

KT11

11/34 MEM MGMT
CFKTGC0

AH-8052C-MC

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IDENTIFICATION

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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 B110=1---INHIBIT MEMORY MGMT. (SRO<0> WILL NOT BE SET AT ALL)

MMOPT B111=1---INHIBIT USE OF USER MODE.

(ALSO INHIBITS 4K AS 32K)

MMOPT B112=1---INHIBIT 4K AS 32 K (ALSO INHIBITED IF EITHER SW0
OR SW1 IS SET)-SEE SECTION 5.3.1 FOR EXPLANATION

MMOPT B115=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 RFSART (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 'DATA' 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 BITS 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 ZEROS TO IT, YOU HAVE THE 18-BIT ADDRESS OF THE CURRENT BANK OF MEMORY. ADD TO THIS THE ADDRESS OF RETURN IN

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

7.0 RESTRICTIONS

PROGRAM MUST BE LOADED INTO LOWER 4K OF MEMORY.

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

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

8.0 MISCELLANEOUS

8.1 EXECUTION TIME

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

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

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

ACT11 WITH OPTIONS SET AS DESCRIBED IN SECTION 8.3:

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

XXDP WITH OPTIONS SET AS DESCRIBED IN SECTION 8.3:

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

8.2 STACK POINTERS

THE KERNEL STACK POINTER IS INITIALIZED TO 17760.

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

8.3 ACT11/XXDP OPERATION

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

THE ACT11/XXDP SOFTWARE SWITCHES ARE:

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

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

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

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

THE LOAD MEDIUM IS NOT EXERCISED BY THE PROGRAM WHEN LOADED 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.

.LIST ME,SEQ,BIN

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.NLIST MC,CND,MD,TOC
.TITLE CFK1GC 11/34 MEM MGMT
.ABS
.DSABL ERFZ

;THIS PROGRAM IS A MODIFICATION OF THE 11/40 DIAGNOSTIC, DBK1G.
;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
```

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.

CHGC1
 CHGC2
 CHGC3
 CHGC4
 CHGC5
 CHGC6
 CHGC7

SBTTL DEFINITIONS

NOP=240 ;SYSTEM NULL OPERATION
 SCOPE=TRAP ;TRAP USED SCOPE LOOP AND ITERATION
 TCSR=TTCSR
 TDBR=TTDBR
 PSR=177776
 HLT=104006 ;ERROR PRINTOUT CALL
 EOB=104010 ;END OF BANK CALL
 R0=%0
 R1=%1
 R2=%2
 R3=%3
 R4=%4
 R5=%5
 SP=%6
 R6=SP
 PC=%7

615
 616
 617
 618
 619
 620
 621
 622
 623
 624
 625
 626 000000 001440
 627 000002 001526
 628 000004 001572
 629 000006 001670
 630 000010 001730
 631 000012 015706
 632 000014 016036
 633
 634
 635
 636
 637 000240
 638 104400
 639 000410
 640 000412
 641 177776
 642 104006
 643 104010
 644 000000
 645 000001
 646 000002
 647 000003
 648 000004
 649 000005
 650 000006
 651 000006
 652 000007
 653

```

.....:
:SBTL  TRAP CATCHER
:.....:

```

Address	Hex	Assembly	Comment
654			
655			
656			
657	000000	0	
658	000000	.+2	TRAP ENTRANCE
659	000002	HALT	TRAPPED TO PREVIOUS LOCATION
660	000004	.+2	TRAP ENTRANCE
661	000006	HALT	TRAPPED TO PREVIOUS LOCATION
662	000010	.+2	TRAP ENTRANCE
663	000012	HALT	TRAPPED TO PREVIOUS LOCATION
664	000014	.+2	TRAP ENTRANCE
665	000016	HALT	TRAPPED TO PREVIOUS LOCATION
666	000020	.+2	TRAP ENTRANCE
667	000022	HALT	TRAPPED TO PREVIOUS LOCATION
668	000024	.+2	TRAP ENTRANCE
669	000026	HALT	TRAPPED TO PREVIOUS LOCATION
670	000030	.+2	TRAP ENTRANCE
671	000032	HALT	TRAPPED TO PREVIOUS LOCATION
672	000034	.+2	TRAP ENTRANCE
673	000036	HALT	TRAPPED TO PREVIOUS LOCATION
674	000040	.+2	TRAP ENTRANCE
675	000042	HALT	TRAPPED TO PREVIOUS LOCATION
676	000044	.+2	TRAP ENTRANCE
677	000046	HALT	TRAPPED TO PREVIOUS LOCATION
678	000050	.+2	TRAP ENTRANCE
679	000052	HALT	TRAPPED TO PREVIOUS LOCATION
680	000054	.+2	TRAP ENTRANCE
681	000056	HALT	TRAPPED TO PREVIOUS LOCATION
682	000060	.+2	TRAP ENTRANCE
683	000062	HALT	TRAPPED TO PREVIOUS LOCATION
684	000064	.+2	TRAP ENTRANCE
685	000066	HALT	TRAPPED TO PREVIOUS LOCATION
686	000070	.+2	TRAP ENTRANCE
687	000072	HALT	TRAPPED TO PREVIOUS LOCATION
688	000074	.+2	TRAP ENTRANCE
689	000076	HALT	TRAPPED TO PREVIOUS LOCATION
690	000100	.+2	TRAP ENTRANCE
691	000102	HALT	TRAPPED TO PREVIOUS LOCATION
692	000104	.+2	TRAP ENTRANCE
693	000106	HALT	TRAPPED TO PREVIOUS LOCATION
694	000110	.+2	TRAP ENTRANCE
695	000112	HALT	TRAPPED TO PREVIOUS LOCATION
696	000114	.+2	TRAP ENTRANCE
697	000116	HALT	TRAPPED TO PREVIOUS LOCATION
698	000120	.+2	TRAP ENTRANCE
699	000122	HALT	TRAPPED TO PREVIOUS LOCATION
700	000124	.+2	TRAP ENTRANCE
701	000126	HALT	TRAPPED TO PREVIOUS LOCATION
702	000130	.+2	TRAP ENTRANCE
703	000132	HALT	TRAPPED TO PREVIOUS LOCATION
704	000134	.+2	TRAP ENTRANCE
705	000136	HALT	TRAPPED TO PREVIOUS LOCATION
706	000140	.+2	TRAP ENTRANCE
707	000142	HALT	TRAPPED TO PREVIOUS LOCATION
708	000144	.+2	TRAP ENTRANCE
709	000146	HALT	TRAPPED TO PREVIOUS LOCATION

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

[illegible]

766	000330	000332	.+2	:TRAP ENTRANCE
767	000332	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
768	000334	000336	.+2	:TRAP ENTRANCE
769	000336	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
770	000340	000342	.+2	:TRAP ENTRANCE
771	000342	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
772	000344	000346	.+2	:TRAP ENTRANCE
773	000346	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
774	000350	000352	.+2	:TRAP ENTRANCE
775	000352	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
776	000354	000356	.+2	:TRAP ENTRANCE
777	000356	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
778	000360	000362	.+2	:TRAP ENTRANCE
779	000362	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
780	000364	000366	.+2	:TRAP ENTRANCE
781	000366	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
782	000370	000372	.+2	:TRAP ENTRANCE
783	000372	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
784	000374	000376	.+2	:TRAP ENTRANCE
785	000376	000000	HALT	:TRAPPED TO PREVIOUS LOCATION
786				
787				
788				
789				
790		000C24	.=24	
791	000024	016370	PFAIL	:POWER FAIL TRAP
792	000026	000340	340	
793		000030	.=30	
794	000030	015072	EMTSRV	:EMT CALLS
795	000032	000340	340	:HIGHEST PRIORITY
796		000034	.=34	
797	000034	014570	SCOPEC	:USER TRAP
798	000036	000000	0	
799		000040	.=40	:LOAD MEDIUM INDICATOR.
800	000040	000000	0	:LOADS AS 0.
801		000042	.=42	:AUTOMATIC MODE INDICATOR.(ACT11/XXDP).
802	000042	000000	0	:ZERO AT LOAD TIME.
803		000046	.=46	:POINTER TO LOGICAL END.
804	000046	015640	\$ENDAD	
805		000052	.=52	:PROGRAM ATTRIBUTES WORD.
806	000052	040000	40000	
807		000174	.=174	
808	000174	000000	MMOPT: 0	:MEMORY MANAGEMENT OPTION SEL.
809	000176	000000	SWREG: 0	:SOFTWARE SWITCH REG.
810		000176	SREG2=SWREG	
811				
812				
813				
814				
815				
816		000200	.=200	
817	000200	000137	JMP @#START	
818		000300	.=300	
819	000300	000137	JMP @#START	
820		000310	.=310	
821	000310	000137	JMP @#RSTRT	

822				
823				
824				
825				
826		000400		
827	000400	000000	UBUFF:	0
828		000406		
829	000406	177560	TRCSR:	177560
830	000410	177564	TTCSR:	177564
831	000412	177566	TTDBR:	177566
832	000414	000064	TTTVC:	64
833	000416	000066	TTTST:	66
834	000420	000000	TTTSAV:	0
835	000422	000100	KWLVC:	100
836	000424	000102	KWLST:	102
837	000426	177546	LKCSR:	177546
838	000430	177514	LPCSR:	177514
839	000432	177516	LPDBR:	177516
840	000434	000200	LPVC:	200
841	000436	000202	LPST:	202
842	000440	177470	RFDAR:	177470
843	000442	177466	RFDAR:	177466
844	000444	177462	RFWC:	177462
845	000446	177464	RFCAR:	177464
846	000450	177460	RFCAR:	177460
847	000452	177461	RFCAR:	177461
848	000454	000204	RFCV:	204
849	000456	000206	RFCV:	206
850	000460	177413	RKDAH:	177413
851	000462	177412	RKDAH:	177412
852	000464	177406	RKWC:	177406
853	000466	177410	RKBAR:	177410
854	000470	177404	RKCSR:	177404
855	000472	177405	RKCSR:	177405
856	000474	000220	RKVC:	220
857	000476	000222	RKST:	222
858	000500	177572	SRO:	177572
859	000502	177600	UPDR0:	177600
860	000504	177602	UPDR1:	177602
861	000506	177616	UPDR7:	177616
862	000510	177640	UPAR0:	177640
863	000512	177642	UPAR1:	177642
864	000514	177656	UPAR7:	177656
865	000516	172300	KPDR0:	172300
866	000520	172302	KPDR1:	172302
867	000522	172304	KPDR2:	172304
868	000524	172316	KPDR7:	172316
869	000526	172340	KPAR0:	172340
870	000530	172342	KPAR1:	172342
871	000532	172344	KPAR2:	172344
872	000534	172356	KPAR7:	172356
873				
874	000536	177600	IPDRTAB:	177600
875	000540	177640		177640
876	000542	172300		172300
877	000544	172340	IPDREND:	172340

;BUFFER FOR USER SP
 ;FOR STACK OVERRUN
 ;TTY READER STATUS REGISTER
 ;TTY PUNCH STATUS REGISTER

;DISK ADDRESS AND ERROR
 ;DISK ADDRESS REGISTER
 ;WORD COUNT REGISTER
 ;CURRENT ADDRESS REGISTER
 ;STATUS REGISTER
 ;HIGH BYTE ADDRESS OR CSR

;HIGH BYTE DISK ADR
 ;DISK ADDRESS REGISTER
 ;WORD COUNT REGISTER
 ;CURRENT ADDRESS REGISTER
 ;STATUS REGISTER
 ;HIGH BYTE OF CSR
 ;TRAP VECTOR

;MEMORY MANAGEMENT REGISTER

878	000546	177570	SR:	177570	; SWITCH REGISTER POINTER
879	000550	177571	SRH:	177571	; HIGH BYTE OF SW. REG. POINTER
880	000552	177342	TCCM:	177342	; CONTROL AND FUNCTION
881	000554	177340	TCST:	177340	; GENERAL STATUS
882	000556	177350	TCDT:	177350	; DATA
883	000560	177344	TCWC:	177344	; WORD COUNT
884	000562	177346	TCBA:	177346	; BUS ADDRESS
885	000564	000214	TCIV:	214	; DECTAPE INTERRUPT VECTOR
886	000566	000216	TCSTA:	216	
887	000570	000000	CURBNK:	0	; SAF TO POINT TO CURRENT BANK
888	000572	000000	OLDBNK:	0	
889	000574	000000	CURPAR:	0	; ADDRESS OF CURRENT ISAR
890	000576	000000	CURPDR:	0	
891	000600	000000	BNKSTR:	0	; PC TO POINT TO BEGIN THRU CURRENT SEGMENT
892	000602	000000	TRPB:	0	
893			; THE NEXT TWO WORDS ARE THE MEMORY MAP. THE FIRST WORD REPRESENTS		
894			; 0-64K WITH ONE BIT REPRESENTING A 4K CONTIGUOUS BLOCK. IF THE		
895			; BIT=1 THAT 4K BLOCK IS PRESENT. THE LSB REPRESENTS 0-4K, THE NEXT		
896			; SIGNIFICANT BIT REPRESENTS 4-8K AND SO ON.		
897	000604	177777	MEM0:	177777	; 0-64K
898	000606	077777	MEM1:	77777	; 64-124K
899	000610	000001	COREPT:	1	
900	000612	000604	MEMUT:	MEM0	
901	000614	000000	TBANK:	0	
902	000616	000000	REFF:	0	
903	000620	000000	TEST:	0	
904					
905			;		
906			; SBTTL FILLCT, ACT11, XXDP SOFTWARE SWITCHES		
907			;		
908	000622	000014	FILLCT:	14	; CONSOLE FILL COUNT.
909	000624	000040	ACTSW1:	40	; NO CORE EXPANSION.
910	000626	000201	ACTSW2:	201	; NO LP, NO TTY.
911	000630	000046	XDPSW1:	46	; NO CORE EXPANSION, NO 4 AS 32, ETC.
912	000632	000001	XDPSW2:	1	; NO TTY.
913			;		
914			; SBTTL RESTART ADD USING INITIAL SR SETTINGS		
915			;		
916					
917	000634	012706	017760	000024	RSTRT: MOV #KSTACK,R6
918	000640	012737	016370		MOV #PFAIL,@#24
919	000646	005737	000042		TST @#42
920	000652	011077			BNE START2
921	000654	117737	177670	000177	MOVB @SRH,@#SREG2+1
922	000662	000473			BR START2
923			;		
924			; SBTTL START UP FOR MINI MONITOR - NORMAL START FROM LOC 00020C		
925			;		
926					
927					
928	000664	012706	017760		START: MOV #KSTACK,R6
929	000670	012737	000137	000200	MOV #137,@#200
930	000676	012737	000664	000202	MOV #START,@#202
931	000704	005067	177672		CLR TRPB
932	000710	005067	013772		CLR PASCNT
933	000714	013746	000004		MOV @#4,-(SP)

; SET UP STACK
 ; RESTORE 200 IF START AT 300
 ; NO TRACE IN FIRST PASS.
 ; CLEAR THE PASS COUNTER.
 ; SAVE ERROR VECTOR

934	000720	013746	000006		MOV	@#6,-(SP)	
935	000724	012767	000740	177052	MOV	#15,4	;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			(MP	(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,#SENDAD	;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	Z7,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			(MP	(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

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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      @#PRON      ;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      ;*****
1000      ;SBTTL TTY INIT
1001      ;*****
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, @#TPVC      ;NO, SETUP INTERRUPT VECTOR
1005 001410 052777 000100 176772      BIS      #100, @#TICSR      ;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      #1RK, @#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      @#RFCR      ;PRESENT?
  
```

1046	001600	012777	003562	176646	MOV	#1RF,ARFVC	;SET UP TRAP RETURN
1047	001606	012777	000240	176642	MOV	#240,ARFST	
1048	001614	012767	043503	002044	MOV	#43503,RFFUNCT	;WRITE CHECK/WRITE
1049	001622	105277	176624		INCB	ARFCSRH	;INITIALIZE DISK-DAR,DAE
1050	001626	016777	002040	176610	MOV	WORDCT,ARFVC	;LENGTH OF TRANSFER
1051	001634	016777	002030	176604	MOV	LLIMIT,ARFCAR	;CORE ADDRESS OF START OF TRANSFER
1052	001642	116777	002020	176600	MOV	RFFUNCT,ARFCSR	;START RF11 READ OR WRITE
1053					;*****		
1054					.SBTTL TC11 INIT		
1055					;*****		
1056	001650	006300			ST6:	ASL	R0
1057	001652	122737	000001	000041		CMPB	#1,AR#41
1058	001660	001417				BEQ	ST7
1059	001662	033727	000176	000100		BIT	AR#SREG2,#100
1060					;*****		
1061	001670	001413			CHGC4:	BEQ	ST7
1062					;*****		
1063	001672	005777	176656			TST	ATCST
1064	001676	012777	003702	176660		MOV	#FENDZ,ATCIV
1065	001704	012777	000300	176654		MOV	#300,ATCSTA
1066	001712	012777	004503	176632		MOV	#R+IE+RB+DO,ATCCM
1067					;*****		
1068					.SBTTL LINE PRINTER INIT		
1069					;*****		
1070	001720	006300			ST7:	ASL	R0
1071	001722	033727	000176	000200		BIT	AR#SREG2,#200
1072					;*****		
1073	001730	001432			CHGC5:	BEQ	ST8
1074					;*****		
1075	001732	005777	176472			TST	ALPCSR
1076	001736	012737	002016	000004		MOV	#ST8,AR#4
1077	001744	012767	000137	001274		MOV	#137,SOLPAT
1078	001752	012767	000117	001360		MOV	#79,CLINCT
1079	001760	012767	000137	001262		MOV	#137,CURPAT
1080	001766	012777	000014	176436		MOV	#14,ALPDBR
1081	001774	012777	003270	176432		MOV	#LPINTR,ALPVC
1082	002002	012777	000200	176426		MOV	#200,ALPST
1083	002010	012777	000100	176412		MOV	#100,ALPCSR
1084					;*****		
1085					.SBTTL PRE-PASS SETUP		
1086					;*****		
1087	002016	005037	000006		ST8:	CLR	AR#6
1088	002022	012737	000006	000004		MOV	#6,AR#4
1089	002030	004767	000370			JSR	AR#7,DETI
1090	002034	032737	000001	000174		BIT	#1,AR#MMOPT
1091	002042	001106				BNE	MODE
1092	002044	004767	012760			JSR	AR#7,NRALL
1093	002050	012777	077406	176446		MOV	#77406,AKPDR7
1094	002056	012777	007600	176450		MOV	#7600,AKPAR7
1095	002064	032737	000006	000174		BIT	#6,AR#MMOPT
1096	002072	001415				BEQ	SEGM1
1097	002074	012701	000007			MOV	#7,R1
1098	002100	016702	176422			MOV	KPAR0,R2
1099	002104	005003				CLR	R3
1100	002106	010312			SETEX:	MOV	R3,AR2
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 SEGMI: MOV      #77406,@KPDRO
1106 002134 032737 000004 000174    BIT      #4,@MMOPT
1107 002142 001416          BEQ      USEALL
1108 002144 012701 000010    MOV      #10,R1
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,@UPDRO
1118 002206 012737 000000 000570    MOV      #0,@CURBNK
1119 002214 012767 000001 176366    MOV      #1,COREPT
1120 002222 012767 000604 176362    MOV      #MEM0,MEMUT
1121 002230 016767 176254 176336    MOV      UPAR0,CURPAR
1122 002236 016767 176240 176332    MOV      UPDRO,CURPDR
1123 002244 012767 005542 176326    MOV      #BEGIN,BNKSTR
1124 002252 052777 000001 176220 SETSEG: BIS      #1,@SRO
1125 002260 005767 176316    MODE:  TST      TRPB
1126 002264 001406          BEQ      1$
1127 002266 012737 015662 000014    MOV      #TRTRP,@#14
1128 002274 012746 000020          MOV      #20,-(SP)
1129 002300 000406          BR       2$
1130 002302 012737 000016 000014 1$: MOV      #16,@#14
1131 002310 005037 000016          CLR      @#16
1132 002314 005046          CLR      -(SP)
1133 002316 012746 002324          2$: MOV      #3$,-(SP)
1134 002322 000002          RTI
1135 002324 032737 000002 000174 3$: BIT      #2,@MMOPT
1136 002332 001016          BNE      MAIN+2
1137 002334 052737 140000 000036    BIS      #140000,@#36
1138 002342 012746 000400          MOV      #UBUFF,-(R6)
1139 002346 052737 030000 177776    BIS      #30000,@#PSR
1140 002354 006606          MTP1     SP
1141 002356 012737 140000 177776    MOV      #140000,@#PSR
1142 002364 000401          BR       .+4
1143 002366 000001          MAIN:  WAIT
1144 002370 033727 000176 002000    BIT      @#SREG2,#2000
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
1152 002410 162716 000006          SUB      #6,(SP)
1153 002414 042766 000017 000002    BIC      #17,2(SP)
1154 002422 000002          RTI
1155
1156 ;*****
1157 ;SBTTL  PDP-11 MEMORY DETERMINATION AND SETUP

```

;MAP KERNEL 0 TO BANK 0, RW
 ;INHIBIT RUNNING 4K AS 32K?
 ;NO, SETUP FOR RUNNING 4K AS 32K
 ;YES, MAP ALL USER ASR'S TO PA

;MAP USER ASRO TO BANK 0, RW
 ;CURRENT SAR CONTENTS
 ;INIT MAP POINTERS

;CURRENT SEGMENT REGISTER ADDRESSES

;CURRENT STARTING PC
 ;SET MEM MGMT ENABLE BIT
 ;USE TRACE MODE?
 ;BR IF NOT.
 ;SET UP TRACE TRAP VECTOR.
 ;ALLOW TRACE MODE.

;NO TRACE MODE . RESET THE VECTOR.

;INSURE NO TRACE WILL BE ENABLED.
 ;CONTINUE AT 3\$.
 ; DO IT NOW.
 ;INHIBIT USER/KERNEL?
 ;YES - SKIP OVER
 ;SET USER BIT IN SCOPE STATUS

;SET UP USER STACK
 ;CHANGE TO USER

;INHIBIT PROCESSOR TEST

;SET INHIBIT BIT
 ;ALTER PC RETURN
 ;CLEAR Z BIT ON STACK

```

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 DET14: 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 STR128
1184 002542 012602 DET2: MOV (6)+,%2 ;RETRIEVE TRAP PC
1185 002544 005726 TST (6)+ ;DISCARD TRAP STATUS WORD
1186 002546 062702 000074 ADD #STR14-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 #0+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 STR14: 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 STR128: 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			JSR	%7,MOVE	
1216	002672	004767	177656			JSR	%7,MOVE	
1217	002676	012701	060000			JSR	%7,MOVE	
1218	002702	004767	177646			JSR	%7,MOVE	
1219	002706	012701	040000			JSR	%7,MOVE	
1220	002712	004767	177636			JSR	%7,MOVE	
1221	002716	012701	020000			JSR	%7,MOVE	
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	012767	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								
1242								
1243	003054	005027	000000			TYOUT:	CLR	#0
1244		003056					DATA2=-2	
1245	003060	016777	177772	175324		TYOUT1:	MOV	DATA2,@TIDBR
1246	003066	000002					RTI	
1247	003070	017767	175314	175322		TYOUTR:	MOV	@TICSR,TISAV
1248	003076	105767	175316				TSTB	TISAV
1249	003102	100401					BMI	.+4
1250	003104	104006					HLT	
1251	003106	005267	177744				INC	DATA2
1252	003112	022767	000400	177736			CMP	#400,DATA2
1253	003120	001755					BEQ	TYOUT
1254	003122	000756					BR	TYOUT1
1255								
1256								
1257								
1258								
1259	003124	005037	003242			LK1:	CLR	@TIME
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	
1266	003156	042777	000200	175242			BIC	#200,@LKCSR
1267	003164	005237	003242			LK4:	INC	@TIME
1268	003170	022737	006344	003242			CMP	#3300.,@TIME
1269	003176	103362					BHS	LK2

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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

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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 MOV @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 MOV @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
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
1360 003614 000337 003666 SWAB @RFFUNCT ;YES-RF11 WRITE CHECK ERROR
1361 003620 000744 BR RFSTART ;CHANGE COMMAND TO DO WRITE
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 @RFDAE,#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

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1382 ;END ZONE. THE DESIRED DATA IS THEN GENERATED IN THE DECTAPE BUFFER AREA
1383 ;AND DATA IS WRITTEN ONTO ALL BLOCKS FROM THE BLOCK NUMBER IN TCFRST
1384 ;THRU THE BLOCK NUMBER IN TCLAST. BLOCK NUMBERS ARE ALSO CHECKED FOR
1385 ;BEING IN ORDER. AFTER THE BLOCK NUMBER IN TCLAST IS WRITTEN, TAPE IS
1386 ;DRIVEN INTO THE REVERSE END ZONE.
1387 ;THE TAPE IS THEN STARTED IN REVERSE, AND WHEN THE CLOSEST BLOCK THAT
1388 ;WAS WRITTEN (TCLAST) IS FOUND, IT IS READ INTO THE DECTAPE BUFFER AREA.
1389 ;THE PROGRAM INTERRUPT REQUEST FACILITY IS THEN USED TO BOOK A REQUEST
1390 ;FOR CHECKING THE DATA AT LEVEL 3, AND NO FURTHER DATA IS READ IN
1391 ;UNTIL THAT DATA HAS BEEN CHECKED. AFTER IT IS CHECKED, THE DATA IS
1392 ;SCRAMBLED TO GUARANTEE THAT NEW DATA IS REALLY READ IN NEXT TIME. WHILE
1393 ;THIS IS GOING ON, BLOCK NUMBERS ARE CHECKED FOR BEING IN ORDER AS THE
1394 ;TAPE TRAVELS TOWARD THE FORWARD END ZONE. ONCE THE DATA IS FULLY CHECKED
1395 ;THE NEXT BLOCK THAT COMES UP IS READ IN AND THE PROCESS REPEATED. ONCE
1396 ;THE BLOCK WHOSE NUMBER IS IN TCFRST HAS BEEN READ, THE TAPE IS DRIVEN
1397 ;INTO THE FORWARD END ZONE AND THE WHOLE SEQUENCE IS REPEATED.
1398
1399 ;FUNCTION VALUES IN CSR
1400 ;DT11 DEC TAPE
1401 RD=4 ;READ DATA
1402 WD=14 ;WRITE DATA
1403 RB=2
1404 IE=500 ;INTERRUPT ENABLE+UNIT 1
1405 DO=1 ;DO - THE FUNCTION
1406 R=4000 ;REVERSE
1407
1408 003674 000000 TCFRST: 0 ;FIRST BLOCK TO BE SEARCHED FOR
1409 003676 001101 TCLAST: 577. ;LAST BLOCK TO BE SEARCHED FOR
1410 003700 000000 TCXPE: 0 ;THE BLOCK THAT IS EXPECTED
1411
1412 ;GO TO FORWARD END ZONE
1413 003702 012777 003702 174654 FENDZ: MOV #FENDZ,@TCIV ;END ZONE VECTOR SETUP
1414 003710 005777 174640 TST @TCST ;TEST FOR END ZONE
1415 003714 100403 BMI FEND1 ;AT END ZONE?
1416 003716 105277 174630 INCB @TCCM ;SET DO - NO DELAY
1417 003722 000002 RTI ;NO - WAIT SOME MORE
1418 003724 012777 003754 174632 FEND1: MOV #TCF1,@TCIV ;YES - NEW VECTOR
1419 003732 042777 104000 174612 BIC #104000,@TCCM ;SEARCH BLOCK FOWARD
1420 003740 016767 177730 177732 MOV TCFRST,TCXPE ;COUNT WHEN THIS BLOCK IS FOUND
1421 003746 105277 174600 TCF1A: INCB @TCCM ;SET DO
1422 003752 000002 RTI ;RETURN ON NEXT BLOCK
1423 003754 032777 100200 174570 TCF1: BIT #100200,@TCCM ;ANY ERROR ON READ?
1424 003762 100001 BPL .+4 ;TC ERROR SET - FORWARD READ BLOCK
1425 003764 104005 HLT ;DONE FLAG UP?
1426 003766 001001 BNE .+4 ;FALSE INTERRUPT
1427 003770 104006 HLT ;IS THIS OUR BLOCK FOR SYNC
1428 003772 027767 174560 177700 CMP @TCDT,TCXPE ;NO-READ SOME MORE BLOCKS
1429 004000 002762 BLT TCF1A ;YES
1430 004002 001401 BEQ TCF2 ;WE PASSED THE BLOCK
1431 004004 104006 HLT
1432
1433 004006 012777 004022 174550 TCF2: MOV #TCF3,@TCIV ;VECTOR FOR SEQUENTIAL READS
1434 004014 105277 174532 INCB @TCCM ;SET DO
1435 004020 000002 RTI ;RETURN AND TEST SEQUENTIAL BLOCKS
1436
1437 ;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,TCCLAS ;HAVE WE TESTED ALL BLOCKS
1444 004046 001414 BFO RENDZ ;YES DRIVE UNIT IN END ZONE TO START OVER
1445 004050 005267 177624 INC TCXPE ;NO-INCREMENT EXPECTED COUNT
1446 004054 027767 174476 177616 CMP @TCDT,TCXPE ;IS CURRENT BLOCK CORRECT
1447 004062 001401 BEO .+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,TCXPE ;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,TCXPE ;IS IT OUR FIRST BLOCK
1484 004252 001406 BEO 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 SEQUENTIAL 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 MCVB #1E+RD+DO,@TCCM ;READ THE BLOCK
1515 004410 004767 000030 JSR X7,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 #1E+RB,@TCCM ;READ BLOCK FUNCTION
1522 004442 000743 BR TCR4 ;RETURN TO BLOCK SEARCH
1523
1524 ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
1525 ;BY DOING A CHECK SUM ON THE DATA
1526 004444 010146 TC1: MOV X1,-(6) ;SAVE THESE ON THE STACK
1527 004446 010246 MOV X2,-(6)
1528 004450 010346 MOV X3,-(6)
1529 004452 005003 CLR X3 ;SUM OF DATA
1530 004454 012701 004510 MOV #TCRBUF,X1 ;ADDRESS OF READ BUFFER
1531 004460 012702 005510 MOV #TCRBUF+1000,X2 ;END OF READ BUFFER
1532 004464 062103 TC2: ADD (1)+,X3 ;EVEN ADD
1533 004466 062103 ADD (1)+,X3 ;ODD ADD -2'S COMPLIMENT
1534 004470 001401 BEQ .+4
1535 004472 104006 HLT ;DATA ERROR TC-11
1536 004474 020102 CMP X1,X2 ;AT END OF BUFFER?
1537 004476 001372 BNE TC2 ;NO - SUM THE REST
1538 004500 012603 MOV (6)+,X3 ;RESTORE THE REGISTERS
1539 004502 012602 MOV (6)+,X2
1540 004504 012601 MOV (6)+,X1
1541 004506 000207 RTS ;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
  
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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	

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

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	

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				

```

1932      ;*****
1933      ;SBITL MAIN ROUTINE: CPU BACKGROUND TESTS
1934      ;*****
1935      005510 010701      BEGINX: MOV    PC,R1      ;SET UP R1 TO SELECT CURBNK
1936      005512 042701 017777      BIC    #17777,R1
1937      005516 042737 160000 000034      BIC    #160000,#34      ;SET SCOPE RET TO CURRENT BANK
1938      005524 050137 000034      BIS    R1,#34
1939      005530 000301      SWAB    R1
1940      005532 006201      ASR     R1
1941      005534 006201      ASR     R1
1942      005536 010137 000570      MOV    R1,#CURBNK
1943
1944      ;BINARY INSTRUCTIONS
1945      ;INDEX, AND INDIRECT TEST OF PDP-11
1946      005542      BEGIN:
1947      005542 005000      CLR     R0      ;CHECK RANDOM NUMBER GENERATOR SEEDS.
1948      005544 066700 007210      ADD    RP1,R0      ;AND RESTORE IF ZEROED.
1949      005550 066700 007206      ADD    RP2,R0
1950      005554 001006      BNE     1$      ;BR IF NOT ZEROED.
1951      005556 012767 001233 007174      MOV    #1233,RP1      ;RESTORE RP1 SEED.
1952      005564 012767 007622 007170      MOV    #7622,RP2      ;RESTORE RP2 SEED.
1953      005572 005067 007104      1$: CLR    SCOPEF
1954      005576 010767 007102      MOV    PC,RETURN      ;FOR SCOPING - SETUP ADDRESS OF BEGIN1 IN
1955      005602 062767 000042 007074      ADD    #42,RETURN      ;THIS BANK THRU CURRENT ASR
1956      005610 016767 007064 007060      MOV    $ICNT,ICOUNT      ;ITERATION COUNT
1957      005616 005737 000042      TST    #42      ;AUTO MODE?
1958      005622 001407      BEQ     2$      ;BR IF NOT.
1959      005624 023737 000042 000046      CMP    #42,#46      ;XXDP CHAIN MODE?
1960      005632 001403      BEQ     2$      ;BR IF NOT.
1961      005634 016767 007050 007034      MOV    XDPNT,ICOUNT      ;USE XXDP CHAIN ITERATION COUNT.
1962      005642      2$:
1963      ;*****
1964      ;SBITL TEST COMPARE INSTRUCTION INDEXED
1965      ;*****
1966      005642 012700 177770      MOV    #-10,X0      ;MINUS 10 TO REG 0
1967      005646 026027 014774 125252      CMP    A(0),#125252      ;(A INDEX BY MINUS 10) TO #125252
1968      005654 001401      BEQ     .+4
1969      005656 104006      HLT
1970      005660 104400      SCOPE      ;COMPARE WITH INDEX FAILED
1971
1972      005662 012700 000010      MOV    #10,X0
1973      005666 022760 052525 014774      CMP    #052525,A(0)
1974      005674 001401      BEQ     .+4
1975      005676 104006      HLT
1976      005700 104400      SCOPE
1977
1978      005702 012700 177770      MOV    #-10,X0
1979      005706 026060 014774 014774      CMP    A(0),A(0)
1980      005714 001401      BEQ     .+4
1981      005716 104006      HLT
1982      005720 104400      SCOPE
1983
1984      005722 012700 000010      MOV    #+10,X0
1985      005726 026060 014774 014774      CMP    A(0),A(0)
1986      005734 001401      BEQ     .+4
1987      005736 104006      HLT
  
```

1988	005740	104400			SCOPE
1989					
1990	005742	012700	177774		MOV #-4,X0
1991	005746	012701	000010		MOV #+10,X1
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,X0
1998	005772	012701	000010		MOV #10,X1
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					
2006					.SBTTL TEST MOVE INSTRUCTION FOR INDEX
2007					
2008	006012	012700	177770		MOV #-10,X0
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,X0
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,X0
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,X0
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,X0
2043	006170	166760	006570	015020	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	

 :SBTTL TEST UNARYS INDEXED
 :*****

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	015016	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	(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	(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	(0)
2146	006644	005737	015016		TST	%TEMP
2147	006650	001401			BEQ	.+4
2148	006652	104006			HLT	
2149	006654	104400			SCOPE	
2150						
2151						
2152						
2153						
2154	006656	010700			MOV	%7,%0
2155	006660	062700	000010		ADD	#10,%0

;
 ; SBTTL TEST JMP INDIRECT
 ;
 ;

2156	006664	000110			JMP	2X0
2157	006666	104006			HLT	
2158	006670	000240			NOP	
2159	006672	104400			SCOPE	
2160						
2161	006674	010700			MOV	27,X0
2162	006676	062700	000010		ADD	#10,X0
2163	006702	000110			JMP	2X0
2164	006704	104006			HLT	
2165	006706	000240			NOP	
2166	006710	104400			SCOPE	
2167						
2168						
2169					:*****	
2170					:SBTTL TEST INDIRECT ADDRESSINGTEST COMPARE INSTRUCTION	
2171	006712	023727	014764	125252	CMP	2#B,#125252
2172	006720	001401			BEQ	.+4
2173	006722	104006			HLT	
2174	006724	104400			SCOPE	
2175						
2176	006726	022737	125252	014764	CMP	#125252,2#B
2177	006734	001401			BEQ	.+4
2178	006736	104006			HLT	
2179	006740	104400			SCOPE	
2180						
2181	006742	023737	014764	014764	CMP	2#B,2#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	2#B,X0
2190	006762	022700	125252		CMP	#125252,X0
2191	006766	001401			BEQ	.+4
2192	006770	104006			HLT	
2193	006772	104400			SCOPE	
2194						
2195	006774	012737	125252	015016	MOV	#125252,2#TEMP
2196	007002	023737	014764	015016	CMP	2#B,2#TEMP
2197	007010	001401			BEQ	.+4
2198	007012	104006			HLT	
2199	007014	104400			SCOPE	
2200						
2201	007016	013737	014764	015006	MOV	2#B,2#C
2202	007024	023737	014764	015006	CMP	2#B,2#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,X0
2211	007044	043700	014764		BIC	2#B,X0

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	

.....
 ;SBTTL TEST SUBTRACT INSTRUCTION
 ;.....

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	

.....
 ;SBTTL TEST ADD INDIRECT
 ;.....

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	C07276	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						
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						
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,AB+2
2325	007524	001401			BEQ	.+4
2326	007526	104006			HLT	
2327	007530	104400			SCOPE	
2328						
2329	007532	027777	005230	005226	CMP	AB+2,AB+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	AB+2,X0
2338	007552	022700	125252		CMP	#125252,X0
2339	007556	001401			BEQ	.+4
2340	007560	104006			HLT	
2341	007562	104400			SCOPE	
2342						
2343	007564	012777	125252	005226	MOV	#125252,ATEMP+2
2344	007572	023737	014764	015016	CMP	AB,ATEMP
2345	007600	001401			BEQ	.+4
2346	007602	104006			HLT	
2347	007604	104400			SCOPE	
2348						
2349	007606	017777	005154	005174	MOV	AB+2,AC+2
2350	007614	023737	014764	015006	CMP	AB,AC
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,X0
2359	007634	047700	005126		BIC	AB+2,X0
2360	007640	020027	052525		CMP	X0,#52525
2361	007644	001401			BEQ	.+4
2362	007646	104006			HLT	
2363	007650	104400			SCOPE	
2364						
2365	007652	012737	177777	015016	MOV	#-1,ATEMP
2366	007660	042777	125252	005132	BIC	#125252,ATEMP+2
2367	007666	022737	052525	015016	CMP	#52525,ATEMP
2368	007674	001401			BEQ	.+4
2369	007676	104006			HLT	
2370	007700	104400			SCOPE	
2371						
2372	007702	012737	177777	015006	MOV	#-1,AC
2373	007710	047777	005052	005072	BIC	AB+2,AC+2
2374	007716	026737	005062	015006	CMP	A+10,AC
2375	007724	001401			BEQ	.+4
2376	007726	104006			HLT	
2377	007730	104400			SCOPE	
2378						
2379	007732	012700	125252		MOV	#125252,X0

2380	007736	167700	005024		SUB	@B+2,X0
2381	007742	020027	000000		CMP	X0,#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						

.....
 :SBTTL TEST ADD INDIRECT WITH INDEXING
 :.....

2401					CLR	X0
2402	010024	005000			ADD	@B+2,X0
2403	010026	067700	004734		CMP	#125252,X0
2404	010032	022700	125252		BEQ	.+4
2405	010036	001401			HLT	
2406	010040	104006			SCOPE	
2407	010042	104400				
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						

.....
 :SBTTL TEST UNARYS INDIRECT WITH INDEXING
 :.....

2423						
2424						
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						
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						

.....
 :SBTTL TEST OF COMBINED INDEXING AND INDIRECT
 :.....

2492	010406	012700	177772		MOV	#-6,X0	
2493	010412	012701	000002		MOV	#-2,X1	
2494	010416	027071	014774	014774	CMP	2A(0),2A(1)	
2495	010424	001401			BEQ	.+4	
2496	010426	104006			HLT		
2497	010430	104400			SCOPE		
2498							
2499							
2500					:*****		
2501					:SBTTL TEST BIC INSTRUCTION		
2502	010432	012700	000006		MOV	#-6,X0	
2503	010436	012767	177777	004352	MOV	#-1,TEMP	
2504	010444	047067	014774	004344	BIC	2A(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,X0	
2511	010472	012737	177777	015006	MOV	#-1,2A(0)	
2512	010500	042770	125252	015016	BIC	#125252,2A(0)	
2513	010506	023727	015006	052525	CMP	2A(0),#052525	
2514	010514	001401			BEQ	.+4	
2515	010516	104006			HLT		
2516	010520	104400			SCOPE		
2517							
2518	010522	012737	177777	015006	MOV	#-1,2A(0)	
2519	010530	012700	177772		MOV	#-6,X0	
2520	010534	012701	177772		MOV	#-6,X1	
2521	010540	047071	014774	015016	BIC	2A(0),2A(1)	
2522	010546	022737	052525	015006	CMP	#052525,2A(0)	
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,X0	: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,X0	: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,X0	: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 #10,20
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 #-10,20
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 #-10,20
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 #-10,20
2569	010726	012701	000004		MOV #-4,21
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 #-4,20
2581	010766	012701	000010		MOV #-10,21
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 #-4,20
2588	011012	012701	000010		MOV #-10,21
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					
2596					
2597	011032	012700	177770		MOV #-10,20
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					

.....
 :SBTTL TEST MOVE INSTRUCTION FOR INDEX
 :.....

2604	011060	012700	000010		MOV	#+10,X0
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,X0
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,X0
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						
2627						
2628	011162	012767	177777	003626	MOV	#-1,TEMP
2629	011170	012700	177770		MOV	#-10,X0
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,X0
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,X0
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,X0
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						

.....
 .SBTTL TEST BIC INSTRUCTION FOR INDEXING


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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 D(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 D(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
  
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2716	011612	104006			HLT	
2717	011614	104400			SCOPE	
2718						
2719	011616	012737	000001	015016	MOV	#1,@#TEMP
2720	011624	012700	000010		MOV	#+10,%0
2721	011630	105460	015006		NEGB	((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	((0)
2740	011724	005737	015016		TST	@#TEMP
2741	011730	001401			BEQ	.+4
2742	011732	104006			HLT	
2743	011734	104400			SCOPE	
2744						
2745						
2746						
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						
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	

.....
 :SBTTL TEST INDIRECT ADDRESSING, TEST COMPARE INSTRUCTION
 :.....

.....
 :SBTTL TEST MOVE INSTRUCTIONS
 :.....

```

2772
2773
2774
2775
2776 012026 012737 177777 015016
2777 012034 105037 015016
2778 012040 023727 015016 177400
2779 012046 001401
2780 012050 104006
2781 012052 104400
2782
2783 012054 012737 125252 015016
2784 012062 105137 015017
2785 012066 022737 052652 015016
2786 012074 001401
2787 012076 104006
2788 012100 104400
2789
2790 012102 005037 015016
2791 012106 105237 015017
2792 012112 022737 000400 015016
2793 012120 001401
2794 012122 104006
2795 012124 104400
2796
2797 012126 005037 015016
2798 012132 105377 002662
2799 012136 023727 015016 000377
2800 012144 001401
2801 012146 104006
2802 012150 104400
2803
2804 012152 005037 015016
2805 012156 112737 000001 015017
2806 012164 105437 015017
2807 012170 022737 177400 015016
2808 012176 001401
2809 012200 104006
2810 012202 104400
2811
2812
2813
2814
2815
2816 012204 122777 125252 002554
2817 012212 001401
2818 012214 104006
2819 012216 104400
2820
2821 012220 127777 002542 002540
2822 012226 001401
2823 012230 104006
2824 012232 104400
2825
2826
2827

```

 SBTTL TEST UNARYS INDIRECT

MOV #-1,@#TEMP
 CLRB @#TEMP
 CMP @#TEMP,#177400
 BEQ .+4
 HLT
 SCOPE

MOV #125252,@#TEMP
 COMB @#TEMP+1
 CMP #052652,@#TEMP
 BEQ .+4
 HLT
 SCOPE

CLR @#TEMP
 INCB @#TEMP+1
 CMP #400,@#TEMP
 BEQ .+4
 HLT
 SCOPE

CLR @#TEMP
 DECB @#TEMP+2
 CMP @#TEMP,#377
 BEQ .+4
 HLT
 SCOPE

CLR @#TEMP
 MOVB #1,@#TEMP+1
 NEGB @#TEMP+1
 CMP #177400,@#TEMP
 BEQ .+4
 HLT
 SCOPE

 SBTTL TEST INDIRECT ADDRESSING WITH INDEXING, TEST COMPARE INSTRUCTION

CMPB #125252,@B+2
 BEQ .+4
 HLT
 SCOPE

CMPB @B+2,@B+2
 BEQ .+4
 HLT
 SCOPE

 SBTTL TEST MOVE INSTRUCTIONS

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

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	CMPS	@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	CMPS	#-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	CMPS	#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						
2923						
2924	012630	012700	177772		MOV	#-6, %0
2925	012634	127027	014774	125252	CMPS	@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	CMPS	@A(0), @A(1)
2933	012666	001401			BEQ	.+4
2934	012670	104006			HLT	
2935	012672	104400			SCOPE	
2936						
2937						
2938						
2939						

.....
 ;SBTTL TEST OF COMBINED INDEXING AND INDIRECT

.....
 ;SBTTL TEST BIC INSTRUCTION

2940	012674	012700	000006		MOV	#6,X0	
2941	012700	012767	177777	002110	MOV	#-1,TEMP	
2942	012706	147067	014774	002102	BICB	2A(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,X0	
2949	012734	012737	177777	015006	MOV	#-1,2#C	
2950	012742	142770	125252	015016	BICB	#125252,2TEMP(0)	
2951	012750	123727	015006	000125	CMPB	2#C,#000125	
2952	012756	001401			BEQ	.+4	
2953	012760	104006			HLT		
2954	012762	104400			SCOPE		
2955							
2956	012764	012700	014766		MOV	#B+2,X0	; ADDRESS OF ADDRESS OF B
2957	012770	023067	001770		CMP	2(0)+,B	
2958	012774	001401			BEQ	.+4	
2959	012776	104006			HLT		
2960	013000	104400			SCOPE		
2961							
2962	013002	012700	014770		MOV	#B+4,X0	
2963	013006	025067	001752		CMP	2-(0),B	
2964	013012	001401			BEQ	.+4	
2965	013014	104006			HLT		
2966	013016	104400			SCOPE		
2967							
2968	013020	012700	014770		MOV	#B+4,X0	
2969	013024	125067	001734		CMPB	2-(0),B	
2970	013030	001401			BEQ	.+4	
2971	013032	104006			HLT		
2972	013034	104400			SCOPE		
2973							
2974	013036	012700	015012		MOV	#C+4,X0	
2975	013042	012737	177777	015006	MOV	#-1,2#C	
2976	013050	105050			CLRB	2-(0)	
2977	013052	023727	015006	177400	CMP	2#C,#177400	
2978	013060	001401			BEQ	.+4	
2979	013062	104006			HLT		
2980	013064	104400			SCOPE		
2981							
2982	013066	012737	177777	015006	MOV	#-1,2#C	
2983	013074	012700	177772		MOV	#-6,X0	
2984	013100	012701	177772		MOV	#-6,X1	
2985	013104	147071	014774	015016	BICB	2A(0),2TEMP(1)	
2986	013112	022737	177525	015006	CMP	#177525,2#C	
2987	013120	001401			BEQ	.+4	
2988	013122	104006			HLT		
2989	013124	104400			SCOPE		
2990							
2991							
2992							
2993							
2994	013126	012700	052525		MOV	#52525,X0	; THIS IS CHECKED LATER IN PROGRAM
2995							

 ;SBTTL SET UP TO TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
 ;*****

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2996 :*****
2997 :SBTTL TEST JSR INSTRUCTION
2998 :*****
2999 013132 004767 000002      JSR      Z7, TJSR2      ;PLACE PC ON STACK
3000 013136 000405          TJSR1: BR      TJSR3      ;RETURN HERE ON RTS Z19
3001 013140 121627 013136    TJSR2: CMPB   @Z6, #TJSR1    ;CHECK FOR CORRECT PC ON STACK
3002 013144 001401          BEQ      .+4
3003 013146 104006          HLT      ;INCORRECT PC ON STACK
3004 013150 000207          RTS      Z7      ;RETURN TO IMST AFTER JSR
3005 013152 104400    TJSR3: SCOPE
3006
3007 013154 000257          CCC
3008 013156 004717          JSR      Z7, @Z7      ;INSTRUCTION UNDER TEST
3009 013160 121627 013160    CMPB   @Z6, #TJSR3+6    ;TEST THE STACK
3010 013164 001401          BEQ      .+4
3011 013166 104006          HLT      ;PC OF JSR DID NOT GO TO STACK
3012 013170 005726          TST      (6)+      ;REPOSITION THE STACK
3013 013172 104400          SCOPE
3014
3015 :*****
3016 :SBTTL TEST NESTED SUBROUTINES
3017 :*****
3018 013174 000257          CCC      ;CLEAR CONDITION CODES
3019 013176 004767 001360    JSR      Z7, SUBR6
3020 013202 100401          BMI      .+4
3021 013204 104006          HLT      ;JSR OR RTS FAILED
3022 013206 001401          BEQ      .+4
3023 013210 104006          HLT      ;JSR OR RTS FAILED
3024 013212 102401          BVS      .+4
3025 013214 104006          HLT      ;JSR OR RTS FAILED
3026 013216 103401          BCS      .+4
3027 013220 104006          HLT      ;JSR OR RTS FAILED
3028 013222 104400          SCOPE
3029
3030 :*****
3031 :SBTTL TEST ROTATE ODD BYTE
3032 :*****
3033 013224 104400          SCOPE
3034 013226 000257          CCC      ;CLEAR "C"
3035 013230 012767 123456 001560  MOV    #123456, TEMP
3036 013236 106067 001555          RORB   TEMP+1      ;ROTATE ODD BYTE
3037 013242 103401          BCS      .+4
3038 013244 104006          HLT      ;C NOT SET
3039 013246 102401          BVS      .+4
3040 013250 104006          HLT      ;V NOT SET
3041 013252 022767 051456 001536  CMP    #051456, TEMP
3042 013260 001401          BEQ      .+4
3043 013262 104006          HLT      ;ROTATE FAILED
3044 013264 104400          SCOPE
3045
3046 013266 000277          SCC      ;SET C
3047 013270 012767 123456 001520  MOV    #123456, TEMP
3048 013276 106067 001515          RORB   TEMP+1
3049 013302 103401          BCS      .+4
3050 013304 104006          HLT      ;C NOT SET
3051 013306 102001          BVC      .+4

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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	001456	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		RCLB	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							

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3108 .SBTTL TEST THAT RO WASN'T CLEARED BY FALSE SELECTION
3109 :.....
3110 013526 022700 052525      CMP      #52525,RO
3111 013532 001401      BEQ      .+4
3112 013534 104006      HLT
3113 013536 104400      SCOPE
3114
3115 :.....
3116 .SBTTL TEST COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
3117 :.....
3118 013540 004767 001146      JSR      PC,RNGEN      ;GET RANDOM NUMBER.
3119 013544 010001      MOV      RO,R1
3120 013546 020001      CMPI:   CMP      %0,%1      ;ARE THE EQUAL
3121 013550 001401      BEQ      .+4
3122 013552 104006      HLT      ;RO AND R1 DID NOT COMPARE
3123 013554 104400      SCOPE
3124
3125 :.....
3126 .SBTTL TEST ROTATING RANDOM NUMBERS
3127 :.....
3128 013556 004767 001130      JSR      PC,RNGEN      ;GET RANDOM NUMBER.
3129 013562 010067 165030      MOV      RO,REFF      ;PUT IN REF WORD.
3130 013566 016767 165024 165024 ROTALL: MOV      REFF,TEST
3131 013574 006067 165020      ROR      TEST
3132 013600 006067 165014      ROR      TEST
3133 013604 006067 165010      ROR      TEST
3134 013610 006167 165004      ROL      TEST
3135 013614 006167 165000      ROL      TEST
3136 013620 006167 164774      ROL      TEST
3137 013624 100004      BPL      .+12
3138 013626 103007      BCC      .+20      ;Z=1
3139 013630 102013      BVC      .+30      ;Z=1, C=1
3140 013632 104006      HLT      ;Z=C, BUT V=1
3141 013634 006411      BR       .+24
3142 013636 103006      BCC      .+16      ;Z=0
3143 013640 102407      BVS      .+20      ;Z=0, C=1
3144 013642 104006      HLT      ;Z NOT EQUAL C, V=1
3145 013644 000405      BR       .+14
3146 013646 102404      BVS      .+12      ;Z=1, C=0
3147 013650 104006      HLT      ;Z NOT EQUAL C, V=1
3148 013652 000402      BR       .+6
3149 013654 102001      BVC      .+4      ;Z=0, C=0
3150 013656 104006      HLT      ;Z=C, BUT V=1
3151 013660 026767 164734 164730      CMP      TEST,REFF
3152 013666 001401      BEQ      .+4
3153 013670 104006      HLT
3154 013672 104400      SCOPE
3155
3156      000616      REF=REFF
3157
3158 :.....
3159 .SBTTL TEST ROTATING BYTE EVEN/ODD, RANDOM NUMBERS
3160 :.....
3161 013674 004767 001012      JSR      PC,RNGEN      ;GET RANDOM NUMBER.
3162 013700 010067 164712      MOV      RO,REFF      ;PUT IN REF WORD.
3163 013704 004767 000006      JSR      %7,ROTBE
  
```

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
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
3175	013760	102013				BVC	.+30
3176	013762	104006				HLT	
3177	013764	000411				BR	.+24
3178	013766	103006				BCC	.+16
3179	013770	102407				BVS	.+20
3180	013772	104006				HLT	
3181	013774	000405				BR	.+14
3182	013776	102404				BVS	.+12
3183	014000	104006				HLT	
3184	014002	000402				BR	.+6
3185	014004	102001				BVC	.+4
3186	014006	104006				HLT	
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
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
3199	014060	102013				BVC	.+30
3200	014062	104006				HLT	
3201	014064	000411				BR	.+24
3202	014066	103006				BCC	.+16
3203	014070	102407				BVS	.+20
3204	014072	104006				HLT	
3205	014074	000405				BR	.+14
3206	014076	102404				BVS	.+12
3207	014100	104006				HLT	
3208	014102	000402				BR	.+6
3209	014104	102001				BVC	.+4
3210	014106	104006				HLT	
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							
3219							

;.....
 ;SBITL ADD AND SUBTRACT RANDOM NUMBERS AGAINST FIXED NUMBERS
 ;.....

```

3220 ;A+B=C, C-A=B, BF SHOULD EQUAL BI
3221 014126 011667 000054 MOV @X6,NUMA
3222 014132 004767 000554 JSR PC,RNGEN ;GET RANDOM NUMBER.
3223 014136 010067 164454 MOV RO,REFF ;PUT IN REF WORD.
3224 014142 004767 000002 JSR X7,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 X7
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 RO,TEST ;PUT IN TEST.
3241 014222 012767 177777 164366 MOV #-1,REFF ;PREDETERMINE RESULT IN REFF.
3242 014230 160067 164362 SUB RO,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 EXPECTED 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 RO,TEST ;PUT IN TEST.
3255 014264 012767 177777 164324 MOV #-1,REFF ;PREDETERMINE THE RESULT.
3256 014272 160067 164320 SUB RO,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 RO,TEST ;PUT IN TEST.
3269 014326 012767 177777 164262 MOV #-1,REFF ;PREDETERMINE RESULT.
3270 014334 160067 164256 SUB RO,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
3280
3281 014360 004767 000326          JSR      PC,RNGEN      ;GET RANDOM NUMBER.
3282 014364 110067 000426          MOV      RO,TEMP      ;PUT IN LOW BYTE OF TEMP.
3283 014370 110067 000423          MOV      RO,TEMP+1    ;PUT IN HIGH BYTE.
3284 014374 126767 000416 000415  CMP      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
3295
3296 014420 012767 000200 164172  :*****
3297 014426 000367 164166          :SBTTL  TEST SWAB
3298 014432 100001          :*****
3299 014434 104006          MOV      #0200,TEST
3300 014436 001401          SWAB      TEST
3301 014440 104006          BPL      .+4
3302 014442 000367 164152          HLT
3303 014446 100401          BEQ      .+4
3304 014450 104006          HLT
3305 014452 001001          SWAB      TEST
3306 014454 104006          BMI      .+4
3307 014456 104400          HLT
3308          SCOPE
3309
3310
3311
3312 014460 004767 000226          :*****
3313 014464 010067 164126          :SBTTL  TEST RANDOM COMBINATIONS OF SWAB
3314 014470 105067 164123          :*****
3315 014474 116767 164116 164117  JSR      PC,RNGEN      ;GET RANDOM NUMBER.
3316 014502 105067 164112          MOV      RO,REFF      ;PUT IN REF.
3317 014506 000367 164106          CLRB     REFF+1
3318 014512 026767 164102 164076  MOV      REFF,TEST+1    ;PUT IN TEST HIGH BYTE.
3319 014520 001401          CLRB     TEST      ;AND CLEAR THE LOW BYTE OF TEST.
3320 014522 104006          SWAB      TEST      ;NOW DO THE SWAB!
3321 014524 104400          CMP      TEST,REFF      ;REFF AND TEST MUST BE SAME.
3322          BEQ      .+4          ;BR IF SAME. OK.
          HLT              ;ERROR!'. SWAB FAILURE.
          SCOPE

```

```

3323 .....
3324 .SBTTL  END OF USER CODE IN BANK
3325 .....
3326 .CALL KERNEL/
3327 .ALTERED IN CORE EXPANSION/
3328 014526 104010 DONE:  EOB ;THIS EMT CALL GOES TO EOBSRV
3329 014530 000240 NOP ;TO ALLOW CORE EXPANSION TO PATCH IN JMP
3330 .....
3331 .SBTTL  GROUP OF NESTED SUBROUTINES/
3332 .....
3333 .....
3334 014532 000207 SUBR1:  RTS 27 ;ONE INSTRUCTION
3335 014534 000277 SUBR2:  SCC ;ONE DEEP
3336 014536 000207 SUBR3:  RTS 27 ;TWO DEEP
3337 014540 004767 177770 SUBR3:  JSR 27,SUBR2 ;TWO DEEP
3338 014544 000207 SUBR4:  RTS 27 ;THREE DEEP
3339 014546 004767 177766 SUBR4:  JSR 27,SUBR3 ;THREE DEEP
3340 014552 000207 SUBR5:  RTS 27 ;FOUR DEEP
3341 014554 004767 177766 SUBR5:  JSR 27,SUBR4 ;FOUR DEEP
3342 014560 000207 SUBR6:  RTS 27 ;FIVE DEEP
3343 014562 004767 177766 SUBR6:  JSR 27,SUBR5 ;FIVE DEEP
3344 014566 000207 SUBR6:  RTS 27
3345 .....
3346 .SBTTL  SCOPE AND/OR ITERATION LOOP FOR EACH TEST TIMES/
3347 .....
3348 .....
3349 014570 005737 000042 SCOPEC:  TST 2742 ;IN AUTOMATIC MODE?
3350 014574 001017 BNE 28 ;BR IF YES.
3351 014576 032767 002000 163372 BIT 2000,SREG2 ;INHIBIT PROCESSOR TESTS?
3352 014604 001403 BEQ 18 ;NO
3353 014606 022626 CMP (SP)+,(SP)+ ;CLEAN UP EMT CALL FROM STACK.
3354 014610 000167 165552 JMP MAIN ;YES
3355 014614 032767 040000 163354 18: BIT 40000,SREG2 ;TEST SR FOR SCOPE
3356 014622 001015 BNE SCOPEB ;YES, SCOPE
3357 014624 032767 004000 163344 BIT 4000,SREG2 ;NO-TEST FOR ITERATION
3358 014632 001014 BNE SCOPEG ;INHIBIT ITERATION
3359 014634 005767 000046 28: TST PASCNT ;IN FIRST PASS?
3360 014640 001411 BEQ SCOPEG ;BR IF YES. NO ITERATIONS ON 1ST PASS.
3361 014642 005267 000034 INC SCOPEF ;INCREMENT COUNT.
3362 014646 026767 000030 000022 CMP SCOPEF,ICOUNT ;COMPARE CURRENT COUNT TO MAX NUMBER
3363 014654 103003 BHS SCOPEG ;EXIT-DONE
3364 014656 016716 000022 SCOPEB:  MOV RETURN,2SP
3365 014662 000002 RTI
3366 014664 005067 000012 SCOPEG:  CLR SCOPEF ;CLEAR COUNT
3367 014670 011667 000010 MOV 2X6,RETURN ;SAVE SCOPE RETURN POINTER
3368 014674 000002 RTI ;RETURN INLINE-NEXT TEST
3369 014676 000000 ICOUNT:  0 ;ITERATION COUNT
3370 014700 000024 SICNT:  20. ;STANDARD ITERATION COUNT.
3371 014702 000000 SCOPEF:  0 ;COUNT LOCATION FOR ITERATION LOOP
3372 014704 000000 RETURN:  0 ;ADDRESS OF LAST TEST
3373 014706 000000 PASCNT:  0 ;HOLDS PASS COUNT.
3374 014710 001750 XDPCNT: 1000. ;PASS COUNT TO USE WHEN IN XNDP (MAIN MODE).
3375 .....
3376 .SBTTL  ROUTINE RNGEN
3377 .....
3378 .....

```

3379
 3380
 3381 014712 016700 000642
 3382 014716 006100
 3383 014720 006100
 3384 014722 066700 000034
 3385 014726 010067 000026
 3386 014732 006100
 3387 014734 006100
 3388 014736 066700 000020
 3389 014742 006100
 3390 014744 006100
 3391 014746 010067 000010
 3392 014752 016700 000002
 3393 014756 000207
 3394 014760 001233
 3395 014762 007622
 3396
 3397
 3398
 3399
 3400 014764 125252
 3401 014766 014764
 3402 014770 052525
 3403 014774 014774
 3404 014776 177777
 3405 014778 015000
 3406 015000 015000
 3407 015002 125252
 3408 015004 015004
 3409 015006 052525
 3410
 3411
 3412 015008 000000
 3413 015010 015006
 3414 015012 015016
 3415 015014 000000
 3416 015016 015016
 3417 015018 015024
 3418 015020 015026
 3419 015022 000000
 3420

```

;*****
;RANDOM NUMBER GENERATOR
RNGEN: MOV     RP1,R0
        ROL     R0
        ROL     R0
        ADD     RP2,R0
        MOV     R0,RP1
        ROL     R0
        ROL     R0
        ADD     RP2,R0
        ROL     R0
        ROL     R0
        MOV     R0,RP2
        MOV     RP1,R0
        RTS     PC
;RETURN.

RP1:    1233
RP2:    7622

;*****
;SBTTL  FIXED VALUES FOR USE IN TEST/
;*****
B:      125252
        B
;ADDRESS OF B
        052525
        . = B+10
A:      -1
        A+4
        . = A+4
        125252
        A+10
;ADDRESS OF A+10
        052525

;FOR STORAGE
C:      0
        C
;ADDRESS OF C
        . = C+10
TEMP:   0
        TEMP
;ADDRESS OF TEMP
        . = TEMP+6
        TEMP+10
;ADDRESS OF TEMP+10 OR "D"
D:      0
  
```

```

3421
3422
3423
3424
3425 015030 010146
3426 015032 010246
3427 015034 010346
3428 015036 012701 000536
3429
3430 015042 012703 000010
3431 015046 012102
3432
3433 015050 005022
3434 015052 077302
3435 015054 020127 000544
3436 015060 003770
3437 015062 012603
3438 015064 012602
3439 015066 012601
3440 015070 000207
3441
3442
3443
3444
3445
3446 015072 162716 000002
3447 015076 006576 000000
3448 015102 012667 000022
3449 015106 062716 000002
3450 015112 105067 000013
3451 015116 062767 015132 000004
3452 015124 017707 000000
3453 015130 000000
3454 000000
3455 000000
3456 000000
3457 015132 000000
3458 015134 000000
3459 015136 000000
3460 015140 015664
3461 015142 015144
3462
3463
3464
3465
3466
3467 015144 032767 000007 163022
3468 015152 001406
3469 015154 012716 015564
3470 015160 012766 000340 000002
3471 015166 000002
3472 015170 042737 000340 177776
3473 015176 026767 163372 163310
3474 015204 001444
3475 015206 062737 020000 000034
3476 015214 062767 020000 163356

;.....
;SBTTL ROUTINE SUBROUTINE TO INITIALIZE ALL PAGES TO NR, BANK 0, 1 PAGE, UP/
;.....
NRALL: MOV R1,-(R6) ;SAVE REGISTERS
      MOV R2,-(R6)
      MOV R3,-(R6)
      MOV #IPDRTAB,R1 ;R1 HOLDS ADDRESS OF CURRENT POSITION
                        ;IN TABLE OF ADDRESSES
NRLOOP: MOV #8,R3 ;R3 USED AS COUNTER
        MOV (R1)+,R2 ;R2 CONTAINS ADDRESS OF PDR OR
                        ;PAR TO BE CLEARED
        CLR (R2)+ ;CLEAR ALL ASR'S FOR THIS MODE
        SOB R3,-2
        CMP R1,#IPDREND ;CHECK FOR DONE
        BLE NRLOOP ;CLEAR ALL IN NEXT MODE IF NOT DONE
        MOV (R6)+,R3
        MOV (R6)+,R2
        MOV (R6)+,R1
        RTS #7

;.....
;SBTTL EMT HANDLER/
;.....
;FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES/
EMTSRV: SUB #2,@SP ;GET CALL
        MFP1 @SP
        MOV (SP)+,EPC
        ADD #2,@SP
        CLRB EPC+1 ;SAVE OFFSET ONLY
        ADD #EMTAB,EPC ;POINT TO TABLE OF ADDRESSES
        MOV @EPC,PC ;JUMP TO DESIRED ROUTINE

EPC: 0
      PATCH1=0
      PATCH2=0
      PATCH3=0

EMTAB: PATCH1 ;PATCH IN ADDRESS OF ROUTINE
        PATCH2
        PATCH3
        PRINT ;ERROR PRINTOUT
        EOBSRV ;END OF BANK

;.....
;SBTTL ROUTINE END OF BANK SERVICE
;.....
EOBSRV: BIT #7,MMOPT ;MEM. MGMT./USER-KERNEL/4KAS 32 INHIBITED?
        BEQ EOBS2 ;NO - CONTINUE
EOBS1C: MOV #LOGIC,(SP) ;GO TO BEGIN
        MOV #340,2(SP) ;WILL ASSUME PRIORITY 7.
        RTI
EOBS2: BIC #340,@#PSR
        CMP CURPAR,UPAR7 ;LAST USER ASR DONE?
        BEQ NXTBNK ;YES - GO FIND NEXT BANK
        ADD #20000,@#34 ;UPDATE SCOPE VECTOR ADDRESS IN BANK J
        ADD #20000,BNKSIR ;UPDATE BANK START TO REFERENCE CURRENT ASR

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3477 015222 016716 163352      MOV      BNKSTR,(SP)
3478 015226 026767 163256 163340  CMP      UPARO,CURPAR
3479 015234 001404      BEQ      NXTSEG
3480 015236 005077 163332      CLR      @CURPAR      ;SET PREVIOUS 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      MFP1      R6 ;PICK UP USER STACK POINTER
3488 015306 062716 020000      ADD      #20000,@R6 ;MAP IT TO NEXT ASR
3489 015312 006606      MTP1      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      MTP1      R6
3494 015332 013737 00057C 000572      MOV      @CURBNK,@OLDBNK ;SAVE PREV BANK ADDRESS
3495 015340 062767 000200 163222  BNK1ST: 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,@KPCR2
3504 015414 036777 163170 163170      BIT      COREPT,@MEMUT
3505 015422 001746      BEQ      BNK1ST
3506 015424 042737 160000 000034      BIC      #160000,@#34 ;INITIALIZE SCOPE VECTOR 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      UPARO,CURPAR ;FIRST ASR CHECKED IS USER ASR0
3514 015460 016767 163016 163110      MOV      UPDRO,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,@KPCR2
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 SENDAD: 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

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3556 ;*****
3557 ;SBTTL RTT EXECUTED WHEN TRACE IS ON/
3558 ;*****
3559 015662 000005 TRTP: RTT
3560
3561 ;*****
3562 ;SBTTL ROUTINE PRINT
3563 ;*****
3564 ;ENTERED WITH SYSTEM TRAP CALL (HLT)
3565 ;PRINT OUT THE ERROR PC+2, STATUS REGISTER, AND LOCATION IN BACKGROUND
3566 PRINT: TST PRTON ;CHECK PRINT ON FLAG
3567 015664 005767 000170 BEQ .+4 ;IF ANOTHER HALT IS BEING PRINTED, SKIP THIS ONE
3568 015670 001401 RTI
3569 015672 000002 INC PRTON
3570 015674 005267 000160 MOV #340,PSR ;SET PRIORITY TO 7
3571 015700 012767 000340 162070
3572 ;*****
3573 015706 037727 162634 020000 CHGC6: BIT @SR,#20000 ;TEST FOR INHIBIT PRINT OUT
3574 ;*****
3575 015714 001044 BNE CK ;BR TO INHIBIT PRINT.
3576 015716 012667 000132 MOV (6)+,SAVPC ;PC OF FAILING ROUTINE
3577 015722 012667 000130 MOV (6)+,SAVPSR ;PSR OF ERROR CONDITION
3578 015726 024646 CMP -(6),-(6) ;RESTORE STACK
3579 015730 012767 000200 162040 MOV #200,PSR
3580 015736 004767 000342 JSR %7,CRLF ;OUTPUT CARRIAGE RETURN AND LINE FEED
3581 015742 016767 000106 000264 MOV SAVPC,PTEMP1 ;LOAD WITH FAILING PC+2
3582 015750 004767 000106 JSR %7,PROCT ;PRINT FAILING PC+2
3583 015754 004767 000272 JSR %7,SPACE
3584 015760 016767 000072 000246 MOV SAVPSR,PTEMP1 ;LOAD PROCESSOR STATUS
3585 015766 004767 000070 JSR %7,PROCT ;PRINT PROCESSOR STATUS
3586 015772 004767 000254 JSR %7,SPACE
3587 015776 016767 162566 000230 MOV CURBNK,PTEMP1
3588 016004 004767 000052 JSR %7,PROCT
3589 016010 004767 000236 JSR %7,SPACE
3590 016014 016767 176664 000212 MOV RETURN,PTEMP1
3591 016022 004767 000034 JSR %7,PROCT
3592 016026 023727 000042 015640 CK: CMP @#42,@SENDAD ;IN ACT11?
3593 016034 001403 BEQ AB ;BR IF YES TO HALT
3594 ;*****
3595 016036 005777 162504 CHGC7: TST @SR ;CHECK SR FOR HALT SWITCH
3596 ;*****
3597 016042 100001 BPL .+4 ;BRANCH IF NOT SET
3598 016044 000000 AB: HALT ;HALT ON ERROR UP
3599 016046 005067 000006 CLR PRTON ;ROUTINE DONE - CLEAR FLAG
3600 016052 000002 RTI ;RETURN TO MAIN LINE
3601 016054 000000 SAVPC: 0
3602 016056 000000 SAVPSR: 0
3603 016060 000000 PRTON: 0
3604
3605 ;*****
3606 ;SBTTL ROUTINE PROCT
3607 ;*****
3608 ;SUBROUTINE TO PRINT OUT OCTAL NUMBER/
3609 016062 012727 000006 016066 PROCT: MOV #6,PTEMP3 ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
3610 016066 PTEMP3=-2
3611

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3612 016070 005067 000136      CLR      PRFLG      ;INITIALIZE CARRY FLAG FOR ROTATES
3613 016074 012767 000060 000134  MOV      #60,PTMP2    ;SETUP R3
3614 016102 005767 000126      TST      PTMP1      ;CHECK BIT 15 OF NUMBER
3615 016106 100002      BPL      .+6        ;BRANCH IF ZERO
3616 016110 005267 000122      INC      PTMP2      ;INCREMENT R3 IF ONE
3617 016114 006167 000114      ROL      PTMP1      ;ROTATE LEFT MOST OCTAL TO RIGHT END
3618 016120 006167 000110      ROL      PTMP1
3619 016124 005567 000102      ADC      PRFLG      ;STORE CARRY
3620 016130 016746 000102      P.WAIT: MOV      PTMP2,-(SP)  ;OUTPUT THE CHARACTER
3621 016134 004767 000210      JSR      PC,CHROUT  ;DO IT.
3622 016140 005367 177722      DEC      PTMP3      ;COUNT
3623 016144 001001      BNE      P.CNT1      ;BRANCH IF NOT DONE
3624 016146 000207      RTS      X7        ;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      PTMP1      ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
3631 016172 006167 000036      ROL      PTMP1
3632 016176 006167 000032      ROL      PTMP1
3633 016202 005567 000024      ADC      PRFLG      ;STORE CARRY
3634 016206 016767 000022 000022  MOV      PTMP1,PTMP2  ;LOAD DATA INTO R3
3635 016214 042767 177770 000014  BIC      #177770,PTMP2 ;CLEAR ALL BUT LOWEST OCTAL DIGIT
3636 016222 052767 000060 000006  BIS      #60,PTMP2    ;SET TO ASCII EQUIVALENT
3637 016230 000737      BR      P.WAIT      ;LOOP
3638 016232 000000      PRFLG: 0
3639 016234 000000      PTMP1: 0      ;CONTAINS VALUE TO BE OUTPUT
3640 016236 000000      PTMP2: 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 .SBTTL ROUTINE SPACE
3653 ;*****
3654 ;SUBROUTINE TO ISSUE SPACE/
3655 016252 012746 000040      SPACE: MOV      #40,-(SP)  ;OUTPUT SPACE.
3656 016256 004767 000066      JSR      PC,CHROUT  ;DO IT.
3657 016262 000207      RTS      X7        ;RETURN
3658
3659 ;*****
3660 .SBTTL ROUTINE BELL
3661 ;*****
3662 ;BELL ON PASS COMPLETE
3663 016264 012746 000007      BELL:  MOV      #7,-(SP)  ;OUTPUT BELL.
3664 016270 004767 000054      BELL1: JSR      PC,CHROUT  ;DO IT.
3665 016274 005327 000000      DEC      #0        ;SLIGHT DELAY.

```

3668 016300 001375
 3669 016302 000207
 3670
 3671
 3672
 3673
 3674
 3675
 3676 016304 012746 000015
 3677 016310 004767 000034
 3678 016314 012746 000012
 3679 016320 004767 000024
 3680 016324 016746 162272
 3681 016330 001405
 3682 016332 005046
 3683 016334 004767 000010
 3684 016340 005316
 3685 016342 001373
 3686 016344 005726
 3687 016346 000207
 3688
 3689
 3690
 3691
 3692
 3693
 3694 016350 016677 000002 162034
 3695 016356 105777 162026
 3696 016362 100375
 3697 016364 012616
 3698 016366 000207
 3699
 3700
 3701 016370 013746 000024
 3702 016374 010667 000010
 3703 016400 012737 016412 000024
 3704 016406 000000
 3705 016410 000000
 3706 016412 016706 177772
 3707 016416 012637 000024
 3708 016422 022626
 3709 016424 104006
 3710 016426 000167 162202
 3711
 3712
 3713 016432 000207
 3714
 3715 017760 017760
 3716 017760 000000
 3717 000001

BELL2: BNE -4
 RTS 27

.....
 :SBTTL ROUTINE CRLF
 :.....
 :SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED/
 CRLF: MOV #15,-(SP) ;OUTPUT CR.
 JSR PC,CHROUT ;DO IT.
 MOV #12,-(SP) ;OUTPUT LF.
 JSR PC,CHROUT ;DO IT.
 MOV FILLCT,-(SP) ;GET THE FILL COUNT.
 BEQ 2\$;BR IF 0.
 1\$: CLR -(SP) ;WILL OUTPUT NULLS FOR FILLERS.
 JSR PC,CHROUT ;DO IT.
 DEC (SP) ;DONE?
 BNE 1\$;BR IF NOT.
 2\$: TST (SP)+ ;CLEAN UP STACK.
 RTS PC ;RETURN.

.....
 :SBTTL ROUTINE CHROUT
 :.....
 :SUBROUTINE TO OUTPUT CHARACTER TO CONSOLE TTY.
 CHROUT: MOV 2(SP),@TDBR ;LOAD THE CONSOLE BUFFER REG.
 1\$: TSTB @TCSR ;READY?
 BPL 1\$;BR IF NOT. WAIT.
 MOV (SP)+,(SP) ;SET UP FOR EXIT.
 RTS PC ;RETURN.

.....
 :ENTER HERE ON POWER FAIL/
 PFAIL: MOV @24,-(6)
 MOV %6,SAVR6 ;STORE STACK POSITION
 MOV #RESTR1,@24
 HALT ;HALT ON POWER DOWN NORMAL
 SAVR6: 0 ;STACK IS SAVED HERE
 RESTR1: MOV SAVR6,%6 ;RESTORE STACK WHEN POWERING UP
 MOV (6)+,@24
 CMP (SP)+,(SP)+ ;RESTORE STACK
 HLT ;POWER FAIL OCCURRED
 JMP RSTR1
 ;RETURN TO MAIN LINE

USER: RTS 27
 ;OVERLAY USER ROUTINE HERE IF 8KW
 ;USE BANK1 IF 8KW

KSTACK: 0
 .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•								
BNKTS1	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										
CMGC1	001440	626	1014#											
CMGC2	001526	627	1030#											
CMGC3	001572	628	1043#											
CMGC4	001670	629	1061#											
CMGC5	001730	630	1073#											
CMGC6	015706	631	3573#											
CMGC7	016036	632	3595#											
CHROUT	016350	3621	3657	3666	3677	3679	3683	3694#						
CK	016026	3575	3592#											
CLINCT=	003340	1078•	1301	1304#	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•	34•9#
		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#										

[illegible]

[illegible]

[illegible]

[illegible]

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#											
TICSR	000410	639	830#	1005*	1247									
TIDBR	000412	640	831#	1245*										
TIPST	000416	833#												
TIPVC	000414	832#	1004*											
TISAV	000420	834#	1247*	1248										
TYOUT	003054	1243#	1253											
TYOUTR	003070	1004	1247#											
TYOUT1	003060	1245#	1254											
USUFF	000400	827#	1138	3491										
UPARO	000510	862#	1109	1121	3478	3513								
UPAR1	000512	863#												
UPAR7	000514	864#	3473	3517*										
UPDRO	000502	859#	1117*	1122	3514									
UPDR1	000504	860#												
UPDR7	000506	861#	3518*											
USEALL	002200	1107	1117#											
USER	C16432	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#											
XFER8	002716	1199	1221#											
SENDAD	015640	804	946	3547#	3592									
SICNT	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#
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		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	3047

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#					

NAME	1#	2#	3#	4#	5#	6#	7#	8#	9#	10#	11#	12#	13#	14#	15#
COMREN	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				
SECTION	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	2828	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									

.SASTA 1#
.SCATC 1#
.SCMTA 1#
.SDB2D 1#
.SDB2D 1#
.SDIV 1#
.SEOP 1#
.SERRO 1#
.SERRT 1#
.SMULT 1#
.SPOWE 1#
.SRAND 1#
.SRDDE 1#
.SRDOC 1#
.SREAD 1#
.SR2AZ 1#
.SSAVE 1#
.SSB2D 1#
.SSB2D 1#
.SSCOP 1#
.SSIZE 1#
.SSUPR 1#
.STRAP 1#
.STYPB 1#
.STYPD 1#
.STYPE 1#
.STYPO 1#
.S4OCA 1#
.1170 1#

. ABS. 017762 000

ERRORS DETECTED: 0

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