

PDP11/34

MEM MANG EXERCISER
MD-11-DFKTG-A

EP DFKTG A DL A

OCT 1976

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FICHE 1 OF 1

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4.1 NORMAL STARTING PROCEDURE (CONTINUED)

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

4.2 MEMORY MANAGEMENT SELECTION SWITCHES (BITS IN LOC. 174, MMOPT)..

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

- MMOPT BIT0=1 ---INHIBIT THE MEMORY MANAG. (SRO<0> WILL NOT BE SET AT ALL)
- MMOPT BIT1=1 ---INHIBIT USE OF USER MODE.
(ALSO INHIBITS 4K AS 32K)
- MMOPT BIT2=1 ---INHIBIT 4K AS 32 K (ALSO INHIBITED IF EITHER MMOPT BIT0 OR MMOPT BIT1 IS SET)-SEE SECTION 5.3.1 FOR EXPLANATION
- MMOPT BITS=1 ---INHIBIT VARIABLE CORE EXPANSION
=0 -CORE EXPAND UNLESS MMOPT BIT0, 1 AND 2 ARE ALL ZERO
(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 SR IF NECESSARY). SEE ALSO 5.1.2. EACH SWITCH, IF SET, INHIBITS A SINGLE I/O DEVICE FROM BEING EXERCISED. IF A DEVICE DOES NOT EXIST, THE CORRESPONDING INHIBIT SWITCH DOES NOT HAVE TO BE SET.

- SW0=1 ---INHIBIT TTY OUTPUT
- SW3=1 ---INHIBIT RK11 DISK
- SW4=1 ---INHIBIT LINE CLOCK
- SW5=1 ---INHIBIT RP11 DISK
- SW6=1 ---INHIBIT TC11 DECTAPE
- SW7=1 ---INHIBIT LINE PRINTER (USE SA310 IF LP11 IS SELECTED)

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4.4 RESTART PROCEDURE

USING RESTART ADDRESS 310 THE SWITCH REGISTER SETTINGS GIVEN PREVIOUSLY ARE USED (FOR BOTH MEMORY MANAGEMENT SELECTION AND DEVICE SELECTION). NO HALT OCCURS AFTER START IS PRESSED.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

5.1.1 BASIC SWITCH SETTINGS-STARTUP

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

5.1.2 DYNAMIC SWITCH SETTINGS

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

THE FOLLOWING SWITCHES ARE RECHECKED PERIODICALLY DURING PROGRAM EXECUTION:

- SW15=1 ---HALT ON ERROR
- SW14=1 ---SCOPE LOOP
- SW13=1 ---INHIBIT PRINT OUT
- SW12=1 ---INHIBIT TRACE TRAPPING
- SW11=1 ---INHIBIT SUB-PROGRAM ITERATION AND INHIBIT TESTS WHICH USE ALL COMBINATIONS OF NUMBERS
- SW10=1 ---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.

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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 (00000). 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.

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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 RSTART (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.

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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.

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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.

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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.

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5.3.2 PROCESSOR TEST EXECUTION - CORE EXPANSION

IF MMOPT BIT 1 OR 2 ARE ONE AND BIT 5 IS ZERO AT STARTUP, THE PROCESSOR TESTS WILL BE CORE EXPANDED THRU ALL AVAILABLE MEMOP. UP TP 28K. THR ROUTINE DET1 DOES THIS CORE EXPANSION, COPYING BANK 0 INTO EACH OF THE OTHER BANKS. THE EMT CALL AT THE END OF EACH BANK (EOB) WHICH CALLS THE END OF BANK SERVICE ROUTINE IS CHANGED TO A JUMP TO BEGINX IN THE NEXT BANK. THE EOB CALL IN THE LAST BANK IS LEFT ALONE. IF 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 SET, KERNEL PAGES 0-6 ARE MAPPED SO THAT THE PHYSICAL AND VIRTUAL ADDRESSES ARE THE SAME, AND THE PROCESSOR TESTS ARE THEN RUN IN KERNEL MODE. IF BIT0 WAS SET, ORDINARY CORE EXPANSION IS RUN WITH NO SPECIAL MAPPING REQUIRED (MEMORY MANAG. IS TURNED OFF).

5.3.3 PROCESSOR TEST EXECUTION - BANK 0 ONLY

IF MMOPT BITS 0, 1 OR 2 ARE ONE AND BITS IS ONE 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 MANAG. IS TURNED OFF AND THE PROCESSOR TESTS ARE EXECUTED IN KERNEL MODE OR USER MODE (DEPENDING ON BIT1) IN BANK 0 ONLY.

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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.

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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 CURBANK 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.

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8.0 MISCELLANEOUS

8.1 EXECUTION TIME

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

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

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

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.

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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 MANAG. SETUP CODE. THE RFI1 AND TCI1 PRIMER CODE IS IN WITH THE MEMORY MANAG. SETUP CODE SINCE THEY REQUIRE CERTAIN PARTS OF THE MEMORY MANAG. CODE TO BE RUN FIRST. AFTER MEMORY MANAGEMENT IS TURNED ON, EXECUTION OF THE BACKGROUND PROCESSOR TESTS BEGINS, AND THE I/O DEVICES ARE SERVICED WHEN THEY INTERRUPT.

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: THIS PROGRAM IS A MODIFICATION OF THE 11/40 DIAGNOSTIC, DBKTG.
: THIS TEST HAS BEEN MODIFIED TO PROVIDE SOFTWARE SWITCH CAPABILITY
: AND TO ACCOUNT FOR ANY 11/34 - 11/40 DIFFERENCES.
: THIS PROGRAM IS INTENDED FOR USE ON ONLY 11/34 PROCESSORS.

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: PDP11/34 SYSTEM EXERCISER, WITH MEMORY MANAG. --- 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 MANAG. 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 ( OPTION SETTINGS PREVIOUSLY MADE ARE USED)

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

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

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

: DEFINITIONS
: NOP=240
: SCOPE=TRAP
: TCSR=TTCSR
: TDBR=TTDBR
: PSR=177776
: HLT=104006
: EOB=104010

: SYSTEM NULL OPERATION
: TRAP USED SCOPE LOOP AND ITERATION

: ERROR PRINTOUT CALL
: END OF BANK CALL

```

000240
104400
000410
000412
177776
104006
104010


```

757 000310 000137 000616 JNP 20RSTRY
758
759 ;DATA AREA
760 000400 ;=400
761 000400 UBUFF: 0
762 000406 ;=44
763 000406 TRCSR: 177560
764 000410 TTCSR: 177564
765 000412 TTDBR: 177566
766 000414 TTPVC: 64
767 000416 TTPST: 66
768 000420 TTSAV: 0
769 000422 KMLVC: 100
770 000424 KMLST: 102
771 000426 LKCSR: 177546
772 000430 LPCSR: 177514
773 000432 LPDBR: 177516
774 000434 LPVC: 20
775 000436 LPST: 202
776 000440 RFDAR: 177470
777 000442 RFDAR: 177466
778 000444 RFWC: 177462
779 000446 RFCAR: 177464
780 000450 RFCSR: 177460
781 000452 RFCSRH: 177461
782 000454 RFVC: 204
783 000456 RFST: 206
784 000460 RKDAH: 177413
785 000462 RKDAE: 177412
786 000464 RKWC: 177406
787 000466 RKBAR: 177410
788 000470 RKCSR: 177404
789 000472 RKCSRH: 177405
790 000474 RKVC: 220
791 000476 RKST: 222
792 000480 SR0: 177572
793 000482 UPDR0: 177600
794 000484 UPDR1: 177602
795 000486 UPDR7: 177616
796 000490 UPAR0: 177640
797 000492 UPAR1: 177642
798 000494 UPAR7: 177656
799 000496 KPDR0: 172300
800 000498 KPDR1: 172302
801 000500 KPDR2: 172304
802 000502 KPDR7: 172316
803 000504 KPAR0: 172340
804 000506 KPAR1: 172342
805 000508 KPAR2: 172344
806 000510 KPAR7: 172356
807
808 000536 IPDRTAB: 177600
809 000540 177640
810 000542 172300
811 000544 IPDREND: 172340
812 000546 SR: 177570

```

```

;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 MANAG. REGISTERS

```

```

;SWITCH REGISTER POINTER

```


H02

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DFKTGA.P11 MAIN

813 000550 177571
814 000550 177342
815 000550 177340
816 000550 177350
817 000550 177344
818 000550 177346
819 000550 000214
820 000550 000216
821 000550 000210
822 000550 000210
823 000574 000210
824 000576 000210
825 000600 000210
826 000602 000000
827
828
829
830
831 000604 177777
832 000606 077777
833 000610 000001
834 000612 000604
835 000614 000000
836
837
838 000616 012706 017760
839 000622 012737 016634 000024
840 000630 117737 177714 000177
841 000636 000452
842
843
844
845 000640 012706 017760
846 000644 012737 000137 000200
847 010652 012737 000640 000202
848 010660 013746 000004
849 010664 013746 000006
850 000670 012767 000704 177106
851 000676 005777 177644
852 000702 000404
853 000704 012767 000176 177634 18:
854 000712 022626
855 000714 016767 177626 177626 28:
856 000722 005267 177622
857 000726 012637 000006
858 000732 012637 000004
859 000736 005737 000042
860 000742 001405
861 000744 005037 000174
862 000750 005037 000176
863 000754 000403
864 000756
865 000756 017737 177564 000176
866 000764 004767 014016
867 000770 012777 077406 177520
868 000776 012777 007600 177530

SRH: 177571
TCOM: 177342
TCST: 177340
TCOT: 177350
TCWC: 177344
TCBA: 177346
TCIV: 214
TCSTA: 216
CUR * : 0
OL * : 0
CUR * : 0
CUR * : 0
BK * : 0
TRP9: 0

;HIGH BYTE SWITCH REG POINTER
;CONTROL AND FUNCTION
;GENERAL STATUS
;DATA
;WORD COUNT
;BUS ADDRESS
;DECTAPE INTERRUPT VECTOR
;SAFE TO POINT TO CURRENT BANK
;ADDRESS OF CURRENT ISAR
;PC TO POINT TO BEGIN THRU CURRENT SEGMENT

;THE NEXT TWO WORDS ARE THE MEMORY MAP. THE FIRST WORD REPRESENTS
;0-64K WITH ONE BIT REPRESENTING A 4K CONTIGUOUS BLOCK. IF THE
;BIT=1 THAT 4K BLOCK IS PRESENT. THE LSB REPRESENTS 0-4K, THE NEXT
;SIGNIFICANT BIT REPRESENTS 4-8K AND SO ON.
M 10: 177777 ;0-64K
M 11: 77777 ;64-124K
CUMPT: 1
MEMUT: MEMO
TBANK: 0

;RESTART ADD USING INITIAL SR SETTINGS

RSTRT: MOV #KSTACK, R6
MOV #PFIL, #24
MOVB #SRH, #SREG2+1
BR START1

;START UP FOR MINI MONITOR

START: MOV #KSTACK, R6 ;SET UP STACK
MOV #137, #200 ;RESTORE 200 IF START AT 300
MOV #START, #202
MOV #4, -(SP) ;;SAVE ERROR VECTOR
MOV #6, -(SP)
MOV #18, 4
TST #SR
BR 28
18: MOV #SREG, SR
CMP (SP)+, (SP)+
28: MOV SR, SRH
INC SRH ;POINT TO HIGH BYTE OF SR
MOV (SP)+, #6 ;;RESTORE ERROR VECTOR
MOV (SP)+, #4
TST #42 ;CHECK FOR MONITOR OPERATION
BEQ STARTX
CLR #MMOPT ;RUN ALL SW DOWN IF MONITOR
CLR #SREG2
BR START1

STARTX: MOV #SREG2
START1: JSR #7, #RALL
MOV #77406, #KPDRO
MOV #7600, #KPAR7

;MAP PAGE 7 TO EXT BANK

869	001004	012777	077406	177512		MOV	#77406, #KPOR7	
870	001012	007367	177576			CLR	TBANK	
871	001016	012767	177777	177550		MOV	#177777, MEMD	;SET UP CORE MAPS
872	001024	012767	077777	177554		MOV	#77777, MEM1	
873	001032	012767	000001	177550		MOV	#1, COREPT	;SET UP 4K POINTER
874	001040	012767	000004	177544		MOV	#MEMD, MEMUT	
875	001046	012777	077406	177446		MOV	#77406, #KPOR2	;BEING CHECKED FOR
876	001054	012737	001124	000004		MOV	#THEMEX, #04	;SET UP FOR TIME OUTS
877	001062	005037	000006			CLR	#06	
878	001066	052777	000001	177404		BIS	#1, #SR0	
879	001074	016777	177514	177430	MAP1:	MOV	TBANK, #KPAR2	;MAP KERNEL PAGE 2 TO BANK
890	001102	005737	041000			TST	#41000	;1ST K PRESENT
881	001106	005737	045000			TST	#45000	;2ND K PRESENT
882	001112	005737	051000			TST	#51000	;3RD K PRESENT
883	001116	00737	055000			TST	#55000	;4TH K PRESENT
884	001122	003404				BR	MOVEPT	;OK, FULL 4K BLOCK PRESENT
885	001124	052777	177460	177460	THEMEX:	BIC	COREPT, #MEMUT	;NO, BLOCK NOT PRESENT
886	001132	007367				CHP	(SP)+ (SP)+	;ADJUST STACK POINTER
887	001134	007367	000200	177452	MOVEPT:	ADD	#200, TBANK	;UPDATE BANK POINTER
888	001142	007367	177442			ASL	COREPT	
889	001146	100006				BCC	MAP2	;THIS 1ST MEM WORD DONE
890	001150	012767	000001	177432		MOV	#1, COREPT	
891	001156	012767	000606	177426		MOV	#MEM1, MEMUT	
892	001164	022767	007600	177422	MAP2:	CHP	#7600, TBANK	;EXTERNAL BANK YET
893	001172	001340				BNE	MAP1	;NO, NOT YET?
894	001174	012767	000001	177406		MOV	#1, COREPT	;RE-INIT
895	001202	012767	000604	177402		MOV	#MEMD, MEMUT	
896	001210	042777	000001	177262		BIC	#1, #SR0	
897	001216	012767	000001	013510		MOV	#1, #ICOUNT	
898	001224	004767	013352			JSR	#7, CALF	
899	001230	012737	014642	000034		MOV	#SCOPEC, #034	
900	001236	005037	000036			CLR	#036	;INITIALIZE SCOPE CALL TO KERNEL STATUS
901	001242	012737	015000	000030		MOV	#ENTSrv, #030	
902	001250	012737	000040	000032		MOV	#340, #032	
903	001256	012737	005452	014740		MOV	#BEGIN, #RETURN	
904	001264	005037	014736			CLR	#SCOPEF	
905	001270	012737	000340	177776		MOV	#340, #PSR	;LOCK OUT INTERRUPTS
906	001276	005037	016352			CLR	#PRTON	;PRINT RO 'TIME BUSY FLAG
907	001302	000005				RESET		
908	001304	012737	002314	000004		MOV	#NODEV, #04	;RETURN FOR NO DEVICE
909	001312	007037	000006			CLR	#06	
910	001316	007067	001444			CLR	DATA2	;BASE DATA FOR TTY TELEPRINTER
911	001322	005737	000042			TST	#42	;ACT 11?
912	001326	001403				BEQ	ST3A	;YES
913	001330	052737	000001	000176		BIS	#1, #SREG2	;INHIBIT TTY OUT
914	001336	033727	000176	000001	ST3A:	BIT	#SREG2, #1	;INHIBIT TTY OUTPUT?
915	001344	001006				BNE	ST3	;YES, GO CHECK NEXT.
916	001346	012777	003000	177040		MOV	#TYOUTR, #TTPVC	;NO, SETUP INTERRUPT VECTOR
917	001354	052777	000100	177026		BIS	#100, #TTCR	;START TTY OUTPUT
918	001362	012700	000010		ST3:	MOV	#10, #0	
919	001366	032737	000010	000176		BIT	#10, #SREG2	;INHIBIT RK DISK
920	001374	001026				BNE	ST4	;YES, SKIP OVER
921	001376	005777	177066			TST	#RKCSR	;PRESENT
922	001402	012777	003376	177064		MOV	#IRK, #RKVC	;SETUP VECTOR RETURNS
923	001410	012777	000240	177060		MOV	#240, #RKST	
924	001416	012767	043503	002014		MOV	#43503, #KFUNCT	

925	001424	005077	177032		CLR	2RKDAE		: INIT
926	001430	016777	002144	177030	MOV	LLIMIT, 2PKBAR		: CORE BASE
927	001436	016777	002140	177020	MOV	WORDCT, 2PKWC		: TRANSFER LENGTH
928	001444	116777	001770	177016	MOVB	RKFUNCT, 2RKCSR		
929	001452	006300			ASL	RO		
930	001454	033727	000176	000020	BIT	2#SREG2, #20	ST4:	: INHIBIT LINE CLOCK?
931	001462	001015			BNE	STS		: YES, GO CK NEXT
932	001464	005777	176736		TST	2LKCSR		: PRESENT
933	001470	012777	003056	176724	MOV	2LK3, 2KHLVC		
934	001476	012777	000350	176720	MOV	2300, 2KHLST		
935	001504	005067	001442		CLR	TIME		: NO, INITIALIZE COUNT
936	001510	012777	000100	176710	BIS	2100, 2LKCSR	ST5:	: START LINE CLOCK
937	001516	006300			ASL	RO		
938	001520	033727	000176	000040	BIT	2#SREG2, #40		: TEST FOR INHIBITING RFI1 DISK
939	001536	001026			BNE	ST6		: SKIP IF SET
940	001530	005777	176714		TST	2RFCSR		: PRESENT?
941	001534	012777	003472	176712	MOV	2IRF, 2RFVC		: SET UP TRAP RETURN
942	001542	012777	000240	176706	MOV	240, 2RFST		
943	001550	012767	043503	002020	MOV	243503, RFFUNCT		: WRITE CHECK/WRITE
944	001556	105277	176670		INCB	2RFCSR4		: INITIALIZE DISK-DAR, DAE
945	001562	016777	002014	176654	MOV	WORDCT, 2RFWC		: LENGTH OF TRANSFER
946	001570	016777	002004	176650	MOV	LLIMIT, 2RFCAP		: CORE ADDRESS OF START OF TRANSFER
947	001576	116777	001774	176644	MOVB	RFFUNCT, 2RFCSR	ST6:	: START RFI1 READ OR WRITE
948	001604	006300			ASL	RO		
949	001606	033727	000176	000100	BIT	2#SREG2, #100		: CHECK FOR INHIBITING TC11 DECTAPE
950	001614	001013			BNE	ST7		: SKIP IF SET
951	001616	005777	176732		TST	2TCST		: PRESENT?
952	001622	012777	003612	176734	MOV	2FENDZ, 2TCIV		: GO TO END ZONE ON INTERRUPT
953	001630	012777	000300	176730	MOV	2300, 2TCSTA		
954	001636	012777	004503	176706	MOV	2R+1E+RB+DO, 2TCCM	ST7:	: START REVERSE READ BLOCK NUMBER
955	001644	006300			ASL	RO		
956	001646	005737	000042		TST	2#42		: ACT 11?
957	001652	001402			BEQ	IS		: YES
958	001654	050037	000176		BIS	RO, 2#SREG2		
959	001660	033727	000176	000200	BIT	2#SREG2, #200	IS:	: INHIBIT LINE PRINTER?
960	001666	001032			BNE	ST8		: YES, GO CK NEXT
961	001670	005777	176534		TST	2LPCSR		: PRESENT?
962	001674	012737	001754	000004	MOV	2ST8, 2#4		: DON'T CHANGE 200 IF NO SUCH DEVICE
963	001702	012767	000137	001246	MOV	2137, 2SOLPAT		: RESET FOR START OF LINE PATTERN
964	001710	012767	000117	001332	MOV	279, 2CLINCT		: LINE COUNT
965	001716	012767	000137	001234	MOV	2137, 2CURPAT		
966	001724	012777	000014	176500	MOV	214, 2LPD8R		: LINE FEED TO POSITION BUFFER
967	001732	012777	003200	176474	MOV	2LPINTR, 2LPVC		: INTERRUPT ENABLE
968	001740	012777	000200	176470	MOV	2200, 2LPST		: INTERRUPT ENABLE
969	001746	012777	000100	176454	MOV	2100, 2LPCSR		: INTERRUPT ENABLE
970	001754	005037	000602		CLR	2#TRAP	ST8:	: NO "T" BIT FIRST PASS
971	001760	005037	000006		CLR	2#6		: CHANGE ADDRESS ERROR VECTOR TO CAUSE
972	001764	012737	000006	000004	MOV	2#6, 2#4		: HALT ON A TRAP TO 4
973	001772	004737	016676		JSR	27, 2#USER		: FOR USER I/O PROGRAM INSERTION
974	001776	004767	000332		JSR	27, 2#DETI		: CHECK FOR CORE EXPANSION
975	002002	032737	000001	000174	BIT	21, 2#MMOPT		: INHIBIT MEMORY MANAG.?
976	002010	001106			BNE	MODE		: YES - GO SETUP USER
977	002012	004767	012770		JSR	27, 2#NRALL		: NO - MAKE ALL SEGMENTS INITIALLY NON-RESIDENT
978	002016	012777	077406	176500	MOV	277406, 2KPD87		
979	002024	012777	007600	176502	MOV	27600, 2KPAR7		
980	002032	032737	000006	000174	BIT	2#6, 2#MMOPT		: INHIBIT USER/KERNEL OR 4K AS 32K?

1037	002354	032737	000040	000174	BIT	#40, @MMOPT	; CHECK VARIABLE CORE SWITCH
1038	002362	001401			BEQ	DET4	; USE VARIABLE CORE ROUTINE
1039	002364	000207			RTS	%7	; 4K ONLY (SWITCH SET)
1040	002366	012737	002452	000004	DET4: MOV	#DET2, @#4	; TRAP VECTOR SETUP
1041	002374	012737	000340	000006	MOV	#340, @#6	; TRAP STATUS SETUP
1042	002402	000241			CLC		
1043	002404	005537	037770		EIGHT: AOC	@#37770	; CHECK FOR 8K
1044	002410	000240			NOP		
1045	002412	005537	057770		AOC	@#57770	; CHECK FOR 12K
1046	002416	000240			NOP		
1047	002420	005537	077770		AOC	@#077770	; CHECK FOR 16K
1048	002424	000240			NOP		
1049	002426	005537	117770		AOC	@#117770	; CHECK FOR 20K
1050	002432	000240			NOP		
1051	002434	000537	137770		AOC	@#137770	; CHECK FOR 24K
1052	002440	000240			NOP		
1053	002442	005537	157770		AOC	@#157770	; CHECK FOR 28K
1054	002446	000240			NOP		
1055	002450	000437			BR	STRT28	
1056	002452	012602			DET2: MOV	(6)+, %2	; RETRIEVE TRAP PC
1057	002454	005726			TST	(6)+	; DISCARD TRAP STATUS WORD
1058	002456	062702	000074		ADD	#STRT4-EIGHT-4, R2	
1059	002462	000112			JMP	@R2	
1060							
1061	002464	005000			MOVE: CLR	%0	; SET UP MAIN CORE POINTER
1062	002466	010102			MOV	%1, %2	
1063	002470	062702	015006		ADD	#0+2, %2	; SET UP MAX CORE MOVE
1064	002474	012021			MOV	(0)+, (1)+	; MOVE WORD
1065	002476	020201			CMP	%2, %1	; MOVE COMPLETE?
1066	002500	001375			BNE	.-4	; MOVE ANOTHER WORD
1067	002502	000207			RTS	%7	; MOVE COMPLETE
1068	002504	000521			STRT4: BR	DET3	
1069	002506	000240			NOP		
1070	002510	000240			NOP		
1071	002512	004767	000110		JSR	7, XFER8	; START 8K TRANSFER
1072	002516	000506			BR	J04	; START 4K MODIFY
1073	002520	004767	000072		JSR	%7, XFER12	; START 12K TRANSFER
1074	002524	000475			BR	MOD8	; START 8K MODIFY
1075	002526	004767	000054		JSR	%7, XFER16	; START 16K TRANSFER
1076	002532	000464			BR	MOD12	; START 12K MODIFY
1077	002534	004767	000036		JSR	%7, XFER20	; START 20K TRANSFER
1078	002540	000453			BR	MOD16	; START 16K MODIFY
1079	002542	004767	000020		JSR	%7, XFER24	; START 24K TRANSFER
1080	002546	000442			BR	MOD20	; START 20K MODIFY
1081	002550	004767	000002		STRT28: JSR	%7, XFER28	; START 28K TRANSFER
1082	002554	000431			BR	MOD24	; START 24K MODIFY
1083	002556	012701	140000		XFER28: MOV	#140000, %1	; SET UP MOVE START LOCATION
1084	002562	004767	177676		JSR	%7, MOVE	; GO TO MOVE SUBROUTINE
1085	002566	012701	120000		XFER24: MOV	#120000, %1	
1086	002572	004767	177666		JSR	%7, MOVE	
1087	002576	012701	100000		XFER20: MOV	#100000, %1	
1088	002602	004767	177656		JSR	%7, MOVE	
1089	002606	012701	060000		XFER16: MOV	#60000, %1	
1090	002612	004767	177646		JSR	%7, MOVE	
1091	002616	012701	040000		XFER12: MOV	#40000, %1	
1092	002622	004767	177636		JSR	%7, MOVE	

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1093	002626	012701	020000		XFER8:	MOV	#20000,%1	
1094	002632	004767	177626			JSR	%7,MOVE	
1095	002632	000207				RTS	%7	;RETURN FROM TRANSFERS
1096	00 640	012767	000137	131732	MOD24:	MOV	#137,DONE+120000	
1097	00 646	012767	145420	131726		MOV	#BEGINX+140000,DONE+120002	
1098	002654	012767	000137	111716	MOD20:	MOV	#137,DONE+100000	
1099	002662	012767	125420	111712		MOV	#BEGINX+120000,DONE+100002	
1100	002670	012767	000137	071702	MOD16:	MOV	#137,DONE+60000	
1101	002676	012767	105420	071676		MOV	#BEGINX+100000,DONE+60002	
1102	002704	012767	000137	051666	MOD12:	MOV	#137,DONE+40000	
1103	002712	012767	05420	051662		MOV	#BEGINX+60000,DONE+40002	
1104	002720	012767	000137	031652	MOD8:	MOV	#137,DONE+20000	
1105	002726	012767	05420	031646		MOV	#BEGINX+40000,DONE+20002	
1106	002734	012767	000137	011636	MOD4:	MOV	#137,DONE	
1107	002742	012767	05420	011632		MOV	#BEGINX+20000,DONE+2	
1108	002750	005037	000006		DET3:	CLR	#6	
1109	002754	012737	000006	000004		MOV	#6,#4	
1110	002762	000207				RTS	%7	
1111								
1112								;TTY TRANSMITTER PRINT VALUES 0 TO 377/
1113	002764	005027	000000		TYOUT:	CLR	#0	;INITAL DATA
1114		002766					DATA2=-2	
1115	002770	016777	177772	175414	TYOUT1:	MOV	DATA2,@TTDBR	;OUTPUT TO DEVICE
1116	002776	000002				RTI		;RETURN TO MAINLINE**
1117	003000	017767	175404	175412	TYOUTR:	MOV	@TTCSR,TTSV	
1118	003006	105767	175406			TSTB	TTSV	;TEST FOR DONE
1119	003012	100401				BMI	#+4	;BRANCH IF FLAG FOUND
1120	003014	104006				HLT		;FALSE INTERRUPT RETURN
1121	003016	005267	177744			INC	DATA2	;INCREMENT DATA
1122	0030 2	022767	000400	177736		CHP	#400,DATA2	;TEST DATA FOR UPPER LIMIT
1123	003030	001755				BEQ	TYOUT	;AT UPPER LIMIT START OVER
1124	003032	000756				BR	TYOUT1	;FINISH REST OF DATA
1125								
1126								;TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
1127	003034	005037	003152		LK1:	CLR	@TIME	;CLEAR LINE CLOCK TIMER
1128	003040	052777	000100	175360		BIS	#100,@LKCSR	
1129	003046	052737	000100	177776		BIS	#100,@PSR	
1130	003054	000002			LK2:	RTI		
1131	003056	105777	175344		LK3:	TSTB	@LKCSR	
1132	003062	100401				BMI	#+4	
1133	003064	104006				HLT		;FALSE INTERRUPT
1134	003066	042777	000200	175332		BIC	#200,@LKCSR	
1135	003074	005237	003152		LK4:	INC	@TIME	;HERE ON INTERRUPTS
1136	003100	022737	006344	003152		CHP	#3300,@TIME	;55 SEC YET?
1137	003106	103362				BHIS	LK2	;BR IF NOT
1138	003110	042777	000100	175310		BIC	#100,@LKCSR	
1139	003116	042737	000100	177776		BIC	#100,@PSR	;LOWER PRIORITY
1140	003124	022737	007020	003152		CHP	#3600,@TIME	;ONE MINUTE YET
1141	003132	001740				BEQ	LK1	;YES RESET TIMER
1142	003134	105777	175266			TSTB	@LKCSR	;NO, SKIP TILL MINUTE UP
1143	003140	100375				BPL	#+4	
1144	003142	042777	000200	175256		BIC	#200,@LKCSR	;CLEAR FLAG
1145	003150	000751				BR	LK4	
1146	003152	000000			TIME:		0	
1147								
1148								;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER/


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1149 ; INTERRUPT VECTOR IS 200/
1150 003154 012727 000000 000000 LP1: MOV #0, #0 ; START OF LINE TO CURRENT
1151 003150 CURPAT=-2 ; CHARACTER BEING PRINTED
1152 003156 SOLPAT=-4 ; START OF LINE CHARACTER
1153 003162 016777 177772 175242 LP2: MOV CURPAT, @LPD8R ; CURRENT PATTERN TO LINE PRINTER
1154 003170 105777 175234 TSTB @LPCSR
1155 003174 100420 BMI LP6
1156 003176 000002 RTI ; RETURN TO MAIN LINE
1157 003200 105777 175224 LPINTR: TSTB @LPCSR ; TEST FOR FLAG
1158 003204 100414 BMI LP6
1159 003206 005737 000042 TST @#42 ; MONITOR? LOAD
1160 003212 001410 BEQ LP7 ; NO ERROR
1161 003214 032777 100000 175206 BIT #100000, @LPCSR ; YES, IS ERROR SET
1162 003222 001404 BEQ LP7 ; NO ERROR
1163 003224 042777 000100 175176 BIC #100, @LPCSR ; DIS ABLE INTERRUPT
1164 003232 000002 RTI
1165 003234 104006 HLT ; FALSE RETURN FROM MAIN LINE
1166 003236 026727 000006 000117 LP6: CMP CLINCT, #79. ; TEST FOR END OF LINE
1167 003244 001415 BEQ LP4 ; GO GENERATE CR/LF
1168 003246 005227 000000 INC #0 ; INCREMENT LINE POSITION COUNT
1169 003250 003250 CLINCT=-2 ; POSITION OF LINE
1170 003252 026727 177702 000137 CMP CURPAT, #137 ; TEST FOR MAXIMUM PATTERN
1171 003260 001403 BEQ LP3 ; YES - GO TO LP3 AND RESET
1172 003262 005267 177672 INC CURPAT ; NO - INCREMENT TO NEXT PATTERN
1173 003266 000735 BR LP2 ; GO SEND IT TO LINE PRINTER
1174 003270 012767 000040 177662 LP3: MOV #40, CURPAT ; RESET PATTERN AND SEND TO PRINTER
1175 003276 000731 BR LP2 ; SENT TO LINE PRINTER
1176 003300 005067 177744 LP4: CLR CLINCT ; RESET LINE COUNT
1177 003304 012777 000012 175120 MOV #12, @LPD8R ; LINE FEED
1178 003312 105777 175112 TSTB @LPCSR
1179 003316 100375 BPL .-4
1180 003320 026727 177632 000137 CMP SOLPAT, #137 ; START OF LINE PATTERN
1181 003326 001403 BEQ LP5
1182 003330 005267 177622 INC SOLPAT ; INCREMENT START OF LINE
1183 003334 000707 BR LP1
1184 003336 012767 000040 177612 LP5: MOV #40, SOLPAT ; RESET START OF LINE
1185 003344 000703 BR LP1 ; PRINT
1186
1187 ; RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
1188 003346 005077 175110 RKSTART: CLR @RKDAE ; INIT
1189 003352 013777 003600 175106 RK1: MOV @#LLIMIT, @RKBAR ; CORE BASE
1190 003360 013777 003602 175076 MOV @#WORDCT, @RKWC ; TRANSFER LENGTH
1191 003366 113777 003440 175074 MOV @#RKFUNCT, @RKCSR ; WRITE OR WRITE CK TO DSK
1192 003374 000002 RTI ; RETURN TO MAINLINE
1193 003376 032777 100200 175064 IRK: BIT #100200, @RKCSR ; INTERRUPT RETURN
1194 003404 003002 BGT .+6
1195 003406 104006 HLT
1196 003410 000756 BR RKSTART
1197 003412 032777 000037 175042 BIT #37, @RKDAE ; DISK AT UPPER LIMIT?
1198 003420 001354 BNE RK1
1199 003422 122777 000031 175030 CMPB #31, @RKDAH
1200 003430 001350 BNE RK1
1201 003432 000337 003440 SWAB @#RKFUNCT ; CHANGE COMMAND
1202 003436 000743 BR RKSTART ; RESTART NEW TRANSFER OF DISK
1203 003440 000000 RKFUNCT: 0
1204

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1261		000500			IE=500				: INTERRUPT ENABLE+UNIT 1
1262		000001			DO=1				: DO - THE FUNCTION
1263		004000			R=4000				: REVERSE
1264									
1265	003604	000000			TCFIRST: 0				: FIRST BLOCK TO BE SEARCHED FOR
1266	003606	001101			TCLAST: 577.				: LAST BLOCK TO BE SEARCHED FOR
1267	003610	000000			TCEXPE: 0				: THE BLOCK THAT IS EXPECTED
1268									
1269									
1270	003612	012777	003612	174744	: GO TO FORWARD END ZONE				
1271	003620	005777	174730		FENDZ: MOV #FENDZ, @TCIV				: END ZONE VECTOR SETUP
1272	003624	100403			TST @TCST				: TEST FOR END ZONE
1273	003626	105277	174720		BMI FEND1				: AT END ZONE?
1274	003632	000002			INCB @TCCH				: SET DO - NO DELAY
1275	003634	012777	003664	174722	RTI				: NO - WAIT SOME MORE
1276	003642	042777	104000	174702	FEND1: MOV @TCF1, @TCIV				: YES - NEW VECTOR
1277	003650	016767	177730	177732	BIC @104000, @TCCH				: SEARCH BLOCK FORWARD
1278	003656	105277	174670		MOV TCFIRST, TCEXPE				: COUNT WHEN THIS BLOCK IS FOUND
1279	003662	000002			TCF1A: INCB @TCCH				: SET DO
1280	003664	032777	100200	174660	RTI				: RETURN ON NEXT BLOCK
1281	003672	100001			TCF1: BIT @100200, @TCCH				: ANY ERROR ON READ?
1282	003674	104006			BPL .+4				
1283	003676	001001			HLT				: TC ERROR SET - FORWARD READ BLOCK
1284	003700	104006			BNE .+4				: DONE FLAG UP?
1285	003702	027767	174650	177700	HLT				: FALSE INTERRUPT
1286	003710	002762			CMP @TCOT, TCEXPE				: IS THIS OUR BLOCK FOR SYNC
1287	003712	001401			BLT TCF1A				: NO-READ SOME MORE BLOCKS
1288	003714	104006			BEQ TCF2				: YES
1289					HLT				: WE PASSED THE BLOCK
1290	003716	012777	003732	174640	TCF2: MOV @TCF3, @TCIV				: VECTOR FOR SEQUENTIAL READS
1291	003724	105277	174622		INCB @TCCH				: SET DO
1292	003730	000002			RTI				: RETURN AND TEST SEQUENTIAL BLOCKS
1293									
1294									
1295	003732	032777	100200	174612	: FIND SEQUENTIAL BLOCK AT FORWARD DIRECTION				
1296	003740	100001			TCF3: BIT @100200, @TCCH				: TEST ERROR AND READY
1297	003742	104006			BPL .+4				
1298	003744	001001			HLT				: FORWARD READ ERROR TC-11
1299	003746	104006			BNE .+4				
1300	003750	027767	174602	177630	HLT				: FALSE INTERRUPT ON TC-11
1301	003756	001414			CMP @TCOT, TCLAST				: HAVE WE TESTED ALL BLOCKS
1302	003760	005267	177624		BEQ RENDZ				: YES DRIVE UNIT IN END ZONE TO START OVER
1303	003764	027767	174566	177616	INC TCEXPE				: NO-INCREMENT EXPECTED COUNT
1304	003772	001401			CMP @TCOT, TCEXPE				: IS CURRENT BLOCK CORRECT
1305	003774	104006			BEQ .+4				
1306	003776	000427			HLT				: FAILED IN FORWARD READ TO FIND NEXT BLOCK
1307	004000	105277	174546		BR TCMK				: THIS ROUTINE WRITES A BLOCK
1308	004004	000002			TCF4: INCB @TCCH				: SET DO
1309	004006	000701			RTI				
1310					XFENDZ: BR FENDZ				: INDIRECT LINK
1311									
1312	004010	012777	004010	174546	: MOVE TAPE TO REVERSE END ZONE				
1313	004016	016767	177564	177564	RENDZ: MOV #RENDZ, @TCIV				: END ZONE VECTOR SETUP
1314	004024	005777	174524		MOV TCLAST, TCEXPE				: SET UP FOR REVERSE SEARCH
1315	004030	100403			TST @TCST				: IN END ZONE
1316	004032	105277	174514		BMI REND1				: YES - START TO TURN UNIT AROUND
					INCB @TCCH				: SET DO

DC3

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1317 004036 000002          RTI          ;NO - WAIT TILL WE ARE
1318 004040 012777 004503 174504 REND1:  MOV      @R+IE+RB+DO,@TCCH ;FUNCTION = READ BLOCK, REVERSE AND GO
1319 004046 012777 004136 174510      MOV      @TCR1,@TCIV ;SET UP NEW INTERRUPT VECTOR
1320 004054 000002          RTI
1321          ;WRITE FORWARD ALL BLOCKS EXCEPT 0
1322
1323 004056 012777 004110 174500 TCMBK:  MOV      @TCMB1,@TCIV ;INTERRUPT VECTOR FOR WRITE
1324 004064 012777 177400 174466      MOV      #-400,@TCMC ;ONE BLOCK
1325 004072 012777 004420 174462      MOV      @TCBUF,@TCBA ;THE WRITE BUFFER ADDRESS
1326 004100 112777 000515 174444      MOVVB   @IE+RD+DO,@TCCH ;WRITE THE BLOCK
1327 004106 000002          RTI          ;RETURN WHEN BLOCK IS WRITTEN
1328 004110 005777 174436          TCMB1:  TST      @TCCH ;ANY ERRORS
1329 004114 100001          BPL      .+4
1330 004116 104006          HLT
1331 004120 012777 003732 174436      MOV      @TCF3,@TCIV ;SEARCH BLOCK VECTOR
1332 004126 112777 000502 174416      MOVVB   @IE+RB,@TCCH ;READ BLOCK
1333 004134 000721          BR       TCF4 ;FIND THE NEXT BLOCK
1334
1335 004136 032777 100200 174406 TCR1:   BIT      @100200,@TCCH ;TEST FOR ERROR AND READY
1336 004144 100001          BPL      .+4
1337 004146 104006          HLT          ;DECTAPE ERROR ON READ BLOCK REVERSE
1338 004150 001001          BNE      .+4
1339 004152 104006          HLT
1340 004154 027767 174376 177426      CMP      @TCODT,TCEXPE ;FALSE INTERRUPT FROM DECTAPE
1341 004162 001406          BEQ      TCR2 ;IS IT OUR FIRST BLOCK
1342 004164 002002          BGE      TCR1A ;YES - GO TEST THE REST
1343 004166 104006          HLT          ;NO - HAVE WE PASSED THE BLOCK
1344 004170 000707          BR       RENDZ ;WE PASS OUR BLOCK
1345 004172 105277 174354          TCR1A:  INCB   @TCCH ;GO TO END ZONE AND TRY AGAIN
1346 004176 000002          RTI          ;SET DO
1347 004200 012777 004214 174356 TCR2:   MOV      @TCR3,@TCIV ;WE FOUND OUR FIRST BLOCK
1348 004206 105277 174340          INCB   @TCCH ;SET UP INTERRUPT TO TEST ALL BLOCKS
1349 004212 000002          RTI          ;SET DO
1350          ;WAIT FOR NEXT BLOCK TO INTERRUPT
1351
1352          ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
1353 004214 012777 100200 174330 TCR3:   BIT      @100200,@TCCH ;TEST FOR READ AND ERROR
1354 004222 100001          BPL      .+4
1355 004224 104006          HLT          ;ERROR READING SEQUENTIAL BLOCK IN REVERSE
1356 004226 100001          BNE      .+4
1357 004230 104006          HLT
1358 004232 026777 177346 174316      CMP      TCFIRST,@TCODT ;FALSE DECTAPE INTERRUPT
1359 004240 001662          BEQ      XFENDZ ;DID WE DO ALL THE BLOCKS
1360 004242 005367 177342          DEC     TCXPE ;YES - GO TO END ZONE TO RESTART
1361 004246 027767 174304 177334      CMP      @TCODT,TCXPE ;NO - DECREMENT BLOCK NUMBER
1362 004254 001401          BEQ      .+4 ;TEST SEQUENTIAL BLOCK IN REVERSE
1363 004256 104006          HLT
1364 004260 000403          BR       TCRBK ;TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1365 004262 105277 174264          TCR4:  INCB   @TCCH ;THIS ROUTINE READ A BLOCK
1366 004266 000002          RTI          ;SET DO
1367          ;LETS TRY A NEW BLOCK
1368 004270 012777 004326 174266 TCRBK:  MOV      @TCRBI,@TCIV ;READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1369 004276 012777 177400 174254      MOV      #-400,@TCMC ;SET UP INTERRUPT VECTOR
1370 004304 012777 004420 174250      MOV      @TCRBUF,@TCBA ;READ ONE BLOCK
1371 004312 112777 000505 174232      MOVVB   @IE+RD+DO,@TCCH ;WHERE BUFFER IS
1372 004320 004767 000030          JSR     %7,TC1 ;READ THE BLOCK
1373          ;CHECK DATA BUFFER

```

```

1373 004324 000002          TCRB1: BTI          ;EXIT - RETURN WHEN BLOCK IS READ
1374 004326 005777 174220 TCRB1: TST          ;AND ERRORS
1375 004332 100001          BPL          .+4
1376 004334 104006          HLT
1377 004336 012777 004214 174220 MOV          ;DECTAPE ERROR
1378 004344 112777 000502 174200 MOVB         ;NEW VECTOR FOR BLOCK SEARCH
1379 004352 000743          BR          ;READ BLOCK FUNCTION
1380                                     ;RETURN TO BLOCK SEARCH

```

: THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
: BY DOING A CHECK SUM ON THE DATA

```

1383 004354 010146          TC1:  MOV          x1,-(6)      ;SAVE THESE ON THE STACK
1384 004356 010246          MOV          x2,-(6)
1385 004360 010346          MOV          x3,-(6)
1386 004362 005003          CLR          x3              ;SUM OF DATA
1387 004364 012701 004420  MOV          @TCRBUF,x1      ;ADDRESS OF READ BUFFER
1388 004370 012702 005420  MOV          @TCRBUF+1000,x2 ;END OF READ BUFFER
1389 004374 062103          ADD          (1)+,x3        ;EVEN ADD
1390 004376 062103          ADD          (1)+,x3        ;ODD ADD -2'S COMPLIMENT
1391 004400 001401          BRG          .+4
1392 004402 104006          HLT
1393 004404 020102          CMP          x1,x2          ;DATA ERROR TC-11
1394 004406 001372          BPL          TC2            ;AT END OF BUFFER?
1395 004410 012603          MOV          (6)+,x3        ;NO - SUM THE REST
1396 004412 012602          MOV          (6)+,x2        ;RESTORE THE REGISTERS
1397 004414 012601          MOV          (6)+,x1
1398 004416 000207          RTS          x7            ;EXIT

```

: THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE

```

1401 004420          TCMBUF:
1402 004420          TCRBUF:
1403 000001          ZI
1404 004420 000001          ZI          ;DECTAPE WRITE BUFFER
1405 004422 177777          ZI
1406 000002          ZI
1407 004424 000002          ZI
1408 004426 177776          ZI          ;DECTAPE WRITE BUFFER
1409 000003          ZI
1410 004430 000003          ZI          ;DECTAPE WRITE BUFFER
1411 004432 177775          ZI
1412 000004          ZI
1413 004434 000004          ZI          ;DECTAPE WRITE BUFFER
1414 004436 177774          ZI
1415 000005          ZI
1416 004440 000005          ZI          ;DECTAPE WRITE BUFFER
1417 004442 177773          ZI
1418 000006          ZI
1419 004444 000006          ZI          ;DECTAPE WRITE BUFFER
1420 004446 177772          ZI
1421 000007          ZI
1422 004450 000007          ZI          ;DECTAPE WRITE BUFFER
1423 004452 177771          ZI
1424 000010          ZI
1425 004454 000010          ZI          ;DECTAPE WRITE BUFFER
1426 004456 177770          ZI
1427 000011          ZI
1428 004460 000011          ZI          ;DECTAPE WRITE BUFFER

```

1429	004462	177767	↑	
1430		000012	↑	
1431	004464	000012	↑	;DECTAPE WRITE BUFFER
1432	004466	177766	↑	
1433		000013	↑	
1434	004470	000013	↑	;DECTAPE WRITE BUFFER
1435	004472	177765	↑	
1436		000014	↑	
1437	004474	000014	↑	;DECTAPE WRITE BUFFER
1438	004476	177764	↑	
1439		000015	↑	
1440	004500	000015	↑	;DECTAPE WRITE BUFFER
1441	004502	177763	↑	
1442		000016	↑	
1443	004504	000016	↑	;DECTAPE WRITE BUFFER
1444	004506	177762	↑	
1445		000017	↑	
1446	004510	000017	↑	;DECTAPE WRITE BUFFER
1447	004512	177761	↑	
1448		000020	↑	
1449	004514	000020	↑	;DECTAPE WRITE BUFFER
1450	004516	177760	↑	
1451		000021	↑	
1452	004520	000021	↑	;DECTAPE WRITE BUFFER
1453	004522	177757	↑	
1454		000022	↑	
1455	004524	000022	↑	;DECTAPE WRITE BUFFER
1456	004526	177756	↑	
1457		000023	↑	
1458	004530	000023	↑	;DECTAPE WRITE BUFFER
1459	004532	177755	↑	
1460		000024	↑	
1461	004534	000024	↑	;DECTAPE WRITE BUFFER
1462	004536	177754	↑	
1463		000025	↑	
1464	004540	000025	↑	;DECTAPE WRITE BUFFER
1465	004542	177753	↑	
1466		000026	↑	
1467	004544	000026	↑	;DECTAPE WRITE BUFFER
1468	004546	177752	↑	
1469		000027	↑	
1470	004550	000027	↑	;DECTAPE WRITE BUFFER
1471	004552	177751	↑	
1472		000030	↑	
1473	004554	000030	↑	;DECTAPE WRITE BUFFER
1474	004556	177750	↑	
1475		000031	↑	
1476	004560	000031	↑	;DECTAPE WRITE BUFFER
1477	004562	177747	↑	
1478		000032	↑	
1479	004564	000032	↑	;DECTAPE WRITE BUFFER
1480	004566	177746	↑	
1481		000033	↑	
1482	004570	000033	↑	;DECTAPE WRITE BUFFER
1483	004572	177745	↑	
1484		000034	↑	

1485	004574	000034	Z	;DECTAPE WRITE BUFFER
1486	004576	177744	Z	
1487		000035	Z	
1488	004600	000035	Z	;DECTAPE WRITE BUFFER
1489	004602	177743	Z	
1490		000036	Z	
1491	004604	000036	Z	;DECTAPE WRITE BUFFER
1492	004606	177742	Z	
1493		000037	Z	
1494	004610	000037	Z	;DECTAPE WRITE BUFFER
1495	004612	177741	Z	
1496		000040	Z	
1497	004614	000040	Z	;DECTAPE WRITE BUFFER
1498	004616	177740	Z	
1499		000041	Z	
1500	004620	000041	Z	;DECTAPE WRITE BUFFER
1501	004622	177737	Z	
1502		000042	Z	
1503	004624	000042	Z	;DECTAPE WRITE BUFFER
1504	004626	177736	Z	
1505		000043	Z	
1506	004630	000043	Z	;DECTAPE WRITE BUFFER
1507	004632	177735	Z	
1508		000044	Z	
1509	004634	000044	Z	;DECTAPE WRITE BUFFER
1510	004636	177734	Z	
1511		000045	Z	
1512	004640	000045	Z	;DECTAPE WRITE BUFFER
1513	004642	177733	Z	
1514		000046	Z	
1515	004644	000046	Z	;DECTAPE WRITE BUFFER
1516	004646	177732	Z	
1517		000047	Z	
1518	004650	000047	Z	;DECTAPE WRITE BUFFER
1519	004652	177731	Z	
1520		000050	Z	
1521	004654	000050	Z	;DECTAPE WRITE BUFFER
1522	004656	177730	Z	
1523		000051	Z	
1524	004660	000051	Z	;DECTAPE WRITE BUFFER
1525	004662	177727	Z	
1526		000052	Z	
1527	004664	000052	Z	;DECTAPE WRITE BUFFER
1528	004666	177726	Z	
1529		000053	Z	
1530	004670	000053	Z	;DECTAPE WRITE BUFFER
1531	004672	177725	Z	
1532		000054	Z	
1533	004674	000054	Z	;DECTAPE WRITE BUFFER
1534	004676	177724	Z	
1535		000055	Z	
1536	004700	000055	Z	;DECTAPE WRITE BUFFER
1537	004702	177723	Z	
1538		000056	Z	
1539	004704	000056	Z	;DECTAPE WRITE BUFFER
1540	004706	177722	Z	

1541		000057		
1542	004710	000057		;DECTAPE WRITE BUFFER
1543	004712	177721		
1544		000060		
1545	004714	000060		;DECTAPE WRITE BUFFER
1546	004716	177720		
1547		000061		
1548	004720	000061		;DECTAPE WRITE BUFFER
1549	004722	177717		
1550		000062		
1551	004724	000062		;DECTAPE WRITE BUFFER
1552	004726	177716		
1553		000063		
1554	004730	000063		;DECTAPE WRITE BUFFER
1555	004732	177715		
1556		000064		
1557	004734	000064		;DECTAPE WRITE BUFFER
1558	004736	177714		
1559		000065		
1560	004740	000065		;DECTAPE WRITE BUFFER
1561	004742	177713		
1562		000066		
1563	004744	000066		;DECTAPE WRITE BUFFER
1564	004746	177712		
1565		000067		
1566	004750	000067		;DECTAPE WRITE BUFFER
1567	004752	177711		
1568		000070		
1569	004754	000070		;DECTAPE WRITE BUFFER
1570	004756	177710		
1571		000071		
1572	004760	000071		;DECTAPE WRITE BUFFER
1573	004762	177707		
1574		000072		
1575	004764	000072		;DECTAPE WRITE BUFFER
1576	004766	177706		
1577		000073		
1578	004770	000073		;DECTAPE WRITE BUFFER
1579	004772	177705		
1580		000074		
1581	004774	000074		;DECTAPE WRITE BUFFER
1582	004776	177704		
1583		000075		
1584	005000	000075		;DECTAPE WRITE BUFFER
1585	005002	177703		
1586		000076		
1587	005004	000076		;DECTAPE WRITE BUFFER
1588	005006	177702		
1589		000077		
1590	005010	000077		;DECTAPE WRITE BUFFER
1591	005012	177701		
1592		000100		
1593	005014	000100		;DECTAPE WRITE BUFFER
1594	005016	177700		
1595		000101		
1596		000100		

1597	005020	177700	Z	
1598	005022	000100	Z	;DEC TAPE WRITE BUFFER
1599		000077	Z	
1600	005024	177701	Z	
1601	005026	000077	Z	;DEC TAPE WRITE BUFFER
1602		000076	Z	
1603	005030	177702	Z	
1604	005032	000076	Z	;DEC TAPE WRITE BUFFER
1605		000075	Z	
1606	005034	177703	Z	
1607	005036	000075	Z	;DEC TAPE WRITE BUFFER
1608		000074	Z	
1609	005040	177704	Z	
1610	005042	000074	Z	;DEC TAPE WRITE BUFFER
1611		000073	Z	
1612	005044	177705	Z	
1613	005046	000073	Z	;DEC TAPE WRITE BUFFER
1614		000072	Z	
1615	005050	177706	Z	
1616	005052	000072	Z	;DEC TAPE WRITE BUFFER
1617		000071	Z	
1618	005054	177707	Z	
1619	005056	000071	Z	;DEC TAPE WRITE BUFFER
1620		000070	Z	
1621	005060	177710	Z	
1622	005062	000070	Z	;DEC TAPE WRITE BUFFER
1623		000067	Z	
1624	005064	177711	Z	
1625	005066	000067	Z	;DEC TAPE WRITE BUFFER
1626		000066	Z	
1627	005070	177712	Z	
1628	005072	000066	Z	;DEC TAPE WRITE BUFFER
1629		000065	Z	
1630	005074	177713	Z	
1631	005076	000065	Z	;DEC TAPE WRITE BUFFER
1632		000064	Z	
1633	005100	177714	Z	
1634	005102	000064	Z	;DEC TAPE WRITE BUFFER
1635		000063	Z	
1636	005104	177715	Z	
1637	005106	000063	Z	;DEC TAPE WRITE BUFFER
1638		000062	Z	
1639	005110	177716	Z	
1640	005112	000062	Z	;DEC TAPE WRITE BUFFER
1641		000061	Z	
1642	005114	177717	Z	
1643	005116	000061	Z	;DEC TAPE WRITE BUFFER
1644		000060	Z	
1645	005120	177720	Z	
1646	005122	000060	Z	;DEC TAPE WRITE BUFFER
1647		000057	Z	
1648	005124	177721	Z	
1649	005126	000057	Z	;DEC TAPE WRITE BUFFER
1650		000056	Z	
1651	005130	177722	Z	
1652	005132	000056	Z	;DEC TAPE WRITE BUFFER

1653		000055	1111	
1654	005134	177723	1111	
1655	005136	000055	1111	;DEC TAPE WRITE BUFFER
1656		000054	1111	
1657	005140	177724	1111	
1658	005142	000054	1111	;DEC TAPE WRITE BUFFER
1659		000053	1111	
1660	005144	177725	1111	
1661	005146	000053	1111	;DEC TAPE WRITE BUFFER
1662		000052	1111	
1663	005150	177726	1111	
1664	005152	000052	1111	;DEC TAPE WRITE BUFFER
1665		000051	1111	
1666	005154	177727	1111	
1667	005156	000051	1111	;DEC TAPE WRITE BUFFER
1668		000050	1111	
1669	005160	177730	1111	
1670	005162	000050	1111	;DEC TAPE WRITE BUFFER
1671		000047	1111	
1672	005164	177731	1111	
1673	005166	000047	1111	;DEC TAPE WRITE BUFFER
1674		000046	1111	
1675	005170	177732	1111	
1676	005172	000046	1111	;DEC TAPE WRITE BUFFER
1677		000045	1111	
1678	005174	177733	1111	
1679	005176	000045	1111	;DEC TAPE WRITE BUFFER
1680		000044	1111	
1681	005200	177734	1111	
1682	005202	000044	1111	;DEC TAPE WRITE BUFFER
1683		000043	1111	
1684	005204	177735	1111	
1685	005206	000043	1111	;DEC TAPE WRITE BUFFER
1686		000042	1111	
1687	005210	177736	1111	
1688	005212	000042	1111	;DEC TAPE WRITE BUFFER
1689		000041	1111	
1690	005214	177737	1111	
1691	005216	000041	1111	;DEC TAPE WRITE BUFFER
1692		000040	1111	
1693	005220	177740	1111	
1694	005222	000040	1111	;DEC TAPE WRITE BUFFER
1695		000037	1111	
1696	005224	177741	1111	
1697	005226	000037	1111	;DEC TAPE WRITE BUFFER
1698		000036	1111	
1699	005230	177742	1111	
1700	005232	000036	1111	;DEC TAPE WRITE BUFFER
1701		000035	1111	
1702	005234	177743	1111	
1703	005236	000035	1111	;DEC TAPE WRITE BUFFER
1704		000034	1111	
1705	005240	177744	1111	
1706	005242	000034	1111	;DEC TAPE WRITE BUFFER
1707		000033	1111	
1708	005244	177745	1111	

1709	005246	000033	Z	;DEC TAPE WRITE BUFFER
1710		000032	Z=N-1	
1711	005250	177746	Z	
1712	005252	000032	Z=N-1	;DEC TAPE WRITE BUFFER
1713		000031	Z	
1714	005254	177747	Z=N-1	
1715	005256	000031	Z	;DEC TAPE WRITE BUFFER
1716		000030	Z=N-1	
1717	005260	177750	Z	
1718	005262	000030	Z=N-1	;DEC TAPE WRITE BUFFER
1719		000027	Z	
1720	005264	177751	Z=N-1	
1721	005266	000027	Z	;DEC TAPE WRITE BUFFER
1722		000026	Z=N-1	
1723	005270	177752	Z	
1724	005272	000026	Z=N-1	;DEC TAPE WRITE BUFFER
1725		000025	Z	
1726	005274	177753	Z=N-1	
1727	005276	000025	Z	;DEC TAPE WRITE BUFFER
1728		000024	Z=N-1	
1729	005300	177754	Z	
1730	005302	000024	Z=N-1	;DEC TAPE WRITE BUFFER
1731		000023	Z	
1732	005304	177755	Z=N-1	
1733	005306	000023	Z	;DEC TAPE WRITE BUFFER
1734		000022	Z=N-1	
1735	005310	177756	Z	
1736	005312	000022	Z=N-1	;DEC TAPE WRITE BUFFER
1737		000021	Z	
1738	005314	177757	Z=N-1	
1739	005316	000021	Z	;DEC TAPE WRITE BUFFER
1740		000020	Z=N-1	
1741	005320	177760	Z	
1742	005322	000020	Z=N-1	;DEC TAPE WRITE BUFFER
1743		000017	Z	
1744	005324	177761	Z=N-1	
1745	005326	000017	Z	;DEC TAPE WRITE BUFFER
1746		000016	Z=N-1	
1747	005330	177762	Z	
1748	005332	000016	Z=N-1	;DEC TAPE WRITE BUFFER
1749		000015	Z	
1750	005334	177763	Z=N-1	
1751	005336	000015	Z	;DEC TAPE WRITE BUFFER
1752		000014	Z=N-1	
1753	005340	177764	Z	
1754	005342	000014	Z=N-1	;DEC TAPE WRITE BUFFER
1755		000013	Z	
1756	005344	177765	Z=N-1	
1757	005346	000013	Z	;DEC TAPE WRITE BUFFER
1758		000012	Z=N-1	
1759	005350	177766	Z	
1760	005352	000012	Z=N-1	;DEC TAPE WRITE BUFFER
1761		000011	Z	
1762	005354	177767	Z=N-1	
1763	005356	000011	Z	;DEC TAPE WRITE BUFFER
1764		000010	Z=N-1	

1765	005360	177770			-N	
1766	005362	000010			N	;DEC TAPE WRITE BUFFER
1767		000007			N=N-1	
1768	005364	177771			-N	
1769	005366	000007			N	;DEC TAPE WRITE BUFFER
1770		000006			N=N-1	
1771	005370	177772			-N	
1772	005372	000006			N	;DEC TAPE WRITE BUFFER
1773		000005			N=N-1	
1774	005374	177773			-N	
1775	005376	000005			N	;DEC TAPE WRITE BUFFER
1776		000004			N=N-1	
1777	005400	177774			-N	
1778	005402	000004			N	;DEC TAPE WRITE BUFFER
1779		000003			N=N-1	
1780	005404	177775			-N	
1781	005406	000003			N	;DEC TAPE WRITE BUFFER
1782		000002			N=N-1	
1783	005410	177776			-N	
1784	005412	000002			N	;DEC TAPE WRITE BUFFER
1785		000001			N=N-1	
1786	005414	177777			-N	
1787	005416	000001			N	;DEC TAPE WRITE BUFFER
1788						
1789	005420	010701			BEGINX: MOV	PC,R1 ;SET UP R1 TO SELECT CURBNK
1790	005422	042701	017777		BIC	#17777,R1
1791	005426	042737	160000	000034	BIC	#160000,#34 ;SET SCOPE RET TO CURRENT BANK
1792	005434	050137	000034		BIS	R1,#34
1793	005440	000301			SWAB	R1
1794	005442	006201			ASR	R1
1795	005444	006201			ASR	R1
1796	005446	010137	000570		MOV	R1,#CURBNK
1797						
1798						
1799						
1800						
1801	005452	010767	007262		BEGIN: MOV	PC,RETURN ;FOR SCOPING - SETUP ADDRESS OF BEGIN1 IN
1802	005456	062767	000016	007254	ADD	#16,RETURN ;THIS BANK THRU CURRENT ASR
1803	005464	012767	000400	007242	MOV	#400,ICOUNT ;ITERATION COUNT
1804						
1805	005472	012700	177770		MOV	#-10,%0 ;MINUS 10 TO REG 0
1806	005476	026027	014752	125252	CMP	A(0),#125252 ;(A INDEX BY MINUS 10) TO #125252
1807	005504	001401			BEQ	+.4
1808	005506	104006			HLT	
1809	005510	104400			SCOPE	;COMPARE WITH INDEX FAILED
1810						
1811	005512	012700	000010		MOV	#10,%0
1812	005516	022760	052525	014752	CMP	#052525,A(0)
1813	005524	001401			BEQ	+.4
1814	005526	104006			HLT	
1815	005530	104400			SCOPE	
1816						
1817	005532	012700	177770		MOV	#-10,%0
1818	005536	026060	014752	014752	CMP	A(0),A(0)
1819	005544	001401			BEQ	+.4
1820	005546	104006			HLT	

1821	005550	104400			SCOPE
1822					
1823	005552	012700	000010		MOV #+10,%0
1824	005556	026060	014752	014752	CMP A(0),A(0)
1825	005564	001401			BEQ .+4
1826	005566	104006			HLT
1827	005570	104400			SCOPE
1828					
1829	005572	012700	177774		MOV #-4,%0
1830	005576	012701	000010		MOV #+10,%1
1831	005602	026061	014752	014752	CMP A(0),A(1)
1832	005610	001401			BEQ .+4
1833	005612	104006			HLT
1834	005614	104400			SCOPE
1835					
1836	005616	012700	177774		MOV #-4,%0
1837	005622	012701	000010		MOV #10,%1
1838	005626	026160	014752	014752	CMP A(1),A(0)
1839	005634	001401			BEQ .+4
1840	005636	104006			HLT
1841	005640	104400			SCOPE
1842					
1843					;TEST MOVE INSTRUCTION FOR INDEX
1844					
1845	005642	012700	177770		MOV #-10,%0
1846	005646	016067	014752	007120	MOV A(0),TEMP
1847	005654	026727	007114	125252	CMP TEMP,#125252
1848	005662	001401			BEQ .+4
1849	005664	104006			HLT
1850	005666	104400			SCOPE
1851					
1852	005670	012700	177770		MOV #-10,%0
1853	005674	012760	125252	014774	MOV #125252,TEMP(0)
1854	005702	023727	014764	125252	CMP @#C,#125252
1855	005710	001401			BEQ .+4
1856	005712	104006			HLT
1857	005714	104400			SCOPE
1858					
1859					;TEST BIC INSTRUCTION FOR INDEXING
1860	005716	012767	177777	007050	MOV #-1,TEMP
1861	005724	012700	177770		MOV #-10,%0
1862	005730	046067	014752	007036	BIC A(0),TEMP
1863	005736	026727	007032	052525	CMP TEMP,#052525
1864	005744	001401			BEQ .+4
1865	005746	104006			HLT
1866	005750	104400			SCOPE
1867					
1868	005752	012700	177770		MOV #-10,%0
1869	005756	012767	177777	007000	MOV #-1,TEMP-10
1870	005764	042767	052525	006772	BIC #052525,TEMP-10
1871	005772	026727	006766	125252	CMP TEMP-10,#125252
1872	006000	001401			BEQ .+4
1873	006002	104006			HLT
1874	006004	104400			SCOPE
1875					
1876	006006	012737	125252	014774	MOV #125252,@#TEMP

1877	006014	012700	177770		MOV	#-10,%0
1878	006020	166760	006716	015004	SUB	B,TEMP+10(0)
1879	006026	001401			BEQ	.+4
1880	006030	104006			HLT	
1881	006032	104400			SCOPE	
1882						
1883	006034	012737	052525	014774	MOV	#052525,@TEMP
1884	006042	012700	000010		MOV	#10,%0
1885	006046	166760	006710	014764	SUB	A+10,C(0)
1886	006054	001401			BEQ	.+4
1887	006056	104006			HLT	
1888	006060	104400			SCOPE	
1889						
1890						
1891						
1892	006062	012737	177777	014774	MOV	#-1,@TEMP
1893	006070	012700	000010		MOV	#+10,%0
1894	006074	005060	014764		CLR	C(0)
1895	006100	005737	014774		TST	@TEMP
1896	006104	001401			BEQ	.+4
1897	006106	104006			HLT	
1898	006110	104400			SCOPE	
1899						
1900	006112	012737	177777	014774	MOV	#-1,@TEMP
1901	006120	012700	000010		MOV	#10,%0
1902	006124	005160	014764		COM	C(0)
1903	006130	005737	014774		TST	@TEMP
1904	006134	001401			BEQ	.+4
1905	006136	104006			HLT	
1906	006140	104400			SCOPE	
1907						
1908	006142	012737	177777	014774	MOV	#-1,@TEMP
1909	006150	012700	177770		MOV	#-10,%0
1910	006154	005260	015004		INC	D(0)
1911	006160	005737	014774		TST	@TEMP
1912	006164	001401			BEQ	.+4
1913	006166	104006			HLT	
1914	006170	104400			SCOPE	
1915						
1916	006172	012737	000001	014774	MOV	#1,@TEMP
1917	006200	012700	177770		MOV	#-10,%0
1918	006204	005360	015004		DEC	D(0)
1919	006210	005737	014774		TST	@TEMP
1920	006214	001401			BEQ	.+4
1921	006216	104006			HLT	
1922	006220	104400			SCOPE	
1923						
1924	006222	012737	000001	014774	MOV	#1,@TEMP
1925	006230	012700	000010		MOV	#10,%0
1926	006234	005360	014764		DEC	C(0)
1927	006240	005737	014774		TST	@TEMP
1928	006244	001401			BEQ	.+4
1929	006246	104006			HLT	
1930	006250	104400			SCOPE	
1931						
1932	006252	012737	000001	014774	MOV	#1,@TEMP

;TEST UNARYS INDEXED

1933	006260	012700	177770		MOV	0-10,%0
1934	006264	005460	015004		NEG	D(0)
1935	006270	022737	177777	014774	CMP	0-1,%0TEMP
1936	006276	001401			BEQ	.+4
1937	006300	104006			HLT	
1938	006302	104400			SCOPE	
1939						
1940	006304	012737	000001	014774	MOV	01,%0TEMP
1941	006312	012700	000010		MOV	0+10,%0
1942	006316	005460	014764		NEG	C(0)
1943	006322	022737	177777	014774	CMP	0-1,%0TEMP
1944	006330	001401			BEQ	.+4
1945	006332	104006			HLT	
1946	006334	104400			SCOPE	
1947						
1948	006336	012737	177777	014774	MOV	0-1,%0TEMP
1949	006344	012700	177770		MOV	0-10,%0
1950	006350	000261			SEC	
1951	006352	005560	015004		ADC	D(0)
1952	006356	005737	014774		TST	%0TEMP
1953	006362	001401			BEQ	.+4
1954	006364	104006			HLT	
1955	006366	104400			SCOPE	
1956						
1957	006370	012737	177777	014774	MOV	0-1,%0TEMP
1958	006376	012700	000010		MOV	0+10,%0
1959	006402	000261			SEC	
1960	006404	005560	014764		ADC	C(0)
1961	006410	005737	014774		TST	%0TEMP
1962	006414	001401			BEQ	.+4
1963	006416	104006			HLT	
1964	006420	104400			SCOPE	
1965						
1966	006422	012737	000001	014774	MOV	01,%0TEMP
1967	006430	012700	177770		MOV	0-10,%0
1968	006434	000261			SEC	
1969	006436	005560	015004		SBC	D(0)
1970	006442	005737	014774		TST	%0TEMP
1971	006446	001401			BEQ	.+4
1972	006450	104006			HLT	
1973	006452	104400			SCOPE	
1974						
1975	006454	012737	000001	014774	MOV	01,%0TEMP
1976	006462	012700	000010		MOV	0+10,%0
1977	006466	000261			SEC	
1978	006470	005560	014764		SBC	C(0)
1979	006474	005737	014774		TST	%0TEMP
1980	006500	001401			BEQ	.+4
1981	006502	104006			HLT	
1982	006504	104400			SCOPE	
1983						
1984						
1985	006506	010700				
1986	006510	062700	000010		MOV	%7,%0
1987	006514	000110			ADD	010,%0
1988	006516	104006			JMP	%0
					HLT	

;TEST JMP INDIRECT

1989	006520	000240			NOP	
1990	006522	104400			SCOPE	
1991						
1992	006524	010700			MOV	x7,x0
1993	006526	062700	000010		ADD	#10,x0
1994	006532	000110			JMP	#x0
1995	006534	104006			HLT	
1996	006536	000240			NOP	
1997	006540	104400			SCOPE	
1998						
1999						
2000					;TEST INDIRECT ADDRESSING	
2001	006542	023727	014742	125252	;TEST COMPARE INSTRUCTION	
2002	006550	001401			CMP	#08,#125252
2003	006552	104006			BEQ	.+4
2004	006554	104400			HLT	
2005					SCOPE	
2006	006556	022737	125252	014742	CMP	#125252,#08
2007	006564	001401			BEQ	.+4
2008	006566	104006			HLT	
2009	006570	104400			SCOPE	
2010						
2011	006572	023737	014742	014742	CMP	#08,#08
2012	006600	001401			BEQ	.+4
2013	006602	104006			HLT	
2014	006604	104400			SCOPE	
2015						
2016					;TEST MOVE INSTRUCTIONS	
2017	006606	013700	014742		MOV	#08,x0
2018	006612	022700	125252		CMP	#125252,x0
2019	006616	001401			BEQ	.+4
2020	006620	104006			HLT	
2021	006622	104400			SCOPE	
2022						

2023	006624	012737	125252	014774	MOV	0125252, 00TEMP
2024	006632	023737	014742	014774	CMP	000, 00TEMP
2025	006640	001401			BEQ	.+4
2026	006642	104006			HLT	
2027	006644	104400			SCOPE	
2028						
2029	006646	013737	014742	014764	MOV	000, 00C
2030	006654	023737	014742	014764	CMP	000, 00C
2031	006662	001401			BEQ	.+4

E04

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DFKTGA.P11 BACKGROUND CPU TESTS

2032 006664 104006

HLT

F04

DFKTG-A MACY11 27(732) 10-SEP-76 09:51 PAGE 44
DFKTGA.P11 BACKGROUND CPU TESTS

2033 006666 104400
2034
2035
2036 006670 012700 177777

SCOPE
;TEST BIC INSTRUCTION INDIRECT
MOV # -1,%0

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 DFKTGA.P11 BACKGROUND CPU TESTS

2037	006674	043700	014742	BIC	@8,%0
2038	006700	020027	052525	CMP	%0,%052525
2039	006704	001401		BEQ	.+4
2040	006706	104006		HLT	
2041	006710	104400		SCOPE	
2042					
2043	006712	012737	177777	MOV	@-1,@TEMP
2044	006720	042737	125252	BIC	@125252,@TEMP
2045	006726	022737	052525	CMP	@052525,@TEMP
2046	006734	001401		BEQ	.+4
2047	006736	104006		HLT	
2048	006740	104400		SCOPE	

2049	006742	012737	177777	014764	MOV	#-1,@#C
2050	006750	043737	014742	014764	BIC	@#B,@#C
2051	006756	023727	014764	052525	CMP	@#C,#52525
2052	006764	001401			BEQ	.+4
2053	006766	104006			HLT	
2054	006770	104400			SCOPE	
2055						
2056						
2057						
2058	006772	012700	125252		;TEST SUBTRACT INSTRUCTION	
2059	006776	163700	014742		MOV	#125252,%0
2060	007002	020027	000000		SUB	@#B,%0
2061	007006	001401			CMP	%0,%0
2062	007010	104006			BEQ	.+4
2063	007012	104400			HLT	
2064					SCOPE	
2065	007014	012737	125252	014774	MOV	#125252,@#TEMP
2066	007022	166737	005714	014774	SUB	@#TEMP
2067	007030	001401			BEQ	.+4
2068	007032	104006			HLT	
2069	007034	104400			SCOPE	
2070						
2071	007036	012767	125252	005730	MOV	#125252,TEMP
2072	007044	163767	014742	005722	SUB	@#B,TEMP
2073	007052	005767	005716		TST	TEMP
2074	007056	001401			BEQ	.+4
2075	007060	104006			HLT	
2076	007062	104400			SCOPE	
2077						
2078						
2079	007064	005000			;TEST ADD INDIRECT	
2080	007066	063700	014742		CLR	%0
2081	007072	022700	125252		ADD	@#B,%0
2082	007076	001401			CMP	#125252,%0
2083	007100	104006			BEQ	.+4
2084	007102	104400			HLT	
2085					SCOPE	
2086	007104	005037	014774		CLR	@#TEMP
2087	007110	062737	125252	014774	ADD	#125252,@#TEMP
2088	007116	062737	125252	014774	CMP	#125252,@#TEMP
2089	007124	001401			BEQ	.+4
2090	007126	104006			HLT	
2091	007130	104400			SCOPE	
2092						
2093	007132	012737	125252	014774	MOV	#125252,@#TEMP
2094	007140	067737	005614	014774	ADD	@#A+6,@#TEMP
2095	007146	023727	014774	177777	CMP	@#TEMP,#-1
2096	007154	001401			BEQ	.+4
2097	007156	104006			HLT	
2098	007160	104400			SCOPE	
2099						
2100						
2101	007162	012737	177777	014774	;TEST UNARYS INDIRECT	
2102	007170	005037	014774		MOV	#-1,@#TEMP
2103	007174	005737	014774		CLR	@#TEMP
2104	007200	001401			TST	@#TEMP
					BEQ	.+4

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2105	007202	104006			HLT	
2106	007204	104400			SCOPE	
2107						
2108	007206	012737	125252	014774	MOV	#125252,@TEMP
2109	007214	005137	014774		COM	@TEMP
2110	007220	022737	052525	014774	CMP	#052525,@TEMP
2111	007226	001401			BEQ	.+4
2112	007230	104006			HLT	
2113	007232	104400			SCOPE	
2114						
2115	007234	005037	014774		CLR	@TEMP
2116	007240	005237	014774		INC	@TEMP
2117	007244	022737	000001	014774	CMP	#1,@TEMP
2118	007252	001401			BEQ	.+4
2119	007254	104006			HLT	
2120	007256	104400			SCOPE	
2121						
2122	007260	005037	014774		CLR	@TEMP
2123	007264	005377	005506		DEC	@TEMP+2
2124	007270	023727	014774	177777	CMP	@TEMP,#-1
2125	007276	001401			BEQ	.+4
2126	007300	104006			HLT	
2127	007302	104400			SCOPE	
2128						
2129	007304	012737	000001	014774	MOV	#1,@TEMP
2130	007312	005437	014774		NEG	@TEMP
2131	007316	022737	177777	014774	CMP	#-1,@TEMP
2132	007324	001401			BEQ	.+4
2133	007326	104006			HLT	
2134	007330	104400			SCOPE	
2135						
2136						
2137						
2138	007332	027727	005406	125252		
2139	007340	001401			CMP	@B+2,#125252
2140	007342	104006			BEQ	.+4
2141	007344	104400			HLT	
2142					SCOPE	
2143	007346	022777	125252	005370	CMP	#125252,@B+2
2144	007354	001401			BEQ	.+4
2145	007356	104006			HLT	
2146	007360	104400			SCOPE	
2147						
2148	007362	027777	005356	005354	CMP	@B+2,@B+2
2149	007370	001401			BEQ	.+4
2150	007372	104006			HLT	
2151	007374	104400			SCOPE	
2152						
2153						
2154	007376	017700	005342			
2155	007402	022700	125252		MOV	@B+2,%0
2156	007406	001401			CMP	#125252,%0
2157	007410	104006			BEQ	.+4
2158	007412	104400			HLT	
2159					SCOPE	
2160	007414	012777	125252	005354	MOV	#125252,@TEMP+2

;TEST INDIRECT ADDRESSING WITH INDEXING
 ;TEST COMPARE INSTRUCTION

;TEST MOVE INSTRUCTIONS

2161	007422	023737	014742	014774	CMP	@B,@TEMP
2162	007430	001401			BEQ	.+4
2163	007432	104006			HLT	
2164	007434	104400			SCOPE	
2165						
2166	007436	017777	005302	005322	MOV	@B+2,@C+2
2167	007444	023737	014742	014764	CMP	@B,@C
2168	007452	001401			BEQ	.+4
2169	007454	104006			HLT	
2170	007456	104400			SCOPE	
2171						
2172						
2173	007460	012700	177777		MOV	B-1,%0
2174	007464	047700	005254		BIC	@B+2,%0
2175	007470	020027	052525		CMP	%0,@52525
2176	007474	001401			BEQ	.+4
2177	007476	104006			HLT	
2178	007500	104400			SCOPE	
2179						
2180	007502	012737	177777	014774	MOV	B-1,@TEMP
2181	007510	042777	125252	005260	BIC	@125252,@TEMP+2
2182	007516	022737	052525	014774	CMP	@52525,@TEMP
2183	007524	001401			BEQ	.+4
2184	007526	104006			HLT	
2185	007530	104400			SCOPE	
2186						
2187	007532	012737	177777	014764	MOV	B-1,@C
2188	007540	047777	005200	005220	BIC	@B+2,@C+2
2189	007546	026737	005210	014764	CMP	A+10,@C
2190	007554	001401			BEQ	.+4
2191	007556	104006			HLT	
2192	007560	104400			SCOPE	
2193						
2194	007562	012700	125252		MOV	@125252,%0
2195	007566	167700	005152		SUB	@B+2,%0
2196	007572	020027	000000		CMP	%0,@0
2197	007576	001401			BEQ	.+4
2198	007600	104006			HLT	
2199	007602	104400			SCOPE	
2200						
2201	007604	012737	125252	014774	MOV	@125252,@TEMP
2202	007612	166777	005124	005156	SUB	B,@TEMP+2
2203	007620	001401			BEQ	.+4
2204	007622	104006			HLT	
2205	007624	104400			SCOPE	
2206						
2207	007626	012737	125252	014774	MOV	@125252,@TEMP
2208	007634	167777	005104	005134	SUB	@B+2,@TEMP+2
2209	007642	005737	014774		TST	@TEMP
2210	007646	001401			BEQ	.+4
2211	007650	104006			HLT	
2212	007652	104400			SCOPE	
2213						
2214						
2215	007654	005000			CLR	%0
2216	007656	067700	005062		ADD	@B+2,%0

;TEST PIC INSTRUCTION INDIRECT WITH INDEXING

;TEST ADD INDIRECT WITH INDEXING

2217	007662	022700	125252		CMP	#125252,%0
2218	007666	001401			BEQ	.+4
2219	007670	104006			HLT	
2220	007672	104400			SCOPE	
2221						
2222	007674	005037	014774		CLR	@TEMP
2223	007700	062777	125252	005070	ADD	#125252,@TEMP+2
2224	007706	022737	125252	014774	CMP	#125252,@TEMP
2225	007714	001401			BEQ	.+4
2226	007716	104006			HLT	
2227	007720	104400			SCOPE	
2228						
2229	007722	012737	125252	014774	MOV	#125252,@TEMP
2230	007730	067777	005024	005040	ADD	@A+6,@TEMP+2
2231	007736	023727	014774	177777	CMP	@TEMP,#-1
2232	007744	001401			BEQ	.+4
2233	007746	104006			HLT	
2234	007750	104400			SCOPE	
2235						
2236						
2237	007752	012737	177777	014774	MOV	#-1,@TEMP
2238	007760	005077	005012		CLR	@TEMP+2
2239	007764	005737	014774		TST	@TEMP
2240	007770	001401			BEQ	.+4
2241	007772	104006			HLT	
2242	007774	104400			SCOPE	
2243						
2244	007776	012737	125252	014774	MOV	#125252,@TEMP
2245	010004	005177	004766		COM	@TEMP+2
2246	010010	022737	052525	014774	CMP	#052525,@TEMP
2247	010016	001401			BEQ	.+4
2248	010020	104006			HLT	
2249	010722	104400			SCOPE	
2250						
2251	010024	005037	014774		CLR	@TEMP
2252	010030	005277	004742		INC	@TEMP+2
2253	010034	022737	000001	014774	CMP	#1,@TEMP
2254	010042	001401			BEQ	.+4
2255	010044	104006			HLT	
2256	010046	104400			SCOPE	
2257						
2258	010050	005037	014774		CLR	@TEMP
2259	010054	005377	004716		DEC	@TEMP+2
2260	010060	023727	014774	177777	CMP	@TEMP,#-1
2261	010066	001401			BEQ	.+4
2262	010070	104006			HLT	
2263	010072	104400			SCOPE	
2264						
2265	010074	012737	000001	014774	MOV	#1,@TEMP
2266	010102	005477	004670		NEG	@TEMP+2
2267	010106	022737	177777	014774	CMP	#-1,@TEMP
2268	010114	001401			BEQ	.+4
2269	010116	104006			HLT	
2270	010120	104400			SCOPE	
2271						
2272	010122	012737	177777	014774	MOV	#-1,@TEMP

;TEST UNARYS INDIRECT WITH INDEXING

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2273	010130	000261			SEC	
2274	010132	005577	004640		AOC	2TEMP+2
2275	010136	005737	014774		TST	2TEMP
2276	010142	001401			BEQ	.+4
2277	010144	104006			HLT	
2278	010146	104400			SCOPE	
2279						
2280	010150	012737	000001	014774	MOV	#1,2TEMP
2281	010156	000261			SEC	
2282	010160	005677	004612		SBC	2TEMP+2
2283	010164	005737	014774		TST	2TEMP
2284	010170	001401			BEQ	.+4
2285	010172	104006			HLT	
2286	010174	104400			SCOPE	
2287						
2288						
2289	010176	012700	177772			
2290	010202	027027	014752	125252	MOV	#-6,%0
2291	010210	001401			CMP	2A(0),#125252
2292	010212	104006			BEQ	.+4
2293	010214	104400			HLT	
2294					SCOPE	
2295	010216	012700	177772			
2296	010222	022770	125252	014752	MOV	#-6,%0
2297	010230	001401			CMP	#125252,2A(0)
2298	010232	104006			BEQ	.+4
2299	010234	104400			HLT	
2300					SCOPE	
2301	010236	012700	177772			
2302	010242	012701	000002		MOV	#-6,%0
2303	010246	027071	014752	014752	MOV	#+2,%1
2304	010254	001401			CMP	2A(0),2A(1)
2305	010256	104006			BEQ	.+4
2306	010260	104400			HLT	
2307					SCOPE	
2308						
2309	010262	012700	000006			
2310	010266	012767	177777	004500	MOV	#+6,%0
2311	010274	047067	014752	004472	MOV	#-1,TEMP
2312	010302	022767	125252	004464	BIC	2A(0),TEMP
2313	010310	001401			CMP	#125252,TEMP
2314	010312	104006			BEQ	.+4
2315	010314	104400			HLT	
2316					SCOPE	
2317	010316	012700	177772			
2318	010322	012737	177777	014764	MOV	#-6,%0
2319	010330	042770	125252	014774	MOV	#-1,2#C
2320	010336	023727	014764	052525	BIC	#125252,2TEMP(0)
2321	010344	001401			CMP	2#C,#052525
2322	010346	104006			BEQ	.+4
2323	010350	104400			HLT	
2324					SCOPE	
2325	010352	012737	177777	014764	MOV	#-1,2#C
2326	010360	012700	177772		MOV	#-6,%0
2327	010364	012701	177772		MOV	#-6,%1
2328	010370	047071	014752	014774	BIC	2A(0),2TEMP(1)

;TEST OF COMBINED INDEXING AND INDIRECT

;TEST BIC INSTRUCTION

M04

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2329	010376	022737	052525	014764	CMP	#052525,2#C	
2330	010404	001401			BEQ	.+4	
2331	010406	104006			HLT		
2332	010410	104400			SCOPE		
2333							
2334							
2335							
2336							
2337	010412	012700	177770		MOV	#-10,%0	;MINUS 10 TO REG 0
2338	010416	126027	014752	000252	CMPB	A(0),#000252	; (A INDEX BY MINUS 10) TO #125252
2339	010424	001401			BEQ	.+4	
2340	010426	104006			HLT		;COMPARE WITH INDEX FAILED
2341	010430	104400			SCOPE		
2342							
2343	010432	012700	177770		MOV	#-10,%0	;FOR INDEX
2344	010436	122760	000252	014752	CMPB	#000252,A(0)	;A INDEXED
2345	010444	001401			BEQ	.+4	
2346	010446	104006			HLT		
2347	010450	104400			SCOPE		
2348							
2349	010452	012700	000010		MOV	#10,%0	;INDEX
2350	010456	126027	014752	000125	CMPB	A(0),#000125	
2351	010464	001401			BEQ	.+4	
2352	010466	104006			HLT		
2353	010470	104400			SCOPE		
2354							
2355	010472	012700	000010		MOV	#10,%0	
2356	010476	122760	000125	014752	CMPB	#000125,A(0)	
2357	010504	001401			BEQ	.+4	
2358	010506	104006			HLT		
2359	010510	104400			SCOPE		
2360							
2361	010512	012700	177770		MOV	#-10,%0	
2362	010516	126060	014752	014752	CMPB	A(0),A(0)	
2363	010524	001401			BEQ	.+4	
2364	010526	104006			HLT		
2365	010530	104400			SCOPE		
2366							
2367	010532	012700	000010		MOV	#+10,%0	
2368	010536	126060	014752	014752	CMPB	A(0),A(0)	
2369	010544	001401			BEQ	.+4	
2370	010546	104006			HLT		
2371	010550	104400			SCOPE		
2372							
2373	010552	012700	177770		MOV	#-10,%0	
2374	010556	012701	000004		MOV	#+4,%1	
2375	010562	126061	014752	014752	CMPB	A(0),A(1)	
2376	010570	001401			BEQ	.+4	
2377	010572	104006			HLT		
2378	010574	104400			SCOPE		
2379							
2380	010576	126160	014752	014752	CMPB	A(1),A(0)	
2381	010604	001401			BEQ	.+4	
2382	010606	104006			HLT		
2383	010610	104400			SCOPE		
2384							

2385	010612	012700	177774		MOV	#-4,%0
2386	010616	012701	000010		MOV	#+10,%1
2387	010622	126061	014752	014752	CMPB	A(0),A(1)
2388	010630	001401			BEQ	.+4
2389	010632	104006			HLT	
2390	010634	104400			SCOPE	
2391						
2392	010636	012700	177774		MOV	#-4,%0
2393	010642	012701	000010		MOV	#10,%1
2394	010646	126160	014752	014752	CMPB	A(1),A(0)
2395	010654	001401			BEQ	.+4
2396	010656	104006			HLT	
2397	010660	104400			SCOPE	
2398						
2399						
2400	010662	012700	177770			;TEST MOVE INSTRUCTION FOR INDEX
2401	010666	116067	014752	004100	MOV	#-10,%0
2402	010674	126727	004074	000252	MOVB	A(0),TEMP
2403	010702	001401			CMPB	TEMP,#000252
2404	010704	104006			BEQ	.+4
2405	010706	104400			HLT	
2406					SCOPE	
2407	010710	012700	000010		MOV	#+10,%0
2408	010714	116067	014752	004052	MOVB	A(0),TEMP
2409	010722	126727	004046	000125	CMPB	TEMP,#000125
2410	010730	001401			BEQ	.+4
2411	010732	104006			HLT	
2412	010734	104400			SCOPE	
2413						
2414	010736	012700	177770		MOV	#-10,%0
2415	010742	112760	125252	014774	MOVB	#125252,TEMP(0)
2416	010750	123727	014764	125252	CMPB	#C,#125252
2417	010756	001401			BEQ	.+4
2418	010760	104006			HLT	
2419	010762	104400			SCOPE	
2420						
2421	010764	012700	000010		MOV	#+10,%0
2422	010770	112760	052525	014774	MOVB	#052525,TEMP(0)
2423	010776	123727	015004	052525	CMPB	#TEMP+10,#052525
2424	011004	001401			BEQ	.+4
2425	011006	104006			HLT	
2426	011010	104400			SCOPE	
2427						
2428						
2429						
2430	011012	012767	177777	003754		;TEST BIC INSTRUCTION FOR INDEXING
2431	011020	012700	177770		MOV	#-1,TEMP
2432	011024	146067	014752	003742	MOV	#-10,%0
2433	011032	126727	003736	177525	BICB	A(0),TEMP
2434	011040	001401			CMPB	TEMP,#177525
2435	011042	104006			BEQ	.+4
2436	011044	104400			HLT	
2437					SCOPE	
2438	011046	012767	177777	003720	MOV	#-1,TEMP
2439	011054	012700	000010		MOV	#10,%0
2440	011060	146067	014752	003706	BICB	A(0),TEMP
2441	011066	126727	003702	007652	CMPB	TEMP,#007652

0111074	001401			BEQ	.+4
0111076	104006			HLT	
0111100	104400			SCOPE	
0111108	012737	177777	015004	MOV	8-1,2@TEMP+10
0111110	012700	000010		MOV	8-10,%0
0111114	142760	125252	014774	BICB	8-125252,TEMP(0)
0111122	123727	015004	002525	CHPB	2@TEMP+10,82525
0111138	001401			BEQ	.+4
0111138	104006			HLT	
0111138	104400			SCOPE	
0111136	012700	177770		MOV	8-10,%0
0111144	012767	177777	003614	MOV	8-1,TEMP-10
0111150	142767	052525	003606	BICB	8-052525,TEMP-10
0111158	126727	003602	125252	CHPB	TEMP-10,8125252
0111164	001401			BEQ	.+4
0111166	104006			HLT	
0111170	104400			SCOPE	
;TEST UNARYS INDEXED					
0111172	012737	177777	014774	MOV	8-1,2@TEMP
0111230	012700	177770		MOV	8-10,%0
0111204	105060	015004		CLRB	D(0)
0111210	105737	014774		TSTB	2@TEMP
0111214	001401			BEQ	.+4
0111216	104006			HLT	
0111220	104400			SCOPE	
0111222	012737	177777	014774	MOV	8-1,2@TEMP
0111230	012700	177770		MOV	8-10,%0
0111234	105060	015004		CLRB	D(0)
0111240	023727	014774	177400	CHP	2@TEMP,8177400
0111246	001401			BEQ	.+4
0111250	104006			HLT	
0111252	104400			SCOPE	
0111254	012737	177777	014774	MOV	8-1,2@TEMP
0111262	012700	177771		MOV	8-7,%0
0111266	105060	015004		CLRB	D(0)
0111272	023727	014774	000377	CHP	2@TEMP,8000377
0111300	001401			BEQ	.+4
0111302	104006			HLT	
0111304	104400			SCOPE	
0111306	012737	177777	014774	MOV	8-1,2@TEMP
0111314	012700	000010		MOV	8+10,%0
0111320	105060	014764		CLRB	C(0)
0111324	105737	014774		TSTB	2@TEMP
0111330	001401			BEQ	.+4
0111332	104006			HLT	
0111334	104400			SCOPE	
0111336	012737	177777	014774	MOV	8-1,2@TEMP
0111344	012700	177770		MOV	8-10,%0
0111350	105160	015004		COMB	D(0)

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

2600	011612	104006			HLT	
2601	011614	104400			SCOPE	
2602						
2603	011616	112700	014742			
2604	011622	122700	000252			
2605	011626	001401				
2606	011630	104006				
2607	011632	104400				
2608						
2609	011634	112737	125252	014774		
2610	011640	126737	003074	014774		
2611	011650	001401				
2612	011652	104006				
2613	011654	104400				
2614						
2615	011656	012737	177777	014774		
2616	011664	105037	014774			
2617	011670	023727	014774	177400		
2618	011676	001401				
2619	011700	104006				
2620	011702	104400				
2621						
2622	011704	012737	125252	014774		
2623	011712	105137	014775			
2624	011716	022737	052652	014774		
2625	011724	001401				
2626	011726	104006				
2627	011730	104400				
2628						
2629	011732	005037	014774			
2630	011736	105237	014775			
2631	011742	022737	000400	014774		
2632	011750	001401				
2633	011752	104006				
2634	011754	104400				
2635						
2636	011756	005037	014774			
2637	011762	105377	003010			
2638	011766	023727	014774	000377		
2639	011774	001401				
2640	011776	104006				
2641	012000	104400				
2642						
2643	012002	005037	014774			
2644	012006	112737	000001	014775		
2645	012014	105437	014775			
2646	012020	022737	177400	014774		
2647	012026	001401				
2648	012030	104006				
2649	012032	104400				

;TEST MOVE INSTRUCTIONS

```

MOV  @B,XD
CMPB @000252,XD
BEQ  .+4
HLT
SCOPE

MOV  @125252,@TEMP
CMPB B,@TEMP
BEQ  .+4
HLT
SCOPE

```

;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

```

;TEST INDIRECT ADDRESSING WITH INDEXING
;TEST COMPARE INSTRUCTION

2609	012034	122777	125252	002702	CMPB	#125252, @B+2
2610	012042	001401			BEQ	.+4
2611	012044	104006			HLT	
2612	012046	104400			SCOPE	
2613						
2614	012050	127777	002670	002666	CMPB	@B+2, @B+2
2615	012056	001401			BEQ	.+4
2616	012060	104006			HLT	
2617	012062	104400			SCOPE	
2618						
2619						

;TEST MOVE INSTRUCTIONS

2620	012064	117700	002654		MOVB	@B+2, X0
2621	012070	122700	125252		CMPB	#125252, X0
2622	012074	001401			BEQ	.+4
2623	012076	104006			HLT	
2624	012100	104400			SCOPE	

2625	012102	112777	125252	002666	MOVB	#125252, @TEMP+2
2626	012110	126737	002626	014774	CMPB	B, @TEMP
2627	012116	001401			BEQ	.+4
2628	012120	104006			HLT	
2629	012122	104400			SCOPE	

2630	012124	117777	002614	002634	MOVB	@B+2, @C+2
2631	012132	126737	002604	014764	CMPB	B, @C
2632	012140	0C +01			BEQ	.+4
2633	012142	104006			HLT	
2634	012144	104400			SCOPE	

;TEST BIC INSTRUCTION INDIRECT WITH INDEXING

2635	012146	012700	177777		MOV	#-1, X0
2636	012152	147700	002566		BICB	@B+2, X0
2637	012156	120027	052525		CMPB	X0, #52525
2638	012162	001401			BEQ	.+4
2639	012164	104006			HLT	
2640	012166	104400			SCOPE	

2641	012170	012737	177777	014774	MOV	#-1, @TEMP
2642	012176	142777	125252	002572	BICB	#125252, @TEMP+2
2643	012204	122737	052525	014774	CMPB	#52525, @TEMP
2644	012212	001401			BEQ	.+4
2645	012214	104006			HLT	
2646	012216	104400			SCOPE	

2647	012220	012737	177777	014764	MOV	#-1, @C
2648	012226	147777	002512	002532	BICB	@B+2, @C+2
2649	012234	126737	002522	014764	CMPB	A+10, @C
2650	012242	001401			BEQ	.+4
2651	012244	104006			HLT	
2652	012246	104400			SCOPE	

;TEST UNARYS INDIRECT WITH INDEXING

2653	012250	012737	177777	014774	MOV	#-1, @TEMP
2654	012256	105077	002514		CLRB	@TEMP+2
2655	012262	105737	014774		TSTB	@TEMP
2656	012266	001401			BEQ	.+4

2665	012270	104006			HLT	
2666	012272	104400			SCOPE	
2667						
2668	012274	005037	014774		CLR	@TEMP
2669	012300	105277	002472		INCB	@TEMP+2
2670	012304	122737	000001	014774	CMPS	@1,@TEMP
2671	012312	001401			BEQ	+.4
2672	012314	104006			HLT	
2673	012316	104400			SCOPE	
2674						
2675	012320	005037	014774		CLR	@TEMP
2676	012324	105377	002446		DECB	@TEMP+2
2677	012330	123727	014774	177777	CMPS	@TEMP,@-1
2678	012336	001401			BEQ	+.4
2679	012340	104006			HLT	
2680	012342	104400			SCOPE	
2681						
2682	012344	012737	000001	014774	MOV	@1,@TEMP
2683	012352	105477	002420		NEGB	@TEMP+2
2684	012356	122737	177777	014774	CMPS	@-1,@TEMP
2685	012364	001401			BEQ	+.4
2686	012366	104006			HLT	
2687	012370	104400			SCOPE	
2688						
2689	012372	012737	177777	014774	MOV	@-1,@TEMP
2690	012400	000261			SEC	
2691	012402	105577	002370		ROCB	@TEMP+2
2692	012406	022737	177400	014774	CMPS	@177400,@TEMP
2693	012414	001401			BEQ	+.4
2694	012416	104006			HLT	
2695	012420	105737	014774		TSTB	@TEMP
2696	012424	001401			BEQ	+.4
2697	012426	104006			HLT	
2698	012430	104400			SCOPE	
2699						
2700	012432	012737	000001	014774	MOV	@1,@TEMP
2701	012440	000261			SEC	
2702	012442	105377	002330		DECB	@TEMP+2
2703	012446	005737	014774		TST	@TEMP
2704	012452	001401			BEQ	+.4
2705	012454	104006			HLT	
2706	012456	104400			SCOPE	
2707						
2708						
2709	012460	012700	177772		MOV	@-6,%0
2710	012464	127027	014752	125252	CMPS	@A(0),@125252
2711	012472	001401			BEQ	+.4
2712	012474	104006			HLT	
2713	012476	104400			SCOPE	
2714						
2715	012500	012700	177772		MOV	@-6,%0
2716	012504	012701	000002		MOV	@+2,%1
2717	012510	127071	014752	014752	CMPS	@A(0),@A(1)
2718	012516	001401			BEQ	+.4
2719	012520	104006			HLT	
2720	012522	104400			SCOPE	

;TEST OF COMBINED INDEXING AND INDIRECT


```

2721
2722
2723 012524 012700 000006 ;TEST BIC INSTRUCTION
2724 012530 012767 177777 002236 MOV #+6,%0
2725 012536 147067 014752 002230 MOV #-1,%TEMP
2726 012544 122767 125252 002222 BICB @A(0),%TEMP
2727 012552 001401 CMPB #125252,%TEMP
2728 012554 104006 BEQ .+4
2729 012556 104400 HLT
2730 SCOPE
2731 012560 012700 177772 MOV #-6,%0
2732 012564 012737 177777 014764 MOV #-1,%@C
2733 012572 142770 125252 014774 BICB #125252,%TEMP(0)
2734 012580 123727 014764 000125 CMPB @@C,%000125
2735 012606 001401 BEQ .+4
2736 012610 104006 HLT
2737 012612 104400 SCOPE
2738
2739 012614 012700 014744 MOV #@+2,%0 ;ADDRESS OF ADDRESS OF B
2740 012620 023067 002116 CMP @A(0)+,%B
2741 012624 001401 BEQ .+4
2742 012626 104006 HLT
2743 012630 104400 SCOPE
2744
2745 012632 012700 014746 MOV #@+4,%0
2746 012636 025067 002100 CMP @-(0),%B
2747 012642 001401 BEQ .+4
2748 012644 104006 HLT
2749 012646 104400 SCOPE
2750
2751 012650 012700 014746 MOV #@+4,%0
2752 012654 125067 002062 CMPB @-(0),%B
2753 012660 001401 BEQ .+4
2754 012662 104006 HLT
2755 012664 104400 SCOPE
2756
2757 012666 012700 014770 MOV #@+4,%0
2758 012672 012737 177777 014764 MOV #-1,%@C
2759 012700 105050 CLR @-(0)
2760 012702 023727 014764 177400 CMP @@C,%177400
2761 012710 001401 BEQ .+4
2762 012712 104006 HLT
2763 012714 104400 SCOPE
2764
2765 012716 012737 177777 014764 MOV #-1,%@C
2766 012724 012700 177772 MOV #-6,%0
2767 012730 012701 177772 MOV #-6,%1
2768 012734 147071 014752 014774 BICB @A(0),@TEMP(1)
2769 012742 022737 177525 014764 CMP #177525,@@C
2770 012750 001401 BEQ .+4
2771 012752 104006 HLT
2772 012754 104400 SCOPE
2773
2774 ;SET UP TO TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
2775 012756 012700 052525 MOV #52525,%0 ;THIS IS CHECKED LATER IN PROGRAM
2776
    
```

```

2777 ;TEST JSR INSTRUCTION
2778 012762 004767 000002          JSR      X7, TJSR2      ;PLACE PC ON STACK
2779 012766 000405          TJSR1: BR      TJSR3    ;RETURN HERE ON RTS %19
2780 012770 121627 012766          TJSR2: CMPB   2%6, 8TJSR1 ;CHECK FOR CORRECT PC ON STACK
2781 012774 001401          BEQ      .+4
2782 012776 104006          HLT
2783 013000 000207          RTS      X7            ;INCORRECT PC ON STACK
2784 013002 104400          TJSR3: SCOPE          ;RETURN TO INST AFTER JSR
2785
2786 013004 000257          CCC
2787 013006 004717          JSR      X7, 2X7      ;INSTRUCTION UNDER TEST
2788 013010 121627 013010          CMPB   2%6, 8TJSR3+6 ;TEST THE STACK
2789 013014 001401          BEQ      .+4
2790 013016 104006          HLT
2791 013020 005726          TST     (6)+
2792 013022 104400          SCOPE          ;PC OF JSR DID NOT GO TO STACK
2793 ;REPOSITION THE STACK
2794
2795 ;TEST NESTED SUBROUTINES
2796 013024 000257          CCC
2797 013026 004767 001602          JSR      X7, SUBR6    ;CLEAR CONDITION CODES
2798 013030 100401          BMI     .+4
2799 013034 104006          HLT
2800 013036 001401          BEQ     .+4          ;JSR OR RTS FAILED
2801 013040 104006          HLT
2802 013042 102401          BVS     .+4          ;JSR OR RTS FAILED
2803 013044 104006          HLT
2804 013046 103401          BCS     .+4          ;JSR OR RTS FAILED
2805 013050 104006          HLT
2806 013052 104400          SCOPE          ;JSR OR RTS FAILED
2807
2808 ;TEST ROTATE ODD BYTE
2809 013054 104400          SCOPE
2810 013056 000257          CCC
2811 013060 012767 123456 001706          MOV     8123456, TEMP ;CLEAR "C"
2812 013066 106067 001703          RORB   TEMP+1        ;ROTATE ODD BYTE
2813 013072 103401          BCS     .+4
2814 013074 104006          HLT
2815 013076 102401          BVS     .+4          ;C NOT SET
2816 013100 104006          HLT
2817 013102 022767 051456 001664          CMP     8051456, TEMP ;V NOT SET
2818 013110 001401          BEQ     .+4
2819 013112 104006          HLT
2820 013114 104400          SCOPE          ;ROTATE FAILED
2821
2822 013116 000277          SCC
2823 013120 012767 123456 001646          MOV     8123456, TEMP ;SET C
2824 013126 106067 001643          RORB   TEMP+1
2825 013132 103401          BCS     .+4
2826 013134 104006          HLT
2827 013136 102001          BVC     .+4          ;C NOT SET
2828 013140 104006          HLT
2829 013142 022767 151456 001624          CMP     8151456, TEMP ;V NOT CLEARED
2830 013150 001401          BEQ     .+4
2831 013152 104006          HLT
2832 013154 104400          SCOPE          ;ROTATE FAILED

```

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2870 013156 000257 CCC
2871 013160 012767 123456 001606 MOV #123456,TEMP
2872 013166 106167 001603 ROLB TEMP+1
2873 013172 103401 BCS .+4
2874 013174 104006 HLT ;C NOT SET
2875 013176 102401 BVS .+4
2876 013180 104006 HLT ;V NOT SET
2877 013182 022767 047056 001564 CMP #047056,TEMP
2878 013210 001401 BEQ .+4
2879 013212 104006 HLT ;ROTATE BYTE FAILED
2880 013214 104400 SCOPE
2881 013216 000277 SCC ;SET C
2882 013220 012767 123456 001546 MOV #123456,TEMP
2883 013226 106167 001543 ROLB TEMP+1
2884 013232 103401 BCS .+4
2885 013234 104006 HLT ;C NOT SET
2886 013236 102401 BVS .+4
2887 013238 104006 HLT ;V NOT SET
2888 013240 022767 047456 001524 CMP #047456,TEMP
2889 013246 001401 BEQ .+4
2890 013248 104006 HLT ;ROTATE ODD BYTE FAILED
2891 013254 104400 SCOPE
2892 013256 000257 CCC ;CLEAR C
2893 013260 012767 177777 001506 MOV #0-1,TEMP
2894 013266 106267 001503 ASRB TEMP+1
2895 013272 103401 BCS .+4
2896 013274 104006 HLT ;C NOT SET
2897 013276 102401 BVS .+4
2898 013278 104006 HLT ;V NOT CLEARED
2899 013302 026727 001466 177777 CMP TEMP,#0-1
2900 013310 001401 BEQ .+4
2901 013312 104006 HLT ;SHIFT FAILED
2902 013314 104400 SCOPE
2903 013316 000277 SCC
2904 013320 012767 177777 001446 MOV #0-1,TEMP
2905 013326 106367 001443 ASLB TEMP+1
2906 013332 103401 BCS .+4
2907 013334 104006 HLT ;C NOT SET
2908 013336 102001 BVC .+4
2909 013340 104006 HLT ;V NOT CLEARED
2910 013342 026727 001426 177377 CMP TEMP,#177377
2911 013350 001401 BEQ .+4
2912 013352 104006 HLT ;SHIFT BYTE FAILED
2913 013354 104400 SCOPE
2914 013356 022700 052525 ;TEST THAT RO WASN'T CLEARED BY FALSE SELECTION
2915 013362 001401 CMP #52525,RO
2916 013364 104006 BEQ .+4
2917 013366 104400 HLT
2918 SCOPE
2919 ;TEST COMBINATION OF N, C AND V

```

J05

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 DFKTGA.P11 BACKGROUND CPU TESTS

```

2889 013370 005067 001340          CLR      ICOUNT          ;NO ITERATION
2890
2891          ;INHIBIT TESTS WHICH USE ALL NUMBERS WHEN SW11 IS SET
2892 013374 032737 004000 000176      BIT      #4000, @SREG2
2893 013402 001402          BEQ      COMPAR
2894 013404 000167 001170          JMP      DONE
2895
2896          ;TEST ALL COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
2897 013410 005000      COMPAR: CLR      X0          ;INIT X0
2898 013412 005001      CLR      X1          ;INIT X1
2899 013414 005001      CMP1:  CMP      X0,X1      ;ARE THE EQUAL
2900 013416 001401      BEQ      .+4
2901 013420 104006      HLT
2902 013422 020007 177777      CMP      X0,#-1      ;R0 AND R1 DID NOT COMPARE
2903 013426 001403      BEQ      CMP2        ;AT UPPER LIMIT
2904 013428 000000      INC      X0          ;YES EXIT
2905 013430 000001      INC      X1          ;INCREMENT TO NEXT NUMBER
2906 013434 000167      BR       CMP1
2907 013436 104400      CMP2:  SCOPE
2908
2909          ;TEST ROTATING ALL NUMBERS
2910 013440 104400      SCOPE
2911 013442 012767 177777 000132      MOV      #-1, REFF
2912 013450 005267 000126      TSROT:  INC      REFF      ;INITIALIZE BASE NUMBER
2913 013454 004767 000012      JSR      %Z, ROTALL    ;INCREMENT NUMBER
2914 013460 026727 000116 177777      CMP      REFF, #-1     ;GO TO COMPARE ROUTINE
2915 013466 001370      BNE      TSROT        ;TEST ALL VALUES
2916 013470 000446      BR       TSRT2A       ;NO TEST THEM ALL
2917                                     ;WE ARE DONE
2918 013472 016767 000104 000104      ROTALL: MOV      REFF, TEST
2919 013478 006067 000100      ROR      TEST
2920 013484 006067 000074      ROR      TEST
2921 013510 006067 000070      ROR      TEST
2922 013514 006167 000064      ROL      TEST
2923 013520 006167 000060      ROL      TEST
2924 013524 006167 000054      ROL      TEST
2925 013530 103004      BPL      .+12
2926 013532 103007      BCC      .+20
2927 013534 102013      BVC      .+30
2928 013536 104006      HLT
2929 013540 000411      BR       .+24
2930 013542 103006      BCC      .+16
2931 013544 102407      BVS      .+20
2932 013546 104006      HLT
2933 013550 000405      BR       .+14
2934 013552 102404      BVS      .+12
2935 013554 104006      HLT
2936 013556 000402      BR       .+6
2937 013560 102001      BVC      .+4
2938 013562 104006      HLT
2939 013564 104400      SCOPE
2940 013566 026767 000012 000006      CMP      TEST, REFF
2941 013574 001401      BEQ      .+4
2942 013576 104006      HLT
2943 013600 000207      RTS      X7
2944 013602 000000      REFF:  0
  
```

K05

DFKTG-A MACY11 27(732) 10-SEP-76 09:51 PAGE 62
 DFKTGA.P11 BACKGROUND CPU TESTS

2945	013604	000000			TEST: 0				
2946		013602			REF=REFF				
2947									
2948									
2949									
2950	013606	012767	177777	177766					
2951	013614	005267	177762						
2952	013620	004767	000016						
2953	013624	004767	000122						
2954	013630	022767	177777	177744					
2955	013636	001366							
2956	013640	000505							
2957	013646	016767	177734	177734	ROTBE:	MOV	REFF, TEST		
2958	013650	106067	177730			RORB	TEST		; ROTATE BYTE EVEN
2959	013654	106067	177724			RORB	TEST		
2960	013660	106067	177720			RORB	TEST		
2961	013664	106167	177714			ROLB	TEST		
2962	013670	106167	177710			ROLB	TEST		
2963	013674	106167	177704			ROLB	TEST		
2964	013700	100004				BPL	+.12		
2965	013702	103007				BCC	+.20		; Z=1
2966	013704	102013				BVC	+.30		; Z=1, C=1
2967	013706	104006				HLT			; Z=C, BUT V=1
2968	013710	000411				BR	+.24		
2969	013712	103006				BCC	+.16		; Z=0
2970	013714	102407				BVS	+.20		; Z=0, C=1
2971	013716	104006				HLT			; Z NOT EQUAL C, V=1
2972	013720	000405				BR	+.14		
2973	013722	102404				BVS	+.12		; Z=1, C=0
2974	013724	104006				HLT			; Z NOT EQUAL C, V=1
2975	013726	000402				BR	+.6		
2976	013730	102001				BVC	+.4		; Z=0, C=0
2977	013732	104006				HLT			; Z=C, BUT V=1
2978	013734	104400				SCOPE			
2979	013736	026767	177642	177636		CMP	TEST, REFF		
2980	013744	001401				BEQ	+.4		
2981	013746	104006				HLT			
2982	013750	000207				RTS	%7		
2983	013752	106067	177627			RORB	TEST+1		; ROTATE BYTE ODD
2984	013756	106067	177623			RORB	TEST+1		
2985	013762	106067	177617			RORB	TEST+1		
2986	013766	106167	177613			ROLB	TEST+1		
2987	013772	106167	177607			ROLB	TEST+1		
2988	013776	106167	177603			ROLB	TEST+1		
2989	014002	100004				BPL	+.12		
2990	014004	103007				BCC	+.20		; Z=1
2991	014006	102013				BVC	+.30		; Z=1, C=1
2992	014010	104006				HLT			; Z=C, BUT V=1
2993	014012	000411				BR	+.24		
2994	014014	103006				BCC	+.16		; Z=0
2995	014016	102407				BVS	+.20		; Z=0, C=1
2996	014020	104006				HLT			; Z NOT EQUAL C, V=1
2997	014022	000405				BR	+.14		
2998	014024	102404				BVS	+.12		; Z=1, C=0
2999	014026	104006				HLT			; Z NOT EQUAL C, V=1
3000	014030	000402				BR	+.6		
	014032	102001				BVC	+.4		; Z=0, C=0

```

3001 014034 104006 HLT ;Z=C, BUT V=1
3002 014036 104400 SCOPE
3003 014040 026767 177540 177534 CMP TEST,REFF
3004 014046 001401 BEQ .+4
3005 014050 104006 HLT
3006 014052 000207 RTS x7
3007 014054 104400 ROTEN1: SCOPE
3008
3009 ;ADD AND SUBTRACT ALL NUMBERS AGAINST FIXED NUMBERS
3010 ;A+B=C, C-A=B, BF SHOULD EQUAL BI
3011 014056 011667 000072 MOV 2%6,NUMA
3012 014062 012767 000001 177512 MOV 01,REF
3013 014070 005267 177506 ARITST: INC REF
3014 014074 004767 000014 JSR x7,ADSUB
3015 014100 022767 177777 177474 CMP 0-1,REFF
3016 014106 001370 BNE ARITST
3017 014110 000422 BR ARIEND
3018 014112 104400 SCOPE
3019 014114 016767 177462 177462 ADSUB: MOV REF,TEST
3020 014122 066767 000026 177454 ADD NUMA,TEST
3021 014130 166767 000020 177446 SUB NUMA,TEST
3022 014136 026767 177440 177440 CMP REF,TEST
3023 014144 001401 BEQ .+4
3024 014146 104006 HLT
3025 014150 104400 SCOPE
3026 014152 000207 RTS x7
3027 014154 000000 NUMA: 0
3028 014156 104400 ARIEND: SCOPE
3029
3030 ;TEST COMPLEMENTING ALL NUMBERS
3031 014160 005067 000610 CLR TEMP ;BASE DATA
3032 014164 005067 000610 CLR TEMP+4 ;BASE REFERENCE
3033 014170 005167 000600 TCOM: COM TEMP ;COMPLEMENT DATA
3034 014174 005367 000600 DEC TEMP+4 ;DECREMENT REFERENCE
3035 014200 026767 000570 000572 CMP TEMP,TEMP+4 ;COMPARE
3036 014206 001401 BEQ .+4 ;TEST
3037 014210 104006 HLT ;COMPLIMENT OR DECREMENT FAILED
3038 014212 005167 000556 COM TEMP
3039 014216 005267 000552 INC TEMP ;INCREMENT AND TEST FOR DONE
3040 014222 001362 BNE TCOM ;NOT FINISHED GO LOOP
3041 014224 104400 SCOPE
3042
3043 ;TEST COMB (EVEN BYTE)
3044 014226 005067 000542 CLR TEMP ;BASE DATA
3045 014232 005067 000542 CLR TEMP+4 ;REFERENCE DATA
3046 014236 105167 000532 TCOM2: COMB TEMP
3047 014242 005367 000532 DEC TEMP+4
3048 014246 126767 000522 000524 CMPB TEMP,TEMP+4 ;COMPARE
3049 014254 001401 BEQ .+4
3050 014256 104006 HLT ;COMPLIMENT OR INCREMENT BYTE FAILED
3051 014260 105167 000510 COMB TEMP
3052 014264 105267 000504 INCB TEMP
3053 014270 001362 BNE TCOM2
3054 014272 104400 SCOPE
3055
3056 ;TEST COMB (ODD BYTE)
    
```

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DFKTGA.P11 BACKGROUND CPU TESTS

3057	014274	005067	000474		CLR	TEMP	;BASE DATA
3058	014300	005067	000474		CLR	TEMP+4	;REFERENCE DATA
3059	014304	105167	000465		COMB	TEMP+1	;ODD BYTE
3060	014310	005367	000464		DEC	TEMP+4	
3061	014314	126767	000455	000456	CMPB	TEMP+1,TEMP+4	
3062	014322	001401			BEQ	.+4	
3063	014324	104006			HLT		;COMPLIMENT BYTE FAILED
3064	014326	105167	000443		COMB	TEMP+1	
3065	014332	105267	000437		INCB	TEMP+1	
3066	014336	001362			BNE	TCOM3	
3067	014340	104400			SCOPE		
3068							
3069							
3070	014342	005067	000426				;TEST COMPARE ALL VALUE EVEN BYTE WITH ODD
3071	014346	126767	000422	000421	CLR	TEMP	;BASE VALUE
3072	014354	001401			TSCOMB: CMPB	TEMP,TEMP+1	;COMPARE
					BEQ	.+4	

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 DFKTGA.P11 BACKGROUND CPU TESTS

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3073 014356 104006          HLT          ;COMPARE FAILED
3074 014360 002001          BGE         .+4
3075 014362 104006          HLT          ;V IS NOT = TO N
3076 014364 003401          BLE         .+4
3077 014366 104006          HLT          ;V IS SET
3078 014370 062767 000401 000376      ADD         #401,TEMP
3079 014376 022767 177777 000370      CMP         #-1,TEMP
3080 014404 001360          BNE         TSCOMB
3081 014406 104400          SCOPE
3082
3083 014410 012767 000010 000316      MOV         #10,ICOUNT
3084
3085          ;TEST TO SEE IF I/O DEVICES WERE SELECTED
3086 014416 016767 163554 000026      MOV         SREG2,CKWAIT
3087 014424 005167 000022          COM         CKWAIT
3088 014430 032767 000371 000014      BIT         #371,CKWAIT
3089 014436 001406          BEQ         WAIT4          ;BRANCH IF NO DEVICES SELECTED
3090 014440 000001          WAIT
3091 014442 000001          WAIT          ;INTERRUPTS WILL OCCUR
3092 014444 000001          WAIT          ;IF DEVICES ARE SELECTED
3093 014446 000001          WAIT
3094 014450 000401          BR         .+4
3095 014452 000000          CKWAIT: 0
3096 014454 104400          WAIT4: SCOPE
3097 014456 012767 000400 000250      MOV         #400,ICOUNT
3098
3099          ;TEST SWAB
3100 014464 012767 000200 177112      MOV         #0200,TEST
3101 014472 000367 177106          SWAB        TEST
3102 014476 100001          BPL         .+4
3103 014500 104006          HLT
3104 014502 001401          BEQ         .+4
3105 014504 104006          HLT
3106 014506 000367 177072          SWAB        TEST
3107 014512 100401          BMI         .+4
3108 014514 104006          HLT
3109 014516 001001          BNE         .+4
3110 014520 104006          HLT
3111 014522 104400          SCOPE
3112
3113          ;TEST ALL COMBINATIONS OF SWAB
3114 014524 005067 177054          CLR         TEST          ;NUMBER UNDER TEST
3115 014530 005067 177046          CLR         REF          ;REFERENCE NUMBER
3116 014534 000367 177044          SWAB        TEST          ;OPERATION UNDER TEST
3117 014540 026767 177040 177034      CMP         TEST,REF      ;TEST SWAB INSTRUCTION
3118 014546 001401          BEQ         .+4
3119 014550 104006          HLT          ;SWAB FAILED
3120 014552 000367 177026          SWAB        TEST
3121 014556 005267 177020          INC         REF          ;INCREMENT REFERENCE NUMBER
3122 014562 105267 177017          INCB        TEST+1       ;INC TEST NUMBER
3123 014566 001362          BNE         SWABA        ;LOOP TILL DONE
3124 014570 104400          SCOPE
3125 014572 012767 004000 000134      MOV         #4000,ICOUNT
3126
3127
3128          ;*****
  
```



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3129          ;END OF USER CODE IN BANK/
3130          ;CALL KERNEL/
3131          ;ALTERED IN CORE EXPANSION/
3132 014600 104010  DONE:  EOB
3133 014602 000240      NOP          ;TO ALLOW CORE EXPANSION TO PATCH IN JMP
3134
3135          ;GROUP OF NESTED SUBROUTINES/
3136 014604 000207  SUBR1:  RTS      X7          ;ONE INSTRUCTION
3137 014606 000277  SUBR2:  SCC          ;ONE DEEP
3138 014610 000207          RTS      X7
3139 014612 004767 177770  SUBR3:  JSR      X7, SUBR2      ;TWO DEEP
3140 014616 000207          RTS      X7
3141 014620 004767 177766  SUBR4:  JSR      X7, SUBR3      ;THREE DEEP
3142 014624 000207          RTS      X7
3143 014626 004767 177766  SUBR5:  JSR      X7, SUBR4      ;FOUR DEEP
3144 014632 000207          RTS      X7
3145 014634 004767 177766  SUBR6:  JSR      X7, SUBR5      ;FIVE DEEP
3146 014640 000207          RTS      X7
3147
3148          ;SCOPE AND/OR ITERATION LOOP FOR EACH TEST TIMES/
3149 014642 032767 002000 163326 SCOPEC: BIT      @2000, SREG2      ;INHIBIT PROCESSOR TESTS?
3150 014650 001403          BEQ      .+10          ;NO
3151 014652 022626          CMP      (SP)+, (SP)+
3152 014654 000167 165416          JMP      MAIN          ;YES
3153 014660 032767 040000 163310 SCOPEB: BIT      @40000, SREG2      ;TEST SR FOR SCOPE
3154 014666 001012          BNE      SCOPEB          ;YES SCOPE
3155 014670 032767 004000 163300 SCOPEI: BIT      @4000, SREG2      ;NO-TEST FOR ITERATION
3156 014676 001011          BNE      SCOPEI          ;INHIBIT ITERATION
3157 014700 026767 000032 000026 SCOPEI: CMP      SCOPEI, ICOUNT      ;COMPARE CURRENT COUNT TO MAX NUMBER
3158 014706 100005          BPL      SCOPEG          ;EXIT-DONE
3159 014710 005267 000022          INC      SCOPEF          ;INCREMENT COUNT
3160 014714 016716 000020          SCOPEB: MOV      RETURN, @SP
3161 014720 000002          RTI
3162 014722 005067 000010          SCOPEG: CLR      SCOPEF          ;CLEAR COUNT
3163 014726 011667 000006          MOV      @%6, RETURN      ;SAVE SCOPE RETURN POINTER
3164 014732 000002          RTI          ;RETURN INLINE-NEXT TEST
3165 014734 000400          ICOUNT: 400          ;ITERATION COUNT
3166 014736 000000          SCOPEF: 0          ;COUNT LOCATION FOR ITERATION LOOP
3167 014740 000000          RETURN: 0          ;ADDRESS OF LAST TEST
3168
3169          ;FIXED VALUES FOR USE IN TEST/
3170 014742 125252          B:      125252          ;ADDRESS OF B
3171 014744 014742          B
3172 014746 052525          B          ;ADDRESS OF B
3173          . =B+10
3174 014752 177777          A:      -1
3175 014754 014756          A+4
3176          . =A+4
3177 014756 125252          . =A+4
3178 014760 014762          . =A+4
3179 014762 052525          . =A+10          ;ADDRESS OF A+10
3180
3181          ;FOR STORAGE
3182 014764 000000          C:      0
3183 014766 014764          C
3184          . =C+10          ;ADDRESS OF C
    
```

3185	014774	000000			TEMP: 0	
3186	014776	014774			TEMP	; ADDRESS OF TEMP
3187		015002			=TEMP+6	
3188	015002	015004			TEMP+10	; ADDRESS OF TEMP+10 OR "D"
3189	015004	000000			D: 0	
3190						
3191						
3192	015006	010146				
3193	015010	010246				
3194	015012	010346				
3195	015014	012701	000536			
3196						
3197	015020	012703	000010			
3198	015024	012102				
3199						
3200	015026	005022				
3201	015030	077302				
3202	015032	020127	000544			
3203	015036	003770				
3204	015040	012603				
3205	015042	012602				
3206	015044	012601				
3207	015046	000207				
3208						
3209						
3210						
3211	015050	162716	000002			
3212	015054	006576	000000			
3213	015060	012667	000022			
3214	015064	062716	000002			
3215	015070	105067	000013			
3216	015074	062767	015110	000004		
3217	015102	017707	000000			
3218	015106	000000				
3219		000000				
3220		000000				
3221		000000				
3222	015110	000000				
3223	015112	000000				
3224	015114	000000				
3225	015116	016164				
3226	015120	015122				
3227						
3228						
3229	015122	117737	163422	000177		
3230	015130	032767	000001	163036		
3231	015136	001507				
3232	015140	004767	001410			
3233	015144	042766	000020	000002		
3234	015152	012737	000016	000014		
3235	015160	005037	000016			
3236	015164	032737	010000	000176		
3237	015172	001011				
3238	015174	005167	163402			
3239	015200	100006				
3240	015202	052766	000020	000002		


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; 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 @IPORTAB, R1 ; R1 HOLDS ADDRESS OF CURRENT POSITION
; IN TABLE OF ADDRESSES
NRLOOP: MOV @R3
MOV (R1)+, R2 ; R3 USED AS COUNTER
; R2 CONTAINS ADDRESS OF PDR OR
; PAR TO BE CLEARED
CLR (R2)+ ; CLEAR ALL ASR'S FOR THIS MODE
SOB R3, -2 ; CHECK FOR DONE
CMP R1, @IPDREND ; CLEAR ALL IN NEXT MODE IF NOT DONE
BLE NRLOOP
MOV (R6)+, R3
MOV (R6)+, R2
MOV (R6)+, R1
RTS X7

; ENT HANDLER/
; FIRST 3 CALLS LEFT OPEN IN TABLE FOR EASY PATCHES/
ENTSRV: SUB @R2, @SP ; GET CALL
MFPI @SP
MOV (SP)+, EPC
ADD @R2, @SP
CLRB EPC+1 ; SAVE OFFSET ONLY
ADD @ENTAB, EPC ; POINT TO TABLE OF ADDRESSES
MOV @EPC, PC ; JUMP TO DESIRED ROUTINE

EPC: 0
PATCH1=0
PATCH2=0
PATCH3=0
ENTAB: PATCH1 ; PATCH IN ADDRESS OF ROUTINE
PATCH2
PATCH3
PRINT ; ERROR PRINTOUT
EOBSRV ; END OF BANK

; END OF BANK SERVICE
EOBSRV: MOV @SRH, @SREG2+1 ; READ SWITCHES AGAIN
BIT @1, @MOPT ; MEMORY MANAG. INHIBITED?
BEQ EOB2 ; NO - CONTINUE
JSR X7, BELL ; SIGNAL END OF PASS
BIC @R20, @SP ; CLEAR TRACE BIT OF STATUS ON STACK
MOV @R16, @R14 ; SETUP TRACE RETURN TO CAUSE HALT
CLR @R16 ; IF A TRACE TRAP OCCURS
BIT @R10000, @SREG2 ; INHIBIT TRACE TRAPPING?
BNE EOB1A ; YES - BRANCH
COM TRPB ; SWITCH TRACE FLAG
BPL EOB1A ; IF NOT SET, LEAVE TRACE OFF
BIS @R20, @SP ; IF SET, SET TRACE BIT OF STATUS ON STACK

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3271	015210	012737	016162	000014		MOV	#STRTP, R014		
3272	015216	032737	000040	000174	E081A:	BIT	#40, R#MPT	;CORE EXPANSION INHIBITED?	
3273	015224	001051				BNE	E081C	;YES, SKIP	
3274	015230	013701	000176			MOV	R#SREG2, R1		
3275	015236	032767	000002	163344		BIT	#2, MEMO		
3276	015242	001402				BEG	DSW1		
3277	015248	010137	020176			MOV	R1, R#SREG2+20000		
3278	015254	032767	000004	163330	DSW1:	BIT	#4, MEMO		
3279	015260	001402				BEG	DSW2		
3280	015266	010137	040176			MOV	R1, R#SREG2+40000		
3281	015272	032767	000010	163314	DSW2:	BIT	#10, MEMO		
3282	015278	001402				BEG	DSW3		
3283	015284	010137	060176			MOV	R1, R#SREG2+60000		
3284	015290	032767	000020	163300	DSW3:	BIT	#20, MEMO		
3285	015296	001402				BEG	DSW4		
3286	015302	010137	100176			MOV	R1, R#SREG2+100000		
3287	015308	032767	000040	163264	DSW4:	BIT	#40, MEMO		
3288	015314	001402				BEG	DSW5		
3289	015320	010137	120176			MOV	R1, R#SREG2+120000		
3290	015326	032767	000100	163250	DSW5:	BIT	#100, MEMO		
3291	015332	001402				BEG	E081B		
3292	015338	010137	140176			MOV	R1, R#SREG2+140000		
3293	015344	011716	005420		E081B:	MOV	#BEGINX, (SP)		
3294	015350	001402				RTI			
3295	015356	011716	005452		E081C:	MOV	#BEGIN, (SP)		
3296	015362	001402				RTI			
3297	015368	000340	177776		E082:	BIC	#340, R#PSR		
3298	015374	000002	162602			BIT	#2, MPT	;USER/KERNEL INHIBITED?	
3299	015380	001262				BNE	E081	;YES - SET PC AND RETURN	
3300	015386	000004	162572			BIT	#4, MPT	;NO--INHIBIT 4K AS 32K?	
3301	015392	001262				BNE	E081	;YES - SET PC AND RETURN	
3302	015398	026767	163164	163102		CMP	CURPAR, UPAR7	;LAST USER ASR DONE?	
3303	015404	001444				BEG	NXTBNK	;YES - GO FIND NEXT BANK	
3304	015410	062737	027000	000034		ADD	#20000, R#34	;UPDATE SCOPE VECTOR ADDRESS IN BANK 0	
3305	015416	062767	027000	163150		ADD	#3000, R#KSTR	;UPDATE BANK START TO REFERENCE CURRENT ASR	
3306	015422	016716	163144			MOV	B#STR, (SP)		
3307	015428	026767	163050	163132		CMP	UPAR0, CURPAR		
3308	015434	001404				BEG	NXTSEG		
3309	015440	005077	163124			CLR	R#CURPAR	;SET PREVIOUS ASR TO NR, BANK 0	
3310	015446	005077	163122			CLR	R#CURPOR		
3311	015452	062767	000002	163112	NXTSEG:	ADD	R#CURPAR	;UPDATE POINTERS TO NEXT SEGMENT	
3312	015458	062767	000002	163106		ADD	R#CURPOR		
3313	015464	012777	077406	163100		MOV	#77405, R#CURPOR	;SET NEXT SEGMENT RN, 4K	
3314	015470	016777	163066	163070		MOV	CURPAR, R#CURPAR	;MAP NEXT SEGMENT TO CURRENT BANK	
3315	015476	062737	030000	177776		BIS	#30000, R#PSR	;SET PREVIOUS MODE TO USER	
3316	015482	006506				HFPI	R6	;PICK UP USER STACK POINTER	
3317	015488	062716	020000			ADD	#20000, R6	;MAP IT TO NEXT ASR	
3318	015494	006606				HTPI	R6	;PUT IT BACK	
3319	015500	000002				RTI		;GO BACK TO MAINLINE	
3320	015506	005327	000000		NXTBNK:	DEC	#0	;STALL SO DOUBLE BELL NOTED	
3321	015512	001375				BNE	#-4		
3322	015518	004767	001016			JSR	#7, BELL		
3323	015524	012746	000400			MOV	#UBUFF, -(SP)		
3324	015530	052737	030000	177776		BIS	#30000, R#PSR		
3325	015536	006606				HTPI	R6		
3326	015542	013737	000570	000572		MOV	R#CURBNK, R#OLDBNK	;SAVE PREV BANK ADDRESS	

33297	015770	002767	000200	163002	BKTTST:	ADD	#200,CURBNK	
33298	015770	002767	163016			ASL	COREPT	
33299	015770	002767				BCC	IS	
33300	015770	002767	000001	163006		MOV	#1,COREPT	
33301	015770	002767	000506	163022		MOV	#MEM1, MEMUT	
33302	015770	002767	007600	162752	IS:	CHP	#7600,CURBNK	;CHECK FOR EXTERNAL BANK
33303	015616	001067				BNE	E0B3	;IF NOT, TEST FOR ITS PRESENCE
33304	015770	012767	000000	162742		MOV	#0,CURBNK	;START OVER, TESTING BANK 0
33305	015770	012767	000001	162754		MOV	#1,COREPT	
33306	015770	012767	000004	162750		MOV	#MEM0, MEMUT	
33307	015642	013701	000042		LOGIC:	MOV	#242,R1	
33308	015642	001412				BEQ	BKKT	
33309	015770	000005				RESET		
33310	015770	000006				CLR	-(SP)	;CLEAR TBTT VIA RTI
33311	015770	012767	015662			MOV	#LOGICAL,-(SP)	
33312	015770	000002				RTI		
33313	015770	004711			LOGICAL:	JSR	X7,#R1	
33314	015770	000240				NOP		
33315	015770	000240				NOP		
33316	015770	000240				NOP		
33317	015770	000000				HALT		
33318	015674	032737	000001	000176	BKKT:	BIT	#1,#SREG2	;TTY OUT SELECTED
33319	015702	001410				BEQ	BKKT1	;YES, NO ASTERISK
33320	015704	004767	000672			JSR	X7,CRLF	
33321	015710	105777	162474			TSTB	#TCSR	;WAIT FOR TELETYPE
33322	015714	100375				BPL	#4	
33323	015716	012777	000252	162466		MOV	#252,#TDBR	;OUTPUT ASTERISK TO SIGNAL END OF PASS
33324	015724	042766	000020	000006	BKKT1:	BIC	#20,6(SP)	;CLEAR TRACE BIT OF STATUS ON STACK
33325	015732	012737	000016	000014		MOV	#16,#R14	
33326	015740	005037	000016			CLR	#16	
33327	015744	032777	010000	162574		BIT	#10000,#SR	
33328	015750	001011				BNE	E0B3	
33329	015754	005167	162622			COM	#TRPB	
33330	015760	100006				BPL	E0B3	
33331	015766	052766	000020	000006		BIS	#20,6(SP)	
33332	015770	012737	016162	000014		MOV	#1TRAP,#R14	
33333	015776	016777	162566	162526	E0B3:	MOV	CURBNK,#KPAR2	;MAP KERNEL SEGMENT 2 TO BANK BEING LOOKED FOR
33334	016004	012777	077406	162510		MOV	#77406,#KPAR2	
33335	016012	036777	162572	162572		BIT	COREPT,#MEMUT	
33336	016020	001657				BEQ	BKTTST	
33337	016022	042737	160000	000034		BIC	#160000,#R34	;INITIALIZE SCOPE VECTOR ADDRESS
33338	016028	005001				CLR	R1	;R1 ADDRESSES BANK 0 THRU KERNEL ASR0
33339	016032	012702	040000			MOV	#40000,R2	;R2 ADDRESSES NEW BANK THRU KERNEL ASR2
33340	016036	012703	015004			MOV	#0,R3	
33341	016040	006203				ASR	R3	
33342	016044	012122			CORMOV:	MOV	(R1)+,(R2)+	
33343	016046	077302				SQB	R3,CORMOV	
33344	016050	016767	162434	162516		MOV	UPAR0,CURPAR	;FIRST ASR CHECKED IS USER ASR0
33345	016056	016767	162420	162512		MOV	UPDR0,CURPDR	
33346	016064	016777	162500	162502		MOV	CURLX,#CURPAR	
33347	016072	012777	077406	162476		MOV	#77406,#CURPDR	
33348	016100	005077	162410			CLR	#UPAR7	
33349	016104	005077	162376			CLR	#UPDR7	
33350	016110	026727	162456	000000		CHP	OLDBNK,#0	;PREV BANK = 0
33351	016116	001414				BEQ	E0B6	;YES, DO NOT CLEAR
33352	016120	016777	162446	162404		MOV	OLDBNK,#KPAR2	

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 DFKTGA.P11 BACKGROUND CPU TESTS

```

3353 016126 012777 077406 162366
3354 016134 012701 040000
3355 016140 012703 007630
3356 016144 000000
3357 016146 077332
3358 016150 012716 005452
3359 016154 011667 162420
3360 016160 000002
3361
3362
3363
3364
3365
3366
3367 016164 005767 000162
3368 016170 001401
3369 016172 000002
3370 016174 000067 000152
3371 016170 012767 000340 161570
3372 016206 037727 162334 020000
3373 016214 001401
3374 016216 000000
3375 016220 012667 000122
3376 016224 012667 000120
3377 016230 024646
3378 016232 012767 000200 161536
3379 016240 004767 000336
3380 016244 016767 000076 000260
3381 016252 004767 000076
3382 016256 004767 000354
3383 016262 016767 000062 000242
3384 016270 004767 000060
3385 016274 004767 000236
3386 016280 016767 167264 000224
3387 016286 004767 000042
3388 016312 004767 000220
3389 016316 016767 176416 000206
3390 016324 004767 000024
3391 016330 005777 162212
3392 016334 100001
3393 016336 000000
3394 016340 005067 000006
3395 016344 000002
3396 016346 000000
3397 016350 000000
3398 016352 000000
3399
3400
3401 016354 012727 000006 016360
3402 016360
3403 016362 005067 000142
3404 016366 012767 000260 000140
3405 016374 005767 000132
3406 016400 100002
3407 016402 005267 000126
3408 016406 006167 000120
  
```

```

MOV      #77406, R2
MOV      #40000, R1
MOV      #7630, R3
BNKLP:   CLR      (R1)+
          SOB     R3, BNKLP
E086:    MOV      BEGIN, (SP)
          MOV     (SP), BNKSTR
          RTI
  
```

```

:RTT EXECUTED WHEN TRACE IS ON/
:TRAP: RTT
  
```

```

:ENTERED WITH SYSTEM TRAP CALL (HLT)
:PRINT OUT THE ERROR PC+2, STATUS REGISTER, AND LOCATION IN BACKGROUND
PRINT:   TST      PRTON
          BEQ     .+4
          RTI
          ;IF ANOTHER HALT IS BEING PRINTED, SKIP THIS ONE
          INC     PRTON
          MOV     #340, PSR
          ;SET PRIORITY TO 7
          BIT     #20000, PSR
          ;TEST FOR INHIBIT PRINT OUT
          BEQ     .+4
          BR     CK
          ;INHIBIT, CHECK FOR HALT
          MOV     (6)+, SAVPC
          ;PC OF FAILING ROUTINE
          MOV     (6)+, SAVPSR
          ;PSR OF ERROR CONDITION
          CMP     -(5), -(6)
          ;RESTORE STACK
          MOV     #200, PSR
          JSR     X7, CALF
          ;OUTPUT CARRIAGE RETURN AND LINE FEED
          MOV     SAVPC, PTEMP1
          ;LOAD WITH FAILING PC+2
          JSR     X7, PROCT
          ;PRINT FAILING PC+2
          JSR     X7, SPACE
          JSR     X7, SPACE
          ;LOAD PROCESSOR STATUS
          MOV     SAVPSR, PTEMP1
          ;PRINT PROCESSOR STATUS
          JSR     X7, PROCT
          JSR     X7, SPACE
          MOV     CURT, PTEMP1
          JSR     X7, PROCT
          JSR     X7, SPACE
          MOV     RETURN, PTEMP1
          JSR     X7, PROCT
          ;CHECK SR FOR HALT SWITCH
          TST     #SR
          ;BRANCH IF NOT SET
          BPL     .+4
          HALT
          ;HALT ON ERROR UP
          CLR     PRTON
          ;ROUTINE DONE - CLEAR FLAG
          RTI
          ;RETURN TO MAIN LINE
  
```

```

CK:      TST      #SR
          BPL     .+4
          HALT
          CLR     PRTON
          RTI
  
```

```

SAVPC:  0
SAVPSR: 0
PRTON:  0
  
```

```

:SUBROUTINE TO PRINT OUT OCTAL NUMBER/
PROCT:   MOV      #6, #PTEMP3
          ;CLEAR R4 FOR COUNTING CHARACTERS OUTPUT
          PTEMP3=-2
          CLR     PRFLG
          ;INITIALIZE CARRY FLAG FOR ROTATES
          MOV     #260, PTEMP2
          ;SETUP R3
          TST     PTEMP1
          ;CHECK BIT 15 OF NUMBER
          BPL     .+6
          ;BRANCH IF ZERO
          INC     PTEMP2
          ;INCREMENT R3 IF ONE
          ROL     PTEMP1
          ;ROTATE LEFT MOST OCTAL TO RIGHT END
  
```

```

3409 016412 006167 000114          ROL      PTEMP1
3410 016416 005357 000106          RDC      PRFLG          ;STORE CARRY
3411 016422 105777 161762          TSTB    @TCSR        ;WAIT FOR TTY READY
3412 016426 100375          BPL     P.WAIT
3413 016430 016777 000100 161754          MOV     PTEMP2,@TDBR ;OUTPUT NEXT CHARACTER
3414 016436 005367 177716          DEC     PTEMP3      ;COUNT
3415 016442 001001          BNE     P.CNT1      ;FINISH IF NOT DONE
3416 016444 000207          RTS     P.CNT1      ;FINISH IF NOT DONE
3417 016446 000241          CLC     P.CNT1      ;CLEAR CARRY
3418 016450 005767 000054          TST     PRFLG       ;CHECK FOR PREVIOUS CARRY
3419 016454 001403          BEQ    .+10         ;FINISH IF PREVIOUSLY ZERO
3420 016456 005067 000046          CLR     PRFLG       ;INITIALIZE FLAG
3421 016462 000261          SEC     SET CARRY
3422 016464 006167 000042          ROL    PTEMP1      ;ROTATE NEXT CHARACTER INTO RIGHT END OF REGISTER
3423 016470 006167 000036          ROL    PTEMP1
3424 016474 006167 000032          ROL    PTEMP1
3425 016500 005567 000024          RDC    PRFLG       ;STORE CARRY
3426 016504 016767 000022 000022          MOV    PTEMP1,PTEMP2 ;LOAD DATA INTO R3
3427 016512 042767 177770 000014          BIC    @177770,PTEMP2 ;CLEAR ALL BUT LOWEST OCTAL DIGIT
3428 016520 052767 000260 000006          BIS    @260,PTEMP2   ;SET TO ASCII EQUIVALENT
3429 016526 000735          BR     P.WAIT      ;LOOP
3430 016530 000000          PRFLG: 0
3431 016532 000300          PTEMP1: 0          ;CONTAINS VALUE TO BE OUTPUT
3432 016534 000000          PTEMP2: 0          ;SCRATCH

3433 016536 105777 161646          ;SUBROUTINE TO ISSUE SPACE/
SPACE: TSTB    @TCSR        ;WAIT FOR TTY READY
3434 016542 100375          BPL     .-4
3435 016544 012777 000240 161640          MOV    @240,@TDBR   ;OUTPUT A SPACE
3436 016552 000207          RTS     X7          ;RETURN

3437 016554 032737 000001 000176          ;BELL ON PASS COMPLETE
BELL: BIT     @1,@SREG2
3438 016562 001406          BEQ    1$
3439 016564 105777 161620          TSTB    @TCSR
3440 016570 100375          BPL     .-4
3441 016572 012777 000207 161612          MOV    @207,@TDBR
3442 016600 000207          1$: RTS     X7

3443 016602 105777 161602          ;SUBROUTINE TO OUTPUT CARRIAGE RETURN AND LINEFEED/
CRLF: TSTB    @TCSR        ;WAIT FOR TTY READY
3444 016606 100375          BPL     .-4
3445 016610 012777 000215 161574          MOV    @215,@TDBR   ;OUTPUT CARRIAGE RETURN
3446 016616 105777 161566          TSTB    @TCSR        ;WAIT FOR TTY READY
3447 016622 100375          BPL     .-4
3448 016624 012777 000212 161560          MOV    @212,@TDBR   ;OUTPUT LINEFEED
3449 016632 000207          RTS     X7          ;RETURN

3450 016634 013746 000024          ;ENTER HERE ON POWER FAIL/
PFAIL: MOV     @24 -(6)
3451 016640 010667 000010          MOV    %6,SAVR6     ;STORE STACK POSITION
3452 016644 012737 016656 000024          MOV    @RESTRT,@24
3453 016652 000000          HALT
3454 016654 000000          SAVR6: 0          ;HALT ON POWER DOWN NORMAL
3455 016656 016706 177772          RESTRT: MOV    SAVR6,%6 ;STACK IS SAVED HERE
3456 016662 012637 000024          MOV    (6)+,@24    ;RESTORE STACK WHEN POWERING UP

```

3465	016666	022626		CMP	(SP)+, (SP)+	:RESTORE STACK
3466	016670	104006		HLT		:POWER FAIL OCCURRED
3467	016672	000167	161720	JMP	RSTRT	:RETURN TO MAIN LINE
3468						
3469						
3470	016676	000207		USER: RTS	x7	:OVERLAY USER ROUTINE HERE IF 4KW
3471						:USE BANK1 IF 8KW
3472		017760				
3473	017760	000000		KSTACK: 0	=17760	
3474		000001			.END	

ST3	001362	915	918#															
ST3A	001336	912	914#															
ST4	001452	920	929#															
ST5	001516	931	937#															
ST6	001604	939	948#															
ST7	001644	950	955#															
ST8	001754	960	962	970#														
SUBR1	014604	3136#																
SUBR2	014606	3137#	3139															
SUBR3	014612	3139#	3141															
SUBR4	014620	3141#	3143															
SUBR5	014626	3143#	3145															
SUBR6	014634	2796	3145#															
SUBR7	014534	3116#	3123															
SUBR8	000176	747#	748	853														
TEMP	000614	835#	870#	879	887*	892												
TCBA	000562	818#	1325#	1370#														
TCCM	000552	814#	954#	1273#	1276*	1278*	1280	1291*	1295	1307*	1316*	1318*	1326*	1328				
		1332*	1335	1345#	1348*	1352	1364*	1371*	1374	1378*								
TCOT	000556	816#	1285	1300	1303	1340	1357	1360										
TCEXPE	003610	1267#	1277*	1285	1302*	1303	1313*	1340	1359*	1360								
TCFIRS	003604	1265#	1277	1357														
TCF1	003664	1275	1280#															
TCF1A	003656	1278#	1286															
TCF2	003716	1287	1290#															
TCF3	003732	1290	1295#	1331														
TCF4	004000	1307#	1333															
TCIV	000564	819#	952*	1270*	1275*	1290*	1312*	1319*	1323*	1331*	1347*	1368*	1377*					
TCLAST	003606	1266#	1300	1313														
TCOM	014170	3033#	3040															
TCOM2	014236	3046#	3053															
TCOM3	014304	3059#	3066															
TCR8K	004270	1363	1368#															
TCR8UF	004420	1370	1387	1388	1402#													
TCR81	004326	1368	1374#															
TCR1	004136	1319	1335#															
TCR1A	004172	1342	1345#															
TCR2	004200	1341	1347#															
TCR3	004214	1347	1352#	1377														
TCR4	004262	1364#	1379															
TCSR =	000410	584#	3321	3411	3435	3443	3449	3452										
TCST	000554	815#	951	1271	1314													
TCSTA	000566	820#	953*															
TCWBK	004056	1306	1323#															
TCWBUF	004420	1325	1401#															
TCWB1	004110	1323	1328#															
TCWC	000560	817#	1324*	1369*														
TC1	004354	1372	1383#															
TC2	004374	1389#	1394															
TDBR =	000412	585#	3323*	3413*	3437*	3445*	3451*	3454*										
TEMP	014774	1846#	1847	1853*	1860*	1862*	1863	1869*	1870*	1871	1876*	1878*	1883*	1892*				
		1895	1900*	1903	1908*	1911	1916*	1919	1924*	1927	1932*	1935	1940*	1943				
		1948#	1952	1957*	1961	1966*	1970	1975*	1979	2023*	2024	2043*	2044*	2045				
		2065*	2066*	2071*	2072*	2073	2086*	2087*	2088	2093*	2094*	2095	2101*	2102*				
		2103	2108*	2109*	2110	2115*	2116*	2117	2122*	2123*	2124	2129*	2130*	2131				
		2160*	2161	2180*	2181*	2182	2201*	2202*	2207*	2208*	2209	2222*	2223*	2224				

TEST	013604	2229#	2230#	2231#	2237#	2238#	2239#	2244#	2245#	2246#	2251#	2252#	2253#	2258#
TIME	003152	2259#	2260#	2265#	2266#	2267#	2273#	2274#	2275#	2276#	2281#	2282#	2283#	2288#
TJSR1	012766	2312#	2319#	2328#	2340#	2342#	2343#	2344#	2345#	2346#	2351#	2352#	2353#	2358#
TJSR2	012770	2377#	2379#	2380#	2381#	2382#	2383#	2384#	2385#	2386#	2391#	2392#	2393#	2398#
TJSR3	013002	2378#	2380#	2788	2381#	2382#	2383#	2384#	2385#	2386#	2391#	2392#	2393#	2398#
THEX	001124	2779#	2780#		2781#	2782#	2783#	2784#	2785#	2786#	2791#	2792#	2793#	2798#
TRCSR	000406	2779#	2784#	2788	2785#	2786#	2787#	2788#	2789#	2790#	2795#	2796#	2797#	2802#
TRPB	000602	2779#	2780#		2781#	2782#	2783#	2784#	2785#	2786#	2791#	2792#	2793#	2798#
TRTRP	016162	2779#	2780#	3238#	3329#	3330#	3331#	3332#	3333#	3334#	3339#	3340#	3341#	3346#
TSCOMB	014346	2779#	2780#	3363#		3364#	3365#	3366#	3367#	3368#	3373#	3374#	3375#	3380#
TSR0T	013450	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TSR0T2	013614	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TSRT2A	013606	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TTCSR	000410	2779#	2780#	917#	1117	2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TT08R	000412	2779#	2780#	1115#		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TTPST	000416	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TTPVC	000414	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TTSAY	000420	2779#	2780#	1118		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TYOUT	002764	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TYOUTR	003000	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
TYOUT1	002770	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
UBUFF	000400	2779#	2780#	3293		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
UPAR0	000510	2779#	2780#	1006	3277	2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
UPAR1	000512	2779#	2780#		3344	2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
UPAR7	000514	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
UPDR0	000502	2779#	2780#	3348#		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
UPDR1	000504	2779#	2780#	1007	3345	2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
UPDR7	000506	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
USEALL	002146	2779#	2780#	3349#		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
USER	016676	2779#	2780#	1002#		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
WAIT4	014454	2779#	2780#	3470#		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
WD	000014	2779#	2780#	3096#		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
WORDCT	003602	2779#	2780#	1326		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
XFENDZ	004006	2779#	2780#	1190	1208	2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
XFER12	002616	2779#	2780#	1208		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
XFER16	002606	2779#	2780#	1236#		2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
XFER20	002576	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
XFER24	002566	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
XFER28	002556	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
XFER8	002626	2779#	2780#			2915#	2916#	2917#	2918#	2919#	2924#	2925#	2926#	2931#
.	= 017762	2779#	2780#	604	606	608	610	612	614	616	618	620	622	624

650 728
1281 1807
1905 2019
1116 2116
1188 2198
1698 2288
1980 2372
2072 3187
3453

674 700
1018 1391
1896 2012
1598 2174
1675 2259
1762 2342
3181 3450

672 722
1212 1380
1500 1680
1770 1950
2040 2220
2300 2480
3172 3447

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3173

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3159

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3118

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3106

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3107

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3107

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3102

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3322

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3291

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3201

670 720
1111 1288
1500 1677
1965 2142
2220 2397
2485 3472

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DFKTGA.P11 CROSS REFERENCE TABLE -- MACRO NAMES

TNCV 2889# 2925 2963 2988

MOV8	840	928	947	1191	1209	1326	1332	1371	1378	2401	2408	2415	2422	2557	2563
MTP1	2599	2620	2626	2632	3229										
NEG	1016	3238	3295												
NEG8	1934	1942	2130	2266											
NOP	2520	2600	2893												
RESET	1044	1046	1048	1050	1052	1054	1069	1070	1989	1996	3133	3314	3315	3316	
ROL	907	3309													
ROLB	2922	2923	2924	3408	3409	3422	3423	3424							
ROR	2835	2847	2960	2961	2962	2985	2986	2987							
RORB	2919	2920	2921												
RTI	2811	2823	2957	2958	2959	2982	2983	2984							
RTS	1028	1116	1130	1156	1164	1192	1210	1274	1279	1292	1308	1317	1320	1327	1346
	1349	1365	1373	3161	3164	3264	3266	3289	3312	3360	3369	3395			
	1036	1039	1067	1095	1110	1398	2783	2943	2981	3006	3026	3136	3138	3140	3142
	3144	3146	3207	3416	3438	3446	3455	3470							
RTT	3363														
SBC	1969	1978	2282												
SBC8	2538														
SCC	2821	2845	2869	3137											
SEC	1950	1959	1968	1977	2273	2281	2528	2537	2690	2701	3421				
SOB	989	1000	3201	3343	3357										
SUB	1026	1878	1885	2059	2066	2072	2195	2202	2208	3021	3211				
SUB8	1201	1220	1232	1793	3101	3106	3116	3120							
TRAP	583														
TST	851	859	880	881	882	883	911	921	932	940	951	956	961	987	999
	1057	1159	1215	1224	1271	1314	1328	1374	1895	1903	1911	1919	1927	1952	1961
	1970	1979	2073	2103	2209	2239	2275	2283	2539	2703	2791	3367	3391	3405	3418
	3411	3435	3443	3449	3452	1178	1211	2465	2489	2497	2505	2513	2663	2695	3321
TSTB	1118	1131	1142	1154	1157										
	1019	3090	3091	3092	3093										
WAIT	540														
.RES	540														
.DSABL	540														
.END	3474														
.LIST	1	540													
.MACR	2889														
.NLIST	1	540													
.REM	1														
.REPT	602	1404	1596												
.SBTTL	540	599	1798												
.TITLE	540														

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATEL: 0

#DFKTGA,DFKTGA,SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DFKTGA.P11
 RUN-TIME: 8 19 4 SECONDS
 RUN-TIME RATIO: 48/33=1.4
 CORE USED: 10K (19 PAGES)

