+60000,DONE+40002
1232  003010  012767  000137  031510 MOD8:   MOV     #137,DONE+20000
1233  003016  012767  045510  031504        MOV     #BEGINX+40000,DONE+20002
1234  003024  012767  000137  011474 MOD4:   MOV     #137,DONE
1235  003032  012767  025510  011470        MOV     #BEGINX+20000,DONE+2
1236  003040  005037  000006        DET3:   CLR     @#6
1237  003044  012737  000006  000004        MOV     #6,@#4
1238  003052  000207                      RTS     %7
1239
1240                                  ;*****************************************************************
1241                                  .SBTTL  TTY TRANSMITTER PRINT VALUES 0 TO 377
1242                                  ;*****************************************************************
1243  003054  005027  000000  TYOUT:  CLR     #0                      ;INITAL DATA
1244          003056          DATA2=.-2
1245  003060  016777  177772  175324 TYOUT1: MOV     DATA2,@TTDBR            ;OUTPUT TO DEVICE
1246  003066  000002                      RTI                             ;RETURN TO MAINLINE**
1247  003070  017767  175314  175322 TYOUTR: MOV     @TTCSR,TTSAV
1248  003076  105767  175316              TSTB    TTSAV                   ;TEST FOR DONE
1249  003102  100401                      BMI     .+4                     ;BRANCH IF FLAG FOUND
1250  003104  104006                      HLT                             ;FALSE INTERRUPT RETURN
1251  003106  005267  177744              INC     DATA2                   ;INCREMENT DATA
1252  003112  022767  000400  177736      CMP     #400,DATA2              ;TEST DATA FOR UPPER LIMIT
1253  003120  001755                      BEQ     TYOUT                   ;AT UPPER LIMIT START OVER
1254  003122  000756                      BR      TYOUT1                  ;FINISH REST OF DATA
1255
1256                                  ;*****************************************************************
1257                                  .SBTTL  TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
1258                                  ;*****************************************************************
1259  003124  005037  003242  LK1:    CLR     @#TIME                  ;CLEAR LINE CLOCK TIMER
1260  003130  052777  000100  175270        BIS     #100,@LKCSR
1261  003136  052737  000100  177776        BIS     #100,@#PSR
1262  003144  000002          LK2:    RTI
1263  003146  105777  175254  LK3:    TSTB    @LKCSR
1264  003152  100401                      BMI     .+4
1265  003154  104006                      HLT                             ;FALSE INTERRUPT
1266  003156  042777  000200  175242        BIC     #200,@LKCSR
1267  003164  005237  003242  LK4:    INC     @#TIME                  ;HERE ON INTERRUPTS
1268  003170  022737  006344  003242        CMP     #3300.,@#TIME           ;55 SEC YET.
1269  003176  103362                      BHIS    LK2                     ;BR IF NOT
```

```
1270  003200  042777  000100  175220          BIC     #100,@LKCSR
1271  003206  042737  000100  177776          BIC     #100,@#PSR              ;LOWER PRIORITY
1272  003214  022737  007020  003242          CMP     #3600.,@#TIME           ;ONE MINUTE YET
1273  003222  001740                          BEQ     LK1                     ;YES RESET TIMER
1274  003224  105777  175176                  TSTB    @LKCSR                  ;NO, SKIP TILL MINUTE UP
1275  003230  100375                          BPL     .-4
1276  003232  042777  000200  175166          BIC     #200,@LKCSR             ;CLEAR FLAG
1277  003240  000751                          BR      LK4
1278  003242  000000                  TIME:   0
1279
1280                                  ;******************************************************************************
1281                                  .SBTTL  LINE PRINTER SERVICE
1282                                  ;******************************************************************************
1283                                  ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER/
1284                                  ;INTERRUPT VECTOR IS 200/
1285  003244  012727  000000  000000  LP1:    MOV     #0,#0                   ;START OF LINE TO CURRENT
1286          003250                          CURPAT=.-2                      ;CHARACTER BEING PRINTED
1287          003246                          SOLPAT=.-4                      ;START OF LINE CHARACTER
1288  003252  016777  177772  175152  LP2:    MOV     CURPAT,@LPDBR           ;CURRENT PATTERN TO LINE PRINTER
1289  003260  105777  175144                  TSTB    @LPCSR
1290  003264  100420                          BMI     LP6
1291  003266  000002                          RTI                             ;RETURN TO MAIN LINE
1292  003270  105777  175134          LPINTR: TSTB    @LPCSR                  ;TEST FOR FLAG
1293  003274  100414                          BMI     LP6
1294  003276  005737  000042                  TST     @#42                    ;MONITOR LOAD
1295  003302  001410                          BEQ     LP7                     ;NO, ERROR
1296  003304  032777  100000  175116          BIT     #100000,@LPCSR          ;YES, IS ERROR SET
1297  003312  001404                          BEQ     LP7                     ;NO, ERROR
1298  003314  042777  000100  175106          BIC     #100,@LPCSR             ;DIS ABLE INTERRUPT
1299  003322  000002                          RTI
1300  003324  104006                  LP7:    HLT                             ;FALSE RETURN FROM MAIN LINE
1301  003326  026727  000006  000117  LP6:    CMP     CLINCT,#79.             ;TEST FOR END OF LINE
1302  003334  001415                          BEQ     LP4                     ;GO GENERATE CR/LF
1303  003336  005227  000000                  INC     #0                      ;INCREMENT LINE POSITION COUNT
1304          003340                          CLINCT=.-2                      ;POSITION OF LINE
1305  003342  026727  177702  000137          CMP     CURPAT,#137             ;TEST FOR MAXIMUM PATTERN
1306  003350  001403                          BEQ     LP3                     ;YES - GO TO LP3 AND RESET
1307  003352  005267  177672                  INC     CURPAT                  ;NO - INCREMENT TO NEXT PATTERN
1308  003356  000735                          BR      LP2                     ;GO SEND IT TO LINE PRINTER
1309  003360  012767  000040  177662  LP3:    MOV     #40,CURPAT              ;RESET PATTERN AND SEND TO PRINTER
1310  003366  000731                          BR      LP2                     ;SENT TO LINE PRINTER
1311  003370  005067  177744          LP4:    CLR     CLINCT                  ;RESET LINE COUNT
1312  003374  012777  000012  175030          MOV     #12,@LPDBR              ;LINE FEED
1313  003402  105777  175022                  TSTB    @LPCSR
1314  003406  100375                          BPL     .-4
1315  003410  026727  177632  000137          CMP     SOLPAT,#137             ;START OF LINE PATTERN
1316  003416  001403                          BEQ     LP5
1317  003420  005267  177622                  INC     SOLPAT                  ;INCREMENT START OF LINE
1318  003424  000707                          BR      LP1
1319  003426  012767  000040  177612  LP5:    MOV     #40,SOLPAT              ;RESET START OF LINE
1320  003434  000703                          BR      LP1                     ;PRINT
1321
1322                                  ;******************************************************************************
1323                                  .SBTTL  RK11 SERVICE
1324                                  ;******************************************************************************
1325                                  ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
```

```
1326  003436  005077  175020          RKSTART:        CLR     @RKDAE  ;INIT
1327  003442  013777  003670  175016  RK1:    MOV     @#LLIMIT,@RKBAR         ;CORE BASE
1328  003450  013777  003672  175006          MOV     @#WORDCT,@RKWC          ;TRANSFER LENGTH
1329  003456  113777  003530  175004          MOVB    @#RKFUNCT,@RKCSR        ;WRITE OR WRITE CK TO DSK
1330  003464  000002                          RTI                             ;RETURN TO MAINLINE
1331  003466  032777  100200  174774  IRK:    BIT     #100200,@RKCSR         ;INTERRUPT RETURN
1332  003474  003002                          BGT     .+6
1333  003476  104006                          HLT
1334  003500  000756                          BR      RKSTART
1335  003502  032777  000037  174752          BIT     #37,@RKDAE              ;DISK AT UPPER LIMIT?
1336  003510  001354                          BNE     RK1
1337  003512  122777  000031  174740          CMPB    #31,@RKDAH
1338  003520  001350                          BNE     RK1
1339  003522  000337  003530                  SWAB    @#RKFUNCT               ;CHANGE COMMAND
1340  003526  000743                          BR      RKSTART                 ;RESTART NEW TRANSFER OF DISK
1341  003530  000000          RKFUNCT:        0
1342
1343                          ;*****************************************************************
1344                           SBTTL  RF11 DISK
1345                          ;*****************************************************************
1346  003532  105277  174714  RFSTART:        INCB    @RFCSRH                 ;INITIALIZE DISK - DAR-DAE
1347  003536  013777  003670  174702  RF1:    MOV     @#LLIMIT,@RFCAR         ;CORE BASE
1348  003544  013777  003672  174672          MOV     @#WORDCT,@RFWC          ;LENGTH OF TRANSFER
1349  003552  113777  003666  174670          MOVB    @#RFFUNCT,@RFCSR                ;WRITE OR WRITE CHECK TO DISK
1350  003560  000002                          RTI                             ;RETURN TO MAINLINE CODE
1351  003562  105777  174662  IRF:    TSTB    @RFCSR                  ;INTERRUPT VECTOR POINTS HERE
1352  003566  100402                          BMI     .+6
1353  003570  104006                          HLT                             ;RF11 READY NOT UP
1354  003572  000757                          BR      RFSTART
1355  003574  005777  174650                  TST     @RFCSR                  ;ERROR SET?
1356  003600  100012                          BPL     ERROK                   ;BRANCH IF NOT
1357  003602  032777  020000  174640          BIT     #20000,@RFCSR           ;YES-WRITE CHECK ERROR?
1358  003610  001404                          BEQ     ERRSET                  ;NO-BRANCH
1359  003612  104006                          HLT                             ;YES-RF11 WRITE CHECK ERROR
1360  003614  000337  003666                  SWAB    @#RFFUNCT               ;CHANGE COMMAND TO DO WRITE
1361  003620  000744                          BR      RFSTART
1362  003622  104006          ERRSET: HLT                                     ;RF11 ERROR SET-NOT WRITE CHECK
1363  003624  000742                          BR      RFSTART
1364  003626  005777  174612  ERROK:  TST     @RFWC
1365  003632  100002                          BPL     .+6
1366  003634  104006                          HLT                             ;RF-11 WORD COUNT NOT ZERO
1367  003636  000735                          BR      RFSTART
1368  003640  122777  000003  174572          CMPB    #3,@RFDAE               ;DISK AT UPPER LIMIT? 7=2, 17=4, 37=8
1369  003646  001333                          BNE     RF1                     ;NO
1370  003650  027727  174566  174000          CMP     @RFDAR,#174000          ;AS FAR ON DISK AS WE CAN GO
1371  003656  101727                          BLOS    RF1                     ;NO
1372  003660  000337  003666                  SWAB    @#RFFUNCT               ;CHANGE COMMAND
1373  003664  000722                          BR      RFSTART                 ;RESTART NEW TRANSFER OF DISK
1374  003666  000000          RFFUNCT:        0                               ;DISK COMMAND
1375  003670  005542          LLIMIT: BEGIN                                   ;FIRST CORE ADDRESS OF TRANSFER
1376  003672  176000          WORDCT: -2000                                   ;LENGTH OF TRANSFER
1377
1378                          ;*****************************************************************
1379                          .SBTTL  TC11 DIAGNOSTIC ROUTINE
1380                          ;*****************************************************************
1381                          ;DECTAPE DIAGNOSTIC ROUTINE.  THE TAPE IS FIRST DRIVEN TO THE FORWARD
```

```
                                        ;END ZONE. THE DESIRED DATA IS THEN GENERATED IN THE DECTAPE BUFFER AREA
                                        ;AND DATA IS WRITTEN ONTO ALL BLOCKS FROM THE BLOCK NUMBER IN TCFRST
                                        ;THRU THE BLOCK NUMBER IN TCLAST.  BLOCK NUMBERS ARE ALSO CHECKED FOR
                                        ;BEING IN ORDER. AFTER THE BLOCK NUMBER IN TCLAST IS WRITTEN, TAPE IS
                                        ;DRIVEN INTO THE REVERSE END ZONE.
                                        ;THE TAPE IS THEN STARTED IN REVERSE, AND WHEN THE CLOSEST BLOCK THAT
                                        ;WAS WRITTEN (TCLAST) IS FOUND, IT IS READ INTO THE DECTAPE BUFFER AREA.
                                        ;THE PROGRAM INTERRUPT REQUEST FACILITY IS THEN USED TO BOOK A REQUEST
                                        ;FOR CHECKING THE DATA AT LEVEL 3, AND NO FURTHER DATA IS READ IN
                                        ;UNTIL THAT DATA HAS BEEN CHECKED.  AFTER IT IS CHECKED, THE DATA IS
                                        ;SCRAMBLED TO GUARANTEE THAT NEW DATA IS REALLY READ IN NEXT TIME. WHILE
                                        ;THIS IS GOING ON, BLOCK NUMBERS ARE CHECKED FOR BEING IN ORDER AS THE
                                        ;TAPE TRAVELS TOWARD THE FORWARD END ZONE.ONCE THE DATA IS FULLY CHECKED
                                        ;THE NEXT BLOCK THAT COMES UP IS READ IN AND THE PROCESS REPEATED.  ONCE
                                        ;THE BLOCK WHOSE NUMBER IS IN TCFRST HAS BEEN READ, THE TAPE IS DRIVEN
                                        ;INTO THE FORWARD END ZONE AND THE WHOLE SEQUENCE IS REPEATED.

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

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

                                        ;GO TO FORWARD END ZONE
003702  012777  003702  174654  FENDZ:  MOV     #FENDZ,@TCIV        ;END ZONE VECTOR SETUP
003710  005777  174640                  TST     @TCST               ;TEST FOR END ZONE
003714  100403                          BMI     FEND1               ;AT END ZONE?
003716  105277  174630                  INCB    @TCCM               ;SET DO - NO DELAY
003722  000002                          RTI                         ;NO - WAIT SOME MORE
003724  012777  003754  174632  FEND1:  MOV     #TCF1,@TCIV         ;YES - NEW VECTOR
003732  042777  104000  174612          BIC     #104000,@TCCM       ;SEARCH BLOCK FOWARD
003740  016767  177730  177732          MOV     TCFIRST,TCEXPE      ;COUNT WHEN THIS BLOCK IS FOUND
003746  105277  174600          TCF1A:  INCB    @TCCM               ;SET DO
003752  000002                          RTI                         ;RETURN ON NEXT BLOCK
003754  032777  100200  174570  TCF1:   BIT     #100200,@TCCM       ;ANY ERROR ON READ?
003762  100001                          BPL     .+4
003764  104005                          HLT                         ;TC ERROR SET - FORWARD READ BLOCK
003766  001001                          BNE     .+4                 ;DONE FLAG UP?
003770  104006                          HLT                         ;FALSE INTERRUPT
003772  027767  174560  177700          CMP     @TCDT,TCEXPE        ;IS THIS OUR BLOCK FOR SYNC
004000  002762                          BLT     TCF1A               ;NO-READ SOME MORE BLOCKS
004002  001401                          BEQ     TCF2                ;YES
004004  104006                          HLT                         ;WE PASSED THE BLOCK

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

                                        ;FIND SEQUENTIAL BLOCK AT FOWARD DIRECTION
```

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1438  004022  032777  100200  174522  TCF3:   BIT     #100200,@TCCM   ;TEST ERROR AND READY
1439  004030  100001                          BPL     .+4
1440  004032  104006                          HLT                     ;FOWARD READ ERROR TC-11
1441  004034  001001                          BNE     .+4
1442  004036  104006                          HLT                     ;FALSE INTERRUPT ON TC-11
1443  004040  027767  174512  177630          CMP     @TCDT,TCLAST    ;HAVE WE TESTED ALL BLOCKS
1444  004046  001414                          BEQ     RENDZ           ;YES DRIVE UNIT IN END ZONE TO START OVER
1445  004050  005267  177624                  INC     TCEXPE          ;NO-INCREMENT EXPECTED COUNT
1446  004054  027767  174476  177616          CMP     @TCDT,TCEXPE    ;IS CURRENT BLOCK CORRECT
1447  004062  001401                          BEQ     .+4
1448  004064  104006                          HLT                     ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
1449  004066  000427                          BR      TCWBK           ;THIS ROUTINE WRITES A BLOCK
1450  004070  105277  174456          TCF4:   INCB    @TCCM           ;SET DO
1451  004074  000002                          RTI
1452  004076  000701                  XFENDZ: BR      FENDZ           ;INDIRECT LINK
1453
1454                                  ;MOVE TAPE TO REVERSE END ZONE
1455  004100  012777  004100  174456  RENDZ:  MOV     #RENDZ,@TCIV    ;END ZONE VECTOR SETUP
1456  004106  016767  177564  177564          MOV     TCLAST,TCEXPE   ;SET UP FOR REVERSE SEARCH
1457  004114  005777  174434                  TST     @TCST           ;IN END ZONE
1458  004120  100403                          BMI     REND1           ;YES - START TO TURN UNIT AROUND
1459  004122  105277  174424                  INCB    @TCCM           ;SET DO
1460  004126  000002                          RTI                     ;NO - WAIT TILL WE ARE
1461  004130  012777  004503  174414  REND1:  MOV     #R+IE+RB+DO,@TCCM ;FUNCTION = READ BLOCK, REVERSE AND GO
1462  004136  012777  004226  174420          MOV     #TCR1,@TCIV     ;SET UP NEW INTERRUPT VECTOR
1463  004144  000002                          RTI
1464                                  ;WRITE FORWARD ALL BLOCKS EXCEPT 0
1465
1466  004146  012777  004200  174410  TCWBK:  MOV     #TCWB1,@TCIV    ;INTERRUPT VECTOR FOR WRITE
1467  004154  012777  177400  174376          MOV     #-400,@TCWC     ;ONE BLOCK
1468  004162  012777  004510  174372          MOV     #TCWBUF,@TCBA   ;THE WRITE BUFFER ADDRESS
1469  004170  112777  000515  174354          MOVB    #IE+WD+DO,@TCCM ;WRITE THE BLOCK
1470  004176  000002                          RTI                     ;RETURN WHEN BLOCK IS WRITTEN
1471  004200  005777  174346          TCWB1:  TST     @TCCM           ;ANY ERRORS
1472  004204  100001                          BPL     .+4
1473  004206  104006                          HLT
1474  004210  012777  004022  174346          MOV     #TCF3,@TCIV     ;SEARCH BLOCK VECTOR
1475  004216  112777  000502  174326          MOVB    #IE+RB,@TCCM    ;READ BLOCK
1476  004224  000721                          BR      TCF4            ;FIND THE NEXT BLOCK
1477
1478  004226  032777  100200  174316  TCR1:   BIT     #100200,@TCCM   ;TEST FOR ERROR AND READY
1479  004234  100001                          BPL     .+4
1480  004236  104006                          HLT                     ;DECTAPE ERROR ON READ BLOCK REVERSE
1481  004240  001001                          BNE     .+4
1482  004242  104006                          HLT                     ;FALSE INTERRUPT FROM DECTAPE
1483  004244  027767  174306  177426          CMP     @TCDT,TCEXPE    ;IS IT OUR FIRST BLOCK
1484  004252  001406                          BEQ     TCR2            ;YES - GO TEST THE REST
1485  004254  002002                          BGE     TCR1A           ;NO - HAVE WE PASSED THE BLOCK
1486  004256  104006                          HLT                     ;WE PASS OUR BLOCK
1487  004260  000707                          BR      RENDZ           ;GO TO END ZONE AND TRY AGAIN
1488  004262  105277  174264          TCR1A:  INCB    @TCCM           ;SET DO
1489  004266  000002                          RTI                     ;WE FOUND OUR FIRST BLOCK
1490  004270  012777  004304  174266  TCR2:   MOV     #TCR3,@TCIV     ;SET UP INTERRUPT TO TEST ALL BLOCKS
1491  004276  105277  174250                  INCB    @TCCM           ;SET DO
1492  004302  000002                          RTI                     ;WAIT FOR NEXT BLOCK TO INTERRUPT
1493
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1494                                    ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
1495  004304  032777  100200  174240  TCR3:   BIT     #100200,@TCCM   ;TEST FOR READ AND ERROR
1496  004312  100001                          BPL     .+4
1497  004314  104006                          HLT                     ;ERROR READING SEQUENTIAL BLOCK IN REVERSE
1498  004316  001001                          BNE     .+4
1499  004320  104006                          HLT                     ;FALSE DECTAPE INTERRUPT
1500  004322  026777  177346  174226        CMP     TCFIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1501  004330  001662                          BEQ     XFENDZ          ;YES - GO TO END ZONE TO RESTART
1502  004332  005367  177342                DEC     TCEXPE          ;NO - DECREMENT BLOCK NUMBER
1503  004336  027767  174214  177334        CMP     @TCDT,TCEXPE    ;TEST SEQUENTAIL BLOCK IN REVERSE
1504  004344  001401                          BEQ     .+4
1505  004346  104006                          HLT                     ;TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1506  004350  000403                          BR      TCRBK           ;THIS ROUTINE READ A BLOCK
1507  004352  105277  174174        TCR4:   INCB    @TCCM           ;SET DO
1508  004356  000002                          RTI                     ;LETS TRY A NEW BLOCK
1509
1510                                    ;READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1511  004360  012777  004416  174176  TCRBK:  MOV     #TCRB1,@TCIV    ;SET UP INTERRUPT VECTOR
1512  004366  012777  177400  174164        MOV     #-400,@TCWC     ;READ ONE BLOCK
1513  004374  012777  004510  174160        MOV     #TCRBUF,@TCBA   ;WHERE BUFFER IS
1514  004402  112777  000505  174142        MOVB    #IE+RD+DO,@TCCM ;READ THE BLOCK
1515  004410  004767  000030                JSR     %7,TC1          ;CHECK DATA BUFFER
1516  004414  000002                          RTI                     ;EXIT - RETURN WHEN BLOCK IS READ
1517  004416  005777  174130        TCRB1:  TST     @TCCM           ;AND ERRORS
1518  004422  100001                          BPL     .+4
1519  004424  104006                          HLT                     ;DECTAPE ERROR
1520  004426  012777  004304  174130        MOV     #TCR3,@TCIV     ;NEW VECTOR FOR BLOCK SEARCH
1521  004434  112777  000502  174110        MOVB    #IE+RB,@TCCM    ;READ BLOCK FUNCTION
1522  004442  000743                          BR      TCR4            ;RETURN TO BLOCK SEARCH
1523
1524
1525                                    ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
1526                                    ;BY DOING A CHECK SUM ON THE DATA
1526  004444  010146                  TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
1527  004446  010246                          MOV     %2,-(6)
1528  004450  010346                          MOV     %3,-(6)
1529  004452  005003                          CLR     %3              ;SUM OF DATA
1530  004454  012701  004510                  MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
1531  004460  012702  005510                  MOV     #TCRBUF+1000,%2 ;END OF READ BUFFER
1532  004464  062103                  TC2:    ADD     (1)+,%3         ;EVEN ADD
1533  004466  062103                          ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
1534  004470  001401                          BEQ     .+4
1535  004472  104006                          HLT                     ;DATA ERROR TC-11
1536  004474  020102                          CMP     %1,%2           ;AT END OF BUFFER?
1537  004476  001372                          BNE     TC2             ;NO - SUM THE REST
1538  004500  012603                          MOV     (6)+,%3         ;RESTORE THE REGISTERS
1539  004502  012602                          MOV     (6)+,%2
1540  004504  012601                          MOV     (6)+,%1
1541  004506  000207                          RTS     %7              ;EXIT
1542
1543                                    ;THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1544  004510                          TCWBUF:
1545  004510                          TCRBUF:
1546          000001                          N=1
1547  004510  000001                          N                       ;DECTAPE WRITE BUFFER
1548  004512  177777                          -N
1549          000002                          N=N+1
```

```
1550  004514  000002                    N                       ;DECTAPE WRITE BUFFER
1551  004516  177776                    -N
1552          000003                    N=N+1
1553  004520  000003                    N                       ;DECTAPE WRITE BUFFER
1554  004522  177775                    -N
1555          000004                    N=N+1
1556  004524  000004                    N                       ;DECTAPE WRITE BUFFER
1557  004526  177774                    -N
1558          000005                    N=N+1
1559  004530  000005                    N                       ;DECTAPE WRITE BUFFER
1560  004532  177773                    -N
1561          000006                    N=N+1
1562  004534  000006                    N                       ;DECTAPE WRITE BUFFER
1563  004536  177772                    -N
1564          000007                    N=N+1
1565  004540  000007                    N                       ;DECTAPE WRITE BUFFER
1566  004542  177771                    -N
1567          000010                    N=N+1
1568  004544  000010                    N                       ;DECTAPE WRITE BUFFER
1569  004546  177770                    -N
1570          000011                    N=N+1
1571  004550  000011                    N                       ;DECTAPE WRITE BUFFER
1572  004552  177767                    -N
1573          000012                    N=N+1
1574  004554  000012                    N                       ;DECTAPE WRITE BUFFER
1575  004556  177766                    -N
1576          000013                    N=N+1
1577  004560  000013                    N                       ;DECTAPE WRITE BUFFER
1578  004562  177765                    -N
1579          000014                    N=N+1
1580  004564  000014                    N                       ;DECTAPE WRITE BUFFER
1581  004566  177764                    -N
1582          000015                    N=N+1
1583  004570  000015                    N                       ;DECTAPE WRITE BUFFER
1584  004572  177763                    -N
1585          000016                    N=N+1
1586  004574  000016                    N                       ;DECTAPE WRITE BUFFER
1587  004576  177762                    -N
1588          000017                    N=N+1
1589  004600  000017                    N                       ;DECTAPE WRITE BUFFER
1590  004602  177761                    -N
1591          000020                    N=N+1
1592  004604  000020                    N                       ;DECTAPE WRITE BUFFER
1593  004606  177760                    -N
1594          000021                    N=N+1
1595  004610  000021                    N                       ;DECTAPE WRITE BUFFER
1596  004612  177757                    -N
1597          000022                    N=N+1
1598  004614  000022                    N                       ;DECTAPE WRITE BUFFER
1599  004616  177756                    -N
1600          000023                    N=N+1
1601  004620  000023                    N                       ;DECTAPE WRITE BUFFER
1602  004622  177755                    -N
1603          000024                    N=N+1
1604  004624  000024                    N                       ;DECTAPE WRITE BUFFER
1605  004626  177754                    -N
```

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1606            000025                  N=N+1
1607  004630    000025                  N                       ;DECTAPE WRITE BUFFER
1608  004632    177753                  -N
1609            000026                  N=N+1
1610  004634    000026                  N                       ;DECTAPE WRITE BUFFER
1611  004636    177752                  -N
1612            000027                  N=N+1
1613  004640    000027                  N                       ;DECTAPE WRITE BUFFER
1614  004642    177751                  -N
1615            000030                  N=N+1
1616  004644    000030                  N                       ;DECTAPE WRITE BUFFER
1617  004646    177750                  -N
1618            000031                  N=N+1
1619  004650    000031                  N                       ;DECTAPE WRITE BUFFER
1620  004652    177747                  -N
1621            000032                  N=N+1
1622  004654    000032                  N                       ;DECTAPE WRITE BUFFER
1623  004656    177746                  -N
1624            000033                  N=N+1
1625  004660    000033                  N                       ;DECTAPE WRITE BUFFER
1626  004662    177745                  -N
1627            000034                  N=N+1
1628  004664    000034                  N                       ;DECTAPE WRITE BUFFER
1629  004666    177744                  -N
1630            000035                  N=N+1
1631  004670    000035                  N                       ;DECTAPE WRITE BUFFER
1632  004672    177743                  -N
1633            000036                  N N+1
1634  004674    000036                  N                       ;DECTAPE WRITE BUFFER
1635  004676    177742                  -N
1636            000037                  N=N+1
1637  004700    000037                  N                       ;DECTAPE WRITE BUFFER
1638  004702    177741                  -N
1639            000040                  N=N+1
1640  004704    000040                  N                       ;DECTAPE WRITE BUFFER
1641  004706    177740                  -N
1642            000041                  N=N+1
1643  004710    000041                  N                       ;DECTAPE WRITE BUFFER
1644  004712    177737                  -N
1645            000042                  N=N+1
1646  004714    000042                  N                       ;DECTAPE WRITE BUFFER
1647  004716    177736                  -N
1648            000043                  N=N+1
1649  004720    000043                  N                       ;DECTAPE WRITE BUFFER
1650  004722    177735                  -N
1651            000044                  N=N+1
1652  004724    000044                  N                       ;DECTAPE WRITE BUFFER
1653  004726    177734                  -N
1654            000045                  N=N+1
1655  004730    000045                  N                       ;DECTAPE WRITE BUFFER
1656  004732    177733                  -N
1657            000046                  N=N+1
1658  004734    000046                  N                       ;DECTAPE WRITE BUFFER
1659  004736    177732                  -N
1660            000047                  N=N+1
1661  004740    000047                  N                       ;DECTAPE WRITE BUFFER
```

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1662  004742  177731                  -N
1663          000050                  N N+1
1664  004744  000050                  N                       ;DECTAPE WRITE BUFFER
1665  004746  177730                  -N
1666          000051                  N-N+1
1667  004750  000051                  N                       ;DECTAPE WRITE BUFFER
1668  004752  177727                  -N
1669          000052                  N N+1
1670  004754  000052                  N                       ;DECTAPE WRITE BUFFER
1671  004756  177726                  -N
1672          000053                  N-N+1
1673  004760  000053                  N                       ;DECTAPE WRITE BUFFER
1674  004762  177725                  -N
1675          000054                  N=N+1
1676  004764  000054                  N                       ;DECTAPE WRITE BUFFER
1677  004766  177724                  -N
1678          000055                  N-N+1
1679  004770  000055                  N                       ;DECTAPE WRITE BUFFER
1680  004772  177723                  -N
1681          000056                  N=N+1
1682  004774  000056                  N                       ;DECTAPE WRITE BUFFER
1683  004776  177722                  -N
1684          000057                  N=N+1
1685  005000  000057                  N                       ;DECTAPE WRITE BUFFER
1686  005002  177721                  -N
1687          000060                  N-N+1
1688  005004  000060                  N                       ;DECTAPE WRITE BUFFER
1689  005006  177720                  -N
1690          000061                  N N+1
1691  005010  000061                  N                       ;DECTAPE WRITE BUFFER
1692  005012  177717                  -N
1693          000062                  N=N+1
1694  005014  000062                  N                       ;DECTAPE WRITE BUFFER
1695  005016  177716                  -N
1696          000063                  N=N+1
1697  005020  000063                  N                       ;DECTAPE WRITE BUFFER
1698  005022  177715                  -N
1699          000064                  N=N+1
1700  005024  000064                  N                       ;DECTAPE WRITE BUFFER
1701  005026  177714                  -N
1702          000065                  N-N+1
1703  005030  000065                  N                       ;DECTAPE WRITE BUFFER
1704  005032  177713                  -N
1705          000066                  N=N+1
1706  005034  000066                  N                       ;DECTAPE WRITE BUFFER
1707  005036  177712                  -N
1708          000067                  N N+1
1709  005040  000067                  N                       ;DECTAPE WRITE BUFFER
1710  005042  177711                  -N
1711          000070                  N-N+1
1712  005044  000070                  N                       ;DECTAPE WRITE BUFFER
1713  005046  177710                  -N
1714          000071                  N-N+1
1715  005050  000071                  N                       ;DECTAPE WRITE BUFFER
1716  005052  177707                  -N
1717          000072                  N N+1
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1718  005054  000072                N                       ;DECTAPE WRITE BUFFER
1719  005056  177706                -N
1720          000073                N-N+1
1721  005060  000073                N                       ;DECTAPE WRITE BUFFER
1722  005062  177705                -N
1723          000074                N N+1
1724  005064  000074                N                       ;DECTAPE WRITE BUFFER
1725  005066  177704                -N
1726          000075                N N+1
1727  005070  000075                N                       ;DECTAPE WRITE BUFFER
1728  005072  177703                -N
1729          000076                N=N+1
1730  005074  000076                N                       ;DECTAPE WRITE BUFFER
1731  005076  177702                -N
1732          000077                N N+1
1733  005100  000077                N                       ;DECTAPE WRITE BUFFER
1734  005102  177701                -N
1735          000100                N=N+1
1736  005104  000100                N                       ;DECTAPE WRITE BUFFER
1737  005106  177700                -N
1738          000101                N=N+1
1739          000100                N=N-1
1740  005110  177700                -N
1741  005112  000100                N                       ;DEC TAPE WRITE BUFFER
1742          000077                N=N-1
1743  005114  177701                -N
1744  005116  000077                N                       ;DEC TAPE WRITE BUFFER
1745          000076                N=N-1
1746  005120  177702                -N
1747  005122  000076                N                       ;DEC TAPE WRITE BUFFER
1748          000075                N=N-1
1749  005124  177703                -N
1750  005126  000075                N                       ;DEC TAPE WRITE BUFFER
1751          000074                N=N-1
1752  005130  177704                -N
1753  005132  000074                N                       ;DEC TAPE WRITE BUFFER
1754          000073                N=N-1
1755  005134  177705                -N
1756  005136  000073                N                       ;DEC TAPE WRITE BUFFER
1757          000072                N=N-1
1758  005140  177706                -N
1759  005142  000072                N                       ;DEC TAPE WRITE BUFFER
1760          000071                N=N-1
1761  005144  177707                -N
1762  005146  000071                N                       ;DEC TAPE WRITE BUFFER
1763          000070                N=N-1
1764  005150  177710                -N
1765  005152  000070                N                       ;DEC TAPE WRITE BUFFER
1766          000067                N-N-1
1767  005154  177711                -N
1768  005156  000067                N                       ;DEC TAPE WRITE BUFFER
1769          000066                N=N-1
1770  005160  177712                -N
1771  005162  000066                N                       ;DEC TAPE WRITE BUFFER
1772          000065                N=N-1
1773  005164  177713                -N
```

```
1774  005166  000065                N                       ;DEC TAPE WRITE BUFFER
1775          000064                N=N-1
1776  005170  177714                -N
1777  005172  000064                N                       ;DEC TAPE WRITE BUFFER
1778          000063                N=N-1
1779  005174  177715                -N
1780  005176  000063                N                       ;DEC TAPE WRITE BUFFER
1781          000062                N=N-1
1782  005200  177716                -N
1783  005202  000062                N                       ;DEC TAPE WRITE BUFFER
1784          000061                N=N-1
1785  005204  177717                -N
1786  005206  000061                N                       ;DEC TAPE WRITE BUFFER
1787          000060                N=N-1
1788  005210  177720                -N
1789  005212  000060                N                       ;DEC TAPE WRITE BUFFER
1790          000057                N=N-1
1791  005214  177721                -N
1792  005216  000057                N                       ;DEC TAPE WRITE BUFFER
1793          000056                N=N-1
1794  005220  177722                -N
1795  005222  000056                N                       ;DEC TAPE WRITE BUFFER
1796          000055                N=N-1
1797  005224  177723                -N
1798  005226  000055                N                       ;DEC TAPE WRITE BUFFER
1799          000054                N=N-1
1800  005230  177724                -N
1801  005232  000054                N                       ;DEC TAPE WRITE BUFFER
1802          000053                N=N-1
1803  005234  177725                -N
1804  005236  000053                N                       ;DEC TAPE WRITE BUFFER
1805          000052                N=N-1
1806  005240  177726                -N
1807  005242  000052                N                       ;DEC TAPE WRITE BUFFER
1808          000051                N=N-1
1809  005244  177727                -N
1810  005246  000051                N                       ;DEC TAPE WRITE BUFFER
1811          000050                N=N-1
1812  005250  177730                -N
1813  005252  000050                N                       ;DEC TAPE WRITE BUFFER
1814          000047                N=N-1
1815  005254  177731                -N
1816  005256  000047                N                       ;DEC TAPE WRITE BUFFER
1817          000046                N=N-1
1818  005260  177732                -N
1819  005262  000046                N                       ;DEC TAPE WRITE BUFFER
1820          000045                N=N-1
1821  005264  177733                -N
1822  005266  000045                N                       ;DEC TAPE WRITE BUFFER
1823          000044                N=N-1
1824  005270  177734                -N
1825  005272  000044                N                       ;DEC TAPE WRITE BUFFER
1826          000043                N=N-1
1827  005274  177735                -N
1828  005276  000043                N                       ;DEC TAPE WRITE BUFFER
1829          000042                N=N-1
```

```
1830  005300  177736          -N
1831  005302  000042          N                   ,DEC TAPE WRITE BUFFER
1832          000041          N=N-1
1833  005304  177737          -N
1834  005306  000041          N                   ;DEC TAPE WRITE BUFFER
1835          000040          N=N-1
1836  005310  177740          -N
1837  005312  000040          N                   ;DEC TAPE WRITE BUFFER
1838          000037          N=N-1
1839  005314  177741          -N
1840  005316  000037          N                   ;DEC TAPE WRITE BUFFER
1841          000036          N=N-1
1842  005320  177742          -N
1843  005322  000036          N                   ;DEC TAPE WRITE BUFFER
1844          000035          N=N-1
1845  005324  177743          -N
1846  005326  000035          N                   ;DEC TAPE WRITE BUFFER
1847          000034          N=N-1
1848  005330  177744          -N
1849  005332  000034          N                   ;DEC TAPE WRITE BUFFER
1850          000033          N=N-1
1851  005334  177745          -N
1852  005336  000033          N                   ;DEC TAPE WRITE BUFFER
1853          000032          N=N-1
1854  005340  177746          -N
1855  005342  000032          N                   ;DEC TAPE WRITE BUFFER
1856          000031          N=N-1
1857  005344  177747          -N
1858  005346  000031          N                   ;DEC TAPE WRITE BUFFER
1859          000030          N=N-1
1860  005350  177750          -N
1861  005352  000030          N                   ;DEC TAPE WRITE BUFFER
1862          000027          N=N-1
1863  005354  177751          -N
1864  005356  000027          N                   ;DEC TAPE WRITE BUFFER
1865          000026          N=N-1
1866  005360  177752          -N
1867  005362  000026          N                   ;DEC TAPE WRITE BUFFER
1868          000025          N=N-1
1869  005364  177753          -N
1870  005366  000025          N                   ;DEC TAPE WRITE BUFFER
1871          000024          N=N-1
1872  005370  177754          -N
1873  005372  000024          N                   ;DEC TAPE WRITE BUFFER
1874          000023          N=N-1
1875  005374  177755          -N
1876  005376  000023          N                   ;DEC TAPE WRITE BUFFER
1877          000022          N=N-1
1878  005400  177756          -N
1879  005402  000022          N                   ;DEC TAPE WRITE BUFFER
1880          000021          N=N-1
1881  005404  177757          -N
1882  005406  000021          N                   ;DEC TAPE WRITE BUFFER
1883          000020          N=N-1
1884  005410  177760          -N
1885  005412  000020          N                   ;DEC TAPE WRITE BUFFER
```

```
1886            000017                  N=N-1
1887  005414    177761                  -N
1888  005416    000017                  N                       ;DEC TAPE WRITE BUFFER
1889            000016                  N-N-1
1890  005420    177762                  -N
1891  005422    000016                  N                       ;DEC TAPE WRITE BUFFER
1892            000015                  N=N-1
1893  005424    177763                  -N
1894  005426    000015                  N                       ;DEC TAPE WRITE BUFFER
1895            000014                  N=N-1
1896  005430    177764                  -N
1897  005432    000014                  N                       ;DEC TAPE WRITE BUFFER
1898            000013                  N=N-1
1899  005434    177765                  -N
1900  005436    000013                  N                       ;DEC TAPE WRITE BUFFER
1901            000012                  N=N-1
1902  005440    177766                  -N
1903  005442    000012                  N                       ;DEC TAPE WRITE BUFFER
1904            000011                  N=N-1
1905  005444    177767                  -N
1906  005446    000011                  N                       ;DEC TAPE WRITE BUFFER
1907            000010                  N=N-1
1908  005450    177770                  -N
1909  005452    000010                  N                       ;DEC TAPE WRITE BUFFER
1910            000007                  N=N-1
1911  005454    177771                  -N
1912  005456    000007                  N                       ;DEC TAPE WRITE BUFFER
1913            000006                  N=N-1
1914  005460    177772                  -N
1915  005462    000006                  N                       ;DEC TAPE WRITE BUFFER
1916            000005                  N=N-1
1917  005464    177773                  -N
1918  005466    000005                  N                       ;DEC TAPE WRITE BUFFER
1919            000004                  N=N-1
1920  005470    177774                  -N
1921  005472    000004                  N                       ;DEC TAPE WRITE BUFFER
1922            000003                  N=N-1
1923  005474    177775                  -N
1924  005476    000003                  N                       ;DEC TAPE WRITE BUFFER
1925            000002                  N=N-1
1926  005500    177776                  -N
1927  005502    000002                  N                       ;DEC TAPE WRITE BUFFER
1928            000001                  N=N-1
1929  005504    177777                  -N
1930  005506    000001                  N                       ;DEC TAPE WRITE BUFFER
1931
```

```
                        ;*****************************************************************
                        .SBTTL  MAIN ROUTINE: CPU BACKGROUND TESTS
                        ;*****************************************************************
005510  010701          BEGINX: MOV     PC,R1           ;SET UP R1 TO SELECT CURBNK
005512  042701  017777          BIC     #17777,R1
005516  042737  160000  000034        BIC     #160000,@#34            ;SET SCOPE RET TO CURRENT BANK
005524  050137  000034          BIS     R1,@#34
005530  000301                  SWAB    R1
005532  006201                  ASR     R1
005534  006201                  ASR     R1
005536  010137  000570          MOV     R1,@#CURBNK

                        ;BINARY INSTRUCTIONS
                        ;INDEX, AND INDIRECT TEST OF PDP-11
005542                  BEGIN:
005542  005000                  CLR     R0                      ;CHECK RANDOM NUMBER GENERATOR SEEDS.
005544  066700  007210          ADD     RP1,R0                  ;AND RESTORE IF ZEROED.
005550  066700  007206          ADD     RP2,R0
005554  001006                  BNE     1$                      ;BR IF NOT ZEROED.
005556  012767  001233  007174        MOV     #1233,RP1               ;RESTORE RP1 SEED.
005564  012767  007622  007170        MOV     #7622,RP2               ;RESTORE RP2 SEED.
005572  005067  007104          1$:     CLR     SCOPEF
005576  010767  007102          MOV     PC,RETURN               ;FOR SCOPING - SETUP ADDRESS OF BEGIN1 IN
005602  062767  000042  007074        ADD     #42,RETURN              ;THIS BANK THRU CURRENT ASR
005610  016767  007064  007060        MOV     $ICNT,ICOUNT            ;ITERATION COUNT
005616  005737  000042          TST     @#42                    ;AUTO MODE?
005622  001407                  BEQ     2$                      ;BR IF NOT.
005624  023737  000042  000046        CMP     @#42,@#46               ;XXDP CHAIN MODE?
005632  001403                  BEQ     2$                      ;BR IF NOT.
005634  016767  007050  007034        MOV     XDPCNT,ICOUNT           ;USE XXDP CHAIN ITERATION COUNT.
005642                  2$:
                        ;*****************************************************************
                        .SBTTL  TEST COMPARE INSTRUCTION INDEXED
                        ;*****************************************************************
005642  012700  177770          MOV     #-10,%0                 ;MINUS 10 TO REG 0
005646  026027  014774  125252        CMP     A(0),#125252            ;(A INDEX BY MINUS 10) TO #125252
005654  001401                  BEQ     .+4
005656  104006                  HLT                             ;COMPARE WITH INDEX FAILED
005660  104400                  SCOPE

005662  012700  000010          MOV     #10,%0
005666  022760  052525  014774        CMP     #052525,A(0)
005674  001401                  BEQ     .+4
005676  104006                  HLT
005700  104400                  SCOPE

005702  012700  177770          MOV     #-10,%0
005706  026060  014774  014774        CMP     A(0),A(0)
005714  001401                  BEQ     .+4
005716  104006                  HLT
005720  104400                  SCOPE

005722  012700  000010          MOV     #+10,%0
005726  026060  014774  014774        CMP     A(0),A(0)
005734  001401                  BEQ     .+4
005736  104006                  HLT
```

```
 1988  005740  104400                          SCOPE
 1989
 1990  005742  012700  177774                  MOV     #-4,%0
 1991  005746  012701  000010                  MOV     #.+10,%1
 1992  005752  026061  014774  014774          CMP     A(0),A(1)
 1993  005760  001401                          BEQ     .+4
 1994  005762  104006                          HLT
 1995  005764  104400                          SCOPE
 1996
 1997  005766  012700  177774                  MOV     #-4,%0
 1998  005772  012701  000010                  MOV     #10,%1
 1999  005776  026160  014774  014774          CMP     A(1),A(0)
 2000  006004  001401                          BEQ     .+4
 2001  006006  104006                          HLT
 2002  006010  104400                          SCOPE
 2003
 2004                                  ;*****************************************************************
 2005                                  .SBTTL  TEST MOVE INSTRUCTION FOR INDEX
 2006                                  ;*****************************************************************
 2007
 2008  006012  012700  177770                  MOV     #-10,%0
 2009  006016  016067  014774  006772          MOV     A(0),TEMP
 2010  006024  026727  006766  125252          CMP     TEMP,#125252
 2011  006032  001401                          BEQ     .+4
 2012  006034  104006                          HLT
 2013  006036  104400                          SCOPE
 2014
 2015  006040  012700  177770                  MOV     #-10,%0
 2016  006044  012760  125252  015016          MOV     #125252,TEMP(0)
 2017  006052  023727  015006  125252          CMP     @#C,#125252
 2018  006060  001401                          BEQ     .+4
 2019  006062  104006                          HLT
 2020  006064  104400                          SCOPE
 2021
 2022                                  ;*****************************************************************
 2023                                  .SBTTL  TEST BIC INSTRUCTION FOR INDEXING
 2024                                  ;*****************************************************************
 2025  006066  012767  177777  006722          MOV     #-1,TEMP
 2026  006074  012700  177770                  MOV     #-10,%0
 2027  006100  046067  014774  006710          BIC     A(0),TEMP
 2028  006106  026727  006704  052525          CMP     TEMP,#052525
 2029  006114  001401                          BEQ     .+4
 2030  006116  104006                          HLT
 2031  006120  104400                          SCOPE
 2032
 2033  006122  012700  177770                  MOV     #-10,%0
 2034  006126  012767  1777    006652          MOV     #-1,TEMP-10
 2035  006134  042767  052525  006644          BIC     #052525,TEMP-10
 2036  006142  026727  006640  125252          CMP     TEMP-10,#125252
 2037  006150  001401                          BEQ     .+4
 2038  006152  104006                          HLT
 2039  006154  104400                          SCOPE
 2040
 2041  006156  012737  125252  015016          MOV     #125252,@#TEMP
 2042  006164  012700  177770                  MOV     #-10,%0
 2043  006170  166760  006570  01502o          SUB     B,TEMP+10(0)
```

```
2044  006176  001401                        BEQ     .+4
2045  006200  104006                        HLT
2046  006202  104400                        SCOPE
2047
2048  006204  012737  052525  015016        MOV     #052525,@#TEMP
2049  006212  012700  000010                MOV     #10,%0
2050  006216  166760  006562  015006        SUB     A+10,C(0)
2051  006224  001401                        BEQ     .+4
2052  006226  104006                        HLT
2053  006230  104400                        SCOPE
2054
2055                          ;*****************************************************************
2056                          .SBTTL  TEST UNARYS INDEXED
2057                          ;*****************************************************************
2058
2059  006232  012737  177777  015016        MOV     #-1,@#TEMP
2060  006240  012700  000010                MOV     #+10,%0
2061  006244  005060  015006                CLR     C(0)
2062  006250  005737  015016                TST     @#TEMP
2063  006254  001401                        BEQ     .+4
2064  006256  104006                        HLT
2065  006260  104400                        SCOPE
2066
2067  006262  012737  177777  015016        MOV     #-1,@#TEMP
2068  006270  012700  000010                MOV     #10,%0
2069  006274  005160  015006                COM     C(0)
2070  006300  005737  015016                TST     @#TEMP
2071  006304  001401                        BEQ     .+4
2072  006306  104006                        HLT
2073  006310  104400                        SCOPE
2074
2075  006312  012737  177777  015016        MOV     #-1,@#TEMP
2076  006320  012700  177770                MOV     #-10,%0
2077  006324  005260  015026                INC     D(0)
2078  006330  005737  015016                TST     @#TEMP
2079  006334  001401                        BEQ     .+4
2080  006336  104006                        HLT
2081  006340  104400                        SCOPE
2082
2083  006342  012737  000001  015016        MOV     #1,@#TEMP
2084  006350  012700  177770                MOV     #-10,%0
2085  006354  005360  015026                DEC     D(0)
2086  006360  005737  015016                TST     @#TEMP
2087  006364  001401                        BEQ     .+4
2088  006366  104006                        HLT
2089  006370  104400                        SCOPE
2090
2091  006372  012737  000001  015016        MOV     #1,@#TEMP
2092  006400  012700  000010                MOV     #10,%0
2093  006404  005360  015006                DEC     C(0)
2094  006410  005737  015016                TST     @#TEMP
2095  006414  001401                        BEQ     .+4
2096  006416  104006                        HLT
2097  006420  104400                        SCOPE
2098
2099  006422  012737  000001  015016        MOV     #1,@#TEMP
```

```
2100  006430  012700  177770                    MOV     #-10,%0
2101  006434  005460  015026                    NEG     D(0)
2102  006440  022737  177777  0150'6            CMP     #-1,@#TEMP
2103  006446  001401                            BEQ     .+4
2104  006450  104006                            HLT
2105  006452  104400                            SCOPE
2106
2107  006454  012737  000001  015016            MOV     #1,@#TEMP
2108  006462  012700  000010                    MOV     #+10,%0
2109  006466  005460  015006                    NEG     C(0)
2110  006472  022737  177777  015016            CMP     #-1,@#TEMP
2111  006500  001401                            BEQ     .+4
2112  006502  104006                            HLT
2113  006504  104400                            SCOPE
2114
2115  006506  012737  177777  015016            MOV     #-1,@#TEMP
2116  006514  012700  177770                    MOV     #-10,%0
2117  006520  000261                            SEC
2118  006522  005560  015026                    ADC     D(0)
2119  006526  005737  015016                    TST     @#TEMP
2120  006532  001401                            BEQ     .+4
2121  006534  104006                            HLT
2122  006536  104400                            SCOPE
2123
2124  006540  012737  177777  015016            MOV     #-1,@#TEMP
2125  006546  012700  000010                    MOV     #+10,%0
2126  006552  000261                            SEC
2127  006554  005560  015006                    ADC     C(0)
2128  006560  005737  015016                    TST     @#TEMP
2129  006564  001401                            BEQ     .+4
2130  006566  104006                            HLT
2131  006570  104400                            SCOPE
2132
2133  006572  012737  000001  015016            MOV     #1,@#TEMP
2134  006600  012700  177770                    MOV     #-10,%0
2135  006604  000261                            SEC
2136  006606  005660  015026                    SBC     D(0)
2137  006612  005737  015016                    TST     @#TEMP
2138  006616  001401                            BEQ     .+4
2139  006620  104006                            HLT
2140  006622  104400                            SCOPE
2141
2142  006624  012737  000001  015016            MOV     #1,@#TEMP
2143  006632  012700  000010                    MOV     #+10,%0
2144  006636  000261                            SEC
2145  006640  005660  015006                    SBC     C(0)
2146  006644  005737  015016                    TST     @#TEMP
2147  006650  001401                            BEQ     .+4
2148  006652  104006                            HLT
2149  006654  104400                            SCOPE
2150
2151                          ;*****************************************************************
2152                          .SBTTL  TEST JMP INDIRECT
2153                          ;*****************************************************************
2154  006656  010700                            MOV     %7,%0
2155  006660  062700  000010                    ADD     #10,%0
```

```
2156  006664  000110                    JMP     @%0
2157  006666  104006                    HLT
2158  006670  000240                    NOP
2159  006672  104400                    SCOPE
2160
2161  006674  010700                    MOV     %7,%0
2162  006676  062700  000010            ADD     #10,%0
2163  006702  000110                    JMP     @%0
2164  006704  104006                    HLT
2165  006706  000240                    NOP
2166  006710  104400                    SCOPE
2167
2168                              ;*****************************************************************
2169                              .SBTTL  TEST INDIRECT ADDRESSINGTEST COMPARE INSTRUCTION
2170                              ;*****************************************************************
2171  006712  023727  014764  125252      CMP     @#B,#125252
2172  006720  001401                    BEQ     .+4
2173  006722  104006                    HLT
2174  006724  104400                    SCOPE
2175
2176  006726  022737  125252  014764      CMP     #125252,@#B
2177  006734  001401                    BEQ     .+4
2178  006736  104006                    HLT
2179  006740  104400                    SCOPE
2180
2181  006742  023737  014764  014764      CMP     @#B,@#B
2182  006750  001401                    BEQ     .+4
2183  006752  104006                    HLT
2184  006754  104400                    SCOPE
2185
2186                              ;*****************************************************************
2187                              .SBTTL  TEST MOVE INSTRUCTIONS
2188                              ;*****************************************************************
2189  006756  013700  014764              MOV     @#B,%0
2190  006762  022700  125252              CMP     #125252,%0
2191  006766  001401                    BEQ     .+4
2192  006770  104006                    HLT
2193  006772  104400                    SCOPE
2194
2195  006774  012737  125252  015016      MOV     #125252,@#TEMP
2196  007002  023737  014764  015016      CMP     @#B,@#TEMP
2197  007010  001401                    BEQ     .+4
2198  007012  104006                    HLT
2199  007014  104400                    SCOPE
2200
2201  007016  013737  014764  015006      MOV     @#B,@#C
2202  007024  023737  014764  015006      CMP     @#B,@#C
2203  007032  001401                    BEQ     .+4
2204  007034  104006                    HLT
2205  007036  104400                    SCOPE
2206
2207                              ;*****************************************************************
2208                              .SBTTL  TEST BIC INSTRUCTION INDIRECT
2209                              ;*****************************************************************
2210  007040  012700  177777              MOV     #-1,%0
2211  007044  043700  014764              BIC     @#B,%0
```

```
2212  007050  020027  052525          CMP     %0,#052525
2213  007054  001401                  BEQ     .+4
2214  007056  104006                  HLT
2215  007060  104400                  SCOPE
2216
2217  007062  012737  177777  015016  MOV     #-1,@#TEMP
2218  007070  042737  125252  015016  BIC     #125252,@#TEMP
2219  007076  022737  052525  015016  CMP     #052525,@#TEMP
2220  007104  001401                  BEQ     .+4
2221  007106  104006                  HLT
2222  007110  104400                  SCOPE
2223
2224  007112  012737  177777  015006  MOV     #-1,@#C
2225  007120  043737  014764  015006  BIC     @#B,@#C
2226  007126  023727  015006  052525  CMP     @#C,#52525
2227  007134  001401                  BEQ     .+4
2228  007136  104006                  HLT
2229  007140  104400                  SCOPE
2230
2231                          ;*****************************************************************
2232                          .SBTTL  TEST SUBTRACT INSTRUCTION
2233                          ;*****************************************************************
2234  007142  012700  125252          MOV     #125252,%0
2235  007146  163700  014764          SUB     @#B,%0
2236  007152  020027  000000          CMP     %0,#0
2237  007156  001401                  BEQ     .+4
2238  007160  104006                  HLT
2239  007162  104400                  SCOPE
2240
2241  007164  012737  125252  015016  MOV     #125252,@#TEMP
2242  007172  166737  005566  015016  SUB     B,@#TEMP
2243  007200  001401                  BEQ     .+4
2244  007202  104006                  HLT
2245  007204  104400                  SCOPE
2246
2247  007206  012767  125252  005602  MOV     #125252,TEMP
2248  007214  163767  014764  005574  SUB     @#B,TEMP
2249  007222  005767  005570          TST     TEMP
2250  007226  001401                  BEQ     .+4
2251  007230  104006                  HLT
2252  007232  104400                  SCOPE
2253
2254                          ;*****************************************************************
2255                          .SBTTL  TEST ADD INDIRECT
2256                          ;*****************************************************************
2257  007234  005000          CLR     %0
2258  007236  063700  014764  ADD     @#B,%0
2259  007242  022700  125252  CMP     #125252,%0
2260  007246  001401          BEQ     .+4
2261  007250  104006          HLT
2262  007252  104400          SCOPE
2263
2264  007254  005037  015016  CLR     @#TEMP
2265  007260  062737  125252  015016  ADD     #125252,@#TEMP
2266  007266  022737  125252  015016  CMP     #125252,@#TEMP
2267  007274  001401          BEQ     .+4
```

```
2268  007276  104006                          HLT
2269  007300  104400                          SCOPE
2270
2271  007302  012737  125252  015016          MOV     #125252,@#TEMP
2272  007310  067737  005466  015016          ADD     @A+6,@#TEMP
2273  007316  023727  015016  177777          CMP     @#TEMP,#-1
2274  007324  001401                          BEQ     .+4
2275  007326  104006                          HLT
2276  007330  104400                          SCOPE
2277
2278                                  ;*****************************************************************
2279                                  .SBTTL  TEST UNARYS INDIRECT
2280                                  ;*****************************************************************
2281  007332  012737  177777  015016          MOV     #-1,@#TEMP
2282  007340  005037  015016                  CLR     @#TEMP
2283  007344  005737  015016                  TST     @#TEMP
2284  007350  001401                          BEQ     .+4
2285  007352  104006                          HLT
2286  007354  104400                          SCOPE
2287
2288  007356  012737  125252  015016          MOV     #125252,@#TEMP
2289  007364  005137  015016                  COM     @#TEMP
2290  007370  022737  052525  015016          CMP     #052525,@#TEMP
2291  007376  001401                          BEQ     .+4
2292  007400  104006                          HLT
2293  007402  104400                          SCOPE
2294
2295  007404  005037  015016                  CLR     @#TEMP
2296  007410  005237  015016                  INC     @#TEMP
2297  007414  022737  000001  015016          CMP     #1,@#TEMP
2298  007422  001401                          BEQ     .+4
2299  007424  104006                          HLT
2300  007426  104400                          SCOPE
2301
2302  007430  005037  015016                  CLR     @#TEMP
2303  007434  005377  005360                  DEC     @TEMP+2
2304  007440  023727  015016  177777          CMP     @#TEMP,#-1
2305  007446  001401                          BEQ     .+4
2306  007450  104006                          HLT
2307  007452  104400                          SCOPE
2308
2309  007454  012737  000001  015016          MOV     #1,@#TEMP
2310  007462  005437  015016                  NEG     @#TEMP
2311  007466  022737  177777  015016          CMP     #-1,@#TEMP
2312  007474  001401                          BEQ     .+4
2313  007476  104006                          HLT
2314  007500  104400                          SCOPE
2315
2316                                  ;*****************************************************************
2317                                  .SBTTL  TEST INDIRECT ADDRESSING WITH INDEXING, TEST COMPARE INSTRUCTION
2318                                  ;*****************************************************************
2319  007502  027727  005260  125252          CMP     @B+2,#125252
2320  007510  001401                          BEQ     .+4
2321  007512  104006                          HLT
2322  007514  104400                          SCOPE
2323
```

```
2324  007516  022777  125252  005242          CMP     #125252,@B+2
2325  007524  001401                          BEQ     .+4
2326  007526  104006                          HLT
2327  007530  104400                          SCOPE
2328
2329  007532  027777  00523C  005226          CMP     @B+2,@B+2
2330  007540  001401                          BEQ     .+4
2331  007542  104006                          HLT
2332  007544  104400                          SCOPE
2333
2334                                  ;*****************************************************************
2335                                  .SBTTL  TEST MOVE INSTRUCTIONS
2336                                  ;*****************************************************************
2337  007546  017700  005214                  MOV     @B+2,%0
2338  007552  022700  125252                  CMP     #125252,%0
2339  007556  001401                          BEQ     .+4
2340  007560  104006                          HLT
2341  007562  104400                          SCOPE
2342
2343  007564  012777  125252  005226          MOV     #125252,@TEMP+2
2344  007572  023737  014764  015016          CMP     @#B,@#TEMP
2345  007600  001401                          BEQ     .+4
2346  007602  104006                          HLT
2347  007604  104400                          SCOPE
2348
2349  007606  017777  005154  005174          MOV     @B+2,@C+2
2350  007614  023737  014764  015006          CMP     @#B,@#C
2351  007622  001401                          BEQ     .+4
2352  007624  104006                          HLT
2353  007626  104400                          SCOPE
2354
2355                                  ;*****************************************************************
2356                                  .SBTTL  TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2357                                  ;*****************************************************************
2358  007630  012700  177777                  MOV     #-1,%0
2359  007634  047700  005126                  BIC     @B+2,%0
2360  007640  020027  052525                  CMP     %0,#52525
2361  007644  001401                          BEQ     .+4
2362  007646  104006                          HLT
2363  007650  104400                          SCOPE
2364
2365  007652  012737  177777  015016          MOV     #-1,@#TEMP
2366  007660  042777  125252  005132          BIC     #125252,@TEMP+2
2367  007666  022737  052525  015016          CMP     #52525,@#TEMP
2368  007674  001401                          BEQ     .+4
2369  007676  104006                          HLT
2370  007700  104400                          SCOPE
2371
2372  007702  012737  177777  015006          MOV     #-1,@#C
2373  007710  047777  005052  005072          BIC     @B+2,@C+2
2374  007716  026737  005062  015006          CMP     A+10,@#C
2375  007724  001401                          BEQ     .+4
2376  007726  104006                          HLT
2377  007730  104400                          SCOPE
2378
2379  007732  012700  125252                  MOV     #125252,%0
```

```
2380  007736  167700  005024            SUB     @B+2,%0
2381  007742  020027  000000            CMP     %0,#0
2382  007746  001401                    BEQ     .+4
2383  007750  104006                    HLT
2384  007752  104400                    SCOPE
2385
2386  007754  012737  125252  015016    MOV     #125252,@#TEMP
2387  007762  166777  004776  005030    SUB     B,@TEMP+2
2388  007770  001401                    BEQ     .+4
2389  007772  104006                    HLT
2390  007774  104400                    SCOPE
2391
2392  007776  012737  125252  015016    MOV     #125252,@#TEMP
2393  010004  167777  004756  005006    SUB     @B+2,@TEMP+2
2394  010012  005737  015016            TST     @#TEMP
2395  010016  001401                    BEQ     .+4
2396  010020  104006                    HLT
2397  010022  104400                    SCOPE
2398
2399                            ;*****************************************************************
2400                            .SBTTL  TEST ADD INDIRECT WITH INDEXING
2401                            ;*****************************************************************
2402  010024  005000                    CLR     %0
2403  010026  067700  004734            ADD     @B+2,%0
2404  010032  022700  125252            CMP     #125252,%0
2405  010036  001401                    BEQ     .+4
2406  010040  104006                    HLT
2407  010042  104400                    SCOPE
2408
2409  010044  005037  015016            CLR     @#TEMP
2410  010050  062777  125252  004742    ADD     #125252,@TEMP+2
2411  010056  022737  125252  015016    CMP     #125252,@#TEMP
2412  010064  001401                    BEQ     .+4
2413  010066  104006                    HLT
2414  010070  104400                    SCOPE
2415
2416  010072  012737  125252  015016    MOV     #125252,@#TEMP
2417  010100  067777  004676  004712    ADD     @A+6,@TEMP+2
2418  010106  023727  015016  177777    CMP     @#TEMP,#-1
2419  010114  001401                    BEQ     .+4
2420  010116  104006                    HLT
2421  010120  104400                    SCOPE
2422
2423                            ;*****************************************************************
2424                            .SBTTL  TEST UNARYS INDIRECT WITH INDEXING
2425                            ;*****************************************************************
2426  010122  012737  177777  015016    MOV     #-1,@#TEMP
2427  010130  005077  004664            CLR     @TEMP+2
2428  010134  005737  015016            TST     @#TEMP
2429  010140  001401                    BEQ     .+4
2430  010142  104006                    HLT
2431  010144  104400                    SCOPE
2432
2433  010146  012737  125252  015016    MOV     #125252,@#TEMP
2434  010154  005177  004640            COM     @TEMP+2
2435  010160  022737  052525  015016    CMP     #052525,@#TEMP
```

```
2436  010166  001401                    BEQ     .+4
2437  010170  104006                    HLT
2438  010172  104400                    SCOPE
2439
2440  010174  005037  015016            CLR     @#TEMP
2441  010200  005277  004614            INC     @TEMP+2
2442  010204  022737  000001  015016    CMP     #1,@#TEMP
2443  010212  001401                    BEQ     .+4
2444  010214  104006                    HLT
2445  010216  104400                    SCOPE
2446
2447  010220  005037  015016            CLR     @#TEMP
2448  010224  005377  004570            DEC     @TEMP+2
2449  010230  023727  015016  177777    CMP     @#TEMP,#-1
2450  010236  001401                    BEQ     .+4
2451  010240  104006                    HLT
2452  010242  104400                    SCOPE
2453
2454  010244  012737  000001  015016    MOV     #1,@#TEMP
2455  010252  005477  004542            NEG     @TEMP+2
2456  010256  022737  177777  015016    CMP     #-1,@#TEMP
2457  010264  001401                    BEQ     .+4
2458  010266  104006                    HLT
2459  010270  104400                    SCOPE
2460
2461  010272  012737  177777  015016    MOV     #-1,@#TEMP
2462  010300  000261                    SEC
2463  010302  005577  004512            ADC     @TEMP+2
2464  010306  005737  015016            TST     @#TEMP
2465  010312  001401                    BEQ     .+4
2466  010314  104006                    HLT
2467  010316  104400                    SCOPE
2468
2469  010320  012737  000001  015016    MOV     #1,@#TEMP
2470  010326  000261                    SEC
2471  010330  005677  004464            SBC     @TEMP+2
2472  010334  005737  015016            TST     @#TEMP
2473  010340  001401                    BEQ     .+4
2474  010342  104006                    HLT
2475  010344  104400                    SCOPE
2476
2477                          ;*****************************************************************
2478                          .SBTTL  TEST OF COMBINED INDEXING AND INDIRECT
2479                          ;*****************************************************************
2480  010346  012700  177772            MOV     #-6,%0
2481  010352  027027  014774  125252    CMP     @A(0),#125252
2482  010360  001401                    BEQ     .+4
2483  010362  104006                    HLT
2484  010364  104400                    SCOPE
2485
2486  010366  012700  177772            MOV     #-6,%0
2487  010372  022770  125252  014774    CMP     #125252,@A(0)
2488  010400  001401                    BEQ     .+4
2489  010402  104006                    HLT
2490  010404  104400                    SCOPE
2491
```

```
2492  010406  012700  177772            MOV     #-6,%0
2493  010412  012701  000002            MOV     #+2,%1
2494  010416  027071  014774  014774    CMP     @A(0),@A(1)
2495  010424  001401                    BEQ     .+4
2496  010426  104006                    HLT
2497  010430  104400                    SCOPE
2498
2499                                ;*****************************************************************
2500                                .SBTTL  TEST BIC INSTRUCTION
2501                                ;*****************************************************************
2502  010432  012700  000006            MOV     #+6,%0
2503  010436  012767  177777  004352    MOV     #-1,TEMP
2504  010444  047067  014774  004344    BIC     @A(0),TEMP
2505  010452  022767  125252  004336    CMP     #125252,TEMP
2506  010460  001401                    BEQ     .+4
2507  010462  104006                    HLT
2508  010464  104400                    SCOPE
2509
2510  010466  012700  177772            MOV     #-6,%0
2511  010472  012737  177777  015006    MOV     #-1,@#C
2512  010500  042770  125252  015016    BIC     #125252,@TEMP(0)
2513  010506  023727  015006  052525    CMP     @#C,#052525
2514  010514  001401                    BEQ     .+4
2515  010516  104006                    HLT
2516  010520  104400                    SCOPE
2517
2518  010522  012737  177777  015006    MOV     #-1,@#C
2519  010530  012700  177772            MOV     #-6,%0
2520  010534  012701  177772            MOV     #-6,%1
2521  010540  047071  014774  015016    BIC     @A(0),@TEMP(1)
2522  010546  022737  052525  015006    CMP     #052525,@#C
2523  010554  001401                    BEQ     .+4
2524  010556  104006                    HLT
2525  010560  104400                    SCOPE
2526
2527                                ;BINARY INSTRUCTIONS
2528                                ;INDEX, AND INDIRECT TEST OF PDP-11
2529                                ;*****************************************************************
2530                                .SBTTL  TEST COMPARE INSTRUCTION INDEXED
2531                                ;*****************************************************************
2532  010562  012700  177770            MOV     #-10,%0                 ;MINUS 10 TO REG 0
2533  010566  126027  014774  000252    CMPB    A(0),#000252            ;(A INDEX BY MINUS 10) TO #125252
2534  010574  001401                    BEQ     .+4
2535  010576  104006                    HLT                             ;COMPARE WITH INDEX FAILED
2536  010600  104400                    SCOPE
2537
2538  010602  012700  177770            MOV     #-10,%0                 ;FOR INDEX
2539  010606  122760  000252  014774    CMPB    #000252,A(0)            ;A INDEXED
2540  010614  001401                    BEQ     .+4
2541  010616  104006                    HLT
2542  010620  104400                    SCOPE
2543
2544  010622  012700  000010            MOV     #10,%0                  ;INDEX
2545  010626  126027  014774  000125    CMPB    A(0),#000125
2546  010634  001401                    BEQ     .+4
2547  010636  104006                    HLT
```

```
2548  010640  104400                          SCOPE
2549
2550  010642  012700  000010                  MOV     #10,%0
2551  010646  122760  000125  014774          CMPB    #000125,A(0)
2552  010654  001401                          BEQ     .+4
2553  010656  104006                          HLT
2554  010660  104400                          SCOPE
2555
2556  010662  012700  177770                  MOV     #-10,%0
2557  010666  126060  014774  014774          CMPB    A(0),A(0)
2558  010674  001401                          BEQ     .+4
2559  010676  104006                          HLT
2560  010700  104400                          SCOPE
2561
2562  010702  012700  000010                  MOV     #+10,%0
2563  010706  126060  014774  014774          CMPB    A(0),A(0)
2564  010714  001401                          BEQ     .+4
2565  010716  104006                          HLT
2566  010720  104400                          SCOPE
2567
2568  010722  012700  177770                  MOV     #-10,%0
2569  010726  012701  000004                  MOV     #+4,%1
2570  010732  126061  014774  014774          CMPB    A(0),A(1)
2571  010740  001401                          BEQ     .+4
2572  010742  104006                          HLT
2573  010744  104400                          SCOPE
2574
2575  010746  126160  014774  014774          CMPB    A(1),A(0)
2576  010754  001401                          BEQ     .+4
2577  010756  104006                          HLT
2578  010760  104400                          SCOPE
2579
2580  010762  012700  177774                  MOV     #-4,%0
2581  010766  012701  000010                  MOV     #+10,%1
2582  010772  126061  014774  014774          CMPB    A(0),A(1)
2583  011000  001401                          BEQ     .+4
2584  011002  104006                          HLT
2585  011004  104400                          SCOPE
2586
2587  011006  012700  177774                  MOV     #-4,%0
2588  011012  012701  000010                  MOV     #10,%1
2589  011016  126160  014774  014774          CMPB    A(1),A(0)
2590  011024  001401                          BEQ     .+4
2591  011026  104006                          HLT
2592  011030  104400                          SCOPE
2593
2594                                  ;*******************************************************************
2595                                  .SBTTL  TEST MOVE INSTRUCTION FOR INDEX
2596                                  ;*******************************************************************
2597  011032  012700  177770                  MOV     #-10,%0
2598  011036  116067  014774  003752          MOVB    A(0),TEMP
2599  011044  126727  003746  000252          CMPB    TEMP,#000252
2600  011052  001401                          BEQ     .+4
2601  011054  104006                          HLT
2602  011056  104400                          SCOPE
2603
```

```
2604  011060  012700  000010              MOV     #.+10,%0
2605  011064  116067  014774  003724      MOVB    A(0),TEMP
2606  011072  126727  003720  000125      CMPB    TEMP,#000125
2607  011100  001401                      BEQ     .+4
2608  011102  104006                      HLT
2609  011104  104400                      SCOPE
2610
2611  011106  012700  177770              MOV     #-10,%0
2612  011112  112760  125252  015016      MOVB    #125252,TEMP(0)
2613  011120  123727  015006  125252      CMPB    @#C,#125252
2614  011126  001401                      BEQ     .+4
2615  011130  104006                      HLT
2616  011132  104400                      SCOPE
2617
2618  011134  012700  000010              MOV     #.+10,%0
2619  011140  112760  052525  015016      MOVB    #052525,TEMP(0)
2620  011146  123727  015026  052525      CMPB    @#TEMP+10,#052525
2621  011154  001401                      BEQ     .+4
2622  011156  104006                      HLT
2623  011160  104400                      SCOPE
2624
2625                                  ;*****************************************************************
2626                                  .SBTTL  TEST BIC INSTRUCTION FOR INDEXING
2627                                  ;*****************************************************************
2628  011162  012767  177777  003626      MOV     #-1,TEMP
2629  011170  012700  177770              MOV     #-10,%0
2630  011174  146067  014774  003614      BICB    A(0),TEMP
2631  011202  126727  003610  177525      CMPB    TEMP,#177525
2632  011210  001401                      BEQ     .+4
2633  011212  104006                      HLT
2634  011214  104400                      SCOPE
2635
2636  011216  012767  177777  003572      MOV     #-1,TEMP
2637  011224  012700  000010              MOV     #10,%0
2638  011230  146067  014774  003560      BICB    A(0),TEMP
2639  011236  126727  003554  007652      CMPB    TEMP,#007652
2640  011244  001401                      BEQ     .+4
2641  011246  104006                      HLT
2642  011250  104400                      SCOPE
2643
2644  011252  012737  177777  015026      MOV     #-1,@#TEMP+10
2645  011260  012700  000010              MOV     #10,%0
2646  011264  142760  125252  015016      BICB    #125252,TEMP(0)
2647  011272  123727  015026  002525      CMPB    @#TEMP+10,#2525
2648  011300  001401                      BEQ     .+4
2649  011302  104006                      HLT
2650  011304  104400                      SCOPE
2651
2652  011306  012700  177770              MOV     #-10,%0
2653  011312  012767  177777  003466      MOV     #-1,TEMP-10
2654  011320  142767  052525  003460      BICB    #052525,TEMP-10
2655  011326  126727  003454  125252      CMPB    TEMP-10,#125252
2656  011334  001401                      BEQ     .+4
2657  011336  104006                      HLT
2658  011340  104400                      SCOPE
2659
```

```
2660                                    ;*****************************************************************
2661                                    ;SBTTL  TEST UNARYS INDEXED
2662                                    ;*****************************************************************
2663  011342  012737  177777  015016          MOV     #-1,@#TEMP
2664  011350  012700  177770                  MOV     #-10,%0
2665  011354  105060  015026                  CLRB    D(0)
2666  011360  105737  015016                  TSTB    @#TEMP
2667  011364  001401                          BEQ     .+4
2668  011366  104006                          HLT
2669  011370  104400                          SCOPE
2670
2671  011372  012737  177777  015016          MOV     #-1,@#TEMP
2672  011400  012700  177770                  MOV     #-10,%0
2673  011404  105060  015026                  CLRB    D(0)
2674  011410  023727  015016  177400          CMP     @#TEMP,#177400
2675  011416  001401                          BEQ     .+4
2676  011420  104006                          HLT
2677  011422  104400                          SCOPE
2678
2679  011424  012737  177777  015016          MOV     #-1,@#TEMP
2680  011432  012700  177771                  MOV     #-7,%0
2681  011436  105060  015026                  CLRB    D(0)
2682  011442  023727  015016  000377          CMP     @#TEMP,#000377
2683  011450  001401                          BEQ     .+4
2684  011452  104006                          HLT
2685  011454  104400                          SCOPE
2686
2687  011456  012737  177777  015016          MOV     #-1,@#TEMP
2688  011464  012700  000010                  MOV     #+10,%0
2689  011470  105060  015006                  CLRB    C(0)
2690  011474  105737  015016                  TSTB    @#TEMP
2691  011500  001401                          BEQ     .+4
2692  011502  104006                          HLT
2693  011504  104400                          SCOPE
2694
2695  011506  012737  177777  015016          MOV     #-1,@#TEMP
2696  011514  012700  177770                  MOV     #-10,%0
2697  011520  105160  015026                  COMB    D(0)
2698  011524  105737  015016                  TSTB    @#TEMP
2699  011530  001401                          BEQ     .+4
2700  011532  104006                          HLT
2701  011534  104400                          SCOPE
2702
2703  011536  012737  177777  015016          MOV     #-1,@#TEMP
2704  011544  012700  000010                  MOV     #+10,%0
2705  011550  105260  015006                  INCB    C(0)
2706  011554  105737  015016                  TSTB    @#TEMP
2707  011560  001401                          BEQ     .+4
2708  011562  104006                          HLT
2709  011564  104400                          SCOPE
2710
2711  011566  012737  000001  015016          MOV     #1,@#TEMP
2712  011574  012700  177770                  MOV     #-10,%0
2713  011600  105360  015026                  DECB    D(0)
2714  011604  105737  015016                  TSTB    @#TEMP
2715  011610  001401                          BEQ     .+4
```

```
2716  011612  104006                          HLT
2717  011614  104400                          SCOPE
2718
2719  011616  012737  000000  015016          MOV     #1,@#TEMP
2720  011624  012700  000010                  MOV     #.+10,%0
2721  011630  105460  015006                  NEGB    C(0)
2722  011634  023727  015016  000377          CMP     @#TEMP,#377
2723  011642  001401                          BEQ     .+4
2724  011644  104006                          HLT
2725  011646  104400                          SCOPE
2726
2727  011650  012737  177777  015016          MOV     #-1,@#TEMP
2728  011656  012700  177770                  MOV     #-10,%0
2729  011662  000261                          SEC
2730  011664  105560  015026                  ADCB    D(0)
2731  011670  023727  015016  177400          CMP     @#TEMP,#177400
2732  011676  001401                          BEQ     .+4
2733  011700  104006                          HLT
2734  011702  104400                          SCOPE
2735
2736  011704  012737  000001  015016          MOV     #1,@#TEMP
2737  011712  012700  000010                  MOV     #.+10,%0
2738  011716  000261                          SEC
2739  011720  105660  015006                  SBCB    C(0)
2740  011724  005737  015016                  TST     @#TEMP
2741  011730  001401                          BEQ     .+4
2742  011732  104006                          HLT
2743  011734  104400                          SCOPE
2744
2745                                  ;*****************************************************************
2746                                  .SBTTL  TEST INDIRECT ADDRESSING, TEST COMPARE INSTRUCTION
2747                                  ;*****************************************************************
2748  011736  123727  014764  000252          CMPB    @#B,#000252
2749  011744  001401                          BEQ     .+4
2750  011746  104006                          HLT
2751  011750  104400                          SCOPE
2752
2753  011752  122737  125252  014764          CMPB    #125252,@#B
2754  011760  001401                          BEQ     .+4
2755  011762  104006                          HLT
2756  011764  104400                          SCOPE
2757
2758                                  ;*****************************************************************
2759                                  .SBTTL  TEST MOVE INSTRUCTIONS
2760                                  ;*****************************************************************
2761  011766  113700  014764                  MOVB    @#B,%0
2762  011772  122700  000252                  CMPB    #000252,%0
2763  011776  001401                          BEQ     .+4
2764  012000  104006                          HLT
2765  012002  104400                          SCOPE
2766
2767  012004  112737  125252  015016          MOVB    #125252,@#TEMP
2768  012012  126737  002746  015016          CMPB    B,@#TEMP
2769  012020  001401                          BEQ     .+4
2770  012022  104006                          HLT
2771  012024  104400                          SCOPE
```

```
2772
2773                                    ;*****************************************************************
2774                                    .SBTTL  TEST UNARYS INDIRECT
2775                                    ;*****************************************************************
2776  012026  012737  177777  015016            MOV     #-1,@#TEMP
2777  012034  105037  015016                    CLRB    @#TEMP
2778  012040  023727  015016  177400            CMP     @#TEMP,#177400
2779  012046  001401                            BEQ     .+4
2780  012050  104006                            HLT
2781  012052  104400                            SCOPE
2782
2783  012054  012737  125252  015016            MOV     #125252,@#TEMP
2784  012062  105137  015017                    COMB    @#TEMP+1
2785  012066  022737  052652  015016            CMP     #052652,@#TEMP
2786  012074  001401                            BEQ     .+4
2787  012076  104006                            HLT
2788  012100  104400                            SCOPE
2789
2790  012102  005037  015016                    CLR     @#TEMP
2791  012106  105237  015017                    INCB    @#TEMP+1
2792  012112  022737  000400  015016            CMP     #400,@#TEMP
2793  012120  001401                            BEQ     .+4
2794  012122  104006                            HLT
2795  012124  104400                            SCOPE
2796
2797  012126  005037  015016                    CLR     @#TEMP
2798  012132  105377  002662                    DECB    @TEMP+2
2799  012136  023727  015016  000377            CMP     @#TEMP,#377
2800  012144  001401                            BEQ     .+4
2801  012146  104006                            HLT
2802  012150  104400                            SCOPE
2803
2804  012152  005037  015016                    CLR     @#TEMP
2805  012156  112737  000001  015017            MOVB    #1,@#TEMP+1
2806  012164  105437  015017                    NEGB    @#TEMP+1
2807  012170  022737  177400  015016            CMP     #177400,@#TEMP
2808  012176  001401                            BEQ     .+4
2809  012200  104006                            HLT
2810  012202  104400                            SCOPE
2811
2812                                    ;*****************************************************************
2813                                    .SBTTL  TEST INDIRECT ADDRESSING WITH INDEXING, TEST COMPARE INSTRUCTION
2814                                    ;*****************************************************************
2815
2816  012204  122777  125252  002554            CMPB    #125252,@B+2
2817  012212  001401                            BEQ     .+4
2818  012214  104006                            HLT
2819  012216  104400                            SCOPE
2820
2821  012220  127777  002542  002540            CMPB    @B+2,@B+2
2822  012226  001401                            BEQ     .+4
2823  012230  104006                            HLT
2824  012232  104400                            SCOPE
2825
2826                                    ;*****************************************************************
2827                                    .SBTTL  TEST MOVE INSTRUCTIONS
```

```
2828                                    ;*****************************************************************
2829  012234  117700  002526            MOVB    @B+2,%0
2830  012240  122700  125252            CMPB    #125252,%0
2831  012244  001401                    BEQ     .+4
2832  012246  104006                    HLT
2833  012250  104400                    SCOPE
2834
2835  012252  112777  125252  002540    MOVB    #125252,@TEMP+2
2836  012260  126737  002500  015016    CMPB    B,@#TEMP
2837  012266  001401                    BEQ     .+4
2838  012270  104006                    HLT
2839  012272  104400                    SCOPE
2840
2841  012274  117777  002466  002506    MOVB    @B+2,@C+2
2842  012302  126737  002456  015006    CMPB    B,@#C
2843  012310  001401                    BEQ     .+4
2844  012312  104006                    HLT
2845  012314  104400                    SCOPE
2846
2847                                    ;*****************************************************************
2848                                    .SBTTL  TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2849                                    ;*****************************************************************
2850  012316  012700  177777            MOV     #-1,%0
2851  012322  147700  002440            BICB    @B+2,%0
2852  012326  120027  052525            CMPB    %0,#52525
2853  012332  001401                    BEQ     .+4
2854  012334  104006                    HLT
2855  012336  104400                    SCOPE
2856
2857  012340  012737  177777  015016    MOV     #-1,@#TEMP
2858  012346  142777  125252  002444    BICB    #125252,@TEMP+2
2859  012354  122737  052525  015016    CMPB    #52525,@#TEMP
2860  012362  001401                    BEQ     .+4
2861  012364  104006                    HLT
2862  012366  104400                    SCOPE
2863
2864  012370  012737  177777  015006    MOV     #-1,@#C
2865  012376  147777  002364  002404    BICB    @B+2,@C+2
2866  012404  126737  002374  015006    CMPB    A+10,@#C
2867  012412  001401                    BEQ     .+4
2868  012414  104006                    HLT
2869  012416  104400                    SCOPE
2870
2871                                    ;*****************************************************************
2872                                    .SBTTL  TEST UNARYS INDIRECT WITH INDEXING
2873                                    ;*****************************************************************
2874  012420  012737  177777  015016    MOV     #-1,@#TEMP
2875  012426  105077  002366            CLRB    @TEMP+2
2876  012432  105737  015016            TSTB    @#TEMP
2877  012436  001401                    BEQ     .+4
2878  012440  104006                    HLT
2879  012442  104400                    SCOPE
2880
2881  012444  005037  015016            CLR     @#TEMP
2882  012450  105277  002344            INCB    @TEMP+2
2883  012454  122737  000001  015016    CMPB    #1,@#TEMP
```

```
 2884  012462  001401                        BEQ     .+4
 2885  012464  104006                        HLT
 2886  012466  104400                        SCOPE
 2887
 2888  012470  005037  015016                CLR     @#TEMP
 2889  012474  105377  002320                DECB    @TEMP+2
 2890  012500  123727  015016  177777        CMPB    @#TEMP,#-1
 2891  012506  001401                        BEQ     .+4
 2892  012510  104006                        HLT
 2893  012512  104400                        SCOPE
 2894
 2895  012514  012737  000001  015016        MOV     #1,@#TEMP
 2896  012522  105477  002272                NEGB    @TEMP+2
 2897  012526  122737  177777  015016        CMPB    #-1,@#TEMP
 2898  012534  001401                        BEQ     .+4
 2899  012536  104006                        HLT
 2900  012540  104400                        SCOPE
 2901
 2902  012542  012737  177777  015016        MOV     #-1,@#TEMP
 2903  012550  000261                        SEC
 2904  012552  105577  002242                ADCB    @TEMP+2
 2905  012556  022737  177400  015016        CMP     #177400,@#TEMP
 2906  012564  001401                        BEQ     .+4
 2907  012566  104006                        HLT
 2908  012570  105737  015016                TSTB    @#TEMP
 2909  012574  001401                        BEQ     .+4
 2910  012576  104006                        HLT
 2911  012600  104400                        SCOPE
 2912
 2913  012602  012737  000001  015016        MOV     #1,@#TEMP
 2914  012610  000261                        SEC
 2915  012612  105377  002202                DECB    @TEMP+2
 2916  012616  005737  015016                TST     @#TEMP
 2917  012622  001401                        BEQ     .+4
 2918  012624  104006                        HLT
 2919  012626  104400                        SCOPE
 2920
 2921                                ;*****************************************************************
 2922                                .SBTTL  TEST OF COMBINED INDEXING AND INDIRECT
 2923                                ;*****************************************************************
 2924  012630  012700  177772                MOV     #-6,%0
 2925  012634  127027  014774  125252        CMPB    @A(0),#125252
 2926  012642  001401                        BEQ     .+4
 2927  012644  104006                        HLT
 2928  012646  104400                        SCOPE
 2929
 2930  012650  012700  177772                MOV     #-6,%0
 2931  012654  012701  000002                MOV     #+2,%1
 2932  012660  127071  014774  014774        CMPB    @A(0),@A(1)
 2933  012666  001401                        BEQ     .+4
 2934  012670  104006                        HLT
 2935  012672  104400                        SCOPE
 2936
 2937                                ;*****************************************************************
 2938                                .SBTTL  TEST BIC INSTRUCTION
 2939                                ;*****************************************************************
```

```
2940  012674  012700  000006                MOV     #.+6,%0
2941  012700  012767  177777  002110        MOV     #-1,TEMP
2942  012706  147067  014774  002102        BICB    @A(0),TEMP
2943  012714  122767  125252  002074        CMPB    #125252,TEMP
2944  012722  001401                        BEQ     .+4
2945  012724  104006                        HLT
2946  012726  104400                        SCOPE
2947
2948  012730  012700  177772                MOV     #-6,%0
2949  012734  012737  177777  015006        MOV     #-1,@#C
2950  012742  142770  125252  015016        BICB    #125252,@TEMP(0)
2951  012750  123727  015006  000125        CMPB    @#C,#000125
2952  012756  001401                        BEQ     .+4
2953  012760  104006                        HLT
2954  012762  104400                        SCOPE
2955
2956  012764  012700  014766                MOV     #B+2,%0         ;ADDRESS OF ADDRESS OF B
2957  012770  023067  001770                CMP     @(0)+,B
2958  012774  001401                        BEQ     .+4
2959  012776  104006                        HLT
2960  013000  104400                        SCOPE
2961
2962  013002  012700  014770                MOV     #B+4,%0
2963  013006  025067  001752                CMP     @-(0),B
2964  013012  001401                        BEQ     .+4
2965  013014  104006                        HLT
2966  013016  104400                        SCOPE
2967
2968  013020  012700  014770                MOV     #B+4,%0
2969  013024  125067  001734                CMPB    @-(0),B
2970  013030  001401                        BEQ     .+4
2971  013032  104006                        HLT
2972  013034  104400                        SCOPE
2973
2974  013036  012700  015012                MOV     #C+4,%0
2975  013042  012737  177777  015006        MOV     #-1,@#C
2976  013050  105050                        CLRB    @-(0)
2977  013052  023727  015006  177400        CMP     @#C,#177400
2978  013060  001401                        BEQ     .+4
2979  013062  104006                        HLT
2980  013064  104400                        SCOPE
2981
2982  013066  012737  177777  015006        MOV     #-1,@#C
2983  013074  012700  177772                MOV     #-6,%0
2984  013100  012701  177772                MOV     #-6,%1
2985  013104  147071  014774  015016        BICB    @A(0),@TEMP(1)
2986  013112  022737  177525  015006        CMP     #177525,@#C
2987  013120  001401                        BEQ     .+4
2988  013122  104006                        HLT
2989  013124  104400                        SCOPE
2990
2991                          ;*****************************************************************
2992                          .SBTTL  SET UP TO TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
2993                          ;*****************************************************************
2994  013126  012700  052525                MOV     #52525,%0       ;THIS IS CHECKED LATER IN PROGRAM
2995
```

```
                        ;*****************************************************************
                        .SBTTL  TEST JSR INSTRUCTION
                        ;*****************************************************************
013132  004767  000002          JSR     %7, TJSR2       ;PLACE PC ON STACK
013136  000405          TJSR1:  BR      TJSR3           ;RETURN HERE ON RTS %19
013140  121627  013136  TJSR2:  CMPB    @%6,#TJSR1      ;CHECK FOR CORRECT PC ON STACK
013144  001401                  BEQ     .+4
013146  104006                  HLT                     ;INCORRECT PC ON STACK
013150  000207                  RTS     %7              ;RETURN TO IMST AFTER JSR
013152  104400          TJSR3:  SCOPE
                        
013154  000257                  CCC
013156  004717                  JSR     %7,@%7          ;INSTRUCTION UNDER TEST
013160  121627  013160          CMPB    @%6,#TJSR3+6            ;TEST THE STACK
013164  001401                  BEQ     .+4
013166  104006                  HLT                     ;PC OF JSR DID NOT GO TO STACK
013170  005726                  TST     (6)+            ;REPOSITION THE STACK
013172  104400                  SCOPE
                        
                        ;*****************************************************************
                        .SBTTL  TEST NESTED SUBROUTINES
                        ;*****************************************************************
013174  000257                  CCC                     ;CLEAR CONDITION CODES
013176  004767  001360          JSR     %7,SUBR6
013202  100401                  BMI     .+4
013204  104006                  HLT                     ;JSR OR RTS FAILED
013206  001401                  BEQ     .+4
013210  104006                  HLT                     ;JSR OR RTS FAILED
013212  102401                  BVS     .+4
013214  104006                  HLT                     ;JSR OR RTS FAILED
013216  103401                  BCS     .+4
013220  104006                  HLT                     ;JSR OR RTS FAILED
013222  104400                  SCOPE
                        
                        ;*****************************************************************
                        .SBTTL  TEST ROTATE ODD BYTE
                        ;*****************************************************************
013224  104400                  SCOPE
013226  000257                  CCC                             ;CLEAR "C"
013230  012767  123456  001560  MOV     #123456,TEMP
013236  106067  001555          RORB    TEMP+1                  ;ROTATE ODD BYTE
013242  103401                  BCS     .+4
013244  104006                  HLT                             ;C NOT SET
013246  102401                  BVS     .+4
013250  104006                  HLT                             ;V NOT SET
013252  022767  051456  001536  CMP     #051456,TEMP
013260  001401                  BEQ     .+4
013262  104006                  HLT                             ;ROTATE FAILED
013264  104400                  SCOPE
                        
013266  000277                  SCC                             ;SET C
013270  012767  123456  001520  MOV     #123456,TEMP
013276  106067  001515          RORB    TEMP+1
013302  103401                  BCS     .+4
013304  104006                  HLT                             ;C NOT SET
013306  102001                  BVC     .+4
```

```
3052  013310  104006                    HLT                             ;V NOT CLEARED
3053  013312  022767  151456  001476    CMP     #151456,TEMP
3054  013320  001401                    BEQ     .+4
3055  013322  104006                    HLT                             ;ROTATE FAILED
3056  013324  104400                    SCOPE
3057
3058  013326  000257                    CCC
3059  013330  012767  123456  001460    MOV     #123456,TEMP
3060  013336  106167  001455            ROLB    TEMP+1
3061  013342  103401                    BCS     .+4
3062  013344  104006                    HLT                             ;C NOT SET
3063  013346  102401                    BVS     .+4
3064  013350  104006                    HLT                             ;V NOT SET
3065  013352  022767  047056  001436    CMP     #047056,TEMP
3066  013360  001401                    BEQ     .+4
3067  013362  104006                    HLT                             ;ROTATE BYTE FAILED
3068  013364  104400                    SCOPE
3069
3070  013366  000277                    SCC                             ;SET C
3071  013370  012767  123456  001420    MOV     #123456,TEMP
3072  013376  106167  001415            ROLB    TEMP+1
3073  013402  103401                    BCS     .+4
3074  013404  104006                    HLT                             ;C NOT SET
3075  013406  102401                    BVS     .+4
3076  013410  104006                    HLT                             ;V NOT SET
3077  013412  022767  047456  001376    CMP     #047456,TEMP
3078  013420  001401                    BEQ     .+4
3079  013422  104006                    HLT                             ;ROTATE ODD BYTE FAILED
3080  013424  104400                    SCOPE
3081
3082  013426  000257                    CCC                             ;CLEAR C
3083  013430  012767  177777  001360    MOV     #-1,TEMP
3084  013436  106267  001355            ASRB    TEMP+1
3085  013442  103401                    BCS     .+4
3086  013444  104006                    HLT                             ;C NOT SET
3087  013446  102001                    BVC     .+4
3088  013450  104006                    HLT                             ;V NOT CLEARED
3089  013452  026727  001340  177777    CMP     TEMP,#-1
3090  013460  001401                    BEQ     .+4
3091  013462  104006                    HLT                             ;SHIFT FAILED
3092  013464  104400                    SCOPE
3093
3094  013466  000277                    SCC
3095  013470  012767  177777  001320    MOV     #-1,TEMP
3096  013476  106367  001315            ASLB    TEMP+1
3097  013502  103401                    BCS     .+4
3098  013504  104006                    HLT                             ;C NOT SET
3099  013506  102001                    BVC     .+4
3100  013510  104006                    HLT                             ;V NOT CLEARED
3101  013512  026727  001300  177377    CMP     TEMP,#177377
3102  013520  001401                    BEQ     .+4
3103  013522  104006                    HLT                             ;SHIFT BYTE FAILED
3104  013524  104400                    SCOPE
3105
3106
3107                          ;.....................................................................
```

```
                                .SBTTL  TEST THAT R0 WASN'T CLEARED BY FALSE SELECTION
                                ;*************************************************************
013526  022700  052525          CMP     #52525,R0
013532  001401                  BEQ     .+4
013534  104006                  HLT
013536  104400                  SCOPE

                                ;*************************************************************
                                .SBTTL  TEST COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
                                ;*************************************************************
013540  004767  001146          JSR     PC,RNGEN                ;GET RANDOM NUMBER.
013544  010001                  MOV     R0,R1
013546  020001          CMP1:   CMP     %0,%1                   ;ARE THE EQUAL
013550  001401                  BEQ     .+4
013552  104006                  HLT                             ;R0 AND R1 DID NOT COMPARE
013554  104400                  SCOPE

                                ;*************************************************************
                                .SBTTL  TEST ROTATING RANDOM NUMBERS
                                ;*************************************************************
013556  004767  001130          JSR     PC,RNGEN                ;GET RANDOM NUMBER.
013562  010067  165030          MOV     R0,REFF                 ;PUT IN REF WORD.
013566  016767  165024  165024  ROTALL: MOV     REFF,TEST
013574  006067  165020          ROR     TEST
013600  006067  165014          ROR     TEST
013604  006067  165010          ROR     TEST
013610  006167  165004          ROL     TEST
013614  006167  165000          ROL     TEST
013620  006167  164774          ROL     TEST
013624  100004                  BPL     .+12
013626  103007                  BCC     .+20                    ;Z=1
013630  102013                  BVC     .+30                    ;Z=1, C=1
013632  104006                  HLT                             ;Z=C, BUT V=1
013634  000411                  BR      .+24
013636  103006                  BCC     .+16                    ;Z=0
013640  102407                  BVS     .+20                    ;Z=0, C=1
013642  104006                  HLT                             ;Z NOT EQUAL C, V=1
013644  000405                  BR      .+14
013646  102404                  BVS     .+12                    ;Z=1, C=0
013650  104006                  HLT                             ;Z NOT EQUAL C, V=1
013652  000402                  BR      .+6
013654  102001                  BVC     .+4                     ;Z=0, C=0
013656  104006                  HLT                             ;Z=C, BUT V=1
013660  026767  164734  164730  CMP     TEST,REFF
013666  001401                  BEQ     .+4
013670  104006                  HLT                             ;INITIAL NOT EQUAL TO FINAL
013672  104400                  SCOPE

000616                  REF=REFF

                                ;*************************************************************
                                .SBTTL  TEST ROTATING BYTE EVEN/ODD, RANDOM NUMBERS
                                ;*************************************************************
013674  004767  001012          JSR     PC,RNGEN                ;GET RANDOM NUMBER.
013700  010067  164712          MOV     R0,REFF                 ;PUT IN REF WORD.
013704  004767  000006          JSR     %7,ROTBF
```

```
3164  013710  004767  000110                    JSR     %7,ROTBO
3165  013714  000503                            BR      ROTEN1
3166  013716  016767  164674  164674  ROTBE:    MOV     REFF,TEST
3167  013724  106067  164670                    RORB    TEST                    ;ROTATE BYTE EVEN
3168  013730  106067  164664                    RORB    TEST
3169  013734  106067  164660                    RORB    TEST
3170  013740  106167  164654                    ROLB    TEST
3171  013744  106167  164650                    ROLB    TEST
3172  013750  106167  164644                    ROLB    TEST
3173  013754  100004                            BPL     .+12
3174  013756  103007                            BCC     .+20                    ;Z=1
3175  013760  102013                            BVC     .+30                    ;Z=1, C=1
3176  013762  104006                            HLT                             ;Z=C, BUT V-1
3177  013764  000411                            BR      .+24
3178  013766  103006                            BCC     .+16                    ;Z=0
3179  013770  102407                            BVS     .+20                    ;Z=0, C=1
3180  013772  104006                            HLT                             ;Z NOT EQUAL C, V-1
3181  013774  000405                            BR      .+14
3182  013776  102404                            BVS     .+12                    ;Z=1, C-0
3183  014000  104006                            HLT                             ;Z NOT EQUAL C, V=1
3184  014002  000402                            BR      .+6
3185  014004  102001                            BVC     .+4                     ;Z=0, C=0
3186  014006  104006                            HLT                             ;Z=C, BUT V-1
3187  014010  026767  164604  164600            CMP     TEST,REFF
3188  014016  001401                            BEQ     .+4
3189  014020  104006                            HLT
3190  014022  000207                            RTS     %7
3191  014024  106067  164571          ROTBO:    RORB    TEST+1                  ;ROTATE BYTE ODD
3192  014030  106067  164565                    RORB    TEST+1
3193  014034  106067  164561                    RORB    TEST+1
3194  014040  106167  164555                    ROLB    TEST+1
3195  014044  106167  164551                    ROLB    TEST+1
3196  014050  106167  164545                    ROLB    TEST+1
3197  014054  100004                            BPL     .+12
3198  014056  103007                            BCC     .+20                    ;Z=1
3199  014060  102013                            BVC     .+30                    ;Z=1, C=1
3200  014062  104006                            HLT                             ;Z=C, BUT V=1
3201  014064  000411                            BR      .+24
3202  014066  103006                            BCC     .+16                    ;Z=0
3203  014070  102407                            BVS     .+20                    ;Z=0, C=1
3204  014072  104006                            HLT                             ;Z NOT EQUAL C, V-1
3205  014074  000405                            BR      .+14
3206  014076  102404                            BVS     .+12                    ;Z=1, C-0
3207  014100  104006                            HLT                             ;Z NOT EQUAL C, V=1
3208  014102  000402                            BR      .+6
3209  014104  102001                            BVC     .+4                     ;Z=0, C=0
3210  014106  104006                            HLT                             ;Z=C, BUT V=1
3211  014110  026767  164504  164500            CMP     TEST,REFF
3212  014116  001401                            BEQ     .+4
3213  014120  104006                            HLT
3214  014122  000207                            RTS     %7
3215  014124  104400                  ROTEN1:   SCOPE
3216
3217                                  ;*****************************************************************
3218                                  .SBTTL  ADD AND SUBTRACT RANDOM NUMBERS AGAINST FIXED NUMBERS
3219                                  ;*****************************************************************
```

```
                                        ;A+B=C, C-A=B, BF SHOULD EQUAL BI
3221  014126  011667  000054            MOV     @%6,NUMA
3222  014132  004767  000554            JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3223  014136  010067  164454            MOV     R0,REFF                 ;PUT IN REF WORD.
3224  014142  004767  000002            JSR     %7,ADSUB
3225  014146  000420                    BR      ARIEND
3226  014150  016767  164442  164442  ADSUB:   MOV     REFF,TEST
3227  014156  066767  000024  164434          ADD     NUMA,TEST
3228  014164  166767  000016  164426          SUB     NUMA,TEST
3229  014172  026767  164420  164420          CMP     REFF,TEST
3230  014200  001401                          BEQ     .+4
3231  014202  104006                          HLT
3232  014204  000207                          RTS     %7
3233  014206  000000                  NUMA:   0
3234  014210  104400                  ARIEND: SCOPE
3235
3236                                  ;*********************************************************** ***
3237                                  .SBTTL  TEST COMPLIMENTING RANDOM NUMBERS
3238                                  ;***********************************************************
3239  014212  004767  000474            JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3240  014216  010067  164376            MOV     R0,TEST                 ;PUT IN TEST.
3241  014222  012767  177777  164366    MOV     #-1,REFF                ;PREDETERMINE RESULT IN REFF.
3242  014230  160067  164362            SUB     R0,REFF
3243  014234  005167  164360            COM     TEST                    ;DO THE COMPLEMENT.
3244  014240  026767  164354  164350    CMP     TEST,REFF               ;EXPECTED RESULT?
3245  014246  001401                    BEQ     .+4                     ;BR IF YES.
3246  014250  104006                    HLT                             ;ERROR!!. COMPLEMENT OF TEST DID NOT
3247                                                                    ;MATCH EXPFCTED RESULTS AS IN REFF.
3248  014252  104400                    SCOPE
3249
3250                                  ;***********************************************************
3251                                  .SBTTL  TEST COMB (EVEN BYTE) RANDOM NUMBERS.
3252                                  ;***********************************************************
3253  014254  004767  000432            JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3254  014260  010067  164334            MOV     R0,TEST                 ;PUT IN TEST.
3255  014264  012767  177777  164324    MOV     #-1,REFF                ;PREDETERMINE THE RESULT.
3256  014272  160067  164320            SUB     R0,REFF
3257  014276  105167  164316            COMB    TEST                    ;DO COMPLEMENT EVEN BYTE.
3258  014302  126767  164312  164306    CMPB    TEST,REFF               ;EXPECTED RESULT?
3259  014310  001401                    BEQ     .+4                     ;BR IF YES. OK.
3260  014312  104006                    HLT                             ;ERROR!!. RESULT IN TEST DOES NOT MATCH
3261                                                                    ;EXPECTED RESULT IN REFF.
3262  014314  104400                    SCOPE
3263
3264                                  ;***********************************************************
3265                                  .SBTTL  TEST COMB (ODD BYTE) RANDOM NUMBERS
3266                                  ;***********************************************************
3267  014316  004767  000370            JSR     PC,RNGEN                ;GET RANDOM NUMBER.
3268  014322  010067  164272            MOV     R0,TEST                 ;PUT IN TEST.
3269  014326  012767  177777  164262    MOV     #-1,REFF                ;PREDETERMINE RESULT.
3270  014334  160067  164256            SUB     R0,REFF
3271  014340  105167  164255            COMB    TEST+1                  ;DO ODD BYTE COMPLEMENT.
3272  014344  126767  164251  164245    CMPB    TEST+1,REFF+1           ;EXPECTED RESULT?
3273  014352  001401                    BEQ     .+4                     ;BR IF YES. OK.
3274  014354  104006                    HLT                             ;ERROR!! RESULT IN TEST DOES NOT MATCH
3275                                                                    ;EXPECTED RESULT IN REFF.
```

```
3276  014356  104400                          SCOPE
3277
3278                                  ;*****************************************************************
3279                                  .SBTTL  TEST COMPARE RANDOM VALUES EVEN BYTE WITH ODD
3280                                  ;*****************************************************************
3281  014360  004767  000326          JSR     PC,RNGEN        ;GET RANDOM NUMBER.
3282  014364  110067  000426          MOVB    R0,TEMP         ;PUT IN LOW BYTE OF TEMP.
3283  014370  110067  000423          MOVB    R0,TEMP+1       ;PUT IN HIGH BYTE.
3284  014374  126767  000416  000415  CMPB    TEMP,TEMP+1     ;DO THE COMPARE.
3285  014402  001401                  BEQ     .+4             ;BR IF EQUAL. OK.
3286  014404  104006                  HLT                     ;COMPARE FAILED.
3287  014406  002001                  BGE     .+4
3288  014410  104006                  HLT                     ;V IS NOT = TO N
3289  014412  003401                  BLE     .+4
3290  014414  104006                  HLT                     ;V IS SET
3291  014416  104400                  SCOPE
3292
3293                                  ;*****************************************************************
3294                                  .SBTTL  TEST SWAB
3295                                  ;*****************************************************************
3296  014420  012767  000200  164172  MOV     #0200,TEST
3297  014426  000367  164166          SWAB    TEST
3298  014432  100001                  BPL     .+4
3299  014434  104006                  HLT
3300  014436  001401                  BEQ     .+4
3301  014440  104006                  HLT
3302  014442  000367  164152          SWAB    TEST
3303  014446  100401                  BMI     .+4
3304  014450  104006                  HLT
3305  014452  001001                  BNE     .+4
3306  014454  104006                  HLT
3307  014456  104400                  SCOPE
3308
3309                                  ;*****************************************************************
3310                                  .SBTTL  TEST RANDOM COMBINATIONS OF SWAB
3311                                  ;*****************************************************************
3312  014460  004767  000226          JSR     PC,RNGEN        ;GET RANDOM NUMBER.
3313  014464  010067  164126          MOV     R0,REFF         ;PUT IN REF.
3314  014470  105067  164123          CLRB    REFF+1          ;
3315  014474  116767  164116  164117  MOVB    REFF,TEST+1     ;PUT IN TEST HIGH BYTE.
3316  014502  105067  164112          CLRB    TEST            ;AND CLEAR THE LOW BYTE OF TEST.
3317  014506  000367  164106          SWAB    TEST            ;NOW DO THE SWAB!
3318  014512  026767  164102  164076  CMP     TEST,REFF       ;REFF AND TEST MUST BE SAME.
3319  014520  001401                  BEQ     .+4             ;BR IF SAME. OK.
3320  014522  104006                  HLT                     ;ERROR!!. SWAB FAILURE.
3321  014524  104400                  SCOPE
3322
```

```
                                ;*****************************************************************
                                .SBTTL  END OF USER CODE IN BANK
                                ;*****************************************************************
                                ;CALL KERNEL/
                                ;ALTERRED IN CORE EXPANSION/
014526  104010                  DONE:   EOB                             ;THIS EMT CALL GOES TO EOBSRV
014530  000240                          NOP                     ;TO ALLOW CORE EXPANSION TO PATCH IN JMP

                                ;*****************************************************************
                                .SBTTL  GROUP OF NESTED SUBROUTINES/
                                ;*****************************************************************
014532  000207                  SUBR1:  RTS     %7              ;ONE INSTRUCTION
014534  000277                  SUBR2:  SCC                     ;ONE DEEP
014536  000207                          RTS     %7
014540  004767  177770          SUBR3:  JSR     %7,SUBR2        ;TWO DEEP
014544  000207                          RTS     %7
014546  004767  177766          SUBR4:  JSR     %7,SUBR3        ;THREE DEEP
014552  000207                          RTS     %7
014554  004767  177766          SUBR5:  JSR     %7,SUBR4        ;FOUR DEEP
014560  000207                          RTS     %7
014562  004767  177766          SUBR6:  JSR     %7,SUBR5        ;FIVE DEEP
014566  000207                          RTS     %7

                                ;*****************************************************************
                                .SBTTL  SCOPE AND/OR ITERATION LOOP FOR EACH TEST TIMES/
                                ;*****************************************************************
014570  005737  000042          SCOPEC: TST     @#42            ;IN AUTOMATIC MODE?
014574  001017                          BNE     2$              ;BR IF YES.
014576  032767  002000  163372          BIT     #2000,SREG2     ;INHIBIT PROCESSOR TESTS?
014604  001403                          BEQ     1$              ;NO
014606  022626                          CMP     (SP)+,(SP)+     ;CLEAN UP EMT CALL FROM STACK.
014610  000167  165552                  JMP     MAIN            ;YES
014614  032767  040000  163354  1$:     BIT     #40000,SREG2    ;TEST SR FOR SCOPE
014622  001015                          BNE     SCOPEB          ;YES, SCOPE
014624  032767  004000  163344          BIT     #4000,SREG2     ;NO-TEST FOR ITERATION
014632  001014                          BNE     SCOPEG          ;INHIBIT ITERATION
014634  005767  000046          2$:     TST     PASCNT          ;IN FIRST PASS?
014640  001411                          BEQ     SCOPEG          ;BR IF YES. NO ITERATIONS ON 1ST PASS.
014642  005267  000034                  INC     SCOPEF          ;INCREMENT COUNT.
014646  026767  000030  000022          CMP     SCOPEF,ICOUNT   ;COMPARE CURRENT COUNT TO MAX NUMBER
014654  103003                          BHIS    SCOPEG          ;EXIT-DONE
014656  016716  000022          SCOPEB: MOV     RETURN,@SP
014662  000002                          RTI
014664  005067  000012          SCOPEG: CLR     SCOPEF          ;CLEAR COUNT
014670  011667  000010                  MOV     @%6,RETURN      ;SAVE SCOPE RETURN POINTER
014674  000002                          RTI                     ;RETURN INLINE-NEXT TEST
014676  000000                  ICOUNT: 0                       ;ITERATION COUNT
014700  000024                  $ICNT:  20.                     ;STANDARD ITERATION COUNT.
014702  000000                  SCOPEF: 0                       ;COUNT LOCATION FOR ITERATION LOOP
014704  000000                  RETURN: 0                       ;ADDRESS OF LAST TEST
014706  000000                  PASCNT: 0                       ;HOLDS PASS COUNT.
014710  001750                  XDPCNT: 1000.                   ;PASS COUNT TO USE WHEN IN XRDP CHAIN MODE.

                                ;*****************************************************************
                                .SBTTL  ROUTINE RNGEN
```

```
3379                                    ;*****************************************************************
3380                                    ;RANDOM NUMBER GENERATOR
3381  014712  016700  000042            RNGEN:  MOV     RP1,R0
3382  014716  006100                            ROL     R0
3383  014720  006100                            ROL     R0
3384  014722  066700  000034                    ADD     RP2,R0
3385  014726  010067  000026                    MOV     R0,RP1
3386  014732  006100                            ROL     R0
3387  014734  006100                            ROL     R0
3388  014736  066700  000020                    ADD     RP2,R0
3389  014742  006100                            ROL     R0
3390  014744  006100                            ROL     R0
3391  014746  010067  000010                    MOV     R0,RP2
3392  014752  016700  000002                    MOV     RP1,R0
3393  014756  000207                            RTS     PC              ;RETURN.
3394  014760  001233                    RP1:    1233
3395  014762  007622                    RP2:    7622
3396
3397                                    ;*****************************************************************
3398                                    .SBTTL  FIXED VALUES FOR USE IN TEST/
3399                                    ;*****************************************************************
3400  014764  125252                    B:      125252
3401  014766  014764                            B                               ;ADDRESS OF B
3402  014770  052525                            052525
3403          014774                            .=B+10
3404  014774  177777                    A:      -1
3405  014776  015000                            A+4
3406          015000                            .=A+4
3407  015000  125252                            125252
3408  015002  015004                            A+10                            ;ADDRESS OF A+10
3409  015004  052525                            052525
3410
3411                                    ;FOR STORAGE
3412  015006  000000                    C:      0
3413  015010  015006                            C                               ;ADDRESS OF C
3414          015016                            .=C+10
3415  015016  000000                    TEMP:   0
3416  015020  015016                            TEMP                            ;ADDRESS OF TEMP
3417          015024                            .=TEMP+6
3418  015024  015026                            TEMP+10                         ;ADDRESS OF TEMP+10 OR "D"
3419  015026  000000                    D:      0
3420
```

```
                        ;*****************************************************************
                        .SBTTL  ROUTINE SUBROUTINE TO INITIALIZE ALL PAGES TO NR, BANK 0, 1 PAGE, UP/
                        ;*****************************************************************
015030  010146         NRALL:  MOV     R1,-(R6)        ;SAVE REGISTERS
015032  010246                 MOV     R2,-(R6)
015034  010346                 MOV     R3,-(R6)
015036  012701  000536         MOV     #IPDRTAB,R1     ;R1 HOLDS ADDRESS OF CURRENT POSITION
                                                        ;IN TABLE OF ADDRESSES
015042  012703  000010 NRLOOP: MOV     #8.,R3          ;R3 USED AS COUNTER
015046  012102                 MOV     (R1)+,R2        ;R2 CONTAINS ADDRESS OF PDR OR
                                                        ;PAR TO BE CLEARED
015050  005022                 CLR     (R2)+           ;CLEAR ALL ASR'S FOR THIS MODE
015052  077302                 SOB     R3,.-2
015054  020127  000544         CMP     R1,#IPDREND     ;CHECK FOR DONE
015060  003770                 BLE     NRLOOP          ;CLEAR ALL IN NEXT MODE IF NOT DONE
015062  012603                 MOV     (R6)+,R3
015064  012602                 MOV     (R6)+,R2
015066  012601                 MOV     (R6)+,R1
015070  000207                 RTS     %7
                        ;*****************************************************************
                        .SBTTL  EMT HANDLER/
                        ;*****************************************************************
                        ;FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES/
015072  162716  000002 EMTSRV: SUB     #2,@SP                  ;GET CALL
015076  006576  000000         MFPI    @(SP)
015102  012667  000022         MOV     (SP)+,EPC
015106  062716  000002         ADD     #2,@SP
015112  105067  000013         CLRB    EPC+1                   ;SAVE OFFSET ONLY
015116  062767  015132  000004 ADD     #EMTAB,EPC              ;POINT TO TABLE OF ADDRESSES
015124  017707  000000         MOV     @EPC,PC                 ;JUMP TO DESIRED ROUTINE
015130  000000         EPC:    0
        000000                 PATCH1=0
        000000                 PATCH2=0
        000000                 PATCH3=0
015132  000000         EMTAB:  PATCH1                          ;PATCH IN ADDRESS OF ROUTINE
015134  000000                 PATCH2
015136  000000                 PATCH3
015140  015664                 PRINT                           ;ERROR PRINTOUT
015142  015144                 EOBSRV                          ;END OF BANK
                        ;*****************************************************************
                        .SBTTL  ROUTINE END OF BANK SERVICE
                        ;*****************************************************************
015144  032767  000007  163022 EOBSRV: BIT     #7,MMOPT        ;MEM. MGMT./USER-KERNEL/4KAS 32 INHIBITED?
015152  001406                 BEQ     EOB2            ;NO - CONTINUE
015154  012716  015564 EOB1C:  MOV     #LOGIC,(SP)     ;GO TO BEGIN
015160  012766  000340  000002 MOV     #340,2(SP)      ;WILL ASSUME PRIORITY 7.
015166  000002                 RTI
015170  042737  000340  177776 EOB2:   BIC     #340,@#PSR
015176  026767  163372  163310 CMP     CURPAR,UPAR7    ;LAST USER ASR DONE?
015204  001444                 BEQ     NXTBNK          ;YES - GO FIND NEXT BANK
015206  062737  020000  000034 ADD     #20000,@#34     ;UPDATE SCOPE VECTOR ADDRESS IN BANK 0
015214  062767  020000  163356 ADD     #20000,BNKSTR   ;UPDATE BANK START TO REFERENCE CURRENT ASM
```

```
 3477  015222  016716  163352                    MOV     BNKSTR,(SP)
 3478  015226  026767  163256  163340            CMP     UPAR0,CURPAR
 3479  015234  001404                            BEQ     NXTSEG
 3480  015236  005077  163332                    CLR     @CURPAR         ;SET PPEVIOUS ASR TO NR, BANK 0
 3481  015242  005077  163330                    CLR     @CURPDR
 3482  015246  062767  000002  163320  NXTSEG:   ADD     #2,CURPAR       ;UPDATE POINTERS TO NEXT SEGMENT
 3483  015254  062767  000002  163314            ADD     #2,CURPDR
 3484  015262  012777  077406  163306            MOV     #77406,@CURPDR  ;SET NEXT SEGMENT RW, 4K
 3485  015270  016777  163274  163276            MOV     CURBNK,@CURPAR  ;MAP NEXT SEGMENT TO CURRENT BANK
 3486  015276  052737  030000  177776            BIS     #30000,@#PSR    ;SET PREVIOUS MODE TO USER
 3487  015304  006506                            MFPI    R6              ;PICK UP USER STACK POINTER
 3488  015306  062716  020000                    ADD     #20000,@R6      ;MAP IT TO NEXT ASR
 3489  015312  006606                            MTPI    R6              ;PUT IT BACK
 3490  015314  000002                            RTI                     ;GO BACK TO MAINLINE
 3491  015316  012746  000400          NXTBNK:   MOV     #UBUFF,-(SP)
 3492  015322  052737  030000  177776            BIS     #30000,@#PSR
 3493  015330  006606                            MTPI    R6
 3494  015332  013737  000570  000572            MOV     @#CURBNK,@#OLDBNK       ;SAVE PREV BANK ADDRESS
 3495  015340  062767  000200  163222  BNKTST:   ADD     #200,CURBNK
 3496  015346  006367  163236                    ASL     COREPT
 3497  015352  103006                            BCC     1$
 3498  015354  012767  000001  163226            MOV     #1,COREPT
 3499  015362  012767  000606  163222            MOV     #MEM1,MEMUT
 3500  015370  022767  007600  163172  1$:       CMP     #7600,CURBNK    ;CHECK FOR EXTERNAL BANK
 3501  015376  001666                            BEQ     EOB1C           ;BR IF YES TO START ANOTHER PASS.
 3502  015400  016777  163164  163124  EOB3:     MOV     CURBNK,@KPAR2   ;MAP KERNEL SEGMENT 2 TO BANK BEING LOOKED FOR
 3503  015406  012777  077406  163106            MOV     #77406,@KPDR2
 3504  015414  036777  163170  163170            BIT     COREPT,@MEMUT
 3505  015422  001746                            BEQ     BNKTST
 3506  015424  042737  160000  000034            BIC     #160000,@#34    ;INITIALIZE SCOPE VE'TOR ADDRESS
 3507  015432  005001                            CLR     R1              ;R1 ADDRESSES BANK 0 THRU KERNEL ASR0
 3508  015434  012702  040000                    MOV     #40000,R2       ;R2 ADDRESSES NEW BANK THRU KERNEL ASR2
 3509  015440  012703  015026                    MOV     #D,R3
 3510  015444  006203                            ASR     R3
 3511  015446  012122                  CORMOV:   MOV     (R1)+,(R2)+
 3512  015450  077302                            SOB     R3,CORMOV
 3513  015452  016767  163032  163114            MOV     UPAR0,CURPAR    ;FIRST ASR CHECKED IS USER ASR0
 3514  015460  016767  163016  163110            MOV     UPDR0,CURPDR
 3515  015466  016777  163076  163100            MOV     CURBNK,@CURPAR
 3516  015474  012777  077406  163074            MOV     #77406,@CURPDR
 3517  015502  005077  163006                    CLR     @UPAR7
 3518  015506  005077  162774                    CLR     @UPDR7
 3519  015512  026727  163054  000000            CMP     OLDBNK,#0               ;PREV BANK   0
 3520  015520  001414                            BEQ     EOB6            ;YES, DO NOT CLEAR
 3521  015522  016777  163044  163002            MOV     OLDBNK,@KPAR2
 3522  015530  012777  077406  162764            MOV     #77406,@KPDR2
 3523  015536  012701  040000                    MOV     #40000,R1
 3524  015542  012703  007630                    MOV     #7630,R3
 3525  015546  005021                  BNKLP:    CLR     (R1)+
 3526  015550  077302                            SOB     R3,BNKLP
 3527  015552  012716  005542          EOB6:     MOV     #BEGIN,(SP)
 3528  015556  011667  163016                    MOV     (SP),BNKSTR
 3529  015562  000002                            RTI
 3530
 3531                                  ;*****************************************************************************
 3532                                  .SBTTL  END OF PASS CODE STARTS HERE
```

```
3533                                    ;*****************************************************************
3534  015564  042777  000001  162706  LOGIC:  BIC     #1,@SR0         ;TURN OFF MEMORY MANAGEMENT.
3535  015572  012737  000016  000014          MOV     #16,@#14        ;RESET THE TRACE VECTOR.
3536  015600  005037  000016                  CLR     @#16
3537  015604  032737  000001  000176          BIT     #1,@#SREG2      ;TTY OUT SELECTED
3538  015612  001404                          BEQ     1$              ;YES, NO ASTERISK
3539  015614  004767  000444                  JSR     PC,BELL         ;RING BELL TOO.
3540  015620  004767  000414                  JSR     PC,STAR         ;TYPE ASTERISK.
3541  015624  005267  177056          1$:     INC     PASCNT          ;INCREMENT PASS COUNT.
3542
3543                                    ;*************************START OF "ACT11/XXDP EOP HOOKS"*****************
3544  015630  013701  000042                  MOV     @#42,R1
3545  015634  001405                          BEQ     HERE
3546  015636  000005                          RESET
3547  015640  004711                  $ENDAD: JSR     %7,@R1
3548  015642  000240                          NOP
3549  015644  000240                          NOP
3550  015646  000240                          NOP
3551                                    ;*************************END OF "ACT11/XXDP EOP HOOKS"*******************
3552  015650  000005                  HERE:   RESET                   ;ISSUE RESET TO HALT I/O.
3553  015652  005167  162724                  COM     TRPB            ;COMPLEMENT THE TRACE SWITCH.
3554  015656  000137  000634                  JMP     @#RSTRT         ;RESTART.
3555
```

```
                                        ;*****************************************************************
                                        .SBTTL  RTT EXECUTED WHEN TRACE IS ON/
                                        ;*****************************************************************
015662  000005                          TRTRP:  RTT


                                        ;*****************************************************************
                                        .SBTTL  ROUTINE PRINT
                                        ;*****************************************************************
                                        ;ENTERED WITH SYSTEM TRAP CALL (HLT)
                                        ;PRINT OUT THE ERROR PC+2, STATUS REGISTER, AND LOCATION IN BACKGROUND
015664  005767  000170                  PRINT:  TST     PRTON           ;CHECK PRINT ON FLAG
015670  001401                                  BEQ     .+4
015672  000002                                  RTI                     ;IF ANOTHER HALT IS BEING PRINTED, SKIP THIS ONE
015674  005267  000160                          INC     PRTON
015700  012767  000340  162070                  MOV     #340,PSR        ;SET PRIORITY TO 7
                                        ;*****************************************************************
015706  037727  162634  020000          CHGC6:  BIT     @SR,#20000      ;TEST FOR INHIBIT PRINT OUT
                                        ;*****************************************************************
015714  001044                                  BNE     CK              ;BR TO INHIBIT PRINT.
015716  012667  000132                          MOV     (6)+,SAVPC      ;PC OF FAILING ROUTINE
015722  012667  000130                          MOV     (6)+,SAVPSR     ;PSR OF ERROR CONDITION
015726  024646                                  CMP     -(6),-(6)       ;RESTORE STACK
015730  012767  000200  162040                  MOV     #200,PSR
015736  004767  000342                          JSR     %7,CRLF         ;OUTPUT CARRIAGE RETURN AND LINE FEED
015742  016767  000106  000264                  MOV     SAVPC,PTEMP1    ;LOAD WITH FAILING PC+2
015750  004767  000106                          JSR     %7,PROCT        ;PRINT FAILING PC+2
015754  004767  000272                          JSR     %7,SPACE
015760  016767  000072  000246                  MOV     SAVPSR,PTEMP1   ;LOAD PROCESSOR STATUS
015766  004767  000070                          JSR     %7,PROCT        ;PRINT PROCESSOR STATUS
015772  004767  000254                          JSR     %7,SPACE
015776  016767  162566  000230                  MOV     CURBNK,PTEMP1
016004  004767  000052                          JSR     %7,PROCT
016010  004767  000236                          JSR     %7,SPACE
016014  016767  176664  000212                  MOV     RETURN,PTEMP1
016022  004767  000034                          JSR     %7,PROCT
016026  023727  000042  015640          CK:     CMP     @#42,#$ENDAD    ;IN ACT11?
016034  001403                                  BEQ     AB              ;BR IF YES TO HALT
                                        ;*****************************************************************
016036  005777  162504                  CHGC7:  TST     @SR             ;CHECK SR FOR HALT SWITCH
                                        ;*****************************************************************
016042  100001                                  BPL     .+4             ;BRANCH IF NOT SET
016044  000000                          AB:     HALT                    ;HALT ON ERROR UP
016046  005067  000006                          CLR     PRTON           ;ROUTINE DONE - CLEAR FLAG
016052  000002                                  RTI                     ;RETURN TO MAIN LINE
016054  000000                          SAVPC:  0
016056  000000                          SAVPSR: 0
016060  000000                          PRTON:  0


                                        ;*****************************************************************
                                        .SBTTL  ROUTINE PROCT
                                        ;*****************************************************************
                                        ;SUBROUTINE TO PRINT OUT OCTAL NUMBER/
016062  012727  000006  016066          PROCT:  MOV     #6,#PTEMP3      ;CLEAR R4 FOR COUNTING CHARACTERS OUTPU
        016066                                  PTEMP3=.-2
```

```
3612  016070  005067  000136                CLR     PRFLG           ;INITIALIZE CARRY FLAG FOR ROTATES
3613  016074  012767  000060  000134        MOV     #60,PTEMP2      ;SETUP R3
3614  016102  005767  000126                TST     PTEMP1          ;CHECK BIT 15 OF NUMBER
3615  016106  100002                        BPL     .+6             ;BRANCH IF ZERO
3616  016110  005267  000122                INC     PTEMP2          ;INCREMENT R3 IF ONE
3617  016114  006167  000114                ROL     PTEMP1          ;ROTATE LEFT MOST OCTAL TO RIGHT END
3618  016120  006167  000110                ROL     PTEMP1
3619  016124  005567  000102                ADC     PRFLG           ;STORE CARRY
3620  016130  016746  000102        P.WAIT: MOV     PTEMP2,-(SP)    ;OUTPUT THE CHARACTER
3621  016134  004767  000210                JSR     PC,CHROUT       ;DO IT.
3622  016140  005367  177722                DEC     PTEMP3          ;COUNT
3623  016144  001001                        BNE     P.CNT1          ;BRANCH IF NOT DONE
3624  016146  000207                        RTS     %7              ;BRANCH IF NOT DONE
3625  016150  000241        P.CNT1: CLC                             ;CLEAR CARRY
3626  016152  005767  000054                TST     PRFLG           ;CHECK FOR PREVIOUS CARRY
3627  016156  001403                        BEQ     .+10            ;BRANCH IF PREVIOUSLY ZERO
3628  016160  005067  000046                CLR     PRFLG           ;INITIALIZE FLAG
3629  016164  000261                        SEC                     ;SET CARRY
3630  016166  006167  000042                ROL     PTEMP1          ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
3631  016172  006167  000036                ROL     PTEMP1
3632  016176  006167  000032                ROL     PTEMP1
3633  016202  005567  000024                ADC     PRFLG           ;STORE CARRY
3634  016206  016767  000022  000022        MOV     PTEMP1,PTEMP2   ;LOAD DATA INTO R3
3635  016214  042767  177770  000014        BIC     #177770,PTEMP2  ;CLEAR ALL BUT LOWEST OCTAL DIGIT
3636  016222  052767  000060  000006        BIS     #60,PTEMP2      ;SET TO ASCII EQUIVALENT
3637  016230  000737                        BR      P.WAIT          ;LOOP
3638  016232  000000                PRFLG:  0
3639  016234  000000                PTEMP1: 0                       ;CONTAINS VALUE TO BE OUTPUT
3640  016236  000000                PTEMP2: 0                       ;SCRATCH
3641
3642
3643                                        ;*****************************************************************
3644                                        .SBTTL  ROUTINE STAR
3645                                        ;*****************************************************************
3646                                        ;SUBROUTINE TO OUTPUT ASTERISK.
3647  016240  004767  000040        STAR:   JSR     PC,CRLF         ;OUTPUT CRLF.
3648  016244  012746  000052                MOV     #52,-(SP)       ;GO OUTPUT A *
3649  016250  000407                        BR      BELL1
3650
3651
3652                                        ;*****************************************************************
3653                                        .SBTTL  ROUTINE SPACE
3654                                        ;*****************************************************************
3655                                        ;SUBROUTINE TO ISSUE SPACE/
3656  016252  012746  000040        SPACE:  MOV     #40,-(SP)       ;OUTPUT SPACE.
3657  016256  004767  000066                JSR     PC,CHROUT       ;DO IT.
3658  016262  000207                        RTS     %7              ;RETURN
3659
3660
3661                                        ;*****************************************************************
3662                                        .SBTTL  ROUTINE BELL
3663                                        ;*****************************************************************
3664                                        ;BELL ON PASS COMPLETE
3665  016264  012746  000007        BELL:   MOV     #7,-(SP)        ;OUTPUT BELL.
3666  016270  004767  000054        BELL1:  JSR     PC,CHROUT       ;DO IT.
3667  016274  005327  000000                DEC     #0              ;SLIGHT DELAY.
```

```
3668  016300  001375                    BNE     .-4
3669  016302  000207            BELL2:  RTS     %7
3670
3671
3672                            ;******************************************************************
3673                            .SBTTL  ROUTINE CRLF
3674                            ;******************************************************************
3675                            ;SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED/
3676  016304  012746  000015    CRLF:   MOV     #15,-(SP)       ;OUTPUT CR.
3677  016310  004767  000034            JSR     PC,CHROUT       ;DO IT.
3678  016314  012746  000012            MOV     #12,-(SP)       ;OUTPUT LF.
3679  016320  004767  000024            JSR     PC,CHROUT       ;DO IT.
3680  016324  016746  162272            MOV     FILLCT,-(SP)    ;GET THE FILL COUNT.
3681  016330  001405                    BEQ     2$              ;BR IF 0.
3682  016332  005046            1$:     CLR     -(SP)           ;WILL OUTPUT NULLS FOR FILLERS.
3683  016334  004767  000010            JSR     PC,CHROUT       ;DO IT.
3684  016340  005316                    DEC     (SP)            ;DONE?
3685  016342  001373                    BNE     1$              ;BR IF NOT.
3686  016344  005726            2$:     TST     (SP)+           ;CLEAN UP STACK.
3687  016346  000207                    RTS     PC              ;RETURN.
3688
3689
3690                            ;******************************************************************
3691                            .SBTTL  ROUTINE CHROUT
3692                            ;******************************************************************
3693                            ;SUBROUTINE TO OUTPUT CHARACTER TO CONSOLE TTY.
3694  016350  016677  000002  162034  CHROUT: MOV     2(SP),@TDBR     ;LOAD THE CONSOLE BUFFER REG.
3695  016356  105777  162026            1$:     TSTB    @TCSR           ;READY?
3696  016362  100375                    BPL     1$              ;BR IF NOT. WAIT.
3697  016364  012616                    MOV     (SP)+,(SP)      ;SET UP  FOR EXIT.
3698  016366  000207                    RTS     PC              ;RETURN.
3699
3700                            ;ENTER HERE ON POWER FAIL/
3701  016370  013746  000024    PFAIL:  MOV     @#24,-(6)
3702  016374  010667  000010            MOV     %6,SAVR6                ;STORE STACK POSITION
3703  016400  012737  016412  000024    MOV     #RESTRT,@#24
3704  016406  000000                    HALT                            ;HALT ON POWER DOWN NORMAL
3705  016410  000000            SAVR6:  0                               ;STACK IS SAVED HERE
3706  016412  016706  177772    RESTRT: MOV     SAVR6,%6                ;RESTORE STACK WHEN POWERING UP
3707  016416  012637  000024            MOV     (6)+,@#24
3708  016422  022626                    CMP     (SP)+,(SP)+             ;RESTORE STACK
3709  016424  104006                    HLT                             ;POWER FAIL OCCURRED
3710  016426  000167  162202            JMP     RSTRT
3711                                                                    ;RETURN TO MAIN LINE
3712
3713  016432  000207            USER:   RTS     %7                      ;OVERLAY USER ROUTINE HERE IF 4KW
3714                                                                    ;USE BANK1 IF 8KW
3715          017760                    .=17760
3716  017760  000000            KSTACK: 0
3717          000001                    .END
```

```
A       014774  1967  1973  1979  1985  1992  1999  2009  2027  2050  2272  2374  2417  2481
                2487  2494  2504  2521  2533  2539  2545  2551  2557  2563  2570  2575  2582
                2589  2598  2605  2630  2638  2866  2925  2932  2942  2985  3404#  3405  3406
                3408
AB      016044  3593  3598#
ACTSW1  000624   909#   948
ACTSW2  000626   910#   949
ADSUB   014150  3224  3226#
ARIEND  014210  3225  3234#
B       014764  2043  2171  2176  2181  2189  2196  2201  2202  2211  2225  2235  2242  2248
                2258  2319  2324  2329  2337  2344  2349  2350  2359  2373  2380  2387  2393
                2403  2748  2753  2761  2768  2816  2821  2829  2836  2841  2842  2851  2865
                2956  2957  2962  2963  2968  2969  3400#  3401  3403
BEGIN   005542   992  1123  1146  1375  1946#  3527
BEGINX  005510  1225  1227  1229  1231  1233  1235  1935#
BELL    016264  3539  3665#
BELL1   016270  3649  3666#
BELL2   016302  3669#
BNKLP   015546  3525#  3526
BNKSTR  000600   891#  1123•  3476•  3477  3528•
BNKTST  015340  3495#  3505
C       015006  2017  2050•  2061•  2069•  2093•  2109•  2127•  2145•  2201•  2202  2224•  2225•  2226
                2349•  2350  2372•  2373•  2374  2511•  2513  2518•  2522  2613  2689•  2705•  2721•
                2739•  2841•  2842  2864•  2865•  2866  2949•  2951  2974  2975•  2977  2982•  2986
                3412#  3413  3414
CHGC1   001440   626  1014#
CHGC2   001526   627  1030#
CHGC3   001572   628  1043#
CHGC4   001670   629  1061#
CHGC5   001730   630  1073#
CHGC6   015706   631  3573#
CHGC7   016036   632  3595#
CHROUT  016350  3621  3657  3666  3677  3679  3683  3694#
CK      016026  3575  3592#
CLINCT= 003340  1078•  1301  1504#  1311•
CMP1    013546  3120#
COREPT  000610   899#   964•   976   979•   981•   985•  1119•  3496•  3498•  3504
CORMOV  015446  3511#  3512
CRLF    016304  3580  3647  3676#
CURBNK  000570   887#  1118•  1942•  3485  3494  3495•  3500  3502  3515  3587
CURPAR  000574   889#  1121•  3473  3478  3480•  3482•  3485•  3513•  3515•
CURPAT- 003250  1079•  1286#  1288  1305  1307•  1309•
CURPDR  000576   890#  1122•  3481•  3483•  3484•  3514•  3516•
D       015026  1191  2077•  2085•  2101•  2118•  2136•  2665•  2673•  2681•  2697•  2713•  2730•  3419#
                3509
DATA2 = 003056  1001•  1244#  1245  1251•  1252
DET1    002424  1089  1160#
DET2    002542  1168  1184#
DET3    003040  1196  1236#
DET4    002456  1166  1168#
DO    = 000001  1066  1405#  1461  1469  1514
DONE    014526  1160•  1224•  1225•  1226•  1227•  1228•  1229•  1230•  1231•  1232•  1233•  1234•  1235•
                3328#
EIGHT   002474  1171#  1186
EMTAB   015132  3451  3457#
EMTSRV  015072   794   990  3446#
```

```
EOB    = 104010          643#   1160   3328
EOBSRV  015144          3461   3467#
EOB1C   015154          3469#  3501
EOB2    015170          3468   3472#
EOB3    015400          3502#
EOB6    015552          3520   3527#
EPC     015130          3448*  3450*  3451*  3452   3453#
ERROK   003626          1356   1364#
ERRSET  003622          1358   1362#
FENDZ   003702          1064   1413#  1452
FEND1   003724          1415   1418#
FILLCT  000622           908#  3680
HERE    015650          3545   3552#
HLT    - 104006          642#  1250   1265   1300   1333   1353   1359   1362   1356   1425   1427   1431   1440
                        1442   1448   1473   1480   1482   1486   1497   1499   1505   1519   1535   1969   1975
                        1981   1987   1994   2001   2012   2019   2030   2038   2045   2052   2064   2072   2080
                        2088   2096   2104   2112   2121   2130   2139   2148   2157   2164   2173   2178   2183
                        2192   2198   2204   2214   2221   2228   2238   2244   2251   2261   2268   2275   2285
                        2292   2299   2306   2313   2321   2326   2331   2340   2346   2352   2362   2369   2376
                        2383   2389   2396   2406   2413   2420   2430   2437   2444   2451   2458   2466   2474
                        2483   2489   2496   2507   2515   2524   2535   2541   2547   2553   2559   2565   2572
                        2577   2584   2591   2601   2608   2615   2622   2633   2641   2649   2657   2668   2676
                        2684   2692   2700   2708   2716   2724   2733   2742   2750   2755   2764   2770   2780
                        2787   2794   2801   2809   2818   2823   2832   2838   2844   2854   2861   2868   2878
                        2885   2892   2899   2907   2910   2918   2927   2934   2945   2953   2959   2965   2971
                        2979   2988   3003   3011   3021   3023   3025   3027   3038   3040   3043   3050   3052
                        3055   3062   3064   3067   3074   3076   3079   3086   3088   3091   3098   3100   3103
                        3112   3122   3140   3144   3147   3150   3153   3176   3180   3183   3186   3189   3200
                        3204   3207   3210   3213   3231   3246   3260   3274   3286   3288   3290   3299   3301
                        3304   3306   3320   3709
ICOUNT  014676          1956*  1961*  3362   3369#
IE     = 000500          1066   1404#  1461   1469   1475   1514   1521
IPDREN  000544           877#  3435
IPDRTA  000536           874#  3428
IRF     003562          1046   1351#
IRK     003466          1017   1331#
KPAR0   000526           869#  1098
KPAR1   000530           870#
KPAR2   000532           871#   970*  3502*  3521*
KPAR7   000534           872#   959*  1094*
KPDR0   000516           865#   958*  1105*
KPDR1   000520           866#
KPDR2   000522           867#   966*  3503*  3522*
KPDR7   000524           868#   960*  1093*
KSTACK  017760           917    928   3716#
KWLST   000424           836#  1034*
KWLVC   000422           835#  1033*
LKCSR   000426           837#  1032   1036*  1260*  1263   1266*  1270*  1274   1276*
LK1     003124          1259#  1273
LK2     003144          1262#  1269
LK3     003146          1033   1263#
LK4     003164          1267#  1277
LLIMIT  003670          1021   1051   1327   1347   1375#
LOGIC   015564          3469   3534#
LPCSR   000430           838#  1075   1083*  1289   1292   1296   1298*  1313
LPDBR   000436           839#  1080*  1288*  1312*
```

```
LPINTR  003270          1081    1292#
LPST    000436           841#   1082*
LPVC    000434           840#   1081*
LP1     003244          1285#   1318    1320
LP2     003252          1288#   1308    1310
LP3     003360          1306    1309#
LP4     003370          1302    1311#
LP5     003426          1316    1319#
LP6     003326          1290    1293    1301#
LP7     003324          1295    1297    1300#
MAIN    002366          1136    1143#   1145    3354
MAP1    001162           970#    984
MAP2    001252           980     983#
MEMUT   000612           900#    965*    976*    982*    986*    1120*   3499*   3504
MEM0    000604           897#    900     962*    965     986     1120
MEM1    000606           898#    963*    982     3499
MMGPT   000174           808#    948*    951*    1090    1095    1106    1135    1161    1165    3467
MODE    002260          1091    1125#
MOD12   002774          1204    1230#
MOD16   002760          1206    1228#
MOD20   002744          1208    1226#
MOD24   002730          1210    1224#
MOD4    003024          1200    1234#
MOD8    003010          1202    1232#
MOVE    002554          1189#   1212    1214    1216    1218    1220    1222
MOVEPT  001222           975     978#
N     = 000001          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    1787#   1788    1789    1790#   1791    1792
                        1793#   1794    1795    1796#   1797    1798    1799#   1800    1801    1802#   1803    1804    1805#
                        1806    1807    1808#   1809    1810    1811#   1812    1813    1814#   1815    1816    1817#   1818
                        1819    1820#   1821    1822    1823#   1824    1825    1826#   1827    1828    1829#   1830    1831
                        1832#   1833    1834    1835#   1836    1837    1838#   1839    1840    1841#   1842    1843    1844#
                        1845    1846    1847#   1848    1849    1850#   1851    1852    1853#   1854    1855    1856#   1857
                        1858    1859#   1860    1861    1862#   1863    1864    1865#   1866    1867    1868#   1869    1870
                        1871#   1872    1873    1874#   1875    1876    1877#   1878    1879    1880#   1881    1882    1883#
                        1884    1885    1886#   1887    1888    1889#   1890    1891    1892#   1893    1894    1895#   1896
                        1897    1898#   1899    1900    1901#   1902    1903    1904#   1905    1906    1907#   1908    1909
                        1910#   1911    1912    1913#   1914    1915    1916#   1917    1918    1919#   1920    1921    1922#
                        1923    1924    1925#   1926    1927    1928#   1929    1930
```

```
NODEV   002404            996   1151#
NOP   = 000240            637#
NRALL   015030            957   1092   3425#
NRLOOP  015042           3430#  3436
NUMA    014206           3221*  3227   3228   3233#
NXTBNK  015316           3474   3491#
NXTSEG  015246           3479   3482#
OLDBNK  000572            888#  3494*  3519   3521
PASCNT  014706            932*  3359   3373#  3541*
PATCH1= 000000           3454#  3457
PATCH2= 000000           3455#  3458
PATCH3= 000000           3456#  3459
PFAIL   016370            791    918   3701#
PRFLG   016232           3612*  3619*  3626   3628*  3633*  3638#
PRINT   015664           3460   3567#
PROCT   016062           3582   3585   3588   3591   3610#
PRTON   016060            994*  3567   3570*  3599*  3603#
PSR   = 177776            641#   993*  1139*  1141*  1261*  1271*  3472*  3486*  3492*  3571*  3579*
PTEMP1  016234           3581*  3584*  3587*  3590*  3614   3617*  3618*  3630*  3631*  3632*  3634   3639#
PTEMP2  016236           3613*  3616*  3620   3634*  3635*  3636*  3640#
PTEMP3= 016066           3610*  3611#  3622*
P.CNT1  016150           3623   3625#
P.WAIT  016130           3620#  3637
R     = 004000           1066   1406#  1461
RB    = 000002           1066   1403#  1461   1475   1521
RD    = 000004           1401#  1514
REF   = 000616           3156#
REFF    000616            902#  3129*  3130   3151   3156   3162*  3166   3187   3211   3223*  3226   3229   3241*
                         3242*  3244   3255*  3256*  3258   3269*  3270*  3272   3313*  3314*  3315   3318
RENDZ   004100           1444   1455#  1487
REND1   004130           1458   1461#
RESTRT  016412           3703   3706#
RETURN  014704            992*  1954*  1955*  3364   3367*  3372#  3590
RFCAR   000446            845#  1051*  1347*
RFCSR   000450            846#  1045   1052*  1349*  1351   1355   1357
RFCSRH  000452            847#  1049*  1346*
RFDAF   000440            842#  1368
RFDAR   000442            843#  1370
RFFUNC  003666           1048*  1052   1349   1360*  1372*  1374#
RFST    000456            849#  1047*
RFSTAR  003532           1346#  1354   1361   1363   1367   1373
RFVC    000454            848#  1046*
RFWC    000444            844#  1050*  1348*  1364
RF1     003536           1347#  1369   1371
RKBAR   000466            853#  1021*  1327*
RKCSR   000470            854#  1016   1023*  1329*  1331
RKCSRH  000472            855#
RKDAE   000462            851#  1020*  1326*  1335
RKDAH   000460            850#  1337
RKFUNC  003530           1019*  1023   1329   1339*  1341#
RKST    000476            857#  1018*
RKSTAR  003436           1326#  1334   1340
RKVC    000474            856#  1017*
RKWC    000464            852#  1022*  1328*
RK1     003442           1327#  1336   1338
RNGEN   014712           3118   3128   3161   3222   3239   3253   3267   3281   3312   3381#
```

```
ROTALL  013566  3130#
ROTBE   013716  3163  3166#
ROTBO   014024  3164  3191#
ROTEN1  014124  3165  3215#
RP1     014760  1948  1951*  3381  3385*  3392  3394#
RP2     014762  1949  1952*  3384  3388  3391*  3395#
RSTRT   000634   821   917#  3554  3710
SAVPC   016054  3576*  3581  3601#
SAVPSR  016056  3577*  3584  3602#
SAVR6   016410  3702*  3705#  3706
SCOPE   104400   638#  1970  1976  1982  1988  1995  2002  2013  2020  2031  2039  2046  2053
                2065  2073  2081  2089  2097  2105  2113  2122  2131  2140  2149  2159  2166
                2174  2179  2184  2193  2199  2205  2215  2222  2229  2239  2245  2252  2262
                2269  2276  2286  2293  2300  2307  2314  2322  2327  2332  2341  2347  2353
                2363  2370  2377  2384  2390  2397  2407  2414  2421  2431  2438  2445  2452
                2459  2467  2475  2484  2490  2497  2508  2516  2525  2536  2542  2548  2554
                2560  2566  2573  2578  2585  2592  2602  2609  2616  2623  2634  2642  2650
                2658  2669  2677  2685  2693  2701  2709  2717  2725  2734  2743  2751  2756
                2765  2771  2781  2788  2795  2802  2810  2819  2824  2833  2839  2845  2855
                2862  2869  2879  2886  2893  2900  2911  2919  2928  2935  2946  2954  2960
                2966  2972  2980  2989  3005  3013  3028  3033  3044  3056  3068  3080  3092
                3104  3113  3123  3154  3215  3234  3248  3262  3276  3291  3307  3321
SCOPEB  014656  3356  3364#
SCOPEC  014570   797   988  3349#
SCOPEF  014702  1953*  3361*  3362  3366*  3371#
SCOPEG  014664  3358  3360  3363  3366#
SEGM1   002126  1096  1105#
SETEX   002106  1100#  1104
SETSEG  002252  1116  1124#
SETUSE  002156  1111#  1115
SOLPAT= 003246  1077*  1287#  1315  1317*  1319*
SPACE   016252  3583  3586  3589  3656#
SR      000546   878#  936  938*  940  955  3573  3595
SREG2 = 000176   810#  921*  949*  952*  955*  1002  1012  1028  1041  1059  1071  1144  1151*
                3351  3355  3357  3537
SRH     000550   879#  921  940*  941*
SR0     000500   858#  969*  987*  1124*  3534*
STAR    016240  3540  3647#
START   000664   817  819  928#  930
STARTX  001044   945  954#
START1  001052   950  953  956#
START2  001052   920  922  957#
STRT28  002640  1183  1209#
STRT4   002574  1186  1196#
ST3     001416  1003  1009#
ST4     001516  1011  1014  1027#
ST5     001562  1030  1040#
ST6     001650  1043  1056#
ST7     001720  1058  1061  1070#
ST8     002016  1073  1076  1087#
SUBR1   014532  3334#
SUBR2   014534  3335#  3337
SUBR3   014540  3337#  3339
SUBR4   014546  3339#  3341
SUBR5   014554  3341#  3343
SUBR6   014562  3019  3343#
```

```
SWREG   000176          809#    810     938
TBANK   000614          901#    961*    970     978*    983
TCBA    000562          884#   1468*   1513*
TCCM    000552          880#   1066*   1416*   1419*   1421*   1423    1434*   1438    1450*   1459*   1461*   1469*   1471
                       1475*   1478    1488*   1491*   1495    1507*   1514*   1517    1521*
TCDT    000556          882#   1428    1443    1446    1483    1500    1503
TCEXPE  003700         1410#   1420*   1428    1445*   1446    1456*   1483    1502*   1503
TCFIRS  003674         1408#   1420    1500
TCF1    003754         1418    1423#
TCF1A   003746         1421#   1429
TCF2    004006         1430    1433#
TCF3    004022         1433    1438#   1474
TCF4    004070         1450#   1476
TCIV    000564          885#   1064*   1413*   1418*   1433*   1455*   1462*   1466*   1474*   1490*   1511*   1520*
TCLAST  003676         1409#   1443    1456
TCRBK   004360         1506    1511#
TCRBUF  004510         1513    1530    1531    1545#
TCRB1   004416         1511    1517#
TCR1    004226         1462    1478#
TCR1A   004262         1485    1488#
TCR2    004270         1484    1490#
TCR3    004304         1490    1495#   1520
TCR4    004352         1507#   1522
TCSR  = 000410          639#   3695
TCST    000554          881#   1063    1414    1457
TCSTA   000566          886#   1065*
TCWBK   004146         1449    1466#
TCWBUF  004510         1468    1544#
TCWB1   004200         1466    1471#
TCWC    000560          883#   1467*   1512*
TC1     004444         1515    1526#
TC2     004464         1532#   1537
TDBR    000412          640#   3694*
TEMP    015016         2009*   2010    2016*   2025*   2027*   2028    2034*   2035*   2036    2041*   2043*   2048*   2059*
                       2062    2067*   2070    2075*   2078    2083*   2086    2091*   2094    2099*   2102    2107*   2110
                       2115*   2119    2124*   2128    2133*   2137    2142*   2146    2195*   2196    2217*   2218*   2219
                       2241*   2242*   2247*   2248*   2249    2264*   2265*   2266    2271*   2272*   2273    2281*   2282*
                       2283    2288*   2289*   2290    2295*   2296*   2297    2302*   2303*   2304    2309*   2310*   2311
                       2343*   2344    2365*   2366*   2367    2386*   2387*   2392*   2393*   2394    2409*   2410*   2411
                       2416*   2417*   2418    2426*   2427*   2428    2433*   2434*   2435    2440*   2441*   2442    2447*
                       2448*   2449    2454*   2455*   2456    2461*   2463*   2464    2469*   2471*   2472    2503*   2504*
                       2505    2512*   2521*   2598*   2599    2605*   2606    2612*   2619*   2620    2628*   2630*   2631
                       2636*   2638*   2639    2644*   2646*   2647    2653*   2654*   2655    2663*   2666    2671*   2674
                       2679*   2682    2687*   2690    2695*   2698    2703*   2706    2711*   2714    2719*   2722    2727*
                       2731    2736*   2740    2767*   2768    2776*   2777*   2778    2783*   2784*   2785    2790*   2791*
                       2792    2797*   2798*   2799    2804*   2805*   2806*   2807    2835*   2836    2857*   2858*   2859
                       2874*   2875*   2876    2881*   2882*   2883    2888*   2889*   2890    2895*   2896*   2897    2902*
                       2904*   2905    2908    2913*   2915*   2916    2941*   2942*   2943    2950*   2985*   3035*   3036*
                       3041    3047*   3048*   3053    3059*   3060*   3065    3071*   3072*   3077    3083*   3084*   3089
                       3095*   3096*   3101    3282*   3283*   3284    3415#   3416    3417    3418
TEST    000620          903#   3130*   3131*   3132*   3133*   3134*   3135*   3136*   3151    3166*   3167*   3168*   3169*
                       3170*   3171*   3172*   3187    3191*   3192*   3193*   3194*   3195*   3196*   3211    3226*   3227*
                       3228*   3229    3240*   3243*   3244    3254*   3257*   3258    3268*   3271*   3272    3296*   3297*
                       3302*   3315*   3316*   3317*   3318
TIME    003242         1035*   1259*   1267*   1268    1272    1278#
TJSR1   013136         3000#   300'
```

```
TJSR2   013140            2999    3001#
TJSR3   013152            3000    3005#   3009
TMEMEX  001212             967     976#
TRCSR   000406             829#
TRPB    000602             892#    931•    1125    3553•
TRTRP   015662            1127    3559#
TTCSR   000410             639     830#    1005•   1247
TTDBR   000412             640     831#    1245•
TTPST   000416             833#
TTPVC   000414             832#    1004•
TTSAV   000420             834#    1247•   1248
TYOUT   003054            1243#    1253
TYOUTR  003070            1004     1247#
TYOUT1  003060            1245#    1254
USUFF   000400             827#    1138    3491
UPAR0   000510             862#    1109    1121    3478    3513
UPAR1   000512             863#
UPAR7   000514             864#    3473    3517•
UPDR0   000502             859#    1117•   1122    3514
UPDR1   000504             860#
UPDR7   000506             861#    3518•
USEALL  002200            1107     1117#
USER    016432            3713#
WD    = 000014            1402#    1469
WORDCT  003672            1022     1050    1328    1348    1376#
XDPCNT  014710            1961     3374#
XDPSW1  000630             911#     951
XDPSW2  000632             912#     952
XFENDZ  004076            1452#    1501
XFER12  002706            1201     1219#
XFER16  002676            1203     1217#
XFER20  002666            1205     1215#
XFER24  002656            1207     1213#
XFER28  002646            1209     1211#
XFERB   002716            1199     1221#
$ENDAD  015640             804     946     3547#   3592
$ICNT   014700            1956     3370#
.       017762             657#    658     660     662     664     666     668     670     672     674     676     678     680
                           682     684     686     688     690     692     694     696     698     700     702     704     706
                           708     710     712     714     716     718     720     722     724     726     728     730     732
                           734     736     738     740     742     744     746     748     750     752     754     756     758
                           760     762     764     766     768     770     772     774     776     778     780     782     784
                           790#    793#    796#    799#    801#    803#    805#    807#    816#    818#    820#    826#    828#
                          1142    1163    1194    1244    1249    1264    1275    1286    1287    1304    1314    1332    1352
                          1365    1424    1426    1439    1441    1447    1472    1479    1481    1496    1498    1504    1518
                          1534    1968    1974    1980    1986    1993    2000    2011    2018    2029    2037    2044    2051
                          2063    2071    2079    2087    2095    2103    2111    2120    2129    2138    2147    2172    2177
                          2182    2191    2197    2203    2213    2220    2227    2237    2243    2250    2260    2267    2274
                          2284    2291    2298    2305    2312    2320    2325    2330    2339    2345    2351    2361    2368
                          2375    2382    2388    2395    2405    2412    2419    2429    2436    2443    2450    2457    2465
                          2473    2482    2488    2495    2506    2514    2523    2534    2540    2546    2552    2558    2564
                          2571    2576    2583    2590    2600    2607    2614    2621    2632    2640    2648    2656    2667
                          2675    2683    2691    2699    2707    2715    2723    2732    2741    2749    2754    2763    2769
                          2779    2786    2793    2800    2808    2817    2822    2831    2837    2843    2853    2860    2867
                          2877    2884    2891    2898    2906    2909    2917    2926    2933    2944    2952    2958    2964
                          2970    2978    2987    3002    3010    3020    3022    3024    3026    3037    3039    3042    3049
```

3051	3054	3061	3063	3066	3073	3075	3078	3085	3087	3090	3097	3099
3102	3111	3121	3137	3138	3139	3141	3142	3143	3145	3146	3148	3149
3152	3173	3174	3175	3177	3178	3179	3181	3182	3184	3185	3188	3197
3198	3199	3201	3202	3203	3205	3206	3208	3209	3212	3230	3245	3259
3273	3285	3287	3289	3298	3300	3303	3305	3319	3403#	3406#	3414#	3417#
3434	3568	3597	3611	3615	3627	3668	3715#					

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COMMEN      1#
ENDCOM      1#
ESCAPE      1#
GETPRI      1#
GETSWR      1#
MAIN      654#  1932
MULT        1#
NEWTST      1#
POP         1#
PUSH        1#
REPORT      1#
ROUTIN    654#  3376  3421  3463  3561  3605  3642  3651  3660  3671  3689
SECTIO     571   634   654#  787   813   823   905   914   924   998   1006  1024  1037  1053  1067
          1084  1148  1156  1240  1256  1280  1322  1343  1378  1963  2004  2022  2055  2151  2168
          2186  2207  2231  2254  2278  2316  2334  2355  2399  2423  2477  2499  2529  2594  2625
          2660  2745  2758  2773  2812  2826  2847  2871  2921  2937  2991  2996  3015  3030  3107
          3115  3125  3158  3217  3236  3250  3264  3278  3293  3309  3323  3331  3346  3397  3442
          3531  3556
SETPRI      1#
SETUP       1#
SKIP        1#
SLASH       1#
STARS       1#   571   573   634   636   654#  656   787   789   813   815   823   825   905   907
           914   916   924   926   998  1000  1006  1008  1013  1015  1024  1026  1029  1031  1037
          1039  1042  1044  1053  1055  1060  1062  1067  1069  1072  1074  1084  1086  1148  1150
          1156  1158  1240  1242  1256  1258  1280  1282  1322  1324  1343  1345  1378  1380  1932
          1934  1963        2004  2006  2022  2024  2055  2057  2151  2153  2168  2170  2186  2188
          2207  2209        2233  2254  2256  2278  2280  2316  2318  2334  2336  2355  2357  2399
          2401  2423  2425  2477  2479  2499  2501  2529  2531  2594  2596  2625  2627  2660  2662
          2745  2747  2758  2760  2773  2775  2812  2814  2826  2628  2847  2849  2871  2873  2921
          2923  2937  2939  2991  2993  2996  2998  3015  3017  3030  3032  3107  3109  3115  3117
          3125  3127  3158  3160  3217  3219  3236  3238  3250  3252  3264  3266  3278  3280  3293
          3295  3309  3311  3323  3325  3331  3333  3346  3348  3377  3379  3397  3399  3422  3424
          3442  3444  3464  3466  3531  3533  3556  3558  3562  3564  3572  3574  3594  3596  3606
          3608  3643  3645  3652  3654  3661  3663  3672  3674  3690  3692
SWRSU       1#
TNCV      3115#  3137  3173  3197
TYPBIN      1#
TYPDEC      1#
TYPNAM      1#
TYPNUM      1#
TYPOCS      1#
TYPOCT      1#
TYPTXT      1#
$$ESCA      1#
$$NEWT      1#
$$SKIP      1#
.EQUAT      1#
.HEADE      1#
.KT11       1#
.SETUP      1#
.SWRHI      1#
.$ACT1      1#
.$APTB      1#
.$APTH      1#
.$APTV      1#
```

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.$ASTA      1#
.$CATC      1#
.$CMTA      1#
.$DB2D      1#
.$DB2O      1#
.$DIV       1#
.$EOP       1#
.$ERRO      1#
.$ERRT      1#
.$MULT      1#
.$POWE      1#
.$RAND      1#
.$RDDE      1#
.$RDOC      1#
.$READ      1#
.$R2AZ      1#
.$SAVE      1#
.$SB2D      1#
.$SB2O      1#
.$SCOP      1#
.$SIZE      1#
.$SUPR      1#
.$TRAP      1#
.$TYPB      1#
.$TYPD      1#
.$TYPE      1#
.$TYPO      1#
.$40CA      1#
.1170       1#

. ABS.  017762      000

 ERRORS DETECTED:  0

 CFKTGC.BIN,CFKTGC.LST/CRF/SOL/NL:TOC=CFKTGC.SML,CFKTGC.P11
 RUN-TIME:  30 42 3 SECONDS
 RUN-TIME RATIO: 171/77-2.2
 CORE USED:  32K  (63 PAGES)
```