PDP11

T17 4K SYSTEM EXERCISER

MD-11-DZQKB-F

EP DZQKB F DL A

OCT 1976

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Made In U.S.A.

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                        .NLIST  SEQ
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IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DZQKB-F-D
PRODUCT NAME:	T17-4K SYSTEM EXERCISER THIS VERSION TEST DECTAPE UNIT 1 (NOT UNIT 0)
DATE:	21-DECEMBER-1975
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	JOHN HITTELL
REVISED BY:	W.F. KELLICKER 25-FEB-74 AL LOSCHAK 21-DEC-75 :SUPPORT SOFTWARE SWITCH REGISTE

1. ABSTRACT

THIS PROGRAM IS A MEMORY EXPANDABLE INTERACTIVE BUS EXERCISER FOR A PAPER TAPE ORIENTED PDP-11. IT PERFORMS A TEST OF INSTRUCTIONS AND CONCURRENT OPERATIONS OF I/O EQUIPMENT SIMULTANEOUSLY. IT MAY ALSO PERFORM THE SAME OPERATION INDEPENDENTLY. THIS PROGRAM IS NOT TO BE CONSIDERED A TOTAL CHECK OF THE SYSTEM. IF AN ERROR IS DETECTED IN AN I/O DEVICE IT WILL PROBABLY BE NECESSARY TO CORRECT THE MALFUNCTION WITH THE RESPECTIVE DIAGNOSTIC FOR THAT DEVICE.

IN THIS VERSION THE INTERRUPT SERVICE ROUTINE FOR THE DISKS, KW11L, PLUS THE STACK AND THE NPR DATA BUFFERS ARE RELOCATED TO THE CURRENT BANK.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE

MM11	UP TO 28KW OF MEMORY
RC11	DISK
RK11	DISK
RP11	DISK
RF11	DISK (256K)
TC11	DECTAPE-TRANSPORT ONE
KE11A	EXTENDED ARITHMETIC UNIT
KW11L	LINE CLOCK
PC11	HIGH SPEED READER/PUNCH
BL11	ASR33 OR ASR35 TELEPRINTER-LC11,VT05
LP11	LINE PRINTER
LS11	LINE PRINTER...SEE 5.2.11

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES 4K OF MEMORY

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

THIS PROGRAM HAS BEEN MODIFIED TO RUN WITH OR WITHOUT
A CONSOLE PROCESSOR.
IF A CONSOLE MACHINE IS USED; THEN THE PROGRAM
LOOKS AT THE HARDWARE SWITCH REGISTER.
IF A CONSOLE-LESS MACHINE IS USED;THEN THE PROGRAM
AUTOMATICALLY LOOKS AT THE CONTENTS OF LOCATION
SOFTSR (176) AS A SWITCH REGISTER.

IT'S THE RESPONSIBILITY OF THE OPERATOR TO SET UP
THIS LOCATION PRIOR TO STARTING THE PROGRAM.

THE PROGRAM REQUIRES TWO BELLS ON THE TTY
TO MAKE ONE TRUE PASS OF THE PROGRAM. THE FIRST BELL
OCCURS AFTER ONE PASS OF THE INSTRUCTION TEST WITH
THE TRACE BIT CLEARED. THE SECOND BELL MARKS THE
END OF AN INSTRUCTION TEST PASS WITH THE TRACE BIT
SET.

4.1 CONTROL SWITCH SETTING

STARTING AT SA 200 ALL SWITCHES SHOULD BE SET AS INDICATED.

4.2 STARTING ADDRESS OR ADDRESSES

(A) 200 = SR = 000777 TEST PROCESSOR ONLY-WITH CORE EXPANSION
(B) 200 = SR = 001777 TEST PROCESSOR ONLY-4K-INHIBIT
     CORE EXPANSION
(C) 200 = SR = 002XXX TEST I/O ONLY
(D) 200 = SR = 000000 -CORE EXPAND AND TEST ALL AVAILABLE
     I/O DEVICES

SW0 = 1 INHIBIT TTY OUTPUT
SW1 = 1 INHIBIT TTY INPUT
SW2 = 1 INHIBIT HSP
SW3 = 1 INHIBIT HSR
SW4 = 1 INHIBIT LINE CLOCK
SW5 = 1 INHIBIT RF11, RK11, RC11 AND RP11 DISK(S)
SW6 = 1 INHIBIT TC11 DECTAPE
SW7 = 1 INHIBIT LINE PRINTER --- IF LINE PRINTER IS USED,
     MUST RESTART AT 502
IF EAE EXIST IT WILL BE AUTOMATICALLY SELECTED

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY.
SET SWITCH REGISTER TO STARTING ADDRESS.
LOAD ADDRESS.
SET SWITCHES TO INHIBIT NON EXISTANT DEVICES
PRESS START.
THE PROGRAM WILL LOOP AND
BELL WILL RING ONCE PER PASS OF THE PROGRAM.
A MINIMUM OF TWO PASSES SHOULD
ALWAYS BE RUN.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

5.1.1 AT SA 200 .. THE INSTRUCTION AND LOGIC TEST. WITH ALL SWITCHES DOWN THE PROGRAM WILL TEST ALL DEVICES AND PRINT OUT ON ERRORS AND CONTINUE IN TEST. (BELL WILL RING AT COMPLETION OF A PASS)

5.1.2 SWITCH SETTINGS ARE

SW15 = 1 OR UP ... HALT ON ERROR
SW14 = 1 OR UP ... SCOPE LOOP
SW13 = 1 OR UP ... INHIBIT PRINTOUT
SW12 = 1 OR UP ... INHIBIT TRACE TRAPPING
SW11 = 1 OR UP ... INHIBIT ITERATION LOOP
SW10 = 1 OR UP ... INHIBIT PROCESSOR TEST
SW09 = 1 OR UP ... INHIBIT VARIABLE CORE EXPANSION
SW08 = 1 OR UP ... RESTART ON ERROR

5.1.3

5.2. SUBROUTINE ABSTRACTS

5.2.1 BEGIN SA 200

5.2.2 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST IN THE INSTRUCTION SECTION. IT RECORDS THE STARTING ADDRESS OF EACH SUB-TEST AS IT IS BEING ENTERED.
IF A SCOPE LOOP IS REQUESTED WITH SW14=1;THEN
IT WILL JUMP TO THE START OF THE SUBTEST THAT THE SCOPE LOOP IS REQUESTED FOR. IF SCOPE LOOP IS NOT REQUESTED, THERE WILL BE EITHER A FIXED OR RANDOM NUMBER OF ITERATIONS ON THAT SUB-TEST BEFORE THE NEXT SUBTEST IS ENTERED. SWITCH 11 ON A 1 INHIBITS ITERATION OF SUBTESTS.

5.2.3 HLT

IS A ROUTINE THAT PRINTS-OUT AN ADDRESS THAT TAGS THE FAILING TEST, THE STATUS REGISTER AT THE TIME OF THE FAILURE, AND THE PROCESSOR TEST BEING EXCUTED AT THE TIME OF FAILURE.

5.2.4 TRTRAP

THIS ROUTINE WILL ALLOW THE TRACE BIT TRAP TO BE SET AFTER FIRST LOOP OF THE PROGRAM. UNDER NORMAL TESTING THE TRACE BIT WILL BE SET ON ALTERNATE LOOPS OF THE PROGRAM. WHEN SET IT CAUSES A TRAP AFTER EACH INSTRUCTION. THE FIRST INSTRUCTION EXECUTED UPON TRAPPING IS AN "RTI" WHICH RETURNS TO THE INTERRUPTED SEQUENCE OF INSTRUCTION.

5.2.5 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.

THE PRINCIPLE OF THIS ROUTINE IS: THE VECTOR ENTRANCE ADDRESS POINTS TO THE NEXT SEQUENTIAL WORD WHICH CONTAINS A HALT (00000). (THIS LOCATION IS ALSO THE STATUS FOR THAT VECTOR ENTRANCE, BUT THIS HAS NO EFFECT ON IT ALSO BEING THE NEXT INSTRUCTION).

IF A HALT OCCURS IN THE TRAP OR INTERRUPT VECTOR AREA, REGISTER SIX SHOULD BE EXAMINED TO DETERMINE ITS CONTENTS, THEN USE REGISTER SIX CONTENTS AS AN ADDRESS TO DETERMINE THE LOCATION WHERE THE PROGRAM WAS AT, WHEN THE INTERRUPT OR TRAP OCCURRED. (MEMORY AS SPECIFIED BY R6 CONTAINS THE PC OF THE INSTRUCTION FOLLOWING THE INSTRUCTION WHERE THE TRAP OCCURRED).

5.2.6 TTYIN1 (TTY INPUT)

THIS ROUTINE OPERATES IN THE INTERRUPT MODE AND CHECKS FOR A COUNT PATTERN IN THE READER OF THE TTY. THE ROUTINE WILL ACCEPT AN INFINITE NUMBER OF ZERO BYTES (BLANK TAPE). BUT THE FIRST BYTE THAT IS NOT A ZERO MUST BE A ONE AND ALL SEQUENTIAL BYTES MUST BE ONE GREATER. IF THE ROUTINE DETECTS AN ERROR IN THE COUNT PATTERN, IT CHECKS TO SEE IF IT IS A 207 (BELL). IF SO IT IS IGNORED, IF NOT A COMPARSION ERROR IS FLAGED.
WHEN TESTING THE TTY
READER THE TAPE MUST HAVE A COUNT PATTERN AND BE LOCATED ON THE LEADER PORTION WHEN STARTING TEST.

5.2.7 TYOUT (TTY OUTPUT)

THIS IS A ROUTINE THAT OUTPUTS A COUNT PATTERN IN
THE INTERRUPT MODE TO THE TELEPRINTER. IF A PAPER
TAPE IS PUNCHED IT MAY HAVE 207'S (BELLS) IN IT.
PUNCHED WHEN THE BELL FOR PASS COMPLETE RINGS.

5.2.8 RFSTART (RF-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK.
THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM
CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN
IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL
DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT
THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO
"DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED
INTO CORE).
THE INTERRUPT SERVICE ROUTINE AND
DATA BUFFER IS TRANSFERRED TO THE CURRENT
BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN.

5.2.9 FENDZ (TC11 FORWARD END ZONE)

FENDZ IS THE FIRST ADDRESS IN THE DECTAPE INTERRUPT
VECTOR (214). THIS ROUTINE WILL READ, IN REVERSE, BLOCK
NUMBERS UNTIL THE REVERSE END ZONE IS FOUND. AT THIS
POINT THE INTERRUPT VECTOR AND COMMAND REGISTER ARE MODIFIED
TO READ ALL BLOCK NUMBERS IN THE FORWARD DIRECTION. EACH
BLOCK NUMBER READ IS COMPARED WITH THE EXPECTED BLOCK NUM-
BER COUNT AND MISCOMPARISONS REPORTED. WHEN EACH BLOCK IS
FOUND (WITH THE EXCEPTION OF BLOCK 0) A BLOCK (400 WORDS)
OF TEST DATA IS WRITTEN ONTO TAPE. AFTER ALL BLOCK NUMBERS
HAVE BEEN READ THE TAPE IS DRIVEN INTO THE FORWARD END ZONE.
HERE THE DIRECTION IS REVERSED AND ALL BLOCK NUMBERS ARE READ
IN REVERSE. STARTING WITH BLOCK 1100(8) THROUGH BLOCK 1 THE
DATA IS READ FROM TAPE. THE SAME BUFFER IS USED FOR BOTH READ
AND WRITE OPERATIONS.
IF THE DATA-BUFFER IS
DESTROYED DURING A READ OPERATION IT MAY BE NECESSARY TO
RELOAD THE PROGRAM.

5.2.10 LCLK (LINE CLOCK)

THIS TEST OF THE LINE CLOCK IS IN THE INTERRUPT
MODE. IF OPERATING CORRECTLY THE SYSTEM I/O
WILL RUN A FULL SPEED FOR 55 SECONDS THEN ALL
I/O AT LEVEL SIX OR LESS WILL STALL FOR 5 SECONDS.
THIS IS BASED ON 60 CYCLES AS THE LINE FREQUENCY.

5.2.11 LP1 (LINE PRINTER)

THIS ROUTINE OUTPUTS TO THE LINE PRINTER IN
THE FLAG MODE WHILE FILLING THE BUFFER IN
THE INTERRUPT MODE WHILE THE BUFFER IS BEING
PRINTED.
FOR 132 COLUMN PRINTER CHANGE LOCATION LP80 FROM 117 TO 203.

5.2.12 HSRIN1 (PC11 INPUT)

THIS ROUTINE OPERATES IN THE INTERRUPT MODE AND CHECKS FOR A COUNT PATTERN IN THE PC11 READER. THE ROUTINE WILL ACCEPT AN INFINITE NUMBER OF ZERO BYTES (BLANK TAPE). BUT THE FIRST BYTE THAT IS NOT A ZERO MUST BE A ONE AND ALL SEQUENTIAL BYTES MUST BE ONE GREATER. IF THE ROUTINE DETECTS AN ERROR IN THE COUNT PATTERN, A DATA ERROR IS FLAGED.
WHEN TESTING THE HSR
READER THE TAPE MUST HAVE A COUNT PATTERN AND BE
LOCATED ON THE LEADER PORTION WHEN STARTING TEST.

5.2.13 HPOUT (PC11 OUTPUT)

THIS IS A ROUTINE THAT OUTPUTS A COUNT PATTERN IN THE INTERRUPT MODE TO THE HIGH SPEED PUNCH.

5.2.14 RKSTART (RK-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERFIY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER ARE TRANSFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN.

5.2.15 RCSTART (RC-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE).THE INTERRUPT
SERVICE ROUTINE AND DATA BUFFER IS TRANFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECTUTED IN.

5.2.16 RPSTART (RP-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER IS TRANSFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN. (FOR THE RP03 THE ISR MUST BE MOTIFIED TO TEST THE FULL SURFACE)

5.2.17 CORE EXPANSION (DET1)

THIS ROUTINE IS CONTROLLED BY SWITCH 9. THE PROCESSOR MAINLINE CODE WILL BE EITHER 4KW OR EXPANDS TO THE MAXIMUM CORE THAT IS AVAILABLE. THE ROUTINE DETERMINES THE MAXIMUM CORE SIZE BY DOING A "DATO" TO A LOCATION IN EACH BANK. IF THE BANK DOES NOT EXIST, A TIME OUT WILL OCCUR. WHEN CORE SIZE IS DETERMINED AN IMAGE OF BANK 0 IS TRANSFERRED TO EACH EXISTING BANK. THEN THE CODE IN EACH BANK IS MODIFIED SO THAT, WHEN THE LAST SUB TEST IN A MEMORY BANK IS EXECUTED THERE IS A JUMP INSERTED TO THE FIRST SUB TEST OF THE NEXT BANK. WHEN IN THE LAST BANK THE MODIFIED INSTRUCTION WILL TRANSFER YOU TO BANK 0.

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

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1 LOADING AND STARTING AT 200 WITH ALL SWITCHES DOWN IS WORSE CASE TESTING. IF AN ERROR IS DETECTED HERE, THERE WILL BE A PRINTOUT. WHEN AN ERROR IS DETECTED AND IT IS NECESSARY TO SCOPE ON IT, SET SW15 TO HALT ON ERROR, THEN SW14 TO LOOP ON ERROR, THEN SW13 TO DELETE PRINTOUTS.THEN THE MACHINE MUST BE CONTINUED.

6. ERRORS

6.1 ERROR PRINTOUT

ARE IN A THREE WORD FORMAT, THE 1ST IS PC+2 OF THE DETECED ERROR, THE 2ND. IS THE STATUS REGISTER.
THE 3RD IS THE PROCESSOR TEST AT THE TIME OF THE ERROR (CONTENTS OF RETURN).
REFER TO THE LISTING FOR DETAILED INFORMATION.

6.2 ERROR RECOVERY

FOR TTY READER AND HSR, TAPE MUST BE REPOSITIONED TO LEADER BEFORE RESTARTING TEST. IT YOU DESIRE TO HAVE THE PROGRAM RESTART ON AN ERROR MAKE SWITCH REGISTER BITB AN ONE.

7. RESTRICTIONS

7.1 STARTING RESTRICTION

IF LINE PRINTER IS USED RESTART ADDRESS MUST BE 400
FOR HSR AND TTY READER, TAPE MUST BE ON LEADER.

7.2 OPERATIONAL RESTRICTION

IF OPERATION UNDER MONITORS, THE CONSOLE DEVICE,LINE PRINTERS AND THE SYSTEM DEVICE ARE NOT TESTED.

8. MISCELLANEOUS

TRACKING DOWN UNUSUAL FAILURES

FAILURES THAT MAY OCCUR BECAUSE OF A FALSE ENTRY INTO A SUBTEST, OR A FAILURE IN A CONTROL ROUTINE RATHER THAN A SUBTEST. DETECTION OF THESE MAY BE ACCOMPLISHED BY SEVERAL PROCEDURES. THERE IS A LOCATION CALLED "RETURN" THAT RECORDS THE LAST SUCCESSFUL SUBTEST COMPLETED. THERE IS ANOTHER LOCATION CALLED "SCOPEF" THAT SHOWS HOW MANY TIMES THE SUBTEST HAS BEEN EXECUTED. THERE IS ANOTHER LOCATION CALLED "ICOUNT" THAT CONTAINS THE ITERATION COMPARISON VALUE. THE STACK "R6" SHOULD BE EQUAL TO "BUFF" WHEN THE FIRST INSTRUCTION OF THE SUBTEST IS ENTERED. TO REDUCE INSTRUCTION EXECUTION IN CONFUSING SITUATION, THE "SCOPE" LOCATION FOLLOWING THE SUBTEST SHOULD BE CHANGED TO A BRANCH TO THE FIRST INSTRUCTION OF THE SUBTEST (THE FIRST LOCATION FOLLOWING THE PREVIOUS SCOPE LOCATION) AND THE "HLT" LOCATION MAY BE REPLACED WITH A "NOP".

A USER MAY ADD A UNIQUE ROUTINE TO THIS TEST TO EXERCISE A NON DEC OPTION, FOR CHECKING BUS INTERACTION WITH HIS EXISTING DEC OPTIONS.

FOR TROUBLE FREE INTERACTION THERE ARE A FEW GROUND RULES THAT SHOULD BE FOLLOWED.

1. USE NO REGISTERS.
2. THE ROUTINE SHOULD BE STAND ALONE.
3. THE EXISTING "HLT" SHOULD BE USED FOR ERROR DETECTION.
4. CODE IN THE PRIMING AREA SHOLD SET INTERRUPT ENABLE, INITIALIZE DATA AND RAISE A FLAG IF NECESSARY.
5. THE INTERRUPT VECTOR STATUS WORD SHOULD CONTAIN THE PRIORITY LEVEL OF THE DEVICE.
6. THE INTERRUPT VECTOR SHOULD POINT TO YOUR STAND ALONE ROUTINE.
7. THE STAND ALONE ROUTINE WHEN COMPLETING ALL HOUSE KEEPING OPERATION AND DATA COMPARISONS SHOULD THEN EXECUTE A "RTI" TO RETURN TO MAINLINE CODE.

INSERTION OF USER I/O ROUTINES

1. MAY BE INSERTED IN BANK ZERO WHERE I/O ROUTINES EXIST. FOR DEVICES THAT THE USER DOES NOT HAVE, IF CORE EXPANSION

IS TO BE INHIBITED, THE USER MAY OVERLAY THE EXPANSION CODE.

2. IF THE USER HAS MORE THAN 4KW OF CORE, THE ROUTINE MAY BE PLACED IN ANY OF THE EXTRA BANKS AND CORE EXPANSION BE INHIBITED.

3. IN THE PRIMING CODE SEVERAL INSTRUCTIONS BEFORE THE TAG "MAINLINE" THERE IS AN INSTRUCTION JSR %7,@#USER. THE SECOND WORD OF THAT INSTRUCTION IS AN ABSOLUTE ADDRESS THAT THE USER MAY CHANGE TO POINT TO HIS ROUTINE. THE USER SHOULD EXIT HIS PRIMING ROUTINE WITH A RTS %7 INSTRUCTION.

8.1 EXECUTION TIME

EXECUTION VARIES WITH NUMBER OF DEVICES, FOR 4KW SYSTEMS WITH TTY AND HSR ONLY, ABOUT 1 MINUTE WITH THE TRACE BIT CLEARED ABOUT 1.5 MINUTES WITH THE TRACE BIT SET.

9. PROGRAM DESCRIPTION

THE DESIGN OF THIS SYSTEM EXERCISER IS PREDICATED UPON IT BEING PRIMARILY INTENDED FOR A PAPER TAPE SYSTEM WITH FOUR KW OF CORE, AND THAT IT BE EASY TO RUN AND UNDERSTAND. ALSO, THAT IT MAY BE MODIFIED EASILY TO EXERCISE A WIDE MULTITUDE OF PERIPHERALS, INCLUDING THOSE OF THE CUSTOMER'S OWN DESIGN. THE CONCEPT IS TO HAVE ALL DESIRED I/O RUNNING CONCURRENTLY WITH THE PROCESSOR TEST FOR BACKGROUND. THE DECISION WHICH I/O DEVICES TO BE USED IS MADE AT START UP TIME. THE DATA PATTERNS USED IN THE EXERCISER ARE FIXED. FOR MECHANICAL DEVICES, SUCH AS THE TTY READER, THERE IS NO AUTOMATIC RE-SYNCHRONIZATION IF IT'S TAPE BECOMES OUT OF PHASE WITH THE DATA. IT WILL BECOME NECESSARY TO STOP THE EXERCISER AND MANUALLY RESYNCHRONIZE THE TAPE AND RESTART THE EXERCISER.

THERE IS NO MONITOR IN THE CONVENTIONAL SENSE. EACH DEVICE THAT IS TO BE EXERCISED HAS IT'S 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. THE PRIMER AREA 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. THEN, THE PRIMER JUMPS TO THE PROCESSOR TEST WHERE THE INDIVIDUAL DEVICES ARE SERVICED AT THE INTERRUPT RATE.

THE INSTRUCTION EXERCISER IS A STRAIGHT LINE TEST OF INSTRUCTIONS. THE SEQUENCE IN WHICH THEY ARE EXECUTED IS THE SAME SEQUENCE IN WHICH THEY ARE

SHOWN IN THE LISTING. EACH AREA OF CODE FROM
"SCOPE TO SCOPE" IS AN INDIVIDUAL SUB-TEST. WITH
SWITCH 11 UP THE SUB-TEST IS EXECUTED ONE TIME
AND THEN THE NEXT SUB-TEST IS EXECUTED, AND SO ON
TILL ALL SUB-TESTS ARE EXECUTED. HOWEVER IF SWITCH
11 IS DOWN THE SUB-TEST WILL BE EXECUTED SOME "N"
NUMBER OF TIMES BEFORE ENTERING THE NEXT SUB-TEST.
IF SWITCH 14 IS UP YOU WILL NEVER LEAVE THE CURRENT
SUB-TEST YOU ARE IN. THIS USE IS INTENDED FOR
TROUBLE SHOOTING A MALFUNCTION IN A SUB-TEST. THE
FIRST GROUP OF SUB-TESTS ARE THE BINARYS AND UNARYS.
THOSE INSTRUCTIONS ARE TESTED IN THE INDEX MODE:
SOURCE ONLY, DESTINATION ONLY, THEN BOTH SOURCE
AND DESTINATION. THE SAME INSTRUCTIONS ARE THEN
TESTED USING THE IMMEDIATE MODE INDIRECT. THESE
MODES ARE TESTED AGAINST OTHER MODES; WHICH MAY USE
A REGISTER OR MEMORY LOCATION. THESE WILL BE SWAPPED
BETWEEN SOURCE AND DESTINATION.

AFTER THE MODES AND INSTRUCTION HAVE BEEN PROVEN
IN THE WORD MODE, THEY ARE THEN TESTED IN THE BYTE
MODE. OTHER TESTING IS ALSO DONE WHERE THE "JSR"
INSTRUCTION IS TESTED IN NESTED COMBINATIONS. ALL
COMBINATIONS OF NUMBERS ARE TESTED USING THE COMPARE,
ROTATE, ADD AND COMPLIMENT INSTRUCTIONS. THERE IS
ALSO A MINIMUM TEST OF POWER FAIL AND AUTO RECOVERY,
WHICH IS NOT ENABLED UNTIL AFTER THE FIRST PASS OF THE
PROGRAM.
THE REASON FOR EXECUTING ALL INSTRUCTIONS
WITH THE TRACE BIT SET IS TO TAKE US INTO SERVICE AT
THE END OF EACH INSTRUCTION.

THE CORE LAYOUT IS BROKEN INTO FIVE DISTINCT PARTS:

(1) THE TRAP CATCHER,
(2) THE SET UP AND I/O PRIMER AREA AND I/O TEST ROU-
     TINES,
(3) THE PROCESSOR TESTS AND
(4) CONTROL AND UTILITY ROUTINES.
(5) CORE DETECTOR AND EXPANSION ROUTINE.

10. LISTING

11. FLOW CHART(S)

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                        .ENDR
                        .ENABLE ABS

                        ;PDP11 PRELIMINARY SYSTEM TEST --- TTY-PC11-LP11,RF11,TC11,KW11L,RK11,RC11,RP11 AND KE11
                        ;TEST SIMULTANEOUS RUNNING OF I/O, WITH PROCESSOR INSTRUCTION TEST AND WITH
                        ;WITH TRACE BIT ENABLED TO BE CONSIDER MAINLINE CODE
000240                          NOP=240                 ;SYSTEM NULL OPERATION
104000                          HLT=EMT         ;TRAP USED FOR ERROR PRINTOUT
104400                          SCOPE=TRAP              ;TRAP USED SCOPE LOOP AND ITERATION OF SUB PROBLEMS
177776                          CC=177776
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                016062                          TDSR=TCSR
                016762                          BUFF=FIN
                000000                          R100=%0
                000001                          R101=%1
                000002                          RSR=%2
                176000                          RKWORDCT=-2000
                176000                          RPWORDCT=-2000
                176040                          RCWORDCT=-2000+40
                176040                          RFWORDCT=-2000+40
                000000                          XX=0
                000000                          .=0
                                                .REPT 100
                                                .+2                             ;TRAP ENTRANCE
                                                HALT                            ;TRAPPED TO PREVIOUS LOCATION
                                                .ENDR
  600                                           .LIST   SEQ,ME
  601             000014                        .=14
  602  000014    000016                         .+2
  603  000016    000000                         HALT                            ;FALSE TRACE TRAP
  604             000024                        .=24
  605  000024    016504                         PFAIL
  606  000026    000340                         340
  607             000030                        .=30
  608  000030    015564                         PRINT                           ;FOR HALT TRAPS
  609  000032    000340                         340                             ;HIGHEST PRIORITY
  610             000034                        .=34
  611  000034    016364                         SCOPEC                          ;USER TRAP
  612  000036    000000                         0
  613             000046                        .=46
  614  000046    015534                         LOGICA                  ;RETURN TO MONITOR ADDRESS
  615             000052                        .=52
  616  000052    040000                         040000                  ;EXECUTION TIME IS MEMORY SIZE DEPENDENT
  617
  618
  619                                   ;(R6) IS THE STACK POINTER
  620                                   ;((R6)) IS THE PC+2 OF LOCATION WHERE THE TRAP ORIGINATED
  621                                   ;FOR NORMAL OPERATION RUN WITH ALL SWITCHES DOWN
  622                                   ;SR 15=1 OR UP---HALT ON ERROR
  623                                   ;SR 14=1 OR UP---SCOPE LOOP
  624                                   ;SR 13=1 OR UP---INHIBIT PRINT OUT
  625                                   ;SR 12=1 OR UP---INHIBIT TRACE TRAPPING
  626                                   ;SR 11=1 OR UP---INHIBIT SUB-PROBLEM ITERATION
  627                                   ;SR 10=1 OR UP---INHIBIT PROCESSOR TEST
  628                                   ;SR 09=1 OR UP INHIBIT VARIABLE CORE EXPANSION
  629                                   ;SR 08=1 OR UP RESTART ON ERROR
  630                                   ;SPECIAL DELETE SWITCHES-SET RESPECTIVE SWITCH TO A 1 TO INHIBIT INITIATION OF DEVICE
  631
  632                                   ;SW 0=1 INHIBIT TTY OUTPUT
  633                                   ;SW 1=1 INHIBIT TTY INPUT
  634                                   ;SW 2=1 INHIBIT HSP
  635                                   ;SW 3=1 INHIBIT HSR
  636                                   ;SW 4=1 INHIBIT LINE CLOCK
  637                                   ;SW 5=1 INHIBIT RC, RF, RK, RP DISKS
  638                                   ;SW 6=1 INHIBIT TC11 DECTAPE
  639                                   ;SW 7=1 INHIBIT LINE PRINTER --- IF LINE PRINTER IS USED, MUST RESTART AT 502
  640                                   ;IF EAE EXIST IT WILL BE AUTOMATICALLY SELECTED.
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                                        ;PDP11 SIMULTANEOUS I/O
                    000060                      .=60
000060  001522                             TTYINR                  ;TTY IN INTERRUPT VECTOR
000062  000200                             200
000064  001576                             TYOUTR                  ;TTY OUT INTERRUPT VECTOR
000066  000200                             200
000070  001624                             HSRINR                  ;HSR INTERRUPT VECTOR
000072  000200                             200
000074  001716                             HPOUTR                  ;HSP INTERRUPT VECTOR
000076  000200                             200
                    000100                      .=100
000100  002022                             LK3                     ;INTERRUPT VECTOR LINE CLOCK
000102  000300                             300                     ;LEVEL SIX PRIORITY
                    000004                      .=4
000004  017456                             .PARSRV                 ;MEMORY PARITY
000006  000340                             340

                    000174                      .=174
000174  177570                 SRPTR:      177570
000176  000000                 SOFTSR:     000000
                    000200                      .=200
000200  000137  000502                     JMP     @#START
                    000204                      .=204
000204  002610                             IRF                     ;RF11 DISK
000206  000240                             240                     ;LEVEL 5
000210  002512                             IRC                     ;RC DISK
000212  000240                             240

                    000214                      .=214
000214  002674                             FENDZ                   ;DEC TAPE
000216  000300                             300                     ;LEVEL 6
                    000220                      .=220
000220  002322                             IRK                     ;RK DISK
000222  000240                             240

                    000254                      .=254
000254  002426                             IRP                     ;RP DISK
000256  000240                             240

                    177776          STATUS=177776
000260  177560                  TRCSR:     177560
000262  177562                  TRDR:      177562
000264  177564                  TTCSR:     177564
000266  177566                  TTDBR:     177566
000270  177550                  HRCSR:     177550
000272  177552                  HRDBR:     177552
000274  177554                  HPCSR:     177554
000276  177556                  HPDBR:     177556
000300  177546                  LKCSR:     177546
000302  177514                  LPCSR:     177514
000304  177516                  LPDBR:     177516
000306  177470                  RFDAE:     177470          ;DISK ADDRESS AND ERROR
000310  177466                  RFDAR:     177466          ;DISK ADDRESS REGISTER
000312  177462                  RFWC:      177462          ;WORD COUNT REGISTER
000314  177464                  RFCAR:     177464          ;CURRENT ADDRESS REGISTER
000316  177460                  RFCSR:     177460          ;STATUS REGISTER
```

```
  697  000320  177461                RFCSRH: 177461          ;HIGH BYTE ADDRESS OR CSR
  698  000322  177442                RCDAR:  177442          ;DISK ADDRESS REGISTER
  699  000324  177450                RCWC:   177450          ;WORD COUNT REGISTER
  700  000326  177452                RCBAR:  177452          ;CURRENT ADDRESS REGISTER
  701  000330  177446                RCCSR:  177446          ;STATUS REGISTER
  702  000332  177447                RCCSRH: 177447          ;HIGH BYTE ADDRESS OR CSR
  703  000334  177413                RKDAH:  177413          ;HIGH BYTE OF DISK ADDRESS
  704  000336  177412                RKDAE:  177412          ;DISK ADDRESS REGISTER
  705  000340  177406                RKWC:   177406          ;WORD COUNT REGISTER
  706  000342  177410                RKBAR:  177410          ;CURRENT ADDRESS REGISTER
  707  000344  177404                RKCSR:  177404          ;STATUS REGISTER
  708  000346  177405                RKCSRH: 177405          ;HIGH BYTE ADDRESS OR CSR
  709  000350  177304                MQ:     177304          ;EAE LOCATIONS
  710  000352  177302                AC:     177302
  711  000354  177310                SC:     177310
  712  000356  177311                SRE:    177311
  713  000360  177306                MUL:    177306
  714  000362  177300                DIV:    177300
  715  000364  177312                NOR:    177312
  716  000366  177314                LSH:    177314
  717  000370  177316                ASH:    177316
  718
  719                                ;DECTAPE ADDRESSES
  720          177340                TC=177340
  721  000372  177342                TCCM:   TC+2            ;CONTROL AND FUNCTION
  722  000374  177340                TCST:   TC              ;GENERAL STATUS
  723  000376  177350                TCDT:   TC+10
  724  000400  000440                        BR      START   ;DATA
  725  000402  177344                TCWC:   TC+4            ;WORD COUNT
  726  000404  177346                TCBA:   TC+6            ;BUS ADDRESS
  727  000406  000214                TCIV:   214             ;DECTAPE INTERRUPT VECTOR
  728  000410  176722                RPCA:   176722          ;CYLINDER ADDRESS RP11 DISK
  729  000412  176725                RPDAH:  176725          ;HIGH BYTE OF DISK ADDRESS
  730  000414  176724                RPDAE:  176724          ;DISK ADDRESS
  731  000416  176710                RPDSR:  176710          ;DRIVE STATUS REGISTER
  732  000420  176724                RPDAR:  176724          ;DISK ADDRESS REGISTER
  733  000422  176716                RPWC:   176716          ;WORD COUNT REGISTER
  734  000424  176720                RPBAR:  176720          ;CURRENT ADDRESS REGISTER
  735  000426  176714                RPCSR:  176714          ;STATUS REGISTER
  736  000430  176715                RPCSRH: 176715          ;HIGH BYTE ADDRESS OR CSR
  737  000432  000000                RPFUNCTION:     0       ;DISK COMMAND
  738                                ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
  739                                ;BY DOING A CHECK SUM ON THE DATA
  740  000434  010146                TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
  741  000436  010346                        MOV     %3,-(6)
  742  000440  005003                        CLR     %3              ;SUM OF DATA
  743  000442  012701  003416                MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
  744  000446  062103                TC2:    ADD     (1)+,%3         ;EVEN ADD
  745  000450  062103                        ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
  746  000452  001775                        BEQ     TC2
  747  000454  020127  004416                CMP     %1,#TCRBUF+1000         ;AT END OF BUFFER?
  748  000460  101001                        BHI     .+4             ;YES BRANCH
  749  000462  104000                        HLT                     ;DATA ERROR
  750  000464  012603                        MOV     (6)+,%3         ;RESTORE THE REGISTERS
  751  000466  012601                        MOV     (6)+,%1
  752  000470  000207                        RTS     %7              ;EXIT
```

```
  753  000472  012767  000240  014232  NOEAE:  MOV     #240,EAESRT     ;BRANCH AROUND EAE ROUTINE
  754  000500  000002                  RTI                             ;JUMP OVER EAE SECTION
  755
  756                                   ;START UP FOR MINI MONITOR
  757                                   ;RESTART HERE IF LINE PRINTER WAS ENABLED
  758
  759  000502  012767  016504  177314  START:  MOV     #PFAIL,24       ;SET POWER FAIL VECTOR
  760  000510  012706  016762          MOV     #BUFF,%6        ;SET UP STACK
  761  000514  012767  000530  177262          MOV     #1$,4                   ;SET UP TIME OUT VECTOR
  762  000522  005777  177446          TST     @SRPTR                  ;TRY TO REFERENCE THE
  763                                                                  ;HARDWARE SWITCH REGISTER
  764  000526  000404                  BR      2$                      ;BRANCH IF NO TIME OUT TRAP OCCURRS
  765  000530  012767  000176  177436  1$:     MOV     #SOFTSR,SRPTR           ;CHANGE THE SWITCH REGISTER POINTER
  766                                                                  ;TO POINT TO A SOFTWARE  SWITCH REGISTER
  767  000536  022626                  CMP     (6)+,(6)+               ;RESTORE THE STACK
  768  000540  012767  000006  177236  2$:     MOV     #6,4            ;RESTORE TIME OUT VECTOR
  769  000546  017767  177422  000742          MOV     @SRPTR,REG1             ;MOV SR TO REGISTER
  770  000554  005737  016570          TST     @#SAVR6         ;SET ON POWER FAIL
  771  000560  001403                  BEQ     ESTART
  772  000562  005037  016570          CLR     @#SAVR6
  773  000566  104000                  HLT                             ;A POWER FAIL OCCURRED
  774  000570  005067  015644  ESTART: CLR     ICOUNT
  775  000574  012706  016762          MOV     #BUFF,%6        ;SET UP STACK
  776  000600  012767  000642  015636          MOV     #START2,RETURN
  777  000606  005067  015630          CLR     SCOPEF
  778  000612  012767  000340  177156          MOV     #340,STATUS             ;LOCK OUT INTERRUPTS
  779  000620  005067  014736          CLR     PRFLAG                  ;PRINT ROUTINE BUSY
  780  000624  016702  000666          MOV     REG1,R5R                ;SAVE SWITCHES
  781  000630  012700  000100          MOV     #100,R100               ;INTERRUPT ENABLE
  782  000634  012701  000101          MOV     #101,R101               ;INTERRUPT ENABLE AND GO
  783  000640  104400                  SCOPE
  784  000642  050077  177412  START2: BIS     R100,@TRCSR
  785  000646  000005                  RESET
  786  000650  030077  177404          BIT     R100,@TRCSR             ;INTERRUPT ENABLE
  787  000654  001401                  BEQ     .+4
  788  000656  104000                  HLT                             ;RESET DID NOT CLEAR INTERRUPT ENABLE
  789  000660  104400                  SCOPE
  790                                   ;DOES "RESET" ON THE BUS LAST TOO LONG
  791  000662  012706  016762          MOV     #BUFF,%6                ;SET UP STACK
  792  000666  000005                  RESET
  793  000670  050077  177370          BIS     R100,@TTCSR             ;SET A BIT
  794  000674  030077  177364          BIT     R100,@TTCSR             ;IS IT SET
  795  000700  001001                  BNE     .+4
  796  000702  104000                  HLT                             ;RESET IS ON BUS TOO LONG
  797  000704  005077  177354          CLR     @TTCSR
  798  000710  104400                  SCOPE
  799  000712  050077  177346          BIS     R100,@TTCSR
  800  000716  005077  177342          CLR     @TTCSR                  ;IF BUS HANG, CHECK NO SACK TIMEOUT
  801  000722  104400                  SCOPE
  802  000724  000005                  RESET
  803  000726  012767  004416  015510          MOV     #BEGIN,RETURN
  804  000734  012737  000472  000004          MOV     #NOEAE,@#4              ;TEST FOR EAE
  805  000742  005777  177402          TST     @MQ                     ;TRAP IF NONEXISTANT
  806  000746  012767  001520  177030          MOV     #RTIA,4                 ;SET UP FOR NON-EXISTANT I/O
  807  000754  012767  000340  177024          MOV     #340,6                  ;KEEP NEW PSW AT 340
  808  000762  012767  000001  000604          MOV     #1,DATA1                ;BASE DATA FOR TTY READER OR KEYBOARD
```

```
  809  000770  005067  000626                    CLR     DATA2           ;BASE DATA FOR TTY PUNCH OR TELEPRINTER
  810  000774  012767  000001  000674            MOV     #1,DATA3        ;BASE DATA FOR HSR
  811  001002  005067  000764                    CLR     DATA4           ;BASE DATA FOR HSP
  812  001006  012706  016762                    MOV     #BUFF,%6
  813  001012  005067  000760                    CLR     DELAY           ;FOR READER STALL - HSR -
  814  001016  012767  000340  176752            MOV     #340,STATUS     ;LOCK OUT INTERRUPTS
  815  001024  030227  000001                    BIT     RSR,#1
  816  001030  001002                            BNE     ST1
  817  001032  050077  177226                    BIS     R100,@TTCSR     ;TTY OUT
  818  001036  030227  000002            ST1:    BIT     RSR,#2
  819  001042  001002                            BNE     ST2
  820  001044  050177  177210                    BIS     R101,@TRCSR     ;TTY IN
  821  001050  005777  177220            ST2:    TST     @HPCSR          ;TEST FOR OUT OF TAPE
  822  001054  100405                            BMI     ST3
  823  001056  030227  000004                    BIT     RSR,#4
  824  001062  001002                            BNE     ST3
  825  001064  050077  177204                    BIS     R100,@HPCSR     ;HSP
  826  001070  005777  177174            ST3:    TST     @HRCSR          ;TEST FOR OUT OF TAPE
  827  001074  100412                            BMI     ST4
  828  001076  000402                            BR      ST3A            ;RESERVED FOR OVERLAYS
  829  001100  017416                            DET3                    ;1020 GTP OVER LAY
  830  001102  017416                            DET3                    ;1022 GTP OVER LAY
  831  001104  030227  000010            ST3A:   BIT     RSR,#10
  832  001110  001004                            BNE     ST4
  833  001112  010067  000660                    MOV     R100,DELAY      ;FOR STALL HSR
  834  001116  050177  177146                    BIS     R101,@HRCSR     ;HSR
  835  001122  030227  000020            ST4:    BIT     RSR,#20
  836  001126  001004                            BNE     ST5
  837  001130  005067  000762                    CLR     TIME
  838  001134  050077  177140                    BIS     R100,@LKCSR     ;LINE CLOCK 50 OR 60 CYCLES
  839  001140  030227  000040            ST5:    BIT     RSR,#40
  840  001144  001053                            BNE     ST6
  841  001146  012767  001210  176630            MOV     #ST5A,4
  842  001154  105777  177246                    TSTB    @RPCSR          ;WAIT FOR CONTROLLER READY
  843  001160  100375                            BPL     .-4
  844  001162  012777  000015  177236            MOV     #15,@RPCSR      ;RESET DRIVE
  845  001170  105777  177232                    TSTB    @RPCSR          ;WAIT FOR CONTROLLER READY
  846  001174  100375                            BPL     .-4
  847  001176  005777  177214                    TST     @RPDSR          ;WAIT FOR ACCESS READY
  848  001202  100375                            BPL     .-4
  849  001204  005077  177206                    CLR     @RPDSR          ;CLR ATTENTION
  850  001210  012767  001520  176566  ST5A:     MOV     #RTIA,4
  851  001216  012777  000037  177076            MOV     #37,@RCDAR
  852  001224  012767  043503  001426            MOV     #43503,RFFUNCTION       ;WRITE CHECK/WRITE RF
  853  001232  012767  043503  001310            MOV     #43503,RCFUNCTION
  854  001240  012767  043503  001116            MOV     #43503,RKFUNCTION
  855  001246  012767  043503  177156            MOV     #43503,RPFUNCTION
  856  001254  110077  177036                    MOVB    R100,@RFCSR     ;TELL DISK TO READ OR WRITE
  857  001260  110077  177060                    MOVB    R100,@RKCSR
  858  001264  110077  177040                    MOVB    R100,@RCCSR
  859  001270  110077  177132                    MOVB    R100,@RPCSR
  860  001274  030200                    ST6:    BIT     RSR,R100        ;TEST FOR DECTAPE
  861  001276  001011                            BNE     ST7
  862  001300  012767  002664  001364            MOV     #TCFIRST,TCEXPE ;FIRST BLOCK SHOULD BE ZERO
  863  001306  012777  002674  177072            MOV     #FENDZ,@TCIV    ;GO TO END ZONE ON INTERRUPT
  864  001314  012777  004503  177050            MOV     #R+IE+RB+DO,@TCCM       ;MOVE REVERSE
```

```
                                ST7:    TSTB    RSR                     ;LINE PRINTER
                                        BMI     ST8
                                        MOV     #ST8,4                  ;DON'T CHANGE 200
                                        MOV     #137,SOLPAT             ;RESET FOR START OF LINE PATTERN
                                        MOV     LP6+4,CLINCT            ;LINE COUNT
                                        MOV     #40,CURPAT
                                        MOV     #14,@LPDBR              ;LINE FEED TO POSITION BUFFER
                                        MOV     #LPINTR,@#200           ;INTERRUPT VECTOR
                                        MOV     #200,@#202              ;PROCESSOR LEVEL 4
                                        MOV     R100,@LPCSR             ;INTERRUPT ENABLE
                                ST8:    CLR     @#TRPB                  ;NO "T" BIT FIRST PASS
                                ;IF OPERATION WITH DIAGNOSTIC PACKAGE OR ACT11
                                        TST     42
                                        BEQ     ST8A            ;BRANCH IF NO MONITOR
                                        MOV     #RTIA,4
                                        CLR     @LPCSR          ;NO LINE PRINTER WITH MONITOR
                                        CLR     @TTCSR          ;NO CONSOLE TEST WITH MONITOR
                                        CMPB    #2,     41      ;IS IT RKDP
                                        BNE     ST8A
                                        CLR     @RKCSR          ;YES DON'T TEST RK DISK
                                ST8A:   JSR     %7,@#USER               ;FOR USER I/O PROGRAM
                                        JSR     %7,DET1                 ;CHECK FOR CORE EXPANSION
                                        CLR     6                       ;HALT FOR BUS ERROR
                                        MOV     #6,4                    ;FOR USER I/O PROGRAM
                                        CLR     STATUS                  ;ALLOW INTERRUPTS
                                        BR      .+4
                                MAINLINE:       WAIT                    ;WAIT HERE FOR INTERRUPTS
                                        BIT     @SRPTR,#2000            ;INHIBIT PROCESSOR TEST
                                        BNE     MAINLINE
                                        JMP     BEGIN
                                REG1:   0                               ;STATUS OF SELECTED DEVICES
                                RTIA:   RTI                             ;AN RTI FOR NON EXISTANT I/O


                                ;TTY RECEIVER VALUES 0 TO 377

                                TTYINR: TSTB    @TRCSR                  ;IS DONE SET
                                        BMI     .+4
                                        HLT                             ;FALSE RETURN FROM MAINLINE
                                        TSTB    @TRDR                   ;TEST DATA FOR LEADER
                                        BEQ     TTYIN2                  ;IF LEADER GO BACK
                                        CMPB    @TRDR,DATA1             ;NOT LEADER TEST FOR DATA
                                        BEQ     TTYIN3
                                        HLT                             ;DATA COMPARISON ERROR
                                TTYIN3: INCB    DATA1                   ;INCREMENT DATA
                                TTYIN4: BNE     TTYIN2
                                TTYIN1: MOV     #1,DATA1                ;BASE DATA
                                TTYIN2: INC     @TRCSR                  ;START READER
                                        RTI                             ;RETURN TO MAINLINE

                                DATA1:  XX                              ;EXPECTED DATA

                                ;TTY TRANSMITTER PRINT VALUES 0 TO 377
```

```
                                TYOUTR: TSTB    @TTCSR                  ;TEST FOR DONE
                                        BMI     .+4                     ;BRANCH IF FLAG FOUND
                                        HLT                             ;FALSE INTERRUPT RETURN
                                        INCB    DATA2                   ;INCREMENT DATA
                        176446  TYOUT1: MOV     DATA2,@TTDBR            ;OUTPUT TO DEVICE
                                        RTI                             ;RETURN TO MAINLINE

                                DATA2:  XX                              ;TRANSMITTED DATA
                                ;HSR SECTION VALUES 0 TO 377

                        176440  HSRINR: TSTB    @HRCSR                  ;IS DONE SET
                                        BMI     .+4
                                        HLT                             ;FALSE RETURN FROM MAINLINE
                        176432          TSTB    @HRDBR                  ;TEST DATA FOR LEADER
                                        BEQ     HSRIN2                  ;IF LEADER GO BACK
                        176424  000026      CMPB    @HRDBR,DATA3        ;NOT LEADER TEST FOR DATA
                                        BEQ     .+4
                                        HLT                             ;DATA COMPARISON ERROR
                                        INCB    DATA3                   ;INCREMENT DATA
                                        BNE     HSRIN2
                        000006  HSRIN1: MOV     #1,DATA3                ;BASE DATA
                        176374  HSRIN2: INC     @HRCSR                  ;START READER
                                        RTI                             ;RETURN TO MAINLINE

                                DATA3:  XX                              ;EXPECTED DATA

                                ;HS PUNCH SECTION, VALUES 0 TO 377
                                ;ENABLE READER ON FIX COUNT OF PUNCH ONLY (14 TIMES)
                        000064  HPOUT:  MOV     #0,DATA4                ;INITAL DATA
                        176362  HPOUT1: MOV     DATA4,@HPDBR            ;OUTPUT TO DEVICE
                                        RTI                             ;RETURN TO MAINLINE
                        176352  HPOUTR: TSTB    @HPCSR                  ;TEST FOR DONE
                                        BMI     .+4                     ;BRANCH IF FLAG FOUND
                                        HLT                             ;FALSE INTERRUPT RETURN
                        176334          BIC     DELAY,@HRCSR            ;CLEAR HSR INTERRUPT ENABLE
                                        INC     INTCNT                  ;COUNT INTERRUPTS
                        000014          CMP     INTCNT,#14              ;SAVE TO TURN READER ON?
                                        BNE     HPOUT2                  ;NO-NEED MORE TIME
                                        CLR     INTCNT                  ;YES RESET COUNTER
                        176306          BIS     DELAY,@HRCSR            ;SET READER INT ENABLE
                                HPOUT2: INCB    DATA4                   ;INCREMENT DATA
                                        BEQ     HPOUT                   ;AT UPPER LIMIT START OVER
                                        BR      HPOUT1                  ;FINISH REST OF DATA

                                DATA4:  XX
                                INTCNT: 0
                                DELAY:  0                               ;EQUAL 100 IF HSR RUNNING

                                ;TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
                        002116  LK1:    CLR     @#TIME                  ;CLEAR LINE CLOCK TIMER
                        176266          BIS     #100,@LKCSR
                        177776          BIS     #100,@#STATUS
                                LK2:    RTI                             ;RETURN TO MAINLINE
                        176252  LK3:    TSTB    @LKCSR                  ;TEST FOR DONE
                                        BMI     .+4
                                        HLT                             ;FALSE INTERRUPT
```

```
  977  002032  042777  000200  176240            BIC     #200,@LKCSR
  978  002040  005237  002116          LK4:      INC     @#TIME                  ;ON INTERUPTS ENTER HERE
  979  002044  022737  006344  002116            CMP     #3300.,@#TIME           ;A LAPS OF 55 SECONDS
  980  002052  103362                            BHIS    LK2                     ;BRANCH IF TIME LESS THAN 55 SECONDS
  981  002054  042777  000100  176216            BIC     #100,@LKCSR
  982  002062  042737  000100  177776            BIC     #100,@#STATUS           ;LOWER PRIORITY
  983  002070  022737  007020  002116            CMP     #3600.,@#TIME           ;ONE MINUTE UP
  984  002076  001740                            BEQ     LK1                     ;YES-RESET TIMER
  985  002100  105777  176174                    TSTB    @LKCSR                  ;NO-SKIP ON FLAG TILL IT IS.
  986  002104  100375                            BPL     .-4
  987  002106  042777  000200  176164            BIC     #200,@LKCSR             ;CLEARS THE FLAG
  988  002114  000751                            BR      LK4                     ;FOUND FLAG GO INCREMENT COUNTER
  989  002116  000000                  TIME:     0
  990
  991                                            ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER
  992                                            ;INTERRUPT VECTOR IS 200
  993          002160                            LP80=LP6+4
  994
  995  002120  016767  000142  000136  LP1:      MOV     SOLPAT,CURPAT           ;START OF LINE TO CURRENT
  996  002126  016777  000132  176150  LP2:      MOV     CURPAT,@LPDBR           ;CURRENT PATTERN TO LINE PRINTER
  997  002134  105777  176142                    TSTB    @LPCSR
  998  002140  100405                            BMI     LP6
  999  002142  000002                            RTI                             ;RETURN TO MAIN LINE
 1000  002144  105777  176132          LPINTR:   TSTB    @LPCSR                  ;TEST FOR FLAG
 1001  002150  100401                            BMI     .+4
 1002  002152  104000                            HLT                             ;FALSE RETURN FROM MAIN LINE
 1003  002154  026727  000110  000117  LP6:      CMP     CLINCT,#79.             ;TEST FOR END OF LINE,
 1004                                                                            ;CHANGE THIS VALUE FOR 132 COLUMN PRINTER
 1005  002162  001415                            BEQ     LP4                     ;GO GENERATE CR/LF
 1006  002164  005267  000100                    INC     CLINCT                  ;INCREMENT LINE POSITION COUNT
 1007  002170  026727  000070  000137            CMP     CURPAT,#137             ;TEST FOR MAXIMUM PATTERN
 1008  002176  001403                            BEQ     LP3                     ;YES - GO TO LP3 AND RESET
 1009  002200  005267  000060                    INC     CURPAT                  ;NO - INCREMENT TO NEXT PATTERN
 1010  002204  000750                            BR      LP2                     ;GO SEND IT TO LINE PRINTER
 1011  002206  012767  000040  000050  LP3:      MOV     #40,CURPAT              ;RESET PATTERN AND SEND TO PRINTER
 1012  002214  000744                            BR      LP2                     ;SENT TO LINE PRINTER
 1013  002216  005067  000046          LP4:      CLR     CLINCT                  ;RESET LINE COUNT
 1014  002222  012777  000012  176054            MOV     #12,@LPDBR              ;LINE FEED
 1015  002230  105777  176046                    TSTB    @LPCSR
 1016  002234  100375                            BPL     .-4
 1017  002236  026727  000024  000137            CMP     SOLPAT,#137             ;START OF LINE PATTERN
 1018  002244  001403                            BEQ     LP5
 1019  002246  005267  000014                    INC     SOLPAT                  ;INCREMENT START OF LINE
 1020  002252  000722                            BR      LP1
 1021  002254  012767  000040  000004  LP5:      MOV     #40,SOLPAT              ;RESET START OF LINE
 1022  002262  000716                            BR      LP1                     ;PRINT
 1023  002264  000000                  CURPAT:   0                               ;CURRENT CHARACTER BEING PRINTED
 1024  002266  000000                  SOLPAT:   0                               ;START OF LINE CHARACTER
 1025  002270  000000                  CLINCT:   0                               ;POSITION OF LINE
 1026
 1027                                            ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
 1028  002272  005077  176040          RKSTART:  CLR     @RKDAE                  ;INITIALIZE DISK - DAR-DAE
 1029  002276  016777  000360  176036  RK1:      MOV     LLIMIT,@RKBAR           ;CORE BASE
 1030  002304  012777  176000  176026            MOV     #RKWORDCT,@RKWC         ;LENGTH OF TRANSFER
 1031  002312  113777  002364  176024            MOVB    @#RKFUNCTION,@RKCSR     ;WRITE OR WRITE CHECK TO DISK
 1032  002320  000002                            RTI                             ;RETURN TO MAINLINE CODE
```

```
1033  002322  032777  100200  176014  IRK:    BIT     #100200,@RKCSR          ;INTERRUPT VECTOR POINTS HERE
1034  002330  003002                          BGT     .+6
1035  002332  104000                          HLT                             ;RK-11 ERROR FLAG UP OR READY NOT UP
1036  002334  000756                          BR      RKSTART
1037  002336  032777  000037  175772          BIT     #37,@RKDAE              ;DISK AT UPPER LIMIT?
1038  002344  001354                          BNE     RK1                     ;NO
1039  002346  122777  000031  175760          CMPB    #31,@RKDAH
1040  002354  001350                          BNE     RK1                     ;NO
1041  002356  000337  002364                  SWAB    @#RKFUNCTION            ;CHANGE COMMAND
1042  002362  000743                          BR      RKSTART                 ;RESTART NEW TRANSFER OF DISK
1043
1044  002364  000000                  RKFUNCTION:     0                       ;DISK COMMAND
1045                                  ;RP11 DISK SERVICE ROUTINE
1046  002366  112777  000001  176032  RPSTART:MOVB    #1,@RPCSR               ;INITIALIZE DISK - DAR-DAE
1047  002374  105777  176026                  TSTB    @RPCSR
1048  002400  100375                          BPL     .-4
1049  002402  016777  000254  176014  RP1:    MOV     LLIMIT,@RPBAR           ;INITIAL CORE ADDRESS
1050  002410  012777  176000  176004          MOV     #RPWORDCT,@RPWC         ;LENGTH OF TRANSFER
1051  002416  113777  000432  176002          MOVB    @#RPFUNCTION,@RPCSR     ;WRITE OR WRITE CHECK TO DISK
1052  002424  000002                          RTI                             ;RETURN TO MAINLINE CODE
1053  002426  032777  100200  175772  IRP:    BIT     #100200,@RPCSR                 ;INTERRUPT VECTOR POINTS HERE
1054  002434  003002                          BGT     .+6
1055  002436  104000                          HLT                             ;RP11 READY NOT UP OR ERROR
1056  002440  000752                          BR      RPSTART
1057  002442  122777  000312  175740          CMPB    #312,@RPCA              ;CYLINDER NO. 312, 624 FOR RP03
1058  002450  001354                          BNE     RP1                     ;NO
1059  002452  000337  000432                  SWAB    @#RPFUNCTION            ;CHANGE COMMAND
1060  002456  000743                          BR      RPSTART                 ;RESTART NEW TRANSFER OF DISK
1061                                  ;RC11 DISK SERVICE ROUTINE
1062  002460  012777  000040  175634  RCSTART: MOV     #40,@RCDAR              ;INITIALIZE DISK - DAR-DAE
1063  002466  016777  000170  175632  RC2:    MOV     LLIMIT,@RCBAR           ;CORE BASE
1064  002474  012777  176040  175622          MOV     #RCWORDCT,@RCWC         ;LENGTH OF TRANSFER
1065  002502  113777  002550  175620          MOVB    @#RCFUNCTION,@RCCSR     ;WRITE OR WRITE CHECK TO DISK
1066  002510  000002                          RTI                             ;RETURN TO MAINLINE CODE
1067  002512  037727  175612  100200  IRC:    BIT     @RCCSR,#100200          ;INTERRUPT VECTOR POINTS HERE
1068  002520  003002                          BGT     .+6
1069  002522  104000                          HLT                             ;RC11 READY NOT UP OR ERROR IS UP
1070  002524  000755                          BR      RCSTART
1071  002526  005277  175570                  INC     @RCDAR                  ;TO INCREASE XFER RATE
1072  002532  022777  002000  175562          CMP     #2000,@RCDAR            ;DISK AT UPPER LIMIT, 4000=2, 6000=3, 10000=4
1073  002540  001352                          BNE     RC2                     ;NO
1074  002542  000337  002550                  SWAB    @#RCFUNCTION            ;CHANGE COMMAND
1075  002546  000744                          BR      RCSTART                 ;RESTART NEW TRANSFER OF DISK
1076  002550  000000                  RCFUNCTION:     0                       ;DISK COMMAND
1077                                  ;RF11 DISK
1078  002552  105277  175542          RFSTART:        INCB    @RFCSRH         ;INITIALIZE DISK - DAR-DAE
1079  002556  062777  000040  175524          ADD     #40,@RFDAR              ;INCREASE DUTY CYCLE
1080  002564  016777  000072  175522  RF1:    MOV     LLIMIT,@RFCAR           ;CORE BASE
1081  002572  012777  176040  175512          MOV     #RFWORDCT,@RFWC         ;LENGTH OF TRANSFER
1082  002600  113777  002660  175510          MOVB    @#RFFUNCTION,@RFCSR     ;WRITE OR WRITE CHECK TO DISK
1083  002606  000002                          RTI                             ;RETURN TO MAINLINE CODE
1084  002610  037727  175502  100200  IRF:    BIT     @RFCSR,#100200          ;INTERRUPT VECTOR POINTS HERE
1085  002616  003002                          BGT     .+6
1086  002620  104000                          HLT                             ;RF11 READY NOT UP OR ERROR UP
1087  002622  000753                          BR      RFSTART
1088  002624  062777  000040  175456          ADD     #40,@RFDAR              ;INCREASE DUTY CYCLE
```

```
1089  002632  122777  000003  175446          CMPB    #3,@RFDAE               ;DISK AT UPPER LIMIT? 7=2, 17=4, 37=8
1090  002640  001351                          BNE     RF1                     ;NO
1091  002642  027727  175442  174000          CMP     @RFDAR,#174000          ;AS FAR ON DISK AS WE CAN GO
1092  002650  101745                          BLOS    RF1                     ;NO
1093  002652  000337  002660                  SWAB    @#RFFUNCTION            ;CHANGE COMMAND
1094  002656  000735                          BR      RFSTART                 ;RESTART NEW TRANSFER OF DISK
1095  002660  000000                  RFFUNCTION:     0                       ;DISK COMMAND
1096  002662  004416                  LLIMIT: BEGIN                           ;FIRST CORE ADDRESS OF TRANSFER
1097                                  ;DT11 DEC TAPE
1098          000004                  RD=4                            ;READ DATA
1099          000014                  WD=14                           ;WRITE DATA
1100          000002                  RB=2
1101          000002                  BR=2                            ;READ BLOCK
1102          000000                  F=0                             ;FORWARD
1103          000500                  IE=500                          ;INTERRUPT ENABLE AND UNIT - UNIT #1
1104          000001                  DO=1                            ;DO - THE FUNCTION
1105          004000                  R=4000                          ;REVERSE
1106
1107  002664  000000                  TCFIRST:        0               ;FIRST BLOCK TO BE SEARCHED FOR
1108  002666  001101                  TCLAST: 577.                    ;LAST BLOCK TO BE SEARCHED FOR
1109  002670  000000                  TCBLK:  0                       ;CURRENT BLOCK FOUND
1110  002672  000000                  TCEXPE: 0                       ;THE BLOCK THAT IS EXPECTED
1111
1112                                  ;GO TO FORWARD END ZONE
1113  002674  012777  002674  175504  FENDZ:  MOV     #FENDZ,@TCIV    ;END ZONE VECTOR SETUP
1114  002702  005777  175466                  TST     @TCST           ;TEST FOR END ZONE
1115  002706  100403                          BMI     FEND1           ;AT END ZONE?
1116  002710  105277  175456                  INCB    @TCCM           ;SET DO - NO DELAY
1117  002714  000002                          RTI                     ;NO - WAIT SOME MORE
1118  002716  012777  002746  175462  FEND1:  MOV     #TCF1,@TCIV     ;YES - NEW VECTOR
1119  002724  042777  104000  175440          BIC     #104000,@TCCM   ;SEARCH BLOCK FOWARD
1120  002732  016767  177726  177732          MOV     TCFIRST,TCEXPE  ;COUNT WHEN THIS BLOCK IS FOUND
1121  002740  105277  175426          TCF1A:  INCB    @TCCM           ;SET DO
1122  002744  000002                          RTI                     ;RETURN ON NEXT BLOCK
1123  002746  032777  100200  175416  TCF1:   BIT     #100200,@TCCM   ;ANY ERROR ON READ?
1124  002754  003001                          BGT     .+4
1125  002756  104000                          HLT                     ;TC ERROR SET - FORWARD READ BLOCK
1126  002760  027767  175412  177704          CMP     @TCDT,TCEXPE    ;IS THIS OUR BLOCK FOR SYNC
1127  002766  002764                          BLT     TCF1A           ;NO-READ SOME MORE BLOCKS
1128  002770  001401                          BEQ     TCF2            ;YES
1129  002772  104000                          HLT                     ;WE PASSED THE BLOCK
1130
1131  002774  012777  003010  175404  TCF2:   MOV     #TCF3,@TCIV     ;VECTOR FOR SEQUENTIAL READS
1132  003002  105277  175364                  INCB    @TCCM           ;SET DO
1133  003006  000002                          RTI                     ;RETURN AND TEST SEQENTIAL BLOCKS
1134
1135                                  ;FIND SEQUENTIAL BLOCK AT FOWARD DIRECTION
1136  003010  032777  100200  175354  TCF3:   BIT     #100200,@TCCM   ;TEST ERROR AND READY
1137  003016  003001                          BGT     .+4
1138  003020  104000                          HLT                     ;FALSE INTERRUPT ON TC-11
1139  003022  027767  175350  177636          CMP     @TCDT,TCLAST    ;HAVE WE TESTED ALL BLOCKS
1140  003030  001414                          BEQ     RENDZ           ;YES DRIVE UNIT IN END ZONE TO START OVER
1141  003032  005267  177634                  INC     TCEXPE          ;NO-INCREMENT EXPECTED COUNT
1142  003036  027767  175334  177626          CMP     @TCDT,TCEXPE    ;IS CURRENT BLOCK CORRECT
1143  003044  001401                          BEQ     .+4
1144  003046  104000                          HLT                     ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
```

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1145  003050  000427                          BR      TCWBK           ;THIS ROUTINE WRITES A BLOCK
1146  003052  105277  175314        TCF4:     INCB    @TCCM           ;SET DO
1147  003056  000002                          RTI
1148  003060  000705                XFENDZ:   BR      FENDZ           ;INDIRECT LINK
1149
1150                                ;MOVE TAPE TO REVERSE END ZONE
1151  003062  012777  003062  175316 RENDZ:   MOV     #RENDZ,@TCIV    ;END ZONE VECTOR SETUP
1152  003070  016767  177572  177574          MOV     TCLAST,TCEXPE   ;SET UP FOR REVERSE SEARCH
1153  003076  005777  175272                  TST     @TCST           ;IN END ZONE
1154  003102  100403                          BMI     REND1           ;YES - START TO TURN UNIT AROUND
1155  003104  105277  175262                  INCB    @TCCM           ;SET DO
1156  003110  000002                          RTI                     ;NO - WAIT TILL WE ARE
1157  003112  012777  004503  175252 REND1:   MOV     #R+IE+RB+DO,@TCCM ;FUNCTION = READ BLOCK, REVERSE AND GO
1158  003120  012777  003210  175260          MOV     #TCR1,@TCIV     ;SET UP NEW INTERRUPT VECTOR
1159  003126  000002                          RTI
1160                                ;WRITE FORWARD ALL BLOCKS EXCEPT 0
1161
1162  003130  012777  003162  175250 TCWBK:   MOV     #TCWB1,@TCIV    ;INTERRUPT VECTOR FOR WRITE
1163  003136  012777  177400  175236          MOV     #-400,@TCWC     ;ONE BLOCK
1164  003144  012777  003416  175232          MOV     #TCWBUF,@TCBA   ;THE WRITE BUFFER ADDRESS
1165  003152  112777  000515  175212          MOVB    #IE+WD+DO,@TCCM ;WRITE THE BLOCK
1166  003160  000002                          RTI                     ;RETURN WHEN BLOCK IS WRITTEN
1167  003162  005777  175204        TCWB1:    TST     @TCCM           ;ANY ERRORS
1168  003166  100001                          BPL     .+4
1169  003170  104000                          HLT
1170  003172  012777  003010  175206          MOV     #TCF3,@TCIV     ;SEARCH BLOCK VECTOR
1171  003200  112777  000502  175164          MOVB    #IE+RB,@TCCM    ;READ BLOCK
1172  003206  000721                          BR      TCF4            ;FIND THE NEXT BLOCK
1173
1174  003210  032777  100200  175154 TCR1:    BIT     #100200,@TCCM   ;TEST FOR ERROR AND READY
1175  003216  003001                          BGT     .+4
1176  003220  104000                          HLT                     ;DECTAPE ERROR ON READ BLOCK REVERSE
1177  003222  027767  175150  177442          CMP     @TCDT,TCEXPE    ;IS IT OUR FIRST BLOCK
1178  003230  001406                          BEQ     TCR2            ;YES - GO TEST THE REST
1179  003232  002002                          BGE     TCR1A           ;NO - HAVE WE PASSED THE BLOCK
1180  003234  104000                          HLT                     ;WE PASS OUR BLOCK
1181  003236  000711                          BR      RENDZ           ;GO TO END ZONE AND TRY AGAIN
1182  003240  105277  175126        TCR1A:    INCB    @TCCM           ;SET DO
1183  003244  000002                          RTI                     ;WE FOUND OUR FIRST BLOCK
1184  003246  012777  003262  175132 TCR2:    MOV     #TCR3,@TCIV     ;SET UP INTERRUPT TO TEST ALL BLOCKS
1185  003254  105277  175112                  INCB    @TCCM           ;SET DO
1186  003260  000002                          RTI                     ;WAIT FOR NEXT BLOCK TO INTERRUPT
1187
1188                                ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
1189  003262  032777  100200  175102 TCR3:    BIT     #100200,@TCCM   ;TEST FOR READ AND ERROR
1190  003270  003001                          BGT     .+4
1191  003272  104000                          HLT                     ;ERROR READING SEQUENTIAL BLOCK IN REVERSE
```

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1192  003274  026777  177364  175074          CMP     TCFIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1193  003302  001666                          BEQ     XFENDZ          ;YES - GO TO END ZONE TO RESTART
1194  003304  005367  177362                  DEC     TCEXPE          ;NO - DECREMENT BLOCK NUMBER
1195  003310  027767  175062  177354          CMP     @TCDT,TCEXPE    ;TEST SEQUENTAIL BLOCK IN REVERSE
1196  003316  001401                          BEQ     .+4
1197  003320  104000                          HLT                     ;TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1198  003322  000403                          BR      TCRBK           ;THIS ROUTINE READ A BLOCK
1199  003324  105277  175042          TCR4:   INCB    @TCCM           ;SET DO
1200  003330  000002                          RTI                     ;LETS TRY A NEW BLOCK
1201
1202                                  ;READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1203  003332  012777  003370  175046  TCRBK:  MOV     #TCRB1,@TCIV    ;SET UP INTERRUPT VECTOR
1204  003340  012777  177400  175034          MOV     #-400,@TCWC     ;READ ONE BLOCK
1205  003346  012777  003416  175030          MOV     #TCRBUF,@TCBA   ;WHERE BUFFER IS
1206  003354  112777  000505  175010          MOVB    #IE+RD+DO,@TCCM ;READ THE BLOCK
1207  003362  004767  175046                  JSR     %7,TC1          ;CHECK DATA BUFFER
1208  003366  000002                          RTI                     ;EXIT - RETURN WHEN BLOCK IS READ
1209  003370  005777  174776          TCRB1:  TST     @TCCM           ;AND ERRORS
1210  003374  100001                          BPL     .+4
1211  003376  104000                          HLT                     ;DECTAPE ERROR
1212  003400  012777  003262  175000          MOV     #TCR3,@TCIV     ;NEW VECTOR FOR BLOCK SEARCH
1213  003406  112777  000502  174756          MOVB    #IE+RB,@TCCM    ;READ BLOCK FUNCTION
1214  003414  000743                          BR      TCR4            ;RETURN TO BLOCK SEARCH
1215
1216                                  ;THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1217  003416                          TCWBUF:
1218  003416                          TCRBUF:
1219                  000001                  N=1
1220                                          .REPT   100
1221                                          N                       ;DECTAPE READ/WRITE BUFFER
1222                                          -N
1223                                          N=N+1
1224                                          .ENDR
1225  003416  000001                          N                       ;DECTAPE READ/WRITE BUFFER
1226  003420  177777                          -N
1227                  000002                  N=N+1
1228  003422  000002                          N                       ;DECTAPE READ/WRITE BUFFER
1229  003424  177776                          -N
1230                  000003                  N=N+1
1231  003426  000003                          N                       ;DECTAPE READ/WRITE BUFFER
1232  003430  177775                          -N
1233                  000004                  N=N+1
1234  003432  000004                          N                       ;DECTAPE READ/WRITE BUFFER
1235  003434  177774                          -N
1236                  000005                  N=N+1
1237  003436  000005                          N                       ;DECTAPE READ/WRITE BUFFER
1238  003440  177773                          -N
1239                  000006                  N=N+1
1240  003442  000006                          N                       ;DECTAPE READ/WRITE BUFFER
1241  003444  177772                          -N
1242                  000007                  N=N+1
1243  003446  000007                          N                       ;DECTAPE READ/WRITE BUFFER
1244  003450  177771                          -N
1245                  000010                  N=N+1
1246  003452  000010                          N                       ;DECTAPE READ/WRITE BUFFER
1247  003454  177770                          -N
```

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1248                    000011                          N=N+1
1249    003456          000011                          N               ;DECTAPE READ/WRITE BUFFER
1250    003460          177767                          -N
1251                    000012                          N=N+1
1252    003462          000012                          N               ;DECTAPE READ/WRITE BUFFER
1253    003464          177766                          -N
1254                    000013                          N=N+1
1255    003466          000013                          N               ;DECTAPE READ/WRITE BUFFER
1256    003470          177765                          -N
1257                    000014                          N=N+1
1258    003472          000014                          N               ;DECTAPE READ/WRITE BUFFER
1259    003474          177764                          -N
1260                    000015                          N=N+1
1261    003476          000015                          N               ;DECTAPE READ/WRITE BUFFER
1262    003500          177763                          -N
1263                    000016                          N=N+1
1264    003502          000016                          N               ;DECTAPE READ/WRITE BUFFER
1265    003504          177762                          -N
1266                    000017                          N=N+1
1267    003506          000017                          N               ;DECTAPE READ/WRITE BUFFER
1268    003510          177761                          -N
1269                    000020                          N=N+1
1270    003512          000020                          N               ;DECTAPE READ/WRITE BUFFER
1271    003514          177760                          -N
1272                    000021                          N=N+1
1273    003516          000021                          N               ;DECTAPE READ/WRITE BUFFER
1274    003520          177757                          -N
1275                    000022                          N=N+1
1276    003522          000022                          N               ;DECTAPE READ/WRITE BUFFER
1277    003524          177756                          -N
1278                    000023                          N=N+1
1279    003526          000023                          N               ;DECTAPE READ/WRITE BUFFER
1280    003530          177755                          -N
1281                    000024                          N=N+1
1282    003532          000024                          N               ;DECTAPE READ/WRITE BUFFER
1283    003534          177754                          -N
1284                    000025                          N=N+1
1285    003536          000025                          N               ;DECTAPE READ/WRITE BUFFER
1286    003540          177753                          -N
1287                    000026                          N=N+1
1288    003542          000026                          N               ;DECTAPE READ/WRITE BUFFER
1289    003544          177752                          -N
1290                    000027                          N=N+1
1291    003546          000027                          N               ;DECTAPE READ/WRITE BUFFER
1292    003550          177751                          -N
1293                    000030                          N=N+1
1294    003552          000030                          N               ;DECTAPE READ/WRITE BUFFER
1295    003554          177750                          -N
1296                    000031                          N=N+1
1297    003556          000031                          N               ;DECTAPE READ/WRITE BUFFER
1298    003560          177747                          -N
1299                    000032                          N=N+1
1300    003562          000032                          N               ;DECTAPE READ/WRITE BUFFER
1301    003564          177746                          -N
1302                    000033                          N=N+1
1303    003566          000033                          N               ;DECTAPE READ/WRITE BUFFER
```

```
1304  003570  177745                          -N
1305          000034                          N=N+1
1306  003572  000034                          N               ;DECTAPE READ/WRITE BUFFER
1307  003574  177744                          -N
1308          000035                          N=N+1
1309  003576  000035                          N               ;DECTAPE READ/WRITE BUFFER
1310  003600  177743                          -N
1311          000036                          N=N+1
1312  003602  000036                          N               ;DECTAPE READ/WRITE BUFFER
1313  003604  177742                          -N
1314          000037                          N=N+1
1315  003606  000037                          N               ;DECTAPE READ/WRITE BUFFER
1316  003610  177741                          -N
1317          000040                          N=N+1
1318  003612  000040                          N               ;DECTAPE READ/WRITE BUFFER
1319  003614  177740                          -N
1320          000041                          N=N+1
1321  003616  000041                          N               ;DECTAPE READ/WRITE BUFFER
1322  003620  177737                          -N
1323          000042                          N=N+1
1324  003622  000042                          N               ;DECTAPE READ/WRITE BUFFER
1325  003624  177736                          -N
1326          000043                          N=N+1
1327  003626  000043                          N               ;DECTAPE READ/WRITE BUFFER
1328  003630  177735                          -N
1329          000044                          N=N+1
1330  003632  000044                          N               ;DECTAPE READ/WRITE BUFFER
1331  003634  177734                          -N
1332          000045                          N=N+1
1333  003636  000045                          N               ;DECTAPE READ/WRITE BUFFER
1334  003640  177733                          -N
1335          000046                          N=N+1
1336  003642  000046                          N               ;DECTAPE READ/WRITE BUFFER
1337  003644  177732                          -N
1338          000047                          N=N+1
1339  003646  000047                          N               ;DECTAPE READ/WRITE BUFFER
1340  003650  177731                          -N
1341          000050                          N=N+1
1342  003652  000050                          N               ;DECTAPE READ/WRITE BUFFER
1343  003654  177730                          -N
1344          000051                          N=N+1
1345  003656  000051                          N               ;DECTAPE READ/WRITE BUFFER
1346  003660  177727                          -N
1347          000052                          N=N+1
1348  003662  000052                          N               ;DECTAPE READ/WRITE BUFFER
1349  003664  177726                          -N
1350          000053                          N=N+1
1351  003666  000053                          N               ;DECTAPE READ/WRITE BUFFER
1352  003670  177725                          -N
1353          000054                          N=N+1
1354  003672  000054                          N               ;DECTAPE READ/WRITE BUFFER
1355  003674  177724                          -N
1356          000055                          N=N+1
1357  003676  000055                          N               ;DECTAPE READ/WRITE BUFFER
1358  003700  177723                          -N
1359          000056                          N=N+1
```

```
 1360  003702  000056                    N                       ;DECTAPE READ/WRITE BUFFER
 1361  003704  177722                    -N
 1362          000057                    N=N+1
 1363  003706  000057                    N                       ;DECTAPE READ/WRITE BUFFER
 1364  003710  177721                    -N
 1365          000060                    N=N+1
 1366  003712  000060                    N                       ;DECTAPE READ/WRITE BUFFER
 1367  003714  177720                    -N
 1368          000061                    N=N+1
 1369  003716  000061                    N                       ;DECTAPE READ/WRITE BUFFER
 1370  003720  177717                    -N
 1371          000062                    N=N+1
 1372  003722  000062                    N                       ;DECTAPE READ/WRITE BUFFER
 1373  003724  177716                    -N
 1374          000063                    N=N+1
 1375  003726  000063                    N                       ;DECTAPE READ/WRITE BUFFER
 1376  003730  177715                    -N
 1377          000064                    N=N+1
 1378  003732  000064                    N                       ;DECTAPE READ/WRITE BUFFER
 1379  003734  177714                    -N
 1380          000065                    N=N+1
 1381  003736  000065                    N                       ;DECTAPE READ/WRITE BUFFER
 1382  003740  177713                    -N
 1383          000066                    N=N+1
 1384  003742  000066                    N                       ;DECTAPE READ/WRITE BUFFER
 1385  003744  177712                    -N
 1386          000067                    N=N+1
 1387  003746  000067                    N                       ;DECTAPE READ/WRITE BUFFER
 1388  003750  177711                    -N
 1389          000070                    N=N+1
 1390  003752  000070                    N                       ;DECTAPE READ/WRITE BUFFER
 1391  003754  177710                    -N
 1392          000071                    N=N+1
 1393  003756  000071                    N                       ;DECTAPE READ/WRITE BUFFER
 1394  003760  177707                    -N
 1395          000072                    N=N+1
 1396  003762  000072                    N                       ;DECTAPE READ/WRITE BUFFER
 1397  003764  177706                    -N
 1398          000073                    N=N+1
 1399  003766  000073                    N                       ;DECTAPE READ/WRITE BUFFER
 1400  003770  177705                    -N
 1401          000074                    N=N+1
 1402  003772  000074                    N                       ;DECTAPE READ/WRITE BUFFER
 1403  003774  177704                    -N
 1404          000075                    N=N+1
 1405  003776  000075                    N                       ;DECTAPE READ/WRITE BUFFER
 1406  004000  177703                    -N
 1407          000076                    N=N+1
 1408  004002  000076                    N                       ;DECTAPE READ/WRITE BUFFER
 1409  004004  177702                    -N
 1410          000077                    N=N+1
 1411  004006  000077                    N                       ;DECTAPE READ/WRITE BUFFER
 1412  004010  177701                    -N
 1413          000100                    N=N+1
 1414  004012  000100                    N                       ;DECTAPE READ/WRITE BUFFER
 1415  004014  177700                    -N
```

```
                000101                          N=N+1
                                                .REPT   100
                                                N=N-1
                                                -N
                                                N                       ;DEC TAPE READ/WRITE BUFFER
                                                .ENDR
                000100                          N=N-1
004016  177700                                  -N
004020  000100                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000077                          N=N-1
004022  177701                                  -N
004024  000077                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000076                          N=N-1
004026  177702                                  -N
004030  000076                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000075                          N=N-1
004032  177703                                  -N
004034  000075                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000074                          N=N-1
004036  177704                                  -N
004040  000074                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000073                          N=N-1
004042  177705                                  -N
004044  000073                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000072                          N=N-1
004046  177706                                  -N
004050  000072                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000071                          N=N-1
004052  177707                                  -N
004054  000071                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000070                          N=N-1
004056  177710                                  -N
004060  000070                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000067                          N=N-1
004062  177711                                  -N
004064  000067                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000066                          N=N-1
004066  177712                                  -N
004070  000066                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000065                          N=N-1
004072  177713                                  -N
004074  000065                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000064                          N=N-1
004076  177714                                  -N
004100  000064                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000063                          N=N-1
004102  177715                                  -N
004104  000063                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000062                          N=N-1
004106  177716                                  -N
004110  000062                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000061                          N=N-1
004112  177717                                  -N
004114  000061                                  N                       ;DEC TAPE READ/WRITE BUFFER
                000060                          N=N-1
004116  177720                                  -N
```

```
1472  004120  000060                    N                       ;DEC TAPE READ/WRITE BUFFER
1473          000057                    N=N-1
1474  004122  177721                    -N
1475  004124  000057                    N                       ;DEC TAPE READ/WRITE BUFFER
1476          000056                    N=N-1
1477  004126  177722                    -N
1478  004130  000056                    N                       ;DEC TAPE READ/WRITE BUFFER
1479          000055                    N=N-1
1480  004132  177723                    -N
1481  004134  000055                    N                       ;DEC TAPE READ/WRITE BUFFER
1482          000054                    N=N-1
1483  004136  177724                    -N
1484  004140  000054                    N                       ;DEC TAPE READ/WRITE BUFFER
1485          000053                    N=N-1
1486  004142  177725                    -N
1487  004144  000053                    N                       ;DEC TAPE READ/WRITE BUFFER
1488          000052                    N=N-1
1489  004146  177726                    -N
1490  004150  000052                    N                       ;DEC TAPE READ/WRITE BUFFER
1491          000051                    N=N-1
1492  004152  177727                    -N
1493  004154  000051                    N                       ;DEC TAPE READ/WRITE BUFFER
1494          000050                    N=N-1
1495  004156  177730                    -N
1496  004160  000050                    N                       ;DEC TAPE READ/WRITE BUFFER
1497          000047                    N=N-1
1498  004162  177731                    -N
1499  004164  000047                    N                       ;DEC TAPE READ/WRITE BUFFER
1500          000046                    N=N-1
1501  004166  177732                    -N
1502  004170  000046                    N                       ;DEC TAPE READ/WRITE BUFFER
1503          000045                    N=N-1
1504  004172  177733                    -N
1505  004174  000045                    N                       ;DEC TAPE READ/WRITE BUFFER
1506          000044                    N=N-1
1507  004176  177734                    -N
1508  004200  000044                    N                       ;DEC TAPE READ/WRITE BUFFER
1509          000043                    N=N-1
1510  004202  177735                    -N
1511  004204  000043                    N                       ;DEC TAPE READ/WRITE BUFFER
1512          000042                    N=N-1
1513  004206  177736                    -N
1514  004210  000042                    N                       ;DEC TAPE READ/WRITE BUFFER
1515          000041                    N=N-1
1516  004212  177737                    -N
1517  004214  000041                    N                       ;DEC TAPE READ/WRITE BUFFER
1518          000040                    N=N-1
1519  004216  177740                    -N
1520  004220  000040                    N                       ;DEC TAPE READ/WRITE BUFFER
1521          000037                    N=N-1
1522  004222  177741                    -N
1523  004224  000037                    N                       ;DEC TAPE READ/WRITE BUFFER
1524          000036                    N=N-1
1525  004226  177742                    -N
1526  004230  000036                    N                       ;DEC TAPE READ/WRITE BUFFER
1527          000035                    N=N-1
```

```
1528  004232  177743                          -N
1529  004234  000035                          N                   ;DEC TAPE READ/WRITE BUFFER
1530          000034                          N=N-1
1531  004236  177744                          -N
1532  004240  000034                          N                   ;DEC TAPE READ/WRITE BUFFER
1533          000033                          N=N-1
1534  004242  177745                          -N
1535  004244  000033                          N                   ;DEC TAPE READ/WRITE BUFFER
1536          000032                          N=N-1
1537  004246  177746                          -N
1538  004250  000032                          N                   ;DEC TAPE READ/WRITE BUFFER
1539          000031                          N=N-1
1540  004252  177747                          -N
1541  004254  000031                          N                   ;DEC TAPE READ/WRITE BUFFER
1542          000030                          N=N-1
1543  004256  177750                          -N
1544  004260  000030                          N                   ;DEC TAPE READ/WRITE BUFFER
1545          000027                          N=N-1
1546  004262  177751                          -N
1547  004264  000027                          N                   ;DEC TAPE READ/WRITE BUFFER
1548          000026                          N=N-1
1549  004266  177752                          -N
1550  004270  000026                          N                   ;DEC TAPE READ/WRITE BUFFER
1551          000025                          N=N-1
1552  004272  177753                          -N
1553  004274  000025                          N                   ;DEC TAPE READ/WRITE BUFFER
1554          000024                          N=N-1
1555  004276  177754                          -N
1556  004300  000024                          N                   ;DEC TAPE READ/WRITE BUFFER
1557          000023                          N=N-1
1558  004302  177755                          -N
1559  004304  000023                          N                   ;DEC TAPE READ/WRITE BUFFER
1560          000022                          N=N-1
1561  004306  177756                          -N
1562  004310  000022                          N                   ;DEC TAPE READ/WRITE BUFFER
1563          000021                          N=N-1
1564  004312  177757                          -N
1565  004314  000021                          N                   ;DEC TAPE READ/WRITE BUFFER
1566          000020                          N=N-1
1567  004316  177760                          -N
1568  004320  000020                          N                   ;DEC TAPE READ/WRITE BUFFER
1569          000017                          N=N-1
1570  004322  177761                          -N
1571  004324  000017                          N                   ;DEC TAPE READ/WRITE BUFFER
1572          000016                          N=N-1
1573  004326  177762                          -N
1574  004330  000016                          N                   ;DEC TAPE READ/WRITE BUFFER
1575          000015                          N=N-1
1576  004332  177763                          -N
1577  004334  000015                          N                   ;DEC TAPE READ/WRITE BUFFER
1578          000014                          N=N-1
1579  004336  177764                          -N
1580  004340  000014                          N                   ;DEC TAPE READ/WRITE BUFFER
1581          000013                          N=N-1
1582  004342  177765                          -N
1583  004344  000013                          N                   ;DEC TAPE READ/WRITE BUFFER
```

```
1584                000012                          N=N-1
1585    004346      177766                          -N
1586    004350      000012                          N                       ;DEC TAPE READ/WRITE BUFFER
1587                000011                          N=N-1
1588    004352      177767                          -N
1589    004354      000011                          N                       ;DEC TAPE READ/WRITE BUFFER
1590                000010                          N=N-1
1591    004356      177770                          -N
1592    004360      000010                          N                       ;DEC TAPE READ/WRITE BUFFER
1593                000007                          N=N-1
1594    004362      177771                          -N
1595    004364      000007                          N                       ;DEC TAPE READ/WRITE BUFFER
1596                000006                          N=N-1
1597    004366      177772                          -N
1598    004370      000006                          N                       ;DEC TAPE READ/WRITE BUFFER
1599                000005                          N=N-1
1600    004372      177773                          -N
1601    004374      000005                          N                       ;DEC TAPE READ/WRITE BUFFER
1602                000004                          N=N-1
1603    004376      177774                          -N
1604    004400      000004                          N                       ;DEC TAPE READ/WRITE BUFFER
1605                000003                          N=N-1
1606    004402      177775                          -N
1607    004404      000003                          N                       ;DEC TAPE READ/WRITE BUFFER
1608                000002                          N=N-1
1609    004406      177776                          -N
1610    004410      000002                          N                       ;DEC TAPE READ/WRITE BUFFER
1611                000001                          N=N-1
1612    004412      177777                          -N
1613    004414      000001                          N                       ;DEC TAPE READ/WRITE BUFFER
1614
1615    004416  012767  004416  012020  BEGIN:  MOV     #BEGIN,RETURN           ;FOR SCOPING
1616    004424  104400                          SCOPE
1617    004426  012737  004000  016440          MOV     #4000,@#ICOUNT          ;ITERATION COUNT
1618                            ;TEST COMPARE INSTRUCTION INDEXED
1619    004434  012700  177770                  MOV     #-10,%0                 ;MINUS 10 TO REG 0
1620    004440  026027  016666  125252          CMP     A(0),#125252            ;(A INDEX BY MINUS 10) TO #125252
1621    004446  001401                          BEQ     .+4
1622    004450  104000                          HLT                             ;COMPARE WITH INDEX FAILED
1623    004452  104400                          SCOPE
1624
1625    004454  022760  125252  016666          CMP     #125252,A(0)            ;A INDEXED
1626    004462  001401                          BEQ     .+4
1627    004464  104000                          HLT                             ;COMPARE FAILED DESTINATION INDEX
1628    004466  104400                          SCOPE
1629                            ;SET "ISR" FOR DISKS AND KW11L TO CURRENT BANK
1630    004470  010700                          MOV     %7,%0                   ;CURRENT BANK
1631    004472  042700  007777                  BIC     #007777,%0              ;LEAVE ONLY BANK BITS
1632    004476  062700  002022                  ADD     #LK3,%0                 ;ADD IN CLOCK ENTRANCE
1633    004502  010037  000100                  MOV     %0,@#100                ;LINE CLOCK, KW11L
1634    004506  042700  007777                  BIC     #007777,%0
1635    004512  062700  002610                  ADD     #IRF,%0
1636    004516  010037  000204                  MOV     %0,@#204                ;RF11 ISR
1637    004522  042700  007777                  BIC     #007777,%0
1638    004526  062700  002512                  ADD     #IRC,%0
1639    004532  010037  000210                  MOV     %0,@#210                ;RC11, ISR
```

```
1640  004536  042700  007777          BIC     #007777,%0
1641  004542  062700  002322          ADD     #IRK,%0
1642  004546  010037  000220          MOV     %0,@#220        ;RK11 ISR
1643  004552  042700  007777          BIC     #7777,%0
1644  004556  062700  002426          ADD     #IRP,%0
1645  004562  010037  000254          MOV     %0,@#254        ;RP11 ISR
1646  004566  042700  007777          BIC     #007777,%0
1647  004572  063700  002662          ADD     @#LLIMIT,%0
1648  004576  010067  176060          MOV     %0,LLIMIT       ;CHANGE DISK NPR BUFFER
1649  004602  042700  007777          BIC     #007777,%0
1650  004606  062700  016762          ADD     #BUFF,%0
1651  004612  010006                  MOV     %0,%6           ;CHANGE STACK TO EXISTING BANK
1652
1653  004614  012700  000010          MOV     #10,%0          ;INDEX
1654  004620  026027  016666  052525  CMP     A(0),#052525
1655  004626  001401                  BEQ     .+4
1656  004630  104000                  HLT                     ;COMPARE FAILED
1657  004632  104400                  SCOPE
1658
1659                                ;REGISTER 0 CONTAINS 000010
1660  004634  022760  052525  016666  CMP     #052525,A(0)
1661  004642  001401                  BEQ     .+4
1662  004644  104000                  HLT
1663  004646  104400                  SCOPE                   ;COMPARE FAILED
1664
1665                                ;REGISTER 0 CONTAINS 000010
1666  004650  026060  016666  016666  CMP     A(0),A(0)
1667  004656  001401                  BEQ     .+4
1668  004660  104000                  HLT
1669  004662  104400                  SCOPE                   ;COMPARE FAILED
1670
1671  004664  012700  177770          MOV     #-10,%0
1672  004670  026060  016666  016666  CMP     A(0),A(0)
1673  004676  001401                  BEQ     .+4
1674  004700  104000                  HLT
1675  004702  104400                  SCOPE                   ;COMPARE FAILED
1676
1677                                ;REGISTER 0 CONTAINS 177770 (-10)
1678  004704  012701  000004          MOV     #+4,%1
1679  004710  026061  016666  016666  CMP     A(0),A(1)
1680  004716  001401                  BEQ     .+4
1681  004720  104000                  HLT
1682  004722  104400                  SCOPE                   ;COMPARE FAILED
1683
1684  004724  026160  016666  016666  CMP     A(1),A(0)
1685  004732  001401                  BEQ     .+4
1686  004734  104000                  HLT
1687  004736  104400                  SCOPE                   ;COMPARE FAILED
1688
1689  004740  012700  177774          MOV     #-4,%0
1690  004744  012701  000010          MOV     #+10,%1
1691  004750  026061  016666  016666  CMP     A(0),A(1)
1692  004756  001401                  BEQ     .+4
1693  004760  104000                  HLT
1694  004762  104400                  SCOPE                   ;CMP FAILED
1695                                ;REGISTER 0 CONTAINS 177774 (-4)
```

```
1696
1697  004764  026160  016666  016666          CMP     A(1),A(0)                       ;REGISTER 1 CONTAINS 000010
1698  004772  001401                          BEQ     .+4
1699  004774  104000                          HLT                                     ;COMPARE FAILED
1700  004776  104400                          SCOPE
1701                                  ;TEST MOVE ODD BYTE TO REGISTER
1702                                  ;PROBLEM 11S0237-7-MAR-72
1703  005000  116700  011677                  MOVB    C+3,%0
1704  005004  022700  000035                  CMP     #35,%0
1705  005010  001401                          BEQ     .+4
1706  005012  104000                          HLT
1707  005014  104400                          SCOPE
1708                                  ;TEST MOVE INSTRUCTION FOR INDEX
1709
1710  005016  012700  177770                  MOV     #-10,%0
1711  005022  016067  016666  011660          MOV     A(0),TEMP
1712  005030  026727  011654  125252          CMP     TEMP,#125252
1713  005036  001401                          BEQ     .+4
1714  005040  104000                          HLT                                     ;COMPARE FAILED
1715  005042  104400                          SCOPE
1716
1717  005044  012700  000010                  MOV     #+10,%0
1718  005050  016067  016666  011632          MOV     A(0),TEMP
1719  005056  026727  011626  052525          CMP     TEMP,#052525
1720  005064  001401                          BEQ     .+4
1721  005066  104000                          HLT                                     ;MOV FAILED
1722  005070  104400                          SCOPE
1723
1724  005072  012700  177770                  MOV     #-10,%0
1725  005076  012760  125252  016710          MOV     #125252,TEMP(0)
1726  005104  023727  016700  125252          CMP     @#C,#125252
1727  005112  001401                          BEQ     .+4
1728  005114  104000                          HLT                                     ;MOV FAILED
1729  005116  104400                          SCOPE
1730
1731  005120  012700  000010                  MOV     #+10,%0
1732  005124  012760  052525  016710          MOV     #052525,TEMP(0)
1733  005132  023727  016720  052525          CMP     @#TEMP+10,#052525
1734  005140  001401                          BEQ     .+4
1735  005142  104000                          HLT                                     ;MOV FAILED
1736  005144  104400                          SCOPE
1737
1738                                  ;TEST BIC INSTRUCTION FOR INDEXING
1739  005146  012767  177777  011534          MOV     #-1,TEMP
1740  005154  012700  177770                  MOV     #-10,%0
1741  005160  046067  016666  011522          BIC     A(0),TEMP
1742  005166  026727  011516  052525          CMP     TEMP,#052525
1743  005174  001401                          BEQ     .+4
1744  005176  104000                          HLT                                     ;BIC FAILED
1745  005200  104400                          SCOPE
1746
1747  005202  012767  177777  011500          MOV     #-1,TEMP
1748  005210  012700  000010                  MOV     #10,%0
1749  005214  046067  016666  011466          BIC     A(0),TEMP
1750  005222  026727  011462  125252          CMP     TEMP,#125252
1751  005230  001401                          BEQ     .+4
```

```
1752  005232  104000                          HLT                             ;BIC FAILED
1753  005234  104400                          SCOPE
1754
1755  005236  012737  177777  016720          MOV     #-1,@#TEMP+10
1756  005244  012700  000010                  MOV     #10,%0
1757  005250  042760  125252  016710          BIC     #125252,TEMP(0)
1758  005256  023727  016720  052525          CMP     @#TEMP+10,#52525
1759  005264  001401                          BEQ     .+4
1760  005266  104000                          HLT                             ;BIC FAILED
1761  005270  104400                          SCOPE
1762
1763  005272  012700  177770                  MOV     #-10,%0
1764  005276  012767  177777  011374          MOV     #-1,TEMP-10
1765  005304  042767  052525  011366          BIC     #052525,TEMP-10
1766  005312  026727  011362  125252          CMP     TEMP-10,#125252
1767  005320  001401                          BEQ     .+4
1768  005322  104000                          HLT                             ;BIC FAILED
1769  005324  104400                          SCOPE
1770                          ;TEST SUBTRACT INSTRUCTION FOR INDEXING
1771  005326  012767  125252  011354          MOV     #125252,TEMP
1772  005334  012700  177770                  MOV     #-10,%0
1773  005340  166067  016666  011342          SUB     A(0),TEMP
1774  005346  001401                          BEQ     .+4
1775  005350  104000                          HLT                             ;SUB FAILED
1776  005352  104400                          SCOPE
1777
1778  005354  012737  125252  016710          MOV     #125252,@#TEMP
1779  005362  012700  177770                  MOV     #-10,%0
1780  005366  166760  011264  016720          SUB     B,TEMP+10(0)
1781  005374  001401                          BEQ     .+4
1782  005376  104000                          HLT                             ;SUB FAILED
1783  005400  104400                          SCOPE
1784
1785  005402  012767  052525  011300          MOV     #052525,TEMP
1786  005410  012700  000010                  MOV     #10,%0
1787  005414  166067  016666  011266          SUB     A(0),TEMP
1788  005422  001401                          BEQ     .+4
1789  005424  104000                          HLT                             ;SUB FAILED
1790  005426  104400                          SCOPE
1791
1792  005430  012737  052525  016710          MOV     #052525,@#TEMP
1793  005436  012700  000010                  MOV     #10,%0
1794  005442  166760  011230  016700          SUB     A+10,C(0)
1795  005450  001401                          BEQ     .+4
1796  005452  104000                          HLT                             ;SUB FAILED
1797  005454  104400                          SCOPE
1798
1799                          ;TEST UNARYS INDEXED
1800  005456  012737  177777  016710          MOV     #-1,@#TEMP
1801  005464  012700  177770                  MOV     #-10,%0
1802  005470  005060  016720                  CLR     D(0)
1803  005474  005737  016710                  TST     @#TEMP
1804  005500  001401                          BEQ     .+4
1805  005502  104000                          HLT                             ;CLR FAILED
1806  005504  104400                          SCOPE
1807
```

```
1808  005506  012737  177777  016710          MOV     #-1,@#TEMP
1809  005514  012700  000010                  MOV     #+10,%0
1810  005520  005060  016700                  CLR     C(0)
1811  005524  005737  016710                  TST     @#TEMP
1812  005530  001401                          BEQ     .+4
1813  005532  104000                          HLT                             ;CLR FAILED
1814  005534  104400                          SCOPE
1815
1816  005536  012737  177777  016710          MOV     #-1,@#TEMP
1817  005544  012700  177770                  MOV     #-10,%0
1818  005550  005160  016720                  COM     D(0)
1819  005554  005737  016710                  TST     @#TEMP
1820  005560  001401                          BEQ     .+4
1821  005562  104000                          HLT                             ;COM FAILED
1822  005564  104400                          SCOPE
1823
1824  005566  012737  177777  016710          MOV     #-1,@#TEMP
1825  005574  012700  000010                  MOV     #10,%0
1826  005600  005160  016700                  COM     C(0)
1827  005604  005737  016710                  TST     @#TEMP
1828  005610  001401                          BEQ     .+4
1829  005612  104000                          HLT                             ;COM FAILED
1830  005614  104400                          SCOPE
1831  005616  012737  177777  016710          MOV     #-1,@#TEMP
1832  005624  012700  177770                  MOV     #-10,%0
1833  005630  005260  016720                  INC     D(0)
1834  005634  005737  016710                  TST     @#TEMP
1835  005640  001401                          BEQ     .+4
1836  005642  104000                          HLT                             ;INC FAILED
1837  005644  104400                          SCOPE
1838
1839  005646  012737  177777  016710          MOV     #-1,@#TEMP
1840  005654  012700  000010                  MOV     #+10,%0
1841  005660  005260  016700                  INC     C(0)
1842  005664  005737  016710                  TST     @#TEMP
1843  005670  001401                          BEQ     .+4
1844  005672  104000                          HLT                             ;INC FAILED
1845  005674  104400                          SCOPE
1846
1847  005676  012737  000001  016710          MOV     #1,@#TEMP
1848  005704  012700  177770                  MOV     #-10,%0
1849  005710  005360  016720                  DEC     D(0)
1850  005714  005737  016710                  TST     @#TEMP
1851  005720  001401                          BEQ     .+4
1852  005722  104000                          HLT                             ;DEC FAILED
1853  005724  104400                          SCOPE
1854
1855  005726  012737  000001  016710          MOV     #1,@#TEMP
1856  005734  012700  000010                  MOV     #10,%0
1857  005740  005360  016700                  DEC     C(0)
1858  005744  005737  016710                  TST     @#TEMP
1859  005750  001401                          BEQ     .+4
1860  005752  104000                          HLT                             ;DEC FAILED
1861  005754  104400                          SCOPE
1862
1863  005756  012737  000001  016710          MOV     #1,@#TEMP
```

```
 1864  005764  012700  177770                  MOV     #-10,%0
 1865  005770  005460  016720                  NEG     D(0)
 1866  005774  022737  177777  016710          CMP     #-1,@#TEMP
 1867  006002  001401                          BEQ     .+4
 1868  006C04  104000                          HLT                             ;NEG FAILED
 1869  006006  104400                          SCOPE
 1870
 1871  006010  012737  000001  016710          MOV     #1,@#TEMP
 1872  006016  012700  000010                  MOV     #+10,%0
 1873  006022  005460  016700                  NEG     C(0)
 1874  006026  022737  177777  016710          CMP     #-1,@#TEMP
 1875  006034  001401                          BEQ     .+4
 1876  006036  104000                          HLT                             ;NEG FAILED
 1877  006040  104400                          SCOPE
 1878
 1879  006042  012737  177777  016710          MOV     #-1,@#TEMP
 1880  006050  012700  177770                  MOV     #-10,%0
 1881  006054  000261                          SEC
 1882  006056  005560  016720                  ADC     D(0)
 1883  006062  005737  016710                  TST     @#TEMP
 1884  006066  001401                          BEQ     .+4
 1885  006070  104000                          HLT                             ;ADC FAILED
 1886  006072  104400                          SCOPE
 1887
 1888  006074  012737  177777  016710          MOV     #-1,@#TEMP
 1889  006102  012700  000010                  MOV     #+10,%0
 1890  006106  000261                          SEC
 1891  006110  005560  016700                  ADC     C(0)
 1892  006114  005737  016710                  TST     @#TEMP
 1893  006120  001401                          BEQ     .+4
 1894  006122  104000                          HLT                             ;ADC FAILED
 1895  006124  104400                          SCOPE
 1896
 1897  006126  012737  000001  016710          MOV     #1,@#TEMP
 1898  006134  012700  177770                  MOV     #-10,%0
 1899  006140  000261                          SEC
 1900  006142  005660  016720                  SBC     D(0)
 1901  006146  005737  016710                  TST     @#TEMP
 1902  006152  001401                          BEQ     .+4
 1903  006154  104000                          HLT                             ;SBC FAILED
 1904  006156  104400                          SCOPE
 1905
 1906  006160  012737  000001  016710          MOV     #1,@#TEMP
 1907  006166  012700  000010                  MOV     #+10,%0
 1908  006172  000261                          SEC
 1909  006174  005660  016700                  SBC     C(0)
 1910  006200  005737  016710                  TST     @#TEMP
 1911  006204  001401                          BEQ     .+4
 1912  006206  104000                          HLT                             ;SBC FAILED
 1913  006210  104400                          SCOPE
 1914
 1915                                  ;TEST JMP INDIRECT
 1916  006212  010700                          MOV     %7,%0
 1917  006214  062700  000010                  ADD     #10,%0
 1918  006220  000110                          JMP     @%0
 1919  006222  104000                          HLT                             ;JMP FAILED
```

```
 1920  006224  000240                          NOP
 1921  006226  104400                          SCOPE
 1922
 1923  006230  010600                          MOV     %6,%0
 1924  006232  010001                          MOV     %0,%1
 1925  006234  010102                          MOV     %1,%2
 1926  006236  010203                          MOV     %2,%3
 1927  006240  010304                          MOV     %3,%4
 1928  006242  010405                          MOV     %4,%5
 1929  006244  020605                          CMP     %6,%5
 1930  006246  001401                          BEQ     .+4
 1931  006250  104000                          HLT                             ;MOV REGISTOR FAILED
 1932  006252  104400                          SCOPE
 1933                                  ;TEST INDIRECT ADDRESSING
 1934                                  ;TEST COMPARE INSTRUCTION
 1935  006254  023727  016656  125252          CMP     @#B,#125252
 1936  006262  001401                          BEQ     .+4
 1937  006264  104000                          HLT                             ;CMP FAILED
 1938  006266  104400                          SCOPE
 1939
 1940  006270  022737  125252  016656          CMP     #125252,@#B
 1941  006276  001401                          BEQ     .+4
 1942  006300  104000                          HLT                             ;CMP FAILED
 1943  006302  104400                          SCOPE
 1944
 1945  006304  023737  016656  016656          CMP     @#B,@#B
 1946  006312  001401                          BEQ     .+4
 1947  006314  104000                          HLT                             ;CMP FAILED
 1948  006316  104400                          SCOPE
 1949
 1950                                  ;TEST MOVE INSTRUCTIONS
 1951  006320  013700  016656                  MOV     @#B,%0
 1952  006324  022700  125252                  CMP     #125252,%0
```

```
 1953  006330  001401                          BEQ     .+4
 1954  006332  104000                          HLT                             ;MOV FAILED
 1955  006334  104400                          SCOPE
 1956
 1957  006336  012737  125252  016710          MOV     #125252,@#TEMP
 1958  006344  023737  016656  016710          CMP     @#B,@#TEMP
 1959  006352  001401                          BEQ     .+4
 1960  006354  104000                          HLT                             ;MOV FAILED
 1961  006356  104400                          SCOPE
 1962
 1963  006360  013737  016656  016700          MOV     @#B,@#C
 1964  006366  023737  016656  016700          CMP     @#B,@#C
 1965  006374  001401                          BEQ     .+4
 1966  006376  104000                          HLT                             ;MOV FAILED
 1967  006400  104400                          SCOPE
 1968                          ;TEST BIC INSTRUCTION INDIRECT
 1969  006402  012700  177777                  MOV     #-1,%0
 1970  006406  043700  016656                  BIC     @#B,%0
 1971  006412  020027  052525                  CMP     %0,#052525
 1972  006416  001401                          BEQ     .+4
 1973  006420  104000                          HLT                             ;BIC FAILED
 1974  006422  104400                          SCOPE
 1975
 1976  006424  012737  177777  016710          MOV     #-1,@#TEMP
 1977  006432  042737  125252  016710          BIC     #125252,@#TEMP
 1978  006440  022737  052525  016710          CMP     #052525,@#TEMP
 1979  006446  001401                          BEQ     .+4
 1980  006450  104000                          HLT                             ;BIC FAILED
 1981  006452  104400                          SCOPE
 1982
 1983  006454  012737  177777  016700          MOV     #-1,@#C
 1984  006462  043737  016656  016700          BIC     @#B,@#C
 1985  006470  023727  016700  052525          CMP     @#C,#52525
 1986  006476  001401                          BEQ     .+4
 1987  006500  104000                          HLT                             ;BIC FAILED
 1988  006502  104400                          SCOPE
 1989
 1990                          ;TEST SUBTRACT INSTRUCTION
 1991  006504  012700  125252                  MOV     #125252,%0
 1992  006510  163700  016656                  SUB     @#B,%0
 1993  006514  020027  000000                  CMP     %0,#0
 1994  006520  001401                          BEQ     .+4
 1995  006522  104000                          HLT                             ;SUB FAILED
 1996  006524  104400                          SCOPE
 1997
 1998  006526  012737  125252  016710          MOV     #125252,@#TEMP
 1999  006534  166737  010116  016710          SUB     B,@#TEMP
 2000  006542  001401                          BEQ     .+4
 2001  006544  104000                          HLT                             ;SUB FAILED
 2002  006546  104400                          SCOPE
 2003
 2004  006550  012767  125252  010132          MOV     #125252,TEMP
 2005  006556  163767  016656  010124          SUB     @#B,TEMP
 2006  006564  005767  010120                  TST     TEMP
 2007  006570  001401                          BEQ     .+4
 2008  006572  104000                          HLT                             ;SUB FAILED
```

```
2009  006574  104400                          SCOPE
2010                                ;TEST UNARYS INDIRECT
2011  006576  012737  177777  016710          MOV     #-1,@#TEMP
2012  006604  005037  016710                  CLR     @#TEMP
2013  006610  005737  016710                  TST     @#TEMP
2014  006614  001401                          BEQ     .+4
2015  006616  104000                          HLT                             ;TST FAILED
2016  006620  104400                          SCOPE
2017
2018  006622  012737  125252  016710          MOV     #125252,@#TEMP
2019  006630  005137  016710                  COM     @#TEMP
2020  006634  022737  052525  016710          CMP     #052525,@#TEMP
2021  006642  001401                          BEQ     .+4
2022  006644  104000                          HLT                             ;COM FAILED
2023  006646  104400                          SCOPE
2024
2025  006650  005037  016710                  CLR     @#TEMP
2026  006654  005237  016710                  INC     @#TEMP
2027  006660  022737  000001  016710          CMP     #1,@#TEMP
2028  006666  001401                          BEQ     .+4
2029  006670  104000                          HLT                             ;INC FAILED
2030  006672  104400                          SCOPE
2031
2032  006674  005037  016710                  CLR     @#TEMP
2033  006700  005377  010006                  DEC     @TEMP+2
2034  006704  023727  016710  177777          CMP     @#TEMP,#-1
2035  006712  001401                          BEQ     .+4
2036  006714  104000                          HLT                             ;DEC FAILED
2037  006716  104400                          SCOPE
2038
2039  006720  012737  000001  016710          MOV     #1,@#TEMP
2040  006726  005437  016710                  NEG     @#TEMP
2041  006732  022737  177777  016710          CMP     #-1,@#TEMP
2042  006740  001401                          BEQ     .+4
2043  006742  104000                          HLT                             ;NEG FAILED
2044  006744  104400                          SCOPE
2045
2046                                ;TEST INDIRECT ADDRESSING WITH INDEXING
2047                                ;TEST COMPARE INSTRUCTION
2048  006746  027727  007706  125252          CMP     @B+2,#125252
2049  006754  001401                          BEQ     .+4
2050  006756  104000                          HLT                             ;CMP FAILED
2051  006760  104400                          SCOPE
2052
2053  006762  022777  125252  007670          CMP     #125252,@B+2
2054  006770  001401                          BEQ     .+4
2055  006772  104000                          HLT                             ;CMP FAILED
2056  006774  104400                          SCOPE
2057
2058  006776  027777  007656  007654          CMP     @B+2,@B+2
2059  007004  001401                          BEQ     .+4
2060  007006  104000                          HLT                             ;CMP FAILED
2061  007010  104400                          SCOPE
2062
2063                                ;TEST MOVE INSTRUCTIONS
2064  007012  017700  007642                  MOV     @B+2,%0
```

```
2065  007016  022700  125252                  CMP     #125252,%0
2066  007022  001401                          BEQ     .+4
2067  007024  104000                          HLT                                     ;MOV FAILED
2068  007026  104400                          SCOPE
2069
2070  007030  012777  125252  007654          MOV     #125252,@TEMP+2
2071  007036  023737  016656  016710          CMP     @#B,@#TEMP
2072  007044  001401                          BEQ     .+4
2073  007046  104000                          HLT                                     ;MOV FAILED
2074  007050  104400                          SCOPE
2075
2076  007052  017777  007602  007622          MOV     @B+2,@C+2
2077  007060  023737  016656  016700          CMP     @#B,@#C
2078  007066  001401                          BEQ     .+4
2079  007070  104000                          HLT
2080  007072  104400                          SCOPE
2081
2082                                  ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2083  007074  012700  177777                  MOV     #-1,%0
2084  007100  047700  007554                  BIC     @B+2,%0
2085  007104  020027  052525                  CMP     %0,#52525
2086  007110  001401                          BEQ     .+4
2087  007112  104000                          HLT                                     ;BIC FAILED
2088  007114  104400                          SCOPE
2089
2090  007116  012737  177777  016710          MOV     #-1,@#TEMP
2091  007124  042777  125252  007560          BIC     #125252,@TEMP+2
2092  007132  022737  052525  016710          CMP     #52525,@#TEMP
2093  007140  001401                          BEQ     .+4
2094  007142  104000                          HLT                                     ;BIC FAILED
2095  007144  104400                          SCOPE
2096
2097  007146  012737  177777  016700          MOV     #-1,@#C
2098  007154  047777  007500  007520          BIC     @B+2,@C+2
2099  007162  026737  007510  016700          CMP     A+10,@#C
2100  007170  001401                          BEQ     .+4
2101  007172  104000                          HLT                                     ;BIC FAILED
2102  007174  104400                          SCOPE
2103
2104  007176  012700  125252                  MOV     #125252,%0
2105  007202  167700  007452                  SUB     @B+2,%0
2106  007206  020027  000000                  CMP     %0,#0
2107  007212  001401                          BEQ     .+4
2108  007214  104000                          HLT                                     ;SUB FAILED
2109  007216  104400                          SCOPE
2110
2111  007220  012737  125252  016710          MOV     #125252,@#TEMP
2112  007226  166777  007424  007456          SUB     B,@TEMP+2
2113  007234  001401                          BEQ     .+4
2114  007236  104000                          HLT                                     ;SUB FAILED
2115  007240  104400                          SCOPE
2116
2117  007242  012737  125252  016710          MOV     #125252,@#TEMP
2118  007250  167777  007404  007434          SUB     @B+2,@TEMP+2
2119  007256  005737  016710                  TST     @#TEMP
2120  007262  001401                          BEQ     .+4
```

```
2121  007264  104000                          HLT                             ;SUB FAILED
2122  007266  104400                          SCOPE
2123
2124                                  ;TEST ADD INDIRECT WITH INDEXING
2125  007270  005000                          CLR     %0
2126  007272  067700  007362                  ADD     @B+2,%0
2127  007276  022700  125252                  CMP     #125252,%0
2128  007302  001401                          BEQ     .+4
2129  007304  104000                          HLT                             ;ADD FAILED
2130  007306  104400                          SCOPE
2131
2132  007310  005037  016710                  CLR     @#TEMP
2133  007314  062777  125252  007370          ADD     #125252,@TEMP+2
2134  007322  022737  125252  016710          CMP     #125252,@#TEMP
2135  007330  001401                          BEQ     .+4
2136  007332  104000                          HLT                             ;ADD FAILED
2137  007334  104400                          SCOPE
2138  007336  012737  125252  016710          MOV     #125252,@#TEMP
2139  007344  067777  007324  007340          ADD     @A+6,@TEMP+2
2140  007352  023727  016710  177777          CMP     @#TEMP,#-1
2141  007360  001401                          BEQ     .+4
2142  007362  104000                          HLT                             ;ADD FAILED
2143  007364  104400                          SCOPE
2144
2145                                  ;TEST UNARYS INDIRECT WITH INDEXING
2146  007366  012737  177777  016710          MOV     #-1,@#TEMP
2147  007374  005077  007312                  CLR     @TEMP+2
2148  007400  005737  016710                  TST     @#TEMP
2149  007404  001401                          BEQ     .+4
2150  007406  104000                          HLT                             ;TST FAILED
2151  007410  104400                          SCOPE
2152
2153  007412  012737  125252  016710          MOV     #125252,@#TEMP
2154  007420  005177  007266                  COM     @TEMP+2
2155  007424  022737  052525  016710          CMP     #052525,@#TEMP
2156  007432  001401                          BEQ     .+4
2157  007434  104000                          HLT                             ;COM FAILED
2158  007436  104400                          SCOPE
2159
2160  007440  005037  016710                  CLR     @#TEMP
2161  007444  005277  007242                  INC     @TEMP+2
2162  007450  022737  000001  016710          CMP     #1,@#TEMP
2163  007456  001401                          BEQ     .+4
2164  007460  104000                          HLT                             ;INC FAILED
2165  007462  104400                          SCOPE
2166
2167  007464  005037  016710                  CLR     @#TEMP
2168  007470  005377  007216                  DEC     @TEMP+2
2169  007474  023727  016710  177777          CMP     @#TEMP,#-1
2170  007502  001401                          BEQ     .+4
2171  007504  104000                          HLT                             ;DEC FAILED
2172  007506  104400                          SCOPE
2173
2174  007510  012737  000001  016710          MOV     #1,@#TEMP
2175  007516  005477  007170                  NEG     @TEMP+2
2176  007522  022737  177777  016710          CMP     #-1,@#TEMP
```

```
2177  007530  001401                          BEQ     .+4
2178  007532  104000                          HLT                             ;NEG FAILED
2179  007534  104400                          SCOPE
2180
2181  007536  012737  177777  016710          MOV     #-1,@#TEMP
2182  007544  000261                          SEC
2183  007546  005577  007140                  ADC     @TEMP+2
2184  007552  005737  016710                  TST     @#TEMP
2185  007556  001401                          BEQ     .+4
2186  007560  104000                          HLT                             ;ADC FAILED
2187  007562  104400                          SCOPE
2188
2189  007564  012737  000001  016710          MOV     #1,@#TEMP
2190  007572  000261                          SEC
2191  007574  005677  007112                  SBC     @TEMP+2
2192  007600  005737  016710                  TST     @#TEMP
2193  007604  001401                          BEQ     .+4
2194  007606  104000                          HLT                             ;SBC FAILED
2195  007610  104400                          SCOPE
2196
2197                          ;TEST OF COMBINED INDEXING AND INDIRECT
2198  007612  012700  177772                  MOV     #-6,%0
2199  007616  027027  016666  125252          CMP     @A(0),#125252
2200  007624  001401                          BEQ     .+4
2201  007626  104000                          HLT                             ;CMP FAILED
2202  007630  104400                          SCOPE
2203
2204  007632  012700  177772                  MOV     #-6,%0
2205  007636  022770  125252  016666          CMP     #125252,@A(0)
2206  007644  001401                          BEQ     .+4
2207  007646  104000                          HLT                             ;CMP FAILED
2208  007650  104400                          SCOPE
2209
2210  007652  012700  177772                  MOV     #-6,%0
2211  007656  012701  000002                  MOV     #+2,%1
2212  007662  027071  016666  016666          CMP     @A(0),@A(1)
2213  007670  001401                          BEQ     .+4
2214  007672  104000                          HLT                             ;CMP FAILED
2215  007674  104400                          SCOPE
2216
2217                          ;TEST BIC INSTRUCTION
2218  007676  012700  000006                  MOV     #+6,%0
2219  007702  012767  177777  007000          MOV     #-1,TEMP
2220  007710  047067  016666  006772          BIC     @A(0),TEMP
2221  007716  022767  125252  006764          CMP     #125252,TEMP
2222  007724  001401                          BEQ     .+4
2223  007726  104000                          HLT                             ;BIC FAILED
2224  007730  104400                          SCOPE
2225
2226  007732  012700  177772                  MOV     #-6,%0
2227  007736  012737  177777  016700          MOV     #-1,@#C
2228  007744  042770  125252  016710          BIC     #125252,@TEMP(0)
2229  007752  023727  016700  052525          CMP     @#C,#052525
2230  007760  001401                          BEQ     .+4
2231  007762  104000                          HLT                             ;BIC FAILED
2232  007764  104400                          SCOPE
```

```
2233  007766  012737  177777  016700          MOV     #-1,@#C
2234  007774  012700  177772                  MOV     #-6,%0
2235  010000  012701  177772                  MOV     #-6,%1
2236  010004  047071  016666  016710          BIC     @A(0),@TEMP(1)
2237  010012  022737  052525  016700          CMP     #052525,@#C
2238  010020  001401                          BEQ     .+4
2239  010022  104000                          HLT                             ;BIC FAILED
2240  010024  104400                          SCOPE
2241
2242  010026  122727  000000  000001          CMPB    #0,#1                   ;T7 FIX
2243  010034  002401                          BLT     .+4
2244  010036  104000                          HLT                             ;CMPB FAILED
2245  010040  104400                          SCOPE
2246                          ;TEST COMPARE INSTRUCTION INDEXED
2247  010042  012700  177770                  MOV     #-10,%0                 ;MINUS 10 TO REG 0
2248  010046  126027  016666  000252          CMPB    A(0),#000252            ;(A INDEX BY MINUS 10) TO #125252
2249  010054  001401                          BEQ     .+4
2250  010056  104000                          HLT                             ;COMPARE WITH INDEX FAILED
2251  010060  104400                          SCOPE
2252
2253  010062  012700  177770                  MOV     #-10,%0                 ;FOR INDEX
2254  010066  122760  000252  016666          CMPB    #000252,A(0)            ;A INDEXED
2255  010074  001401                          BEQ     .+4
2256  010076  104000                          HLT                             ;CMPB FAILED
2257  010100  104400                          SCOPE
2258
2259  010102  012700  000010                  MOV     #10,%0                  ;INDEX
2260  010106  126027  016666  000125          CMPB    A(0),#000125
2261  010114  001401                          BEQ     .+4
2262  010116  104000                          HLT                             ;CMPB FAILED
2263  010120  104400                          SCOPE
2264
2265  010122  012700  000010                  MOV     #10,%0
2266  010126  122760  000125  016666          CMPB    #000125,A(0)
2267  010134  001401                          BEQ     .+4
2268  010136  104000                          HLT                             ;CMPB FAILED
2269  010140  104400                          SCOPE
2270
2271  010142  012700  177770                  MOV     #-10,%0
2272  010146  126060  016666  016666          CMPB    A(0),A(0)
2273  010154  001401                          BEQ     .+4
2274  010156  104000                          HLT                             ;CMPB FAILED
2275  010160  104400                          SCOPE
2276
2277  010162  012700  000010                  MOV     #+10,%0
2278  010166  126060  016666  016666          CMPB    A(0),A(0)
2279  010174  001401                          BEQ     .+4
2280  010176  104000                          HLT                             ;CMPB FAILED
2281  010200  104400                          SCOPE
2282
2283  010202  012700  177770                  MOV     #-10,%0
2284  010206  012701  000004                  MOV     #+4,%1
2285  010212  126061  016666  016666          CMPB    A(0),A(1)
2286  010220  001401                          BEQ     .+4
2287  010222  104000                          HLT                             ;CMPB FAILED
2288  010224  104400                          SCOPE
```

```
2289
2290  010226  126160  016666  016666          CMPB    A(1),A(0)
2291  010234  001401                          BEQ     .+4
2292  010236  104000                          HLT                             ;CMPB FAILED
2293  010240  104400                          SCOPE
2294
2295  010242  012700  177774                  MOV     #-4,%0
2296  010246  012701  000010                  MOV     #+10,%1
2297  010252  126061  016666  016666          CMPB    A(0),A(1)
2298  010260  001401                          BEQ     .+4
2299  010262  104000                          HLT                             ;CMPB FAILED
2300  010264  104400                          SCOPE
2301
2302  010266  012700  177774                  MOV     #-4,%0
2303  010272  012701  000010                  MOV     #10,%1
2304  010276  126160  016666  016666          CMPB    A(1),A(0)
2305  010304  001401                          BEQ     .+4
2306  010306  104000                          HLT                             ;CMPB FAILED
2307  010310  104400                          SCOPE
2308                                ;TEST MOVE INSTRUCTION FOR INDEX
2309
2310  010312  012700  177770                  MOV     #-10,%0
2311  010316  116067  016666  006364          MOVB    A(0),TEMP
2312  010324  126727  006360  000252          CMPB    TEMP,#000252
2313  010332  001401                          BEQ     .+4
2314  010334  104000                          HLT                             ;MOVB FAILED
2315  010336  104400                          SCOPE
2316
2317  010340  012700  000010                  MOV     #+10,%0
2318  010344  116067  016666  006336          MOVB    A(0),TEMP
2319  010352  126727  006332  000125          CMPB    TEMP,#000125
2320  010360  001401                          BEQ     .+4
2321  010362  104000                          HLT                             ;MOVB FAILED
2322  010364  104400                          SCOPE
2323
2324  010366  012700  177770                  MOV     #-10,%0
2325  010372  112760  125252  016710          MOVB    #125252,TEMP(0)
2326  010400  123727  016700  125252          CMPB    @#C,#125252
2327  010406  001401                          BEQ     .+4
2328  010410  104000                          HLT                             ;MOVB FAILED
2329  010412  104400                          SCOPE
2330
2331  010414  012700  000010                  MOV     #+10,%0
2332  010420  112760  052525  016710          MOVB    #052525,TEMP(0)
2333  010426  123727  016720  052525          CMPB    @#TEMP+10,#052525
2334  010434  001401                          BEQ     .+4
2335  010436  104000                          HLT                             ;MOVB FAILED
2336  010440  104400                          SCOPE
2337
2338                                ;TEST BIC INSTRUCTION FOR INDEXING
2339  010442  012767  177777  006240          MOV     #-1,TEMP
2340  010450  012700  177770                  MOV     #-10,%0
2341  010454  146067  016666  006226          BICB    A(0),TEMP
2342  010462  126727  006222  177525          CMPB    TEMP,#177525
2343  010470  001401                          BEQ     .+4
2344  010472  104000                          HLT                             ;BICB FAILED
```

```
2345  010474  104400                          SCOPE
2346
2347  010476  012767  177777  006204          MOV     #-1,TEMP
2348  010504  012700  000010                  MOV     #10,%0
2349  010510  146067  016666  006172          BICB    A(0),TEMP
2350  010516  126727  006166  007652          CMPB    TEMP,#007652
2351  010524  001401                          BEQ     .+4
2352  010526  104000                          HLT                             ;BICB FAILED
2353  010530  104400                          SCOPE
2354
2355  010532  012737  177777  016720          MOV     #-1,@#TEMP+10
2356  010540  012700  000010                  MOV     #10,%0
2357  010544  142760  125252  016710          BICB    #125252,TEMP(0)
2358  010552  123727  016720  002525          CMPB    @#TEMP+10,#2525
2359  010560  001401                          BEQ     .+4
2360  010562  104000                          HLT                             ;BICB FAILED
2361  010564  104400                          SCOPE
2362
2363  010566  012700  177770                  MOV     #-10,%0
2364  010572  012767  177777  006100          MOV     #-1,TEMP-10
2365  010600  142767  052525  006072          BICB    #052525,TEMP-10
2366  010606  126727  006066  125252          CMPB    TEMP-10,#125252
2367  010614  001401                          BEQ     .+4
2368  010616  104000                          HLT                             ;BICB FAILED
2369  010620  104400                          SCOPE
2370
2371                          ;TEST UNARYS INDEXED
2372  010622  012737  177777  016710          MOV     #-1,@#TEMP
2373  010630  012700  177770                  MOV     #-10,%0
2374  010634  105060  016720                  CLRB    D(0)
2375  010640  105737  016710                  TSTB    @#TEMP
2376  010644  001401                          BEQ     .+4
2377  010646  104000                          HLT                             ;CLRB FAILED
2378  010650  104400                          SCOPE
2379
2380  010652  012737  177777  016710          MOV     #-1,@#TEMP
2381  010660  012700  177770                  MOV     #-10,%0
2382  010664  105060  016720                  CLRB    D(0)
2383  010670  023727  016710  177400          CMP     @#TEMP,#177400
2384  010676  001401                          BEQ     .+4
2385  010700  104000                          HLT                             ;CLRB FAILED
2386  010702  104400                          SCOPE
2387
2388  010704  012737  177777  016710          MOV     #-1,@#TEMP
2389  010712  012700  177771                  MOV     #-7,%0
2390  010716  105060  016720                  CLRB    D(0)
2391  010722  023727  016710  000377          CMP     @#TEMP,#000377
2392  010730  001401                          BEQ     .+4
2393  010732  104000                          HLT                             ;CLRB FAILED
2394  010734  104400                          SCOPE
2395
2396  010736  012737  177777  016710          MOV     #-1,@#TEMP
2397  010744  012700  000010                  MOV     #+10,%0
2398  010750  105060  016700                  CLRB    C(0)
2399  010754  105737  016710                  TSTB    @#TEMP
2400  010760  001401                          BEQ     .+4
```

```
2401  010762  104000                        HLT                             ;CLRB FAILED
2402  010764  104400                        SCOPE
2403
2404  010766  012737  177777  016710        MOV     #-1,@#TEMP
2405  010774  012700  177770                MOV     #-10,%0
2406  011000  105160  016720                COMB    D(0)
2407  011004  105737  016710                TSTB    @#TEMP
2408  011010  001401                        BEQ     .+4
2409  011012  104000                        HLT                             ;COMB FAILED
2410  011014  104400                        SCOPE
2411
2412  011016  012737  177777  016710        MOV     #-1,@#TEMP
2413  011024  012700  000010                MOV     #10,%0
2414  011030  105160  016700                COMB    C(0)
2415  011034  105737  016710                TSTB    @#TEMP
2416  011040  001401                        BEQ     .+4
2417  011042  104000                        HLT                             ;COMB FAILED
2418  011044  104400                        SCOPE
2419  011046  012737  177777  016710        MOV     #-1,@#TEMP
2420  011054  012700  177770                MOV     #-10,%0
2421  011060  105260  016720                INCB    D(0)
2422  011064  105737  016710                TSTB    @#TEMP
2423  011070  001401                        BEQ     .+4
2424  011072  104000                        HLT                             ;INCB FAILED
2425  011074  023727  016710  177400        CMP     @#TEMP,#177400
2426  011102  001401                        BEQ     .+4
2427  011104  104000                        HLT                             ;INCB FAILED
2428  011106  104400                        SCOPE
2429
2430  011110  012737  177777  016710        MOV     #-1,@#TEMP
2431  011116  012700  000010                MOV     #+10,%0
2432  011122  105260  016700                INCB    C(0)
2433  011126  105737  016710                TSTB    @#TEMP
2434  011132  001401                        BEQ     .+4
2435  011134  104000                        HLT                             ;INCB FAILED
2436  011136  104400                        SCOPE
2437
2438  011140  012737  000001  016710        MOV     #1,@#TEMP
2439  011146  012700  177770                MOV     #-10,%0
2440  011152  105360  016720                DECB    D(0)
2441  011156  105737  016710                TSTB    @#TEMP
2442  011162  001401                        BEQ     .+4
2443  011164  104000                        HLT                             ;DECB FAILED
2444  011166  104400                        SCOPE
2445
2446  011170  012737  000001  016710        MOV     #1,@#TEMP
2447  011176  012700  000010                MOV     #10,%0
2448  011202  105360  016700                DECB    C(0)
2449  011206  105737  016710                TSTB    @#TEMP
2450  011212  001401                        BEQ     .+4
2451  011214  104000                        HLT                             ;DECB FAILED
2452  011216  104400                        SCOPE
2453
2454  011220  012737  000001  016710        MOV     #1,@#TEMP
2455  011226  012700  177770                MOV     #-10,%0
2456  011232  105460  016720                NEGB    D(0)
```

```
2457  011236  023727  016710  000377          CMP     @#TEMP,#377
2458  011244  001401                          BEQ     .+4
2459  011246  104000                          HLT                             ;NEGB FAILED
2460  011250  104400                          SCOPE
2461
2462  011252  012737  000001  016710          MOV     #1,@#TEMP
2463  011260  012700  000010                  MOV     #+10,%0
2464  011264  105460  016700                  NEGB    C(0)
2465  011270  023727  016710  000377          CMP     @#TEMP,#377
2466  011276  001401                          BEQ     .+4
2467  011300  104000                          HLT                             ;NEGB FAILED
2468  011302  104400                          SCOPE
2469
2470  011304  012737  177777  016710          MOV     #-1,@#TEMP
2471  011312  012700  177770                  MOV     #-10,%0
2472  011316  000261                          SEC
2473  011320  105560  016720                  ADCB    D(0)
2474  011324  023727  016710  177400          CMP     @#TEMP,#177400
2475  011332  001401                          BEQ     .+4
2476  011334  104000                          HLT                             ;ADCB FAILED
2477  011336  104400                          SCOPE
2478
2479  011340  012737  177777  016710          MOV     #-1,@#TEMP
2480  011346  012700  000010                  MOV     #+10,%0
2481  011352  000261                          SEC
2482  011354  105560  016700                  ADCB    C(0)
2483  011360  023727  016710  177400          CMP     @#TEMP,#177400
2484  011366  001401                          BEQ     .+4
2485  011370  104000                          HLT                             ;ADCB FAILED
2486  011372  104400                          SCOPE
2487
2488  011374  012737  000401  016710          MOV     #401,@#TEMP
2489  011402  012700  177771                  MOV     #-7,%0
2490  011406  000261                          SEC
2491  011410  105660  016720                  SBCB    D(0)
2492  011414  022737  000001  016710          CMP     #1,@#TEMP
2493  011422  001401                          BEQ     .+4
2494  011424  104000                          HLT                             ;SBCB FAILED
2495  011426  104400                          SCOPE
2496
2497  011430  012737  000001  016710          MOV     #1,@#TEMP
2498  011436  012700  000010                  MOV     #+10,%0
2499  011442  000261                          SEC
2500  011444  105660  016700                  SBCB    C(0)
2501  011450  005737  016710                  TST     @#TEMP
2502  011454  001401                          BEQ     .+4
2503  011456  104000                          HLT                             ;SBCB FAILED
2504  011460  104400                          SCOPE
2505
2506                          ;TEST INDIRECT ADDRESSING
2507                          ;TEST COMPARE INSTRUCTION
2508  011462  123727  016656  000252          CMPB    @#B,#000252
2509  011470  001401                          BEQ     .+4
2510  011472  104000                          HLT                             ;CMPB FAILED
2511  011474  104400                          SCOPE
2512
```

```
2513  011476  123727  016657  000252          CMPB    @#B+1,#252
2514  011504  001401                          BEQ     .+4
2515  011506  104000                          HLT                             ;CMPB FAILED
2516  011510  104400                          SCOPE
2517
2518
2519  011512  122737  125252  016656          CMPB    #125252,@#B
2520  011520  001401                          BEQ     .+4
2521  011522  104000                          HLT                             ;CMPB FAILED
2522  011524  104400                          SCOPE
2523
2524  011526  123737  016656  016656          CMPB    @#B,@#B
2525  011534  001401                          BEQ     .+4
2526  011536  104000                          HLT                             ;CMPB FAILED
2527  011540  104400                          SCOPE
2528
2529                                  ;TEST MOVE INSTRUCTIONS
2530  011542  113700  016656                  MOVB    @#B,%0
2531  011546  122700  000252                  CMPB    #000252,%0
2532  011552  001401                          BEQ     .+4
2533  011554  104000                          HLT                             ;MOVB FAILED
2534  011556  104400                          SCOPE
2535
2536  011560  112737  125252  016710          MOVB    #125252,@#TEMP
2537  011566  126737  005064  016710          CMPB    B,@#TEMP
2538  011574  001401                          BEQ     .+4
2539  011576  104000                          HLT                             ;MOVB FAILED
2540  011600  104400                          SCOPE
2541
2542  011602  113737  016656  016700          MOVB    @#B,@#C
2543  011610  126737  005042  016700          CMPB    B,@#C
2544  011616  001401                          BEQ     .+4
2545  011620  104000                          HLT                             ;MOVB FAILED
2546  011622  104400                          SCOPE
2547                                  ;TEST UNARYS INDIRECT
2548  011624  012737  177777  016710          MOV     #-1,@#TEMP
2549  011632  105037  016710                  CLRB    @#TEMP
2550  011636  023727  016710  177400          CMP     @#TEMP,#177400
2551  011644  001401                          BEQ     .+4
2552  011646  104000                          HLT                             ;CLRB FAILED
2553  011650  104400                          SCOPE
2554
2555  011652  012737  125252  016710          MOV     #125252,@#TEMP
2556  011660  105137  016710                  COMB    @#TEMP
2557  011664  022737  125125  016710          CMP     #125125,@#TEMP
2558  011672  001401                          BEQ     .+4
2559  011674  104000                          HLT                             ;COMB FAILED
2560  011676  104400                          SCOPE
2561
2562  011700  012737  125252  016710          MOV     #125252,@#TEMP
2563  011706  105137  016711                  COMB    @#TEMP+1
2564  011712  022737  052652  016710          CMP     #052652,@#TEMP
2565  011720  001401                          BEQ     .+4
2566  011722  104000                          HLT                             ;COMB FAILED
2567  011724  104400                          SCOPE
2568
```

```
 2569  011726  005037  016710                 CLR     @#TEMP
 2570  011732  105237  016711                 INCB    @#TEMP+1
 2571  011736  022737  000400  016710         CMP     #400,@#TEMP
 2572  011744  001401                         BEQ     .+4
 2573  011746  104000                         HLT                             ;INCB FAILED
 2574  011750  104400                         SCOPE
 2575
 2576  011752  005037  016710                 CLR     @#TEMP
 2577  011756  105377  004730                 DECB    @TEMP+2
 2578  011762  023727  016710  000377         CMP     @#TEMP,#377
 2579  011770  001401                         BEQ     .+4
 2580  011772  104000                         HLT                             ;DECB FAILED
 2581  011774  104400                         SCOPE
 2582
 2583  011776  005037  016710                 CLR     @#TEMP
 2584  012002  112737  000001  016711         MOVB    #1,@#TEMP+1
 2585  012010  105437  016711                 NEGB    @#TEMP+1
 2586  012014  022737  177400  016710         CMP     #177400,@#TEMP
 2587  012022  001401                         BEQ     .+4
 2588  012024  104000                         HLT                             ;NEGB FAILED
 2589  012026  104400                         SCOPE
 2590
 2591                          ;TEST INDIRECT ADDRESSING WITH INDEXING
 2592                          ;TEST COMPARE INSTRUCTION
 2593  012030  127727  004624  125252         CMPB    @B+2,#125252
 2594  012036  001401                         BEQ     .+4
 2595  012040  104000                         HLT                             ;CMPB FAILED
 2596  012042  104400                         SCOPE
 2597
 2598  012044  122777  125252  004606         CMPB    #125252,@B+2
 2599  012052  001401                         BEQ     .+4
 2600  012054  104000                         HLT                             ;CMPB FAILED
 2601  012056  104400                         SCOPE
 2602
 2603  012060  127777  004574  004572         CMPB    @B+2,@B+2
 2604  012066  001401                         BEQ     .+4
 2605  012070  104000                         HLT                             ;CMPB FAILED
 2606  012072  104400                         SCOPE
 2607                          ;TEST MOVE INSTRUCTIONS
 2608  012074  117700  004560                 MOVB    @B+2,%0
 2609  012100  122700  125252                 CMPB    #125252,%0
 2610  012104  001401                         BEQ     .+4
 2611  012106  104000                         HLT                             ;MOVB FAILED
 2612  012110  104400                         SCOPE
 2613
 2614  012112  112777  125252  004572         MOVB    #125252,@TEMP+2
 2615  012120  126737  004532  016710         CMPB    B,@#TEMP
 2616  012126  001401                         BEQ     .+4
 2617  012130  104000                         HLT                             ;MOVB FAILED
 2618  012132  104400                         SCOPE
 2619
 2620  012134  117777  004520  004540         MOVB    @B+2,@C+2
 2621  012142  126737  004510  016700         CMPB    B,@#C
 2622  012150  001401                         BEQ     .+4
 2623  012152  104000                         HLT                             ;MOVB FAILED
 2624  012154  104400                         SCOPE
```

```
2625
2626                                        ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2627  012156  012700  177777                        MOV     #-1,%0
2628  012162  147700  004472                        BICB    @B+2,%0
2629  012166  120027  052525                        CMPB    %0,#$2525
2630  012172  001401                                BEQ     .+4
2631  012174  104000                                HLT                             ;BICB FAILED
2632  012176  104400                                SCOPE
2633
2634  012200  012737  177777  016710                MOV     #-1,@#TEMP
2635  012206  142777  125252  004476                BICB    #125252,@TEMP+2
2636  012214  122737  052525  016710                CMPB    #52525,@#TEMP
2637  012222  001401                                BEQ     .+4
2638  012224  104000                                HLT                             ;BICB FAILED
2639  012226  104400                                SCOPE
2640
2641  012230  012737  177777  016700                MOV     #-1,@#C
2642  012236  147777  004416  004436                BICB    @B+2,@C+2
2643  012244  126737  004426  016700                CMPB    A+10,@#C
2644  012252  001401                                BEQ     .+4
2645  012254  104000                                HLT                             ;BICB FAILED
2646  012256  104400                                SCOPE
2647                                        ;TEST UNARYS INDIRECT WITH INDEXING
2648  012260  012737  177777  016710                MOV     #-1,@#TEMP
2649  012266  105077  004420                        CLRB    @TEMP+2
2650  012272  105737  016710                        TSTB    @#TEMP
2651  012276  001401                                BEQ     .+4
2652  012300  104000                                HLT                             ;CLRB FAILED
2653  012302  104400                                SCOPE
2654
2655  012304  012737  125252  016710                MOV     #125252,@#TEMP
2656  012312  105177  004374                        COMB    @TEMP+2
2657  012316  122737  052525  016710                CMPB    #052525,@#TEMP
2658  012324  001401                                BEQ     .+4
2659  012326  104000                                HLT                             ;COMB FAILED
2660  012330  104400                                SCOPE
2661
2662  012332  005037  016710                        CLR     @#TEMP
2663  012336  105277  004350                        INCB    @TEMP+2
2664  012342  122737  000001  016710                CMPB    #1,@#TEMP
2665  012350  001401                                BEQ     .+4
2666  012352  104000                                HLT                             ;INCB FAILED
2667  012354  104400                                SCOPE
2668
2669  012356  005037  016710                        CLR     @#TEMP
2670  012362  105377  004324                        DECB    @TEMP+2
2671  012366  123727  016710  177777                CMPB    @#TEMP,#-1
2672  012374  001401                                BEQ     .+4
2673  012376  104000                                HLT                             ;DECB FAILED
2674  012400  104400                                SCOPE
2675
2676  012402  012737  000001  016710                MOV     #1,@#TEMP
2677  012410  105477  004276                        NEGB    @TEMP+2
2678  012414  122737  177777  016710                CMPB    #-1,@#TEMP
2679  012422  001401                                BEQ     .+4
2680  012424  104000                                HLT                             ;NEGB FAILED
```

```
2681   012426  104400                          SCOPE
2682
2683   012430  012737  177777  016710          MOV     #-1,@#TEMP
2684   012436  000261                          SEC
2685   012440  105577  004246                  ADCB    @TEMP+2
2686   012444  022737  177400  016710          CMP     #177400,@#TEMP
2687   012452  001401                          BEQ     .+4
2688   012454  104000                          HLT                             ;ADCB FAILED
2689   012456  105737  016710                  TSTB    @#TEMP
2690   012462  001401                          BEQ     .+4
2691   012464  104000                          HLT                             ;TSTB FAILED
2692   012466  104400                          SCOPE
2693
2694   012470  012737  000001  016710          MOV     #1,@#TEMP
2695   012476  000261                          SEC
2696   012500  105377  004206                  DECB    @TEMP+2
2697   012504  005737  016710                  TST     @#TEMP
2698   012510  001401                          BEQ     .+4
2699   012512  104000                          HLT                             ;DECB FAILED
2700   012514  104400                          SCOPE
2701
2702                                  ;TEST OF COMBINED INDEXING AND INDIRECT
2703   012516  012700  177772                  MOV     #-6,%0
2704   012522  127027  016666  125252          CMPB    @A(0),#125252
2705   012530  001401                          BEQ     .+4
2706   012532  104000                          HLT                             ;CMPB FAILED
2707   012534  104400                          SCOPE
2708
2709   012536  012700  177772                  MOV     #-6,%0
2710   012542  122770  125252  016666          CMPB    #125252,@A(0)
2711   012550  001401                          BEQ     .+4
2712   012552  104000                          HLT                             ;CMPB FAILED
2713   012554  104400                          SCOPE
2714
2715   012556  012700  177772                  MOV     #-6,%0
2716   012562  012701  000002                  MOV     #+2,%1
2717   012566  127071  016666  016666          CMPB    @A(0),@A(1)
2718   012574  001401                          BEQ     .+4
2719   012576  104000                          HLT                             ;CMPB FAILED
2720   012600  104400                          SCOPE
2721                                  ;TEST BIC INSTRUCTION
2722   012602  012700  000006                  MOV     #+6,%0
2723   012606  012767  177777  004074          MOV     #-1,TEMP
2724   012614  147067  016666  004066          BICB    @A(0),TEMP
2725   012622  122767  125252  004060          CMPB    #125252,TEMP
2726   012630  001401                          BEQ     .+4
2727   012632  104000                          HLT                             ;BICB FAILED
2728   012634  104400                          SCOPE
2729
2730   012636  012700  177772                  MOV     #-6,%0
2731   012642  012737  177777  016700          MOV     #-1,@#C
2732   012650  142770  125252  016710          BICB    #125252,@TEMP(0)
2733   012656  123727  016700  000125          CMPB    @#C,#000125
2734   012664  001401                          BEQ     .+4
2735   012666  104000                          HLT                             ;BICB FAILED
2736   012670  104400                          SCOPE
```

```
2737
2738  012672  012700  016660                MOV     #B+2,%0         ;ADDRESS OF ADDRESS OF B
2739  012676  023067  003754                CMP     @(0)+,B
2740  012702  001401                        BEQ     .+4
2741  012704  104000                        HLT                             ;CMP FAILED
2742  012706  104400                        SCOPE
2743
2744  012710  012700  016662                MOV     #B+4,%0
2745  012714  025067  003736                CMP     @-(0),B
2746  012720  001401                        BEQ     .+4
2747  012722  104000                        HLT                             ;CMP FAILED
2748  012724  104400                        SCOPE
2749
2750  012726  012700  016662                MOV     #B+4,%0
2751  012732  125067  003720                CMPB    @-(0),B
2752  012736  001401                        BEQ     .+4
2753  012740  104000                        HLT                             ;CMPB FAILED
2754  012742  104400                        SCOPE
2755
2756  012744  012700  016704                MOV     #C+4,%0
2757  012750  012737  177777  016700        MOV     #-1,@#C
2758  012756  105050                        CLRB    @-(0)
2759  012760  023727  016700  177400        CMP     @#C,#177400
2760  012766  001401                        BEQ     .+4
2761  012770  104000                        HLT                             ;CLRB FAILED
2762  012772  104400                        SCOPE
2763  012774  012737  177777  016700        MOV     #-1,@#C
2764  013002  012700  177772                MOV     #-6,%0
2765  013006  012701  177772                MOV     #-6,%1
2766  013012  147071  016666  016710        BICB    @A(0),@TEMP(1)
2767  013020  022737  177525  016700        CMP     #177525,@#C
2768  013026  001401                        BEQ     .+4
2769  013030  104000                        HLT                             ;BICB FAILED
2770  013032  104400                        SCOPE
2771                          ;TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
2772  013034  012700  052525                MOV     #52525,%0       ;THIS IS CHECK LATER IN PROGRAM
2773                          ;TEST JSR INSTRUCTION
2774
2775  013040  004767  000002                JSR     %7, TJSR2       ;PLACE PC ON STACK
2776  013044  000405                TJSR1:  BR      TJSR3           ;RETURN HERE ON RTS %7
2777  013046  121627  013044        TJSR2:  CMPB    @%6,#TJSR1      ;CHECK FOR CORRECT PC ON STACK
2778  013052  001401                        BEQ     .+4
2779  013054  104000                        HLT                     ;INCORRECT PC ON STACK
2780  013056  000207                        RTS     %7              ;RETURN TO INST AFTER JSR
2781  013060  104400                TJSR3:  SCOPE
2782
2783  013062  000257                        CCC
2784  013064  004717                        JSR     %7,@%7          ;INSTRUCTION UNDER TEST
2785  013066  121627  013066                CMPB    @%6,#TJSR3+6            ;TEST THE STACK
2786  013072  001401                        BEQ     .+4
2787  013074  104000                        HLT                     ;PC OF JSR DID NOT GO TO STACK
2788  013076  005726                        TST     (6)+            ;REPOSITION THE STACK
2789  013100  104400                        SCOPE
2790                          ;TEST NESTED SUBROUTINES
2791
2792  013102  000257                        CCC                     ;CLEAR CONDITION CODES
```

```
2793  013104  004767  003366              JSR     %7,SUBR6
2794  013110  100401                      BMI     .+4
2795  013112  104000                      HLT                     ;JSR OR RTS FAILED
2796  013114  001401                      BEQ     .+4
2797  013116  104000                      HLT                     ;JSR OR RTS FAILED
2798  013120  102401                      BVS     .+4
2799  013122  104000                      HLT                     ;JSR OR RTS FAILED
2800  013124  103401                      BCS     .+4
2801  013126  104000                      HLT                     ;JSR OR RTS FAILED
2802  013130  104400                      SCOPE
2803                          ;TEST ROTATE ODD BYTE
2804  013132  104400                      SCOPE
2805  013134  000257                      CCC                             ;CLEAR "C"
2806  013136  012767  123456  003544      MOV     #123456,TEMP
2807  013144  106067  003541              RORB    TEMP+1                  ;ROTATE ODD BYTE
2808  013150  103401                      BCS     .+4
2809  013152  104000                      HLT                             ;C NOT SET
2810  013154  102401                      BVS     .+4
2811  013156  104000                      HLT                             ;V NOT SET
2812  013160  022767  051456  003522      CMP     #051456,TEMP
2813  013166  001401                      BEQ     .+4
2814  013170  104000                      HLT                             ;ROTATE FAILED
2815  013172  104400                      SCOPE
2816  013174  000277                      SCC                             ;SET C
2817  013176  012767  123456  003504      MOV     #123456,TEMP
2818  013204  106067  003501              RORB    TEMP+1
2819  013210  103401                      BCS     .+4
2820  013212  104000                      HLT                             ;C NOT SET
2821  013214  102001                      BVC     .+4
2822  013216  104000                      HLT                             ;V NOT CLEARED
2823  013220  022767  151456  003462      CMP     #151456,TEMP
2824  013226  001401                      BEQ     .+4
2825  013230  104000                      HLT                             ;ROTATE FAILED
2826  013232  104400                      SCOPE
2827
2828  013234  000257                      CCC
2829  013236  012767  123456  003444      MOV     #123456,TEMP
2830  013244  106167  003441              ROLB    TEMP+1
2831  013250  103401                      BCS     .+4
2832  013252  104000                      HLT                             ;C NOT SET
2833  013254  102401                      BVS     .+4
2834  013256  104000                      HLT                             ;V NOT SET
2835  013260  022767  047056  003422      CMP     #047056,TEMP
2836  013266  001401                      BEQ     .+4
2837  013270  104000                      HLT                             ;ROTATE BYTE FAILED
2838  013272  104400                      SCOPE
2839
2840  013274  000277                      SCC                             ;SET C
2841  013276  012767  123456  003404      MOV     #123456,TEMP
2842  013304  106167  003401              ROLB    TEMP+1
2843  013310  103401                      BCS     .+4
2844  013312  104000                      HLT                             ;C NOT SET
2845  013314  102401                      BVS     .+4
2846  013316  104000                      HLT                             ;V NOT SET
2847  013320  022767  047456  003362      CMP     #047456,TEMP
2848  013326  001401                      BEQ     .+4
```

```
2849  013330  104000                          HLT                             ;ROTATE ODD BYTE FAILED
2850  013332  104400                          SCOPE
2851
2852  013334  000257                          CCC                             ;CLEAR C
2853  013336  012767  177777  003344          MOV     #-1,TEMP
2854  013344  106267  003341                  ASRB    TEMP+1
2855  013350  103401                          BCS     .+4
2856  013352  104000                          HLT                             ;C NOT SET
2857  013354  102001                          BVC     .+4
2858  013356  104000                          HLT                             ;V NOT CLEARED
2859  013360  026727  003324  177777          CMP     TEMP,#-1
2860  013366  001401                          BEQ     .+4
2861  013370  104000                          HLT                             ;SHIFT FAILED
2862  013372  104400                          SCOPE
2863
2864  013374  000277                          SCC
2865  013376  012767  177777  003304          MOV     #-1,TEMP
2866  013404  106367  003301                  ASLB    TEMP+1
2867  013410  103401                          BCS     .+4
2868  013412  104000                          HLT                             ;C NOT SET
2869  013414  102001                          BVC     .+4
2870  013416  104000                          HLT                             ;V NOT CLEARED
2871  013420  026727  003264  177377          CMP     TEMP,#177377
2872  013426  001401                          BEQ     .+4
2873  013430  104000                          HLT                             ;SHIFT BYTE FAILED
2874  013432  104400                          SCOPE
2875                                  ;TEST COMBINATION OF N, C AND V
2876                                          .MACR   TNCV
2877                                          BPL     .+12
2878                                          BCC     .+20                    ;Z=1
2879                                          BVC     .+30                    ;Z=1, C=1
2880                                          HLT                             ;Z=C, BUT V=1
2881                                          BR      .+24
2882                                          BCC     .+16                    ;Z=0
2883                                          BVS     .+20                    ;Z=0, C=1
2884                                          HLT                             ;Z NOT EQUAL C, V=1
2885                                          BR      .+14
2886                                          BVS     .+12                    ;Z=1, C=0
2887                                          HLT                             ;Z NOT EQUAL C, V=1
2888                                          BR      .+6
2889                                          BVC     .+4                     ;Z=0, C=0
2890                                          HLT                             ;Z=C, BUT V=1
2891                                          SCOPE
2892                                          .ENDM
2893  013434  005037  016440                  CLR     @#ICOUNT                        ;NO ITERATION
2894
2895                                  ;TEST ROTATING NUMBERS
2896  013440  104400                          SCOPE
2897  013442  012767  177777  000142          MOV     #-1,REFF                ;INITIALIZE BASE NUMBER
2898  013450  005267  000136          TSROT:  INC     REFF                    ;INCREMENT NUMBER
2899  013454  004767  000012                  JSR     %7,ROTALL               ;GO TO COMPARE ROUTINE
2900  013460  026727  000126  100077          CMP     REFF,#100077            ;TEST ALL VALUES
2901  013466  001370                          BNE     TSROT                   ;NO TEST THEM ALL
2902  013470  000452                          BR      TSRT2A                  ;WE ARE DONE
2903
2904  013472  016767  000114  000114  ROTALL: MOV     REFF,TEST
```

```
2905  013500  006167  000110                  ROL     TEST
2906  013504  006067  000104                  ROR     TEST
2907  013510  006067  000100                  ROR     TEST
2908  013514  006067  000074                  ROR     TEST
2909  013520  006067  000070                  ROR     TEST
2910  013524  006167  000064                  ROL     TEST
2911  013530  006167  000060                  ROL     TEST
2912  013534  006167  000054                  ROL     TEST
2913  013540                                  TNCV
2914  013540  100004                          BPL     .+12
2915  013542  103007                          BCC     .+20            ;Z=1
2916  013544  102013                          BVC     .+30            ;Z=1, C=1
2917  013546  104000                          HLT                     ;Z=C, BUT V=1
2918  013550  000411                          BR      .+24
2919  013552  103006                          BCC     .+16            ;Z=0
2920  013554  102407                          BVS     .+20            ;Z=0, C=1
2921  013556  104000                          HLT                     ;Z NOT EQUAL C, V=1
2922  013560  000405                          BR      .+14
2923  013562  102404                          BVS     .+12            ;Z=1, C=0
2924  013564  104000                          HLT                     ;Z NOT EQUAL C, V=1
2925  013566  000402                          BR      .+6
2926  013570  102001                          BVC     .+4             ;Z=0, C=0
2927  013572  104000                          HLT                     ;Z=C, BUT V=1
2928  013574  104400                          SCOPE
2929  013576  026767  000012  000006          CMP     TEST,REFF
2930  013604  001401                          BEQ     .+4
2931  013606  104000                          HLT                     ;INITIAL NOT EQUAL TO FINAL
2932  013610  000207                          RTS     %7              ;ROTATE WORD FAILED
2933  013612  000000                  REFF:   0                       ;GOOD DATA
2934  013614  000000                  TEST:   0                       ;BAD DATA
2935          013612                          REF=REFF
2936                                  ;TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS
2937  013616  012767  177777  177766  TSRT2A: MOV     #-1,REFF
2938  013624  005267  177762          TSROT2: INC     REFF
2939  013630  004767  000016                  JSR     %7,ROTBE
2940  013634  004767  000122                  JSR     %7,ROTBO
2941  013640  022767  177777  177744          CMP     #-1,REFF
2942  013646  001366                          BNE     TSROT2
2943  013650  000505                          BR      ROTEN1
2944  013652  016767  177734  177734  ROTBE:  MOV     REFF,TEST
2945  013660  106067  177730                  RORB    TEST                    ;ROTATE BYTE EVEN
2946  013664  106067  177724                  RORB    TEST
2947  013670  106067  177720                  RORB    TEST
2948  013674  106167  177714                  ROLB    TEST
2949  013700  106167  177710                  ROLB    TEST
2950  013704  106167  177704                  ROLB    TEST
2951  013710                                  TNCV
2952  013710  100004                          BPL     .+12
2953  013712  103007                          BCC     .+20            ;Z=1
2954  013714  102013                          BVC     .+30            ;Z=1, C=1
2955  013716  104000                          HLT                     ;Z=C, BUT V=1
2956  013720  000411                          BR      .+24
2957  013722  103006                          BCC     .+16            ;Z=0
2958  013724  102407                          BVS     .+20            ;Z=0, C=1
2959  013726  104000                          HLT                     ;Z NOT EQUAL C, V=1
2960  013730  000405                          BR      .+14
```

```
 2961  013732  102404                          BVS     .+12                    ;Z=1, C=0
 2962  013734  104000                          HLT                             ;Z NOT EQUAL C, V=1
 2963  013736  000402                          BR      .+6
 2964  013740  102001                          BVC     .+4                     ;Z=0, C=0
 2965  013742  104000                          HLT                             ;Z=C, BUT V=1
 2966  013744  104400                          SCOPE
 2967  013746  026767  177642  177636         CMP     TEST,REFF
 2968  013754  001401                          BEQ     .+4
 2969  013756  104000                          HLT
 2970  013760  000207                          RTS     %7
 2971  013762  106067  177627        ROTBO:    RORB    TEST+1                  ;ROTATE BYTE ODD
 2972  013766  106067  177623                  RORB    TEST+1
 2973  013772  106067  177617                  RORB    TEST+1
 2974  013776  106167  177613                  ROLB    TEST+1
 2975  014002  106167  177607                  ROLB    TEST+1
 2976  014006  106167  177603                  ROLB    TEST+1
 2977  014012                                  TNCV
 2978  014012  100004                          BPL     .+12
 2979  014014  103007                          BCC     .+20                    ;Z=1
 2980  014016  102013                          BVC     .+30                    ;Z=1, C=1
 2981  014020  104000                          HLT                             ;Z=C, BUT V=1
 2982  014022  000411                          BR      .+24
 2983  014024  103006                          BCC     .+16                    ;Z=0
 2984  014026  102407                          BVS     .+20                    ;Z=0, C=1
 2985  014030  104000                          HLT                             ;Z NOT EQUAL C, V=1
 2986  014032  000405                          BR      .+14
 2987  014034  102404                          BVS     .+12                    ;Z=1, C=0
 2988  014036  104000                          HLT                             ;Z NOT EQUAL C, V=1
 2989  014040  000402                          BR      .+6
 2990  014042  102001                          BVC     .+4                     ;Z=0, C=0
 2991  014044  104000                          HLT                             ;Z=C, BUT V=1
 2992  014046  104400                          SCOPE
 2993  014050  026767  177540  177534         CMP     TEST,REFF
 2994  014056  001401                          BEQ     .+4
 2995  014060  104000                          HLT
 2996  014062  000207                          RTS     %7
```

```
  2997  014064  104400                    ROTEN1: SCOPE
  2998                                    ;WILL ALLOW TWO FAST PASSES
  2999  014066  005227  177776                    INC     #177776
  3000  014072  100002                            BPL     .+6
  3001  014074  000167  000632                    JMP     EAESRT
  3002                                    ;ADD AND SUBTRACT ALL NUMBERS AGAINST FIXED NUMBERS
  3003                                    ;A+B=C, C-A=B, BF SHOULD EQUAL BI
  3004  014100  011667  000072            TSTARI: MOV     @.+6,NUMA
  3005  014104  012767  000001  177500            MOV     #1,REF
  3006  014112  005267  177474            ARITST: INC     REF
```

```
 3007  014116  004767  000014                    JSR     %7,ADSUB
 3008  014122  022767  177777  177462            CMP     #-1,REFF
 3009  014130  001370                            BNE     ARITST
 3010  014132  000422                            BR      ARIEND
 3011  014134  104400                            SCOPE
 3012  014136  016767  177450  177450  ADSUB:    MOV     REF,TEST
 3013  014144  066767  000026  177442            ADD     NUMA,TEST
 3014  014152  166767  000020  177434            SUB     NUMA,TEST
 3015  014160  026767  177426  177426            CMP     REF,TEST
 3016  014166  001401                            BEQ     .+4
 3017  014170  104000                            HLT
 3018  014172  104400                            SCOPE
 3019  014174  000207                            RTS     %7
 3020  014176  000000                  NUMA:     0
 3021  014200  104400                  ARIEND:   SCOPE
 3022
 3023                                  ;TEST ALL COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
 3024  014202  005002                  COMPAR:   CLR     %2                      ;INIT %2
 3025  014204  005001                            CLR     %1                      ;INIT %1
 3026  014206  020201                  CMP1:     CMP     %2,%1                   ;ARE THE EQUAL
 3027  014210  001401                            BEQ     .+4
 3028  014212  104000                            HLT                             ;R0 AND R1 DID NOT COMPARE
 3029  014214  020227  177777                    CMP     %2,#-1                  ;AT UPPER LIMIT
 3030  014220  001403                            BEQ     CMP2                    ;YES EXIT
 3031  014222  005202                            INC     %2                      ;INCREMENT TO NEXT NUMBER
 3032  014224  005201                            INC     %1
 3033  014226  000767                            BR      CMP1
 3034  014230  104400                  CMP2:     SCOPE
 3035                                  ;TEST COMPLIMENTING ALL NUMBERS
 3036  014232  005067  002452                    CLR     TEMP                    ;BASE DATA
 3037  014236  005067  002452                    CLR     TEMP+4                  ;BASE REFERENCE
 3038  014242  005167  002442          TCOM:     COM     TEMP                    ;COMPLIMENT DATA
 3039  014246  005367  002442                    DEC     TEMP+4                  ;DECREMENT REFERENCE
 3040  014252  026767  002432  002434            CMP     TEMP,TEMP+4             ;COMPARE
 3041  014260  001401                            BEQ     .+4                     ;TEST
 3042  014262  104000                            HLT                             ;COMPLIMENT OR DECREMENT FAILED
 3043  014264  005167  002420                    COM     TEMP
 3044  014270  005267  002414                    INC     TEMP                    ;INCREMENT AND TEST FOR DONE
 3045  014274  001362                            BNE     TCOM                    ;NOT FINISHED GO LOOP
 3046  014276  104400                            SCOPE
 3047
 3048                                  ;TEST COMB (EVEN BYTE)
 3049  014300  005067  002404                    CLR     TEMP                    ;BASE DATA
 3050  014304  005067  002404                    CLR     TEMP+4                  ;REFERENCE DATA
 3051  014310  105167  002374          TCOM2:    COMB    TEMP
 3052  014314  005367  002374                    DEC     TEMP+4
 3053  014320  126767  002364  002366            CMPB    TEMP,TEMP+4             ;COMPARE
 3054  014326  001401                            BEQ     .+4
 3055  014330  104000                            HLT                             ;COMPLIMENT OR INCREMENT BYTE FAILED
 3056  014332  105167  002352                    COMB    TEMP
 3057  014336  105267  002346                    INCB    TEMP
 3058  014342  001362                            BNE     TCOM2
 3059  014344  104400                            SCOPE
 3060                                  ;TEST COMB (ODD BYTE)
 3061  014346  005067  002336                    CLR     TEMP                    ;BASE DATA
 3062  014352  005067  002336                    CLR     TEMP+4                  ;REFERENCE DATA
```

```
3063  014356  105167  002327          TCOM3:  COMB    TEMP+1          ;ODD BYTE
3064  014362  005367  002326                  DEC     TEMP+4
3065  014366  126767  002317  002320          CMPB    TEMP+1,TEMP+4
3066  014374  001401                          BEQ     .+4
3067  014376  104000                          HLT                     ;COMPLIMENT BYTE FAILED
3068  014400  105167  002305                  COMB    TEMP+1
3069  014404  105267  002301                  INCB    TEMP+1
3070  014410  001362                          BNE     TCOM3
3071  014412  104400                          SCOPE
3072
3073                          ;TEST COMPARE ALL VALUE EVEN BYTE WITH ODD
3074  014414  005067  002270                  CLR     TEMP            ;BASE VALUE
3075  014420  126767  002264  002263  TSCOMB: CMPB    TEMP,TEMP+1     ;COMPARE
3076  014426  001401                          BEQ     .+4
3077  014430  104000                          HLT                     ;COMPARE FAILED
3078  014432  002001                          BGE     .+4
3079  014434  104000                          HLT                     ;V IS NOT = TO N
3080  014436  003401                          BLE     .+4
3081  014440  104000                          HLT                     ;V IS SET
3082  014442  062767  000401  002240          ADD     #401,TEMP
3083  014450  022767  177777  002232          CMP     #-1,TEMP
3084  014456  001360                          BNE     TSCOMB
3085  014460  104400                          SCOPE
3086  014462  012737  004000  016440          MOV     #4000,@#ICOUNT
3087  014470  104400                  WAIT3:  SCOPE
3088  014472                          WAIT5:
3089  014472  012737  000010  016440          MOV     #10,@#ICOUNT
3090
3091                          ;TEST TO SEE IF I/O DEVICES WERE SELECTED
3092  014500  122737  000377  001516          CMPB    #377,@#REG1             ;SELECTED DEVICES STORED IN REG1
3093  014506  001404                          BEQ     WAIT4           ;BRANCH IF NO DEVICES SELECTED
3094  014510  000001                          WAIT                    ;INTERRUPTS WILL OCCUR
3095  014512  000001                          WAIT                    ;IF DEVICES ARE SELECTED
3096  014514  000001                          WAIT
3097  014516  000001                          WAIT
3098  014520  104400                  WAIT4:  SCOPE
3099  014522  012737  004000  016440          MOV     #4000,@#ICOUNT
3100
3101                          ;TEST SWAB
3102  014530  012767  000200  177056          MOV     #0200,TEST
3103  014536  000367  177052                  SWAB    TEST
3104  014542  100001                          BPL     .+4
3105  014544  104000                          HLT
3106  014546  001401                          BEQ     .+4
3107  014550  104000                          HLT
3108  014552  000367  177036                  SWAB    TEST
3109  014556  100401                          BMI     .+4
3110  014560  104000                          HLT
3111  014562  001001                          BNE     .+4
3112  014564  104000                          HLT
3113  014566  104400                          SCOPE
3114  014570  005037  016440                  CLR     @#ICOUNT
3115
3116                          ;TEST ALL COMBINATIONS OF SWAB
3117  014574  005067  177014                  CLR     TEST            ;NUMBER UNDER TEST
3118  014600  005067  177006                  CLR     REF             ;REFERENCE NUMBER
```

```
3119  014604  000367  177004          SWABA:  SWAB    TEST            ;OPERATION UNDER TEST
3120  014610  026767  177000  176774          CMP     TEST,REF        ;TEST SWAB INSTRUCTION
3121  014616  001401                          BEQ     .+4
3122  014620  104000                          HLT                     ;SWAB FAILED
3123  014622  000367  176766                  SWAB    TEST
3124  014626  005267  176760                  INC     REF             ;INCREMENT REFERENCE NUMBER
3125  014632  105267  176757                  INCB    TEST+1          ;INC TEST NUMBER
3126  014636  001362                          BNE     SWABA           ;LOOP TILL DONE
3127  014640  104400                          SCOPE
3128  014642  012737  004000  016440          MOV     #4000,@#ICOUNT
3129          000240                  NOP=240
3130          177776                  CC=177776
3131
3132  014650  012767  177777  002032          MOV     #-1,TEMP
3133  014656  000261                          SEC
3134  014660  105567  002025                  ADCB    TEMP+1
3135  014664  103401                          BCS     .+4
3136  014666  104000                          HLT                     ;ADCB FAILED
3137  014670  022767  000377  002012          CMP     #377,TEMP
3138  014676  001401                          BEQ     .+4
3139  014700  104000                          HLT                     ;ADCB FAILED
3140  014702  104400                          SCOPE
3141                          ;PROBLEM 11S 0300 17 AUG 1972
3142  014704  012703  000100                  MOV     #100,%3
3143  014710  012705  016710                  MOV     #TEMP,%5
3144  014714  012737  177777  016710          MOV     #-1,@#TEMP
3145  014722  030315                          BIT     %3,@%5
3146  014724  001001                          BNE     .+4
3147  014726  104000                          HLT                     ;BIT FAILED
3148  014730  104400                          SCOPE
3149  014732  000402                  EAESRT: BR      .+6             ;NOP IF NO EAE
3150  014734  000167  000362                  JMP     ENDEAE
3151                          ;TEST LEFT SHIFT
3152  014740  104400                          SCOPE                   ;TEST OF LOGICAL SHIFT
3153  014742  005077  163402                  CLR     @MQ             ;LOAD MQ WITH 0
3154  014746  012777  125252  163376          MOV     #125252,@AC     ;LOAD AC WITH 125252
3155  014754  012777  177760  163404          MOV     #-16.,@LSH      ;LOAD SHIFT COUNT (LSH) WITH -16
3156  014762  005777  163364                  TST     @AC             ;COMPARE AC WITH 0
3157  014766  001401                          BEQ     .+4             ;GO TO HLT IF BAD
3158  014770  104000                          HLT
3159  014772  022777  125252  163350          CMP     #125252,@MQ     ;COMPARE MQ WITH 125252
3160  015000  001401                          BEQ     .+4             ;GO TO HLT IF BAD
3161  015002  104000                          HLT
3162  015004  122777  000020  163344          CMPB    #20,@SRE                ;COMPARE SR WITH 2
3163  015012  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3164  015014  104000                          HLT                     ;HALT ON ERROR (LEFT SHIFT)
3165
3166                          ;TEST RIGHT SHIFT
3167  015016  104400                          SCOPE                   ;TEST OF ARITHMETIC SHIFT
3168  015020  005077  163324                  CLR     @MQ             ;LOAD MQ WITH 0
3169  015024  012777  177777  163320          MOV     #-1,@AC         ;LOAD AC WITH -1
3170  015032  012777  000020  163330          MOV     #16.,@ASH       ;LOAD SHIFT COUNT (ASH) WITH 16.
3171  015040  005777  163306                  TST     @AC             ;COMPARE AC WITH 100000
3172  015044  100401                          BMI     .+4             ;SKIP HLT IF GOOD
3173  015046  104000                          HLT                     ;HALT ON ERROR
3174  015050  005777  163274                  TST     @MQ             ;COMPARE MQ WITH 0
```

```
3175  015054  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3176  015056  104000                          HLT                     ;HALT ON ERROR
3177  015060  122777  000110  163270          CMPB    #110,@SRE       ;COMPARE SR WITH 10
3178  015066  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3179  015070  104000                          HLT                     ;HALT ON ERROR (RIGHT SHIFT)
3180
3181                                  ;TEST NORMALIZE
3182  015072  104400                          SCOPE                   ;TEST OF NORMALIZE
3183  015074  012777  125252  163246          MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3184  015102  012777  170000  163242          MOV     #170000,@AC     ;LOAD AC WITH 170000
3185  015110  005077  163250                  CLR     @NOR            ;START NORMALIZE
3186  015114  022777  100005  163230          CMP     #100005,@AC     ;COMPARE AC WITH 100005
3187  015122  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3188  015124  104000                          HLT                     ;HALT ON ERROR
3189  015126  022777  052520  163214          CMP     #52520,@MQ      ;COMPARE MQ WITH 52520
3190  015134  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3191  015136  104000                          HLT                     ;HALT ON ERROR
3192  015140  122777  000003  163206          CMPB    #3,@SC          ;COMPARE SC WITH 3
3193  015146  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3194  015150  104000                          HLT                     ;HALT ON ERROR (NORMALIZE)
3195                                  ;TEST MULTIPLY
3196  015152  104400                          SCOPE                   ;TEST OF MULTIPLY
3197  015154  012777  125252  163166          MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3198  015162  012777  040000  163170          MOV     #40000,@MUL     ;LOAD MUL WITH 40000
3199  015170  022777  165252  163154          CMP     #165252,@AC     ;COMPARE AC WITH 1652
3200  015176  001401                          BEQ     .+4             ;SKIP IF GOOD
3201  015200  104000                          HLT                     ;HALT ON ERROR
3202  015202  005777  163142                  TST     @MQ             ;COMPARE MQ WITH 10000
3203  015206  100401                          BMI     .+4             ;SKIP HLT IF GOOD
3204  015210  104000                          HLT                     ;HALT ON ERROR
3205  015212  122777  000300  163136          CMPB    #300,@SRE       ;COMPARE SR WITH 300
3206  015220  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3207  015222  104000                          HLT                     ;HALT ON ERROR (MULTIPLY)
3208
3209                                  ;TEST DIVIDE
3210  015224  104400                          SCOPE                   ;TEST OF DIVIDE
3211  015226  012777  125252  163114          MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3212  015234  012777  177777  163110          MOV     #-1,@AC         ;LOAD AC WITH -1
3213  015242  012777  000002  163112          MOV     #2,@DIV         ;LOAD DIV WITH 2 AND DIVIDE
3214  015250  005777  163076                  TST     @AC             ;COMPARE AC WITH 0 (QUOTIANT)
3215  015254  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3216  015256  104000                          HLT                     ;HALT ON ERROR
3217  015260  022777  152525  163062          CMP     #152525,@MQ     ;COMPARE MQ WITH 152525
3218  015266  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3219  015270  104000                          HLT                     ;DIVIDE ERROR
3220  015272  104400                          SCOPE
3221  015274  012767  177777  001406          MOV     #-1,TEMP
3222  015302  000261                          SEC
3223  015304  105667  001401                  SBCB    TEMP+1
3224  015310  022767  177377  001372          CMP     #177377,TEMP
3225  015316  001401                          BEQ     .+4
3226  015320  104000                          HLT
3227  015322  104400                  ENDEAE: SCOPE
3228  015324  022700  052525                  CMP     #52525,%0
3229  015330  001401                          BEQ     .+4
3230  015332  104000                          HLT                     ;SOME OPERATION DESTROYED %0
```

```
3231  015334  012737  016504  000024          MOV     #PFAIL,@#24             ;POWER FAIL VECTOR
3232  015342  012737  000340  000026          MOV     #340,@#26                       ;PROCESSOR PRIORITY
3233
3234  015350  000401                  SKPBEL: BR      .+4                     ;SKIP OVER BELL-NOP ON CORE EXPANSION
3235  015352  000501                          BR      TRPA
3236  015354  032777  000100  162702          BIT     #100,@TTCSR
3237  015362  001006                          BNE     SBELL                   ;DON'T RING BELL IF TTY IS BUSY
3238                                  ;BELL ON PASS COMPLETE
3239  015364  012777  000207  000466  BELL:   MOV     #207,@TDBR
3240  015372  105777  000464                  TSTB    @TCSR
3241  015376  100375                          BPL     .-4
3242  015400  005227  000000          SBELL:  INC     #0                      ;PASS COUNT LOCATION
3243  015404  010700                          MOV     %7,%0                   ;SET UP RESERVED INSTRUCTION
3244  015406  042700  017777                  BIC     #17777,%0               ;OFFSET
3245  015412  062700  015436                  ADD     #BEG20,%0
3246  015416  010037  000010                  MOV     %0,@#10
3247  015422  006701                          6701                            ;ATTEMPT TO EXECUTE SIGN EXTEND
3248  015424  000240                          NOP
3249  015426  012737  000006  015552          MOV     #6,@#YESRT              ;NO TRAP, PROCESSOR IS NOT=20,15,05
3250  015434  000403                          BR      BEGANY
3251  015436  012737  000002  015552  BEG20:  MOV     #2,@#YESRT              ;TRAP OCCURRED
3252  015444  012737  000012  000010  BEGANY: MOV     #12,@#10                ;RESTORE HALT FOR RESERVED INC
3253                                  ;ROUTINE TO CHECK FOR TRACE TRAP TO BE RUN WITH PROGRAM
3254
3255                                  ;SAVE OLD CONTENTS, SET UP FOR TRACE TRAP
3256  015452  005046                  YESTR:  CLR     -(6)
3257  015454  032777  010000  162512          BIT     #10000,@SRPTR           ;INHIBIT "T" TRAP IF SET
3258  015462  001013                          BNE     ACT
3259  015464  012737  015552  000014          MOV     #YESRT,@#14             ;T TRAP VECTOR
3260  015472  005167  000052                  COM     TRPB
3261  015476  001405                          BEQ     ACT
3262  015500  012716  000020                  MOV     #20,(6)                 ;SET TRACE TRAP
3263  015504  012746  004416          YESTR1: MOV     #BEGIN,-(6)             ;START OF TEST WITH TRACE ON
3264  015510  000002                  YESTR2: RTI
3265  015512  013700  000042          ACT:    MOV     @#42,%0                 ;ARE WE UNDER ACT?
3266  015516  001772                          BEQ     YESTR1                  ;NO
3267  015520  012737  015532  000014          MOV     #CLEAR,@#14             ;TO BANK ZERO
3268  015526  012707  015532                  MOV     #CLEAR,%7
3269  015532  000005                  CLEAR:  RESET                           ;CLER  THE WORLD
3270  015534  004710                  LOGICA: JSR     %7,@%0                  ;YES
3271  015536  000240                          NOP                             ;FOR ACT 11
3272  015540  000240                          NOP
3273  015542  000240                          NOP
3274  015544  000137  000570                  JMP     @#ESTART
3275  015550  000000                  TRPB:   0
3276  015552  000002                  YESRT:  RTI                             ;RETURN TO PROGRAM FROM TRAP - CAN BE AN RTT
3277  015554  000000                          HALT                            ;RTI FAILED
3278  015556  000137  004416          TRPA:   JMP     @#BEGIN                 ;BEGIN MODIFY BY EXPANSION
3279  015562  000000                  PRFLAG: 0                               ;PRINT ROUTINE BUSY IF NOT ZERO
3280
3281                                  ;ENTERED WITH SYSTEM TRAP CALL(HLT)
3282                                  ;PRINT OUT THE ERROR PC AND STATUS REGISTER
3283  015564  005767  177772          PRINT:  TST     PRFLAG                  ;IS ROUTINE BUSY
3284  015570  001401                          BEQ     .+4
3285  015572  000002                          RTI                             ;YES EXIT
3286  015574  005267  177762                  INC     PRFLAG                  ;NO SET FLAG
```

```
3287  015600  005227  000000          INC     #0                      ;ERROR COUNT LOCATION
3288  015604  037727  162364  020000  BIT     @SRPTR,#20000           ;TEST FOR INHIBIT PRINT OUT
3289  015612  001401                  BEQ     .+4                     ;BRANCH TO PRINT
3290  015614  000501                  BR      PRINT1                  ;INHIBIT, RETURN TO MAIN STREAM
3291  015616  012667  000242          MOV     (6)+,SAVPC              ;PC OF FAILING ROUTINE
3292  015622  012667  000240          MOV     (6)+,SAVCC              ;CC OF ERROR CONDITION
3293  015626  024646                  CMP     -(6),-(6)               ;REPOSITION THE STACK
3294  015630  042767  000140  162140  BIC     #140,STATUS
3295  015636  105777  000220          TSTB    @TCSR           ;WAIT FOR FLAG
3296  015642  100375                  BPL     .-4
3297  015644  012777  000215  000206  MOV     #215,@TDBR      ;FILLER CHARACTER.
3298  015652  105777  000204          TSTB    @TCSR
3299  015656  100375                  BPL     .-4
3300  015660  012777  000212  000172  MOV     #212,@TDBR              ;LINE FEED
3301  015666  105777  000170          TSTB    @TCSR
3302  015672  100375                  BPL     .-4
3303  015674  010267  000152          MOV     %2,SAVR2                ;SAVE R2
3304  015700  010367  000150          MOV     %3,SAVR3                ;SAVE R3
3305  015704  010467  000146          MOV     %4,SAVR4                ;SAVE R4
3306  015710  016702  000150          MOV     SAVPC,%2
3307  015714  004767  000150          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
3308  015720  012777  000240  000132  MOV     #240,@TDBR
3309  015726  105777  000130          TSTB    @TCSR                   ;SPACE BETWEEN WORDS
3310  015732  100375                  BPL     .-4
3311  015734  016702  000126          MOV     SAVCC,%2
3312  015740  004767  000124          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
3313  015744  012777  000240  000106  MOV     #240,@TDBR
3314  015752  105777  000104          TSTB    @TCSR
3315  015756  100375                  BPL     .-4
3316  015760  016702  000460          MOV     RETURN,%2               ;WHERE CPU TEST IS AT
3317  015764  004767  000100          JSR     %7,PRTAB
3318  015770  016702  000056          MOV     SAVR2,%2                ;RESTORE REGISTERS
3319  015774  016703  000054          MOV     SAVR3,%3
3320  016000  016704  000052          MOV     SAVR4,%4
3321  016004  012777  000377  000046  MOV     #377,@TDBR
3322  016012  105777  000044          TSTB    @TCSR
3323  016016  100375                  BPL     .-4
3324  016020  005777  162150  PRINT1: TST     @SRPTR                  ;TEST FOR HALT SWITCH
3325  016024  100001                  BPL     .+4
3326  016026  000000                  HALT                            ;HALT ON ERROR SET
3327  016030  005067  177526          CLR     PRFLAG                  ;CLEAR FLAG WHEN DONE
3328  016034  032777  000400  162132  BIT     #400,@SRPTR
3329  016042  001402                  BEQ     EXPRINT
3330  016044  000167  162520          JMP     ESTART                  ;RESTART ON ERROR
3331  016050  000002  EXPRINT: RTI                                    ;RETURN TO MAIN STREAM
3332  016052  000000  SAVR2:  0
3333  016054  000000  SAVR3:  0
3334  016056  000000  SAVR4:  0
3335  016060  177566  TDBR:   177566                                  ;DATA
3336  016062  177564  TCSR:   177564                                  ;STATUS
3337  016064  000000  SAVPC:  0
3338  016066  000000  SAVCC:  0
3339          016762          BUFF=FIN                                ;END OF PROGRAM-SP AREA.
3340
3341  016070  005067  000252  PRTAB:  CLR     BINCT
3342  016074  005067  000244          CLR     WGTCT
```

```
3343  016100  012704  016352                MOV     #LIST,%4                ;GET LIST ADDRESS
3344  016104  012767  000005  000236        MOV     #5,ASCNT
3345  016112  012767  000007  000220        MOV     #7,SEVEN
3346  016120  012767  000001  000214        MOV     #1,DECML
3347  016126  105777  177730        WAIT1:  TSTB    @TCSR
3348  016132  100375                        BPL     WAIT1
3349  016134  005702                        TST     %2
3350  016136  100404                        BMI     MINUS                   ;NEG SIGN PRINT 1
3351  016140  012777  000260  177712        MOV     #260,@TDBR              ;POS SIGN PRINT 0
3352  016146  000403                        BR      STAR
3353  016150  012777  000261  177702  MINUS: MOV    #261,@TDBR
3354  016156  016703  000156        STAR:   MOV     SEVEN,%3                ;PUT MASK IN R3
3355  016162  010267  000150                MOV     %2,TOODLE               ;GET READY TO DOODLE NUMBER IN TOODLE
3356  016166  005167  000144                COM     TOODLE                  ;COMPENSATES FOR COMPLEMENT DURING BIC
3357  016172  046703  000140                BIC     TOODLE,%3               ;AND IN OCTAL CHARACTER
3358  016176  001410                        BEQ     WRTOC                   ;ZERO, WRITE 0 IN LIST
3359  016200  066767  000136  000136  MKNUM: ADD     DECML,WGTCT             ;COUNT UP TO
3360  016206  005267  000134                INC     BINCT                   ;AND RECORD
3361  016212  026703  000126                CMP     WGTCT,%3                ;SAME BINARY WEIGHT
3362  016216  001370                        BNE     MKNUM                   ;KEEP COUNTN
3363  016220  062767  000260  000120  WRTOC: ADD     #260,BINCT              ;ADD ASCII PREFIX
3364  016226  016724  000114                MOV     BINCT,(4)+              ;WRITE ASCII CHAR IN LIST
3365  016232  066767  000102  000102        ADD     SEVEN,DECML             ;EXPAND BINARY WEIGHT
3366  016240  005067  000100                CLR     WGTCT
3367  016244  005067  000076                CLR     BINCT
3368  016250  005367  000074                DEC     ASCNT
3369  016254  001410                        BEQ     XLIST                   ;5 CHAR IN LIST
3370  016256  012703  000003                MOV     #3,%3                   ;SET X3 FOR ADD LOOP
3371  016262  066767  000052  000050  MOADD: ADD     SEVEN,SEVEN             ;MAKING SEVENTY BY SEVEN
3372  016270  005303                        DEC     %3
3373  016272  001373                        BNE     MOADD
3374  016274  000730                        BR      STAR                    ;NX SEVEN SET GET NX OCTAL
3375  016276  012767  000005  000044  XLIST: MOV     #5,ASCNT                ;SEND 5 CHAR TO TTY
3376  016304  105777  177552        WAIT2:  TSTB    @TCSR
3377  016310  100375                        BPL     WAIT2
3378  016312  014477  177542                MOV     -(4),@TDBR
3379  016316  005367  000026                DEC     ASCNT
3380  016322  001401                        BEQ     HDFHM                   ;FINISH PRINTING GET NXT NUM
3381  016324  000767                        BR      WAIT2
3382  016326  105777  177530        HDFHM:  TSTB    @TCSR
3383  016332  100375                        BPL     .-4
3384  016334  000207                        RTS     %7                      ;HEAD FOR HOME
3385  016336  000000                TOODLE: 0
3386  016340  000000                SEVEN:  0
3387  016342  000000                DECML:  0
3388  016344  000000                WGTCT:  0
3389  016346  000000                BINCT:  0
3390  016350  000000                ASCNT:  0
3391  016352  000000                LIST:   0
3392  016354  000000                        0
3393  016356  000000                        0
3394  016360  000000                        0
3395  016362  000000                        0
3396                                ;SCOPE LOOP ROUTINE ENTERED BY USER TRAP
3397
3398                                ;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 4000 TIMES
```

```
3399  016364  032777  040000  161602  SCOPEC: BIT     #40000,@SRPTR           ;TEST SR FOR SCOPE
3400  016372  001012                          BNE     SCOPEB                  ;YES SCOPE
3401  016374  032777  004000  161572          BIT     #4000,@SRPTR            ;NO - TEST FOR ITERATION
3402  016402  001011                          BNE     SCOPEG                  ;INHIBIT ITERATION
3403  016404  026767  000032  000026          CMP     SCOPEF,ICOUNT
3404  016412  001405                          BEQ     SCOPEG                  ;EXIT - DONE
3405  016414  005267  000022                  INC     SCOPEF                  ;INCREMENT COUNT
3406  016420  016716  000020          SCOPEB: MOV     RETURN,@%6              ;REPOSITION THE STACK
3407  016424  000002                          RTI                             ;SCOPE RETURN
3408  016426  005067  000010          SCOPEG: CLR     SCOPEF                  ;CLEAR COUNT
3409  016432  011667  000006                  MOV     @%6,RETURN              ;SAVE SCOPE RETURN POINTER
3410  016436  000002                          RTI                             ;RETURN INLINE-NEXT TEST
3411  016440  004000                  ICOUNT: 4000
3412  016442  000000                  SCOPEF: 0                               ;COUNT LOCATION FOR ITERATION LOOP
3413  016444  004416                  RETURN: BEGIN                           ;ADDRESS OF LAST TEST
3414
3415                                  ;GROUP OF NESTED SUBROUTINES
3416  016446  000207                  SUBR1:  RTS     %7              ;ONE INSTRUCTION
3417  016450  000277                  SUBR2:  SCC                     ;ONE DEEP
3418  016452  000205                          RTS     %5
3419  016454  004537  016450          SUBR3:  JSR     %5,@#SUBR2      ;TWO DEEP
3420  016460  000204                          RTS     %4
3421  016462  004467  177766          SUBR4:  JSR     %4,SUBR3        ;THREE DEEP
3422  016466  000203                          RTS     %3
3423  016470  004367  177766          SUBR5:  JSR     %3,SUBR4        ;FOUR DEEP
3424  016474  000202                          RTS     %2
3425  016476  004267  177766          SUBR6:  JSR     %2,SUBR5        ;FIVE DEEP
3426  016502  000207                          RTS     %7
3427                                  ;ENTER HERE OR POWER FAIL
3428
3429  016504  010046                  PFAIL:  MOV     %0,-(6)                 ;SAVE REGISTER OR STACK
3430  016506  010146                          MOV     %1,-(6)                 ;WHEN POWERING DOWN
3431  016510  010246                          MOV     %2,-(6)
3432  016512  010346                          MOV     %3,-(6)
3433  016514  010446                          MOV     %4,-(6)
3434  016516  010546                          MOV     %5,-(6)
3435  016520  016746  161300                  MOV     24,-(6)
3436  016524  012737  000002  000006          MOV     #RTI,@#6                ;IN CASE OF NO EAE
3437  016532  012700  016572                  MOV     #HAC,%0
```

```
3438  016536  017720  161610                  MOV     @AC,(%0)+
3439  016542  017720  161602                  MOV     @MQ,(%0)+
3440  016546  017720  161602                  MOV     @SC,(%0)+
3441  016552  010046                          MOV     %0,-(%6)
3442  016554  010667  000010                  MOV     %6,SAVR6                ;STORE STACK POSITION, POWER FAIL FLAG
3443  016560  012767  016600  161236          MOV     #RESTART,24
3444  016566  000000                          HALT                            ;HALT ON POWER DOWN NORMAL
3445  016570  000000              SAVR6:      0                               ;STACK IS SAVED HERE
3446  016572  000000              HAC:        0
3447  016574  000000              HMQ:        0
3448  016576  000000              HSC:        0
3449  016600  016706  177764      RESTART:    MOV     SAVR6,%6                ;RESTORE REGISTER OFF STACK
3450  016604  012600                          MOV     (%6)+,%0
3451  016606  014077  161542                  MOV     -(%0),@SC
3452  016612  014077  161532                  MOV     -(%0),@MQ               ;MQ MUST BE LOADED BEFORE AC
3453  016616  014077  161530                  MOV     -(%0),@AC
3454  016622  005037  000006                  CLR     @#6                     ;RESTORE TIME OUT
3455  016626  012667  161172                  MOV     (6)+,24                 ;WHEN POWERING UP
3456  016632  012605                          MOV     (6)+,%5
3457  016634  012604                          MOV     (6)+,%4
3458  016636  012603                          MOV     (6)+,%3
3459  016640  012602                          MOV     (6)+,%2
3460  016642  012601                          MOV     (6)+,%1
3461  016644  012600                          MOV     (6)+,%0
3462  016646  005037  016570                  CLR     @#SAVR6
3463  016652  104000                          HLT                             ;POWER FAIL OCCURRED
3464  016654  000002                          RTI                             ;RETURN TO MAIN LINE
3465  016656  125252              B:          125252
3466                                ;FIXED VALUES FOR USE IN TEST
3467  016660  016656                          B                               ;ADDRESS OF B
3468  016662  052525                          052525
3469
3470          016666                        .=B+10
3471  016666  177777              A:          -1
3472  016670  016672                          A+4
3473
3474          016672                        .=A+4
3475  016672  125252                          125252
3476  016674  016676                          A+10                            ;ADDRESS OF A+10
3477  016676  052525                          052525
3478                                ;FOR STORAGE
3479  016700  000000              C:          0
3480  016702  016700                          C                               ;ADDRESS OF C
3481
3482          016710                        .=C+10
3483  016710  000000              TEMP:       0
3484  016712  016710                          TEMP                            ;ADDRESS OF TEMP
3485
3486          016716                        .=TEMP+6
3487  016716  016720                          TEMP+10                         ;ADDRESS OF TEMP+10 OR "D"
3488  016720  000000              D:          0
3489          016762                        .=.+40
3490  016762  000000              FIN:        0                               ;BUFFER FOR SP
3491  016764  000207              USER:       RTS     %7                      ;OVERLAY USER ROUTINE HERE IF 4KW, USE BANK1 IF 8KW
3492                                ;PDP-11 MEMORY DETERMINATION AND SETUP
3493                                ;USE WITH VARIABLE CORE QUANTITY SYSTEMS
```

```
3494                016766                                  .=FIN + 4               ;APPLICABLE TO SYSTEM TEST 21
3495   016766   012767   004416   176564   DET1:   MOV     #BEGIN,TRPA+2
3496   016774   012767   000401   176346           MOV     #401,SKPBEL             ;BR .+4
3497   017002   004767   000412                    JSR     %7,..MAMF
3498   017006   023727   000042   016766           CMP     @#42,#DET1              ;CHECK FOR DDP1
3499   017014   101401                            BLOS    .+4
3500   017016   000207                            RTS     %7                      ;NO CORE EXPANSION WITH DDP1
3501   017020   032777   001000   161146           BIT     #1000,@SRPTR            ;CHECK VARIABLE CORE SWITCH
3502   017026   001401                            BEQ     DET4                    ;USE VARIABLE CORE ROUTINE
3503   017030   000207                            RTS     %7                      ;4K ONLY
3504   017032   012767   017100   160744   DET4:   MOV     #DET2,4                 ;TRAP VECTOR SETUP
3505   017040   012767   000340   160740           MOV     #340,6                  ;TRAP STATUS SETUP
3506   017046   005537   037770            EIGHT:  ADC     @#37770                 ;CHECK FOR 8K
3507   017052   005537   057770            TWELVE: ADC     @#57770                 ;CHECK FOR 12K
3508   017056   005537   077770            SXTEEN: ADC     @#077770                ;CHECK FOR 16K
3509   017062   005537   117770            TWENTY: ADC     @#117770                ;CHECK FOR 20K
3510   017066   005537   137770            TWOFOR: ADC     @#137770                ;CHECK FOR 24K
3511   017072   005537   157770            TWOEIG: ADC     @#157770                ;CHECK FOR 28K
3512   017076   000430                            BR      STRT28
3513   017100   012602                    DET2:   MOV     (6)+,%2                 ;RETRIEVE TRAP PC
3514   017102   005726                            TST     (6)+                    ;DISCARD TRAP STATUS WORD
3515   017104   022702   017052                   CMP     #EIGHT+4,%2
3516   017110   001542                            BEQ     DET3                    ;4K
3517   017112   022702   017056                   CMP     #TWELVE+4,%2
3518   017116   001437                            BEQ     STRT8                           ;8K
3519   017120   022702   017062                   CMP     #SXTEEN+4,%2
3520   017124   001431                            BEQ     STRT12                  ;12K
3521   017126   022702   017066                   CMP     #TWENTY+4,%2
3522   017132   001423                            BEQ     STRT16                  ;16K
3523   017134   022702   017072                   CMP     #TWOFOR+4,%2
3524   017140   001415                            BEQ     STRT20                  ;20K
3525   017142   000411                            BR      STRT24                  ;24K
3526   017144   005000                    MOVE:   CLR     %0                      ;SET UP MAIN CORE CURRENT
3527   017146   012021                            MOV     (0)+,(1)+               ;MOVE WORD
3528   017150   020027   016764                   CMP     %0,#FIN+2               ;MOVE COMPLETE?
3529   017154   001374                            BNE     .-6                     ;MOVE ANOTHER WORD
3530   017156   000207                            RTS     %7                      ;MOVE COMPLETE
3531   017160   004767   000040           STRT28: JSR     %7,XFER28               ;START 28K TRANSFER
3532   017164   000450                            BR      MOD24                   ;START 24K MODIFY
3533   017166   004767   000042           STRT24: JSR     %7,XFER24               ;START 24K TRANSFER
3534   017172   000453                            BR      MOD20                   ;START 20K MODIFY
3535   017174   004767   000044           STRT20: JSR     %7,XFER20               ;START 20K TRANSFER
3536   017200   000456                            BR      MOD16                   ;START 16K MODIFY
3537   017202   004767   000046           STRT16: JSR     %7,XFER16               ;START 16K TRANSFER
3538   017206   000461                            BR      MOD12                   ;START 12K MODIFY
3539   017210   004767   000050           STRT12: JSR     %7,XFER12               ;START 12K TRANSFER
3540   017214   000464                            BR      MOD8                    ;START 8K MODIFY
3541   017216   004767   000052           STRT8:  JSR     %7,XFER8                ;START 8K TRANSFER
3542   017222   000467                            BR      MOD4                    ;START 4K MODIFY
3543   017224   012701   140000           XFER28: MOV     #140000,%1              ;SET UP MOVE START LOCATION
3544   017230   004767   177710                   JSR     %7,MOVE                 ;GO TO MOVE SUBROUTINE
3545   017234   012701   120000           XFER24: MOV     #120000,%1
3546   017240   004767   177700                   JSR     %7,MOVE
3547   017244   012701   100000           XFER20: MOV     #100000,%1
3548   017250   004767   177670                   JSR     %7,MOVE
3549   017254   012701   060000           XFER16: MOV     #60000,%1
```

```
3550  017260  004767  177660                  JSR     %7,MOVE
3551  017264  012701  040000          XFER12: MOV     #40000,%1
3552  017270  004767  177650                  JSR     %7,MOVE
3553  017274  012701  020000          XFER8:  MOV     #20000,%1
3554  017300  004767  177640                  JSR     %7,MOVE
3555  017304  000207                          RTS     %7                      ;RETURN FROM TRANSFERS
3556  017306  012767  144424  116244  MOD24:  MOV     #BEGIN+140006,TRPA+120002
3557  017314  012767  000240  116026          MOV     #NOP,SKPBEL+120000
3558  017322  012767  124424  076230  MOD20:  MOV     #BEGIN+120006,TRPA+100002
3559  017330  012767  000240  076012          MOV     #NOP,SKPBEL+100000
3560  017336  012767  104424  056214  MOD16:  MOV     #BEGIN+100006,TRPA+60002
3561  017344  012767  000240  055776          MOV     #NOP,SKPBEL+60000
3562  017352  012767  064424  036200  MOD12:  MOV     #BEGIN+60006,TRPA+40002
3563  017360  012767  000240  035762          MOV     #NOP,SKPBEL+40000
3564  017366  012767  044424  016164  MOD8:   MOV     #BEGIN+40006,TRPA+20002
3565  017374  012767  000240  015746          MOV     #NOP,SKPBEL+20000
3566  017402  012767  024424  176150  MOD4:   MOV     #BEGIN+20006,TRPA+2
3567  017410  012767  000240  175732          MOV     #NOP,SKPBEL
3568  017416  000207                  DET3:   RTS     %7                      ;RETURN FROM MODIFY
3569                                  ;ROUTINE TO SET ACTION ENABLE ON MA/MF PARITY MEMORIES
3570                                  ;CALL:  JSR     PC,.MAMF
3571
3572          172100                  PARCSR= 172100                  ;ADDRESS OF FIRST MA/MF PA
3573          000114                  PARVEC= 114                     ;ADDRESS OF PARITY INTERRU
3574          000004                  ERRVEC=4
3575          000000                  R0=%0
3576          000006                  SP=%6
3577          000002                  R2=%2
3578          000007                  PC=%7
3579
3580  017420  012737  000006  000004  .MAMF:  MOV     #ERRVEC+2,@#ERRVEC
3581  017426  012737  000002  000006          MOV     #RTI,@#ERRVEC+2
3582  017434  012700  172100                  MOV     #PARCSR,R0              ;GET FIRST CSR ADDRESS
3583  017440  012702  000001                  MOV     #1,R2
3584
3585                                                                          ;SET TIME OUT INDICATOR
3586  017444  012720  000001          1$:     MOV     #1,(R0)+                ;SET ACTION ENABLE IF AVAI
3587                                                                          ;BRANCH IF CSR NOT AVAILAB
3588  017450  006302                          ASL     R2                      ;SHIFT AVAILABILITY INDICA
3589  017452  103374                          BCC     1$
3590  017454  000207                          RTS     PC
3591  017456  104000                  .PARSRV:HLT                             ;PARITY ERROR
3592  017460  000137  000570                  JMP     @#ESTART
3593          000001                          .END
```

DZQKBF.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
A       016666          1620    1625    1654    1660    1666    1672    1679    1684    1691    1697    1711    1718    1741
                        1749    1773    1787    1794    2099    2139    2199    2205    2212    2220    2236    2248    2254
                        2260    2266    2272    2278    2285    2290    2297    2304    2311    2318    2341    2349    2643
                        2704    2710    2717    2724    2766    3471#   3472    3474    3476
AC      000352           710#   3154*   3156    3169*   3171    3184*   3186    3199    3212*   3214    3438    3453*
ACT     015512          3258    3261    3265#
ADSUB   014136          3007    3012#
ARIEND  014200          3010    3021#
ARITST  014112          3006#   3009
ASCNT   016350          3344*   3368*   3375*   3379*   3390#
ASH     000370           717#   3170*
B       016656          1780    1935    1940    1945    1951    1958    1963    1964    1970    1984    1992    1999    2005
                        2048    2053    2058    2064    2071    2076    2077    2084    2098    2105    2112    2118    2126
                        2508    2513    2519    2524    2530    2537    2542    2543    2593    2598    2603    2608    2615
                        2620    2621    2628    2642    2738    2739    2744    2745    2750    2751    3465#   3467    3470
BEGANY  015444          3250    3252#
BEGIN   004416           803     894    1096    1615#   3263    3278    3413    3495    3556    3558    3560    3562    3564
                        3566
BEG20   015436          3245    3251#
BELL    015364          3239#
BINCT   016346          3341*   3360*   3363*   3364    3367*   3389#
BR      = 000002        1101#
BUFF    = 016762         586#    760     775     791     812    1650    3339#
C       016700          1703    1726    1794*   1810*   1826*   1841*   1857*   1873*   1891*   1909*   1963*   1964    1983*
                        1984*   1985    2076*   2077    2097*   2098*   2099    2227*   2229    2233*   2237    2326    2398*
                        2414*   2432*   2448*   2464*   2482*   2500*   2542*   2543    2620*   2621    2641*   2642*   2643
                        2731*   2733    2756    2757*   2759    2763*   2767    3479#   3480    3482
CC      = 177776         584#   3130#
CLEAR   015532          3267    3268    3269#
CLINCT  002270           869*   1003    1006*   1013*   1025#
CMP1    014206          3026#   3033
CMP2    014230          3030    3034#
COMPAR  014202          3024#
CURPAT  002264           870*    995*    996    1007    1009*   1011*   1023#
D       016720          1802*   1818*   1833*   1849*   1865*   1882*   1900*   2374*   2382*   2390*   2406*   2421*   2440*
                        2456*   2473*   2491*   3488#
DATA1   001574           808*    908     911*    913*    917#
DATA2   001622           809*    924*    925     928#
DATA3   001676           810*    936     939*    941*    945#
DATA4   001772           811*    949*    950     961*    965#
DECML   016342          3346*   3359    3365*   3387#
DELAY   001776           813*    833*    955     960     967#
DET1    016766           886    3495#   3498
DET2    017100          3504    3513#
DET3    017416           829     830    3516    3568#
DET4    017032          3502    3504#
DIV     000362           714#   3213*
DO      = 000001         864    1104#   1157    1165    1206
EAESRT  014732           753*   3001    3149#
EIGHT   017046          3506#   3515
ENDEAE  015322          3150    3227#
ERRVEC= 000004          3574#   3580*   3581*
ESTART  000570           771     774#   3274    3330    3592
EXPRIN  016050          3329    3331#
F       = 000000        1102#
FENDZ   002674           670     863    1113#   1148
```

DZQKBF.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
FEND1   002716          1115   1118#
FIN     016762           586   3339    3490#   3494    3528
HAC     016572          3437   3446#
HDFHM   016326          3380   3382#
HLT   = 104000           582#   749     773     788     796     905     910     923     933     938     954     976     1002
                        1035   1055    1069    1086    1125    1129    1138    1144    1169    1176    1180    1191    1197
                        1211   1622    1627    1656    1662    1668    1674    1681    1686    1693    1699    1706    1714
                        1721   1728    1735    1744    1752    1760    1768    1775    1782    1789    1796    1805    1813
                        1821   1829    1836    1844    1852    1860    1868    1876    1885    1894    1903    1912    1919
                        1931   1937    1942    1947    1954    1960    1966    1973    1980    1987    1995    2001    2008
                        2015   2022    2029    2036    2043    2050    2055    2060    2067    2073    2079    2087    2094
                        2101   2108    2114    2121    2129    2136    2142    2150    2157    2164    2171    2178    2186
                        2194   2201    2207    2214    2223    2231    2239    2244    2250    2256    2262    2268    2274
                        2280   2287    2292    2299    2306    2314    2321    2328    2335    2344    2352    2360    2368
                        2377   2385    2393    2401    2409    2417    2424    2427    2435    2443    2451    2459    2467
                        2476   2485    2494    2503    2510    2515    2521    2526    2533    2539    2545    2552    2559
                        2566   2573    2580    2588    2595    2600    2605    2611    2617    2623    2631    2638    2645
                        2652   2659    2666    2673    2680    2688    2691    2699    2706    2712    2719    2727    2735
                        2741   2747    2753    2761    2769    2779    2787    2795    2797    2799    2801    2809    2811
                        2814   2820    2822    2825    2832    2834    2837    2844    2846    2849    2856    2858    2861
                        2868   2870    2873    2917    2921    2924    2927    2931    2955    2959    2962    2965    2969
                        2981   2985    2988    2991    2995    3017    3028    3042    3055    3067    3077    3079    3081
                        3105   3107    3110    3112    3122    3136    3139    3147    3158    3161    3164    3173    3176
                        3179   3188    3191    3194    3201    3204    3207    3216    3219    3226    3230    3463    3591
HMQ     016574          3447#
HPCSR   000274           687#   821     825*    952
HPDBR   000276           688#   950*
HPOUT   001700           949#   962
HPOUTR  001716           649    952#
HPOUT1  001706           950#   963
HPOUT2  001762           958    961#
HRCSR   000270           685#   826     934*    931     942*    955*    960*
HRDBR   000272           686#   934     936
HSC     016576          3448#
HSRINR  001624           647    931#
HSRIN1  001662           941#
HSRIN2  001670           935    940     942#
ICOUNT  016440           774*  1617*   2893*   3086*   3089*   3099*   3114*   3128*   3403    3411#
IE    = 000500           864   1103#   1157    1165    1171    1206    1213
INTCNT  001774           956*   957     959*    966#
IRC     002512           666   1067#   1638
IRF     002610           664   1084#   1635
IRK     002322           673   1033#   1641
IRP     002426           677   1053#   1644
LIST    016352          3343   3391#
LKCSR   000300           689#   838*    971*    974     977*    981*    985     987*
LK1     002000           970#   984
LK2     002020           973#   980
LK3     002022           652    974#    1632
LK4     002040           978#   988
LLIMIT  002662          1029   1049    1063    1080    1096#   1647    1648*
LOGICA  015534           614   3270#
LPCSR   000302           690#   874*    880*    997     1000    1015
LPDBR   000304           691#   871*    996*   1014*
LPINTR  002144           872   1000#
LP1     002120           995#  1020    1022
```

```
LP2     002126            996*   1010    1012
LP3     002206           1008    1011*
LP4     002216           1005    1013*
LP5     002254           1018    1021*
LP6     002154            869     993     998    1003*
LPSC  = 002160            993*
LSH     000366            716*   3155*
MAINLI  001500            891*    893
MINUS   016150           3350    3353*
MKNUM   016200           3359*   3362
MOADD   016262           3371*   3373
MOD12   017352           3538    3562*
MOD16   017336           3536    3560*
MOD20   017322           3534    3558*
MOD24   017306           3532    3556*
MOD4    017402           3542    3566*
MOD8    017366           3540    3564*
MOVE    017144           3526*   3544    3546    3548    3550    3552    3554
MQ      000350            709*    805    3153*   3159    3168*   3174    3183*   3189    3197*   3202    3211*   3217    3439
                         3452*
MUL     000360            713*   3198*
N     = 000001           1219*   1225    1226    1227*   1228    1229    1230*   1231    1232    1233*   1234    1235    1236*
                         1237    1238    1239*   1240    1241    1242*   1243    1244    1245*   1246    1247    1248*   1249
                         1250    1251*   1252    1253    1254*   1255    1256    1257*   1258    1259    1260*   1261    1262
                         1263*   1264    1265    1266*   1267    1268    1269*   1270    1271    1272*   1273    1274    1275*
                         1276    1277    1278*   1279    1280    1281*   1282    1283    1284*   1285    1286    1287*   1288
                         1289    1290*   1291    1292    1293*   1294    1295    1296*   1297    1298    1299*   1300    1301
                         1302*   1303    1304    1305*   1306    1307    1308*   1309    1310    1311*   1312    1313    1314*
                         1315    1316    1317*   1318    1319    1320*   1321    1322    1323*   1324    1325    1326*   1327
                         1328    1329*   1330    1331    1332*   1333    1334    1335*   1336    1337    1338*   1339    1340
                         1341*   1342    1343    1344*   1345    1346    1347*   1348    1349    1350*   1351    1352    1353*
                         1354    1355    1356*   1357    1358    1359*   1360    1361    1362*   1363    1364    1365*   1366
                         1367    1368*   1369    1370    1371*   1372    1373    1374*   1375    1376    1377*   1378    1379
                         1380*   1381    1382    1383*   1384    1385    1386*   1387    1388    1389*   1390    1391    1392*
                         1393    1394    1395*   1396    1397    1398*   1399    1400    1401*   1402    1403    1404*   1405
                         1406    1407*   1408    1409    1410*   1411    1412    1413*   1414    1415    1416*   1422*   1423
                         1424    1425*   1426    1427    1428*   1429    1430    1431*   1432    1433    1434*   1435    1436
                         1437*   1438    1439    1440*   1441    1442    1443*   1444    1445    1446*   1447    1448    1449*
                         1450    1451    1452*   1453    1454    1455*   1456    1457    1458*   1459    1460    1461*   1462
                         1463    1464*   1465    1466    1467*   1468    1469    1470*   1471    1472    1473*   1474    1475
                         1476*   1477    1478    1479*   1480    1481    1482*   1483    1484    1485*   1486    1487    1488*
                         1489    1490    1491*   1492    1493    1494*   1495    1496    1497*   1498    1499    1500*   1501
                         1502    1503*   1504    1505    1506*   1507    1508    1509*   1510    1511    1512*   1513    1514
                         1515*   1516    1517    1518*   1519    1520    1521*   1522    1523    1524*   1525    1526    1527*
                         1528    1529    1530*   1531    1532    1533*   1534    1535    1536*   1537    1538    1539*   1540
                         1541    1542*   1543    1544    1545*   1546    1547    1548*   1549    1550    1551*   1552    1553
                         1554*   1555    1556    1557*   1558    1559    1560*   1561    1562    1563*   1564    1565    1566*
                         1567    1568    1569*   1570    1571    1572*   1573    1574    1575*   1576    1577    1578*   1579
                         1580    1581*   1582    1583    1584*   1585    1586    1587*   1588    1589    1590*   1591    1592
                         1593*   1594    1595    1596*   1597    1598    1599*   1600    1601    1602*   1603    1604    1605*
                         1605    1607    1608*   1609    1610    1611*   1612    1613
NOEAE   000472            753*    804
NOP   = 000240            581*   3129*   3557    3559    3561    3563    3565    3567
NOR     000364            715*   3185*
NUMA    014176           3004*   3013    3014    3020*
PARCSR= 172100           3572*   3582
```

DZQKBF.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
PARVEC= 000114          3573#
PC    =X000007          3578#   3590*
PFAIL   016504           605     759    3231    3429#
PRFLAG  015562           779*   3279#   3283    3286*   3327*
PRINT   015564           608    3283#
PRINT1  016020          3290    3324#
PRTAB   016070          3307    3312    3317    3341#
R     = 004000           864    1105#   1157
RB    = 000002           864    1100#   1157    1171    1213
RCBAR   000326           700#   1063*
RCCSR   000330           701#    858*   1065*   1067
RCCSRH  000332           702#
RCDAR   000322           698#    851*   1062*   1071*   1072
RCFUNC  002550           853*   1065    1074*   1076#
RCSTAR  002460          1062#   1070    1075
RCWC    000324           699#   1064*
RCWORD= 176040           592#   1064
RC2     002466          1063#   1073
RD    = 000004          1098#   1206
REF   = 013612          2935#   3005*   3006*   3012    3015    3118*   3120    3124*
REFF    013612          2897*   2898*   2900    2904    2929    2933#   2935    2937*   2938*   2941    2944    2967    2993
                        3008
REG1    001516           769*    780     895#   3092
RENDZ   003062          1140    1151#   1181
REND1   003112          1154    1157#
RESTAR  016600          3443    3449#
RETURN  016444           776*    803*   1615*   3316    3406    3409*   3413#
RFCAR   000314           695#   1080*
RFCSR   000316           696#    856*   1082*   1084
RFCSRH  000320           697#   1078*
RFDAE   000306           692#   1089
RFDAR   000310           693#   1079*   1088*   1091
RFFUNC  002660           852*   1082    1093*   1095#
RFSTAR  002552          1078#   1087    1094
RFWC    000312           694#   1081*
RFWORD= 176040           593#   1081
RF1     002564          1080#   1090    1092
RKBAR   000342           706#   1029*
RKCSR   000344           707#    857*    884*   1031*   1033
RKCSRH  000346           708#
RKDAE   000336           704#   1028*   1037
RKDAH   000334           703#   1039
RKFUNC  002364           854*   1031    1041*   1044#
RKSTAR  002272          1028#   1036    1042
RKWC    000340           705#   1030*
RKWORD= 176000           590#   1030
RK1     002276          1029#   1038    1040
ROTALL  013472          2899    2904#
ROTBE   013652          2939    2944#
ROTBO   013762          2940    2971#
ROTEN1  014064          2943    2997#
RPBAR   000424           734#   1049*
RPCA    000410           728#   1057
RPCSR   000426           735#    842     844*    845     859*   1046*   1047    1051*   1053
RPCSRH  000430           736#
RPDAE   000414           730#
```

DZQKBF.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
RPDAH   000412          729#
RPDAR   000420          732#
RPDSR   000416          731#    847     849*
RPFUNC  000432          737#    855*    1051    1059*
RPSTAR  002366         1046#   1056     1060
RPWC    000422          733#   1050*
RPWORD= 176000          591#   1050
RP1     002402         1049#   1058
RSR    =%000002          589#    780*    815     818     823     831     835     839     860     865
RTIA    001520          806     850     879     896#
R0     =%000000         3575#   3582*   3586*
R1CO   =%000000          587#    781*    784     786     793     794     799     817     825     833     838     856     857
                         858     859     860     874
R1O1   =%000001          588#    782*    820     834
R2     =%000002         3577#   3583*   3588*
SAVCC   016066          3292*   3311    3338#
SAVPC   016064          3291*   3306    3337#
SAVR2   016052          3303*   3318    3332#
SAVR3   016054          3304*   3319    3333#
SAVR4   016056          3305*   3320    3334#
SAVR6   016570           770     772*   3442*   3445#   3449    3462*
SBELL   015400          3237    3242#
SC      000354           711#   3192    3440    3451*
SCOPE = 104400           583#    783     789     798     801    1616    1623    1628    1657    1663    1669    1675    1682
                        1687    1694    1700    1707    1715    1722    1729    1736    1745    1753    1761    1769    1776
                        1783    1790    1797    1806    1814    1822    1830    1837    1845    1853    1861    1869    1877
                        1866    1895    1904    1913    1921    1932    1938    1943    1948    1955    1961    1967    1974
                        1981    1988    1996    2002    2009    2016    2023    2030    2037    2044    2051    2056    2061
                        2068    2074    2080    2088    2095    2102    2109    2115    2122    2130    2137    2143    2151
                        2158    2165    2172    2179    2187    2195    2202    2208    2215    2224    2232    2240    2245
                        2251    2257    2263    2269    2275    2281    2288    2293    2300    2307    2315    2322    2329
                        2336    2345    2353    2361    2369    2378    2386    2394    2402    2410    2418    2428    2436
                        2444    2452    2460    2468    2477    2486    2495    2504    2511    2516    2522    2527    2534
                        2540    2546    2553    2560    2567    2574    2581    2589    2596    2601    2606    2612    2618
                        2624    2632    2639    2646    2653    2660    2667    2674    2681    2692    2700    2707    2713
                        2720    2728    2736    2742    2748    2754    2762    2770    2781    2789    2802    2804    2815
                        2826    2838    2850    2862    2874    2896    2928    2966    2992    2997    3011    3018    3021
                        3034    3046    3059    3071    3085    3087    3098    3113    3127    3140    3148    3152    3167
                        3182    3196    3210    3220    3227
SCOPEB  016420          3400    3406#
SCOPEC  016364           611    3399#
SCOPEF  016442           777*   3403    3405*   3408*   3412#
SCOPEG  016426          3402    3404    3408#
SEVEN   016340          3345*   3354    3365    3371*   3386#
SKPBEL  015350          3234#   3496*   3557*   3559*   3561*   3563*   3565*   3567*
SOFTSR  000176           660#    765
SOLPAT  002266           868*    995    1017    1019*   1021*   1024#
SP     =%000006         3576#
SRE     000356           712#   3162    3177    3205
SRPTR   000174           659#    762     765*    769     892    3257    3288    3324    3328    3399    3401    3501
STAR    016156          3352    3354#   3374
START   000502           662     724     759#
START2  000642           776     784#
STATUS= 177776           680#    778*    814*    889*    972*    982*   3294*
STRT12  017210          3520    3539#
STRT16  017202          3522    3537#
```

```
STRT20  017174            3524    3535#
STRT24  017166            3525    3533#
STRT28  017160            3512    3531#
STRT8   017216            3518    3541#
ST1     001036             816     818#
ST2     001050             819     821#
ST3     001070             822     824     826#
ST3A    001104             828     831#
ST4     001122             827     832     835#
ST5     001140             836     839#
ST5A    001210             841     850#
ST6     001274             840     860#
ST7     001322             861     865#
ST8     001404             866     867     875#
ST8A    001450             878     883     885#
SUBR1   016446            3416#
SUBR2   016450            3417#   3419
SUBR3   016454            3419#   3421
SUBR4   016462            3421#   3423
SUBR5   016470            3423#   3425
SUBR6   016476            2793    3425#
SWABA   014604            3119#   3126
SXTEEN  017056            3508#   3519
TC    = 177340             720#    721     722     723     725     726
TCBA    000404             726#   1164*   1205*
TCBLK   002670            1109#
TCCM    000372             721#    864*   1116*   1119*   1121*   1123   1132*   1136   1146*   1155*   1157*   1165*   1167
                          1171*   1174    1182*   1185*   1189    1199*  1206*   1209   1213*
TCDT    000376             723#   1126    1139    1142    1177    1192   1195
TCEXPE  002672             862*   1110#   1120*   1126    1141*   1142   1152*   1177   1194*   1195
TCFIRS  002664             862    1107#   1120    1192
TCF1    002746            1118    1123#
TCF1A   002740            1121#   1127
TCF2    002774            1128    1131#
TCF3    003010            1131    1136#   1170
TCF4    003052            1146#   1172
TCIV    000406             727#    863*   1113*   1118*   1131*   1151*   1158*   1162*   1170*   1184*   1203*   1212*
TCLAST  002666            1108#   1139    1152
TCOM    014242            3038#   3045
TCOM2   014310            3051#   3058
TCOM3   014356            3063#   3070
TCRBK   003332            1198    1203#
TCRBUF  003416             743     747    1205    1218#
TCRB1   003370            1203    1209#
TCR1    003210            1158    1174#
TCR1A   003240            1179    1182#
TCR2    003246            1178    1184#
TCR3    003262            1184    1189#   1212
TCR4    003324            1199#   1214
TCSR    016062             585    3240    3295    3298    3301    3309   3314   3322   3336#   3347   3376   3382
TCST    000374             722#   1114    1153
TCWBK   003130            1145    1162#
TCWBUF  003416            1164    1217#
TCWB1   003162            1162    1167#
TCWC    000402             725#   1163*   1204*
TC1     000434             740#   1207
```

```
TC2     000446          744#   746
TDBR    016060         3239*  3297*  3300*  3308*  3313*  3321*  3335#  3351*  3353*  3378*
TDSR  = 016062          585#
TEMP    016710         1711*  1712   1718*  1719   1725*  1732*  1733   1739*  1741*  1742   1747*  1749*  1750
                       1755*  1757*  1758   1764*  1765*  1766   1771*  1773*  1778*  1780*  1785*  1787*  1792*
                       1800*  1803   1808*  1811   1816*  1819   1824*  1827   1831*  1634   1839*  1842   1847*
                       1850   1855*  1858   1863*  1866   1871*  1874   1879*  1883   1888*  1892   1897*  1901
                       1906*  1910   1957*  1958   1976*  1977*  1978   1998*  1999*  2004*  2005*  2006   2011*
                       2012*  2013   2018*  2019*  2020   2025*  2026*  2027   2032*  2033*  2034   2039*  2040*
                       2041   2070*  2071   2090*  2091*  2092   2111*  2112*  2117*  2118*  2119   2132*  2133*
                       2134   2138*  2139*  2140   2146*  2147*  2148   2153*  2154*  2155   2160*  2161*  2162
                       2167*  2168*  2169   2174*  2175*  2176   2181*  2183*  2184   2189*  2191*  2192   2219*
                       2220*  2221   2228*  2236*  2311*  2312   2318*  2319   2325*  2332*  2333   2339*  2341*
                       2342   2347*  2349*  2350   2355*  2357*  2358   2364*  2365*  2366   2372*  2375   2380*
                       2383   2388*  2391   2396*  2399   2404*  2407   2412*  2415   2419*  2422   2425   2430*
                       2433   2438*  2441   2446*  2449   2454*  2457   2462*  2465   2470*  2474   2479*  2483
                       2488*  2492   2497*  2501   2536*  2537   2548*  2549*  2550   2555*  2556*  2557   2562*
                       2563*  2564   2569*  2570*  2571   2576*  2577*  2578   2583*  2584*  2585*  2586   2614*
                       2615   2634*  2635*  2636   2648*  2649*  2650   2655*  2656*  2657   2662*  2663*  2664
                       2669*  2670*  2671   2676*  2677*  2678   2683*  2685*  2686   2689   2694*  2696*  2697
                       2723*  2724*  2725   2732*  2766*  2806*  2807*  2812   2817*  2818*  2823   2829*  2830*
                       2835   2841*  2842*  2847   2853*  2854*  2859   2865*  2866*  2871   3036*  3037*  3038*
                       3039*  3040   3043*  3044*  3049*  3050*  3051*  3052*  3053   3056*  3057*  3061*  3062*
                       3063*  3064*  3065   3068*  3069*  3074*  3075   3082*  3083   3132*  3134*  3137   3143
                       3144*  3221*  3223*  3224   3483#  3484   3486   3487
TEST    013614         2904*  2905*  2906*  2907*  2908*  2909*  2910*  2911*  2912*  2929   2934#  2944*  2945*
                       2946*  2947*  2948*  2949*  2950*  2967   2971*  2972*  2973*  2974*  2975*  2976*  2993
                       3012*  3013*  3014*  3015   3102*  3103*  3108*  3117*  3119*  3120   3123*  3125*
TIME    002116          837*   970*   978*   979    983    989#
TJSR1   013044         2776#  2777
TJSR2   013046         2775   2777#
TJSR3   013060         2776   2781#  2785
TOODLE  016336         3355*  3356*  3357   3385#
TRCSR   000260          681#   784*   786    820*   903    914*
TRDR    000262          682#   906    908
TRPA    015556         3235   3278#  3495*  3556*  3558*  3560*  3562*  3564*  3566*
TRPB    015550          875*  3260*  3275#
TSCOMB  014420         3075#  3084
TSROT   013450         2898#  2901
TSROT2  013624         2938#  2942
TSRT2A  013616         2902   2937#
TSTARI  014100         3004#
TTCSR   000264          683#   793*   794    797*   799*   800*   817*   881*   921    3236
TTDBR   000266          684#   925*
TTYINR  001522          643    903#
TTYIN1  001560          913#
TTYIN2  001566          907    912    914#
TTYIN3  001552          909    911#
TTYIN4  001556          912#
TWELVE  017052         3507#  3517
TWENTY  017062         3509#  3521
TWOEIG  017072         3511#
TWOFOR  017066         3510#  3523
TYOUTR  001576          645    921#
TYOUT1  001612          925#
USER    016764          885   3491#
```

DZQKBF.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
WAIT1   016126           3347#   3348
WAIT2   016304           3376#   3377    3381
WAIT3   014470           3087#
WAIT4   014520           3093    3098#
WAIT5   014472           3088#
WD    = 000014           1099#   1165
WGTCT   016344           3342*   3359*   3361    3366*   3388#
WRTOC   016220           3358    3363#
XFENDZ  003060           1148#   1193
XFER12  017264           3539    3551#
XFER16  017254           3537    3549#
XFER20  017244           3535    3547#
XFER24  017234           3533    3545#
XFER28  017224           3531    3543#
XFER8   017274           3541    3553#
XLIST   016276           3369    3375#
XX    = 000000            594#    917     928     945     965
YESRT   015552           3249*   3251*   3259    3276#
YESTR   015452           3256#
YESTR1  015504           3263#   3266
YESTR2  015510           3264#
.     = 017464            595#    600     601#    602     604#    607#    610#    613#    615#    642#    651#    654#    658#
                          661#    663#    669#    672#    676#    748     787     795     843     846     848     890     904
                          922     932     937     953     975     986     1001    1016    1034    1048    1054    1068    1085
                         1124    1137    1143    1168    1175    1190    1196    1210    1621    1626    1655    1661    1667
                         1673    1680    1685    1692    1698    1705    1713    1720    1727    1734    1743    1751    1759
                         1767    1774    1781    1788    1795    1804    1812    1820    1828    1835    1843    1851    1859
                         1867    1875    1884    1893    1902    1911    1930    1936    1941    1946    1953    1959    1965
                         1972    1979    1986    1994    2000    2007    2014    2021    2028    2035    2042    2049    2054
                         2059    2066    2072    2078    2086    2093    2100    2107    2113    2120    2128    2135    2141
                         2149    2156    2163    2170    2177    2185    2193    2200    2206    2213    2222    2230    2238
                         2243    2249    2255    2261    2267    2273    2279    2286    2291    2298    2305    2313    2320
                         2327    2334    2343    2351    2359    2367    2376    2384    2392    2400    2408    2416    2423
                         2426    2434    2442    2450    2458    2466    2475    2484    2493    2502    2509    2514    2520
                         2525    2532    2538    2544    2551    2558    2565    2572    2579    2587    2594    2599    2604
                         2610    2616    2622    2630    2637    2644    2651    2658    2665    2672    2679    2687    2690
                         2698    2705    2711    2718    2726    2734    2740    2746    2752    2760    2768    2778    2786
                         2794    2796    2798    2800    2808    2810    2813    2819    2821    2824    2831    2833    2836
                         2843    2845    2848    2855    2857    2860    2867    2869    2872    2914    2915    2916    2918
                         2919    2920    2922    2923    2925    2926    2930    2952    2953    2954    2956    2957    2958
                         2960    2961    2963    2964    2968    2978    2979    2980    2982    2983    2984    2986    2987
                         2989    2990    2994    3000    3016    3027    3041    3054    3066    3076    3078    3080    3104
                         3106    3109    3111    3121    3135    3138    3146    3149    3157    3160    3163    3172    3175
                         3178    3187    3190    3193    3200    3203    3206    3215    3218    3225    3229    3234    3241
                         3284    3289    3296    3299    3302    3310    3315    3323    3325    3383    3470#   3474#   3482#
                         3486#   3489#   3494#   3499    3529
.MAMF   017420           3497    3580#
.PARSR  017456            655    3591#
```

DZQKBF.P11 CROSS REFERENCE TABLE -- MACRO NAMES

TNCV 2876# 2913 2951 2977

DZQKBF.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
ADC     1882  1891  2183  3506  3507  3508  3509  3510  3511
ADCB    2473  2482  2685  3134
ADD      744   745  1079  1088  1632  1635  1638  1641  1644  1647  1650  1917  2126  2133  2139
        3013  3082  3245  3359  3363  3365  3371
ASL     3588
ASLB    2866
ASRB    2854
BCC     2915  2919  2953  2957  2979  2983  3589
BCS     2800  2808  2819  2831  2843  2855  2867  3135
BEQ      746   771   787   878   907   909   935   937   962   984  1005  1008  1018  1128  1140
        1143  1178  1193  1196  1621  1626  1655  1661  1667  1673  1680  1685  1692  1698  1705
        1713  1720  1727  1734  1743  1751  1759  1767  1774  1781  1788  1795  1804  1812  1820
        1828  1835  1843  1851  1859  1867  1875  1884  1893  1902  1911  1930  1936  1941  1946
        1953  1959  1965  1972  1979  1986  1994  2000  2007  2014  2021  2028  2035  2042  2049
        2054  2059  2066  2072  2078  2086  2093  2100  2107  2113  2120  2128  2135  2141  2149
        2156  2163  2170  2177  2185  2193  2200  2206  2213  2222  2230  2238  2249  2255  2261
        2267  2273  2279  2286  2291  2298  2305  2313  2320  2327  2334  2343  2351  2359  2367
        2376  2384  2392  2400  2408  2416  2423  2426  2434  2442  2450  2458  2466  2475  2484
        2493  2502  2509  2514  2520  2525  2532  2538  2544  2551  2558  2565  2572  2579  2587
        2594  2599  2604  2610  2616  2622  2630  2637  2644  2651  2658  2665  2672  2679  2687
        2690  2698  2705  2711  2718  2726  2734  2740  2746  2752  2760  2768  2778  2786  2796
        2813  2824  2836  2848  2860  2872  2930  2968  2994  3016  3027  3030  3041  3054  3066
        3076  3093  3106  3121  3138  3157  3160  3163  3175  3178  3187  3190  3193  3200  3206
        3215  3218  3225  3229  3261  3266  3284  3289  3329  3358  3369  3380  3404  3502  3516
        3518  3520  3522  3524
BGE     1179  3078
BGT     1034  1054  1068  1085  1124  1137  1175  1190
BHI      748
BHIS     980
BIC      955   977   981   982   987  1119  1631  1634  1637  1640  1643  1646  1649  1741  1749
        1757  1765  1970  1977  1984  2084  2091  2098  2220  2228  2236  3244  3294  3357
BICB    2341  2349  2357  2365  2628  2635  2642  2724  2732  2766
BIS      784   793   799   817   820   825   834   838   960   971   972
BIT      786   794   815   818   823   831   835   839   860   892  1033  1037  1053  1067  1084
        1123  1136  1174  1189  3145  3236  3257  3288  3328  3399  3401  3501
BLE     3080
BLOS    1092  3499
BLT     1127  2243
BMI      822   827   866   904   922   932   953   975   998  1001  1115  1154  2794  3109  3172
        3203  3350
BNE      795   816   819   824   832   836   840   861   883   893   912   940   958  1038  1040
        1058  1073  1090  2901  2942  3009  3045  3058  3070  3084  3111  3126  3146  3237  3258
        3362  3373  3400  3402  3529
BPL      843   846   848   986  1016  1048  1168  1210  2914  2952  2978  3000  3104  3241  3296
        3299  3302  3310  3315  3323  3325  3348  3377  3383
BR       724   764   828   890   963   988  1010  1012  1020  1022  1036  1042  1056  1060  1070
        1075  1087  1094  1145  1148  1172  1181  1198  1214  2776  2902  2918  2922  2925  2943
        2956  2960  2963  2982  2986  2989  3010  3033  3149  3234  3235  3250  3290  3352  3374
        3381  3512  3525  3532  3534  3536  3538  3540  3542
BVC     2821  2857  2869  2916  2926  2954  2964  2980  2990
BVS     2798  2810  2833  2845  2920  2923  2958  2961  2984  2987
CCC     2783  2792  2805  2828  2852
CLR      742   772   774   777   779   797   800   809   811   813   837   849   875   880   881
         884   887   889   959   970  1013  1028  1802  1810  2012  2025  2032  2125  2132  2147
        2160  2167  2569  2576  2583  2662  2669  2893  3024  3025  3036  3037  3049  3050  3061
        3062  3074  3114  3117  3118  3153  3168  3185  3256  3327  3341  3342  3366  3367  3408
```

```
        3454  3462  3526
CLRB    2374  2382  2390  2398  2549  2649  2758
CMP      747   767   957   979   983  1003  1007  1017  1072  1091  1126  1139  1142  1177  1192
        1195  1620  1625  1654  1660  1666  1672  1679  1684  1691  1697  1704  1712  1719  1726
        1733  1742  1750  1758  1766  1866  1874  1929  1935  1940  1945  1952  1958  1964  1971
        1978  1985  1993  2020  2027  2034  2041  2048  2053  2058  2065  2071  2077  2085  2092
        2099  2106  2127  2134  2140  2155  2162  2169  2176  2199  2205  2212  2221  2229  2237
        2383  2391  2425  2457  2465  2474  2483  2492  2550  2557  2564  2571  2578  2586  2686
        2739  2745  2759  2767  2812  2823  2835  2847  2859  2871  2900  2929  2941  2967  2993
        3008  3015  3026  3029  3040  3083  3120  3137  3159  3186  3189  3199  3217  3224  3228
        3293  3361  3403  3498  3515  3517  3519  3521  3523  3528
CMPB     882   908   936  1039  1057  1089  2242  2248  2254  2260  2266  2272  2278  2285  2290
        2297  2304  2312  2319  2326  2333  2342  2350  2358  2366  2508  2513  2519  2524  2531
        2537  2543  2593  2598  2603  2609  2615  2621  2629  2636  2643  2657  2664  2671  2678
        2704  2710  2717  2725  2733  2751  2777  2785  3053  3065  3075  3092  3162  3177  3192
        3205
COM     1818  1826  2019  2154  3038  3043  3260  3356
COMB    2406  2414  2556  2563  2656  3051  3056  3063  3068
DEC     1194  1849  1857  2033  2168  3039  3052  3064  3368  3372  3379
DECB    2440  2448  2577  2670  2696
EMT      582
HALT     600   603  3277  3326  3444
INC      914   942   956   978  1006  1009  1019  1071  1141  1833  1841  2026  2161  2898  2938
        2999  3006  3031  3032  3044  3124  3242  3286  3287  3360  3405
INCB     911   924   939   961  1078  1116  1121  1132  1146  1155  1182  1185  1199  2421  2432
        2570  2663  3057  3069  3125
JMP      662   894  1918  3001  3150  3274  3278  3330  3592
JSR      885   886  1207  2775  2784  2793  2899  2939  2940  3007  3270  3307  3312  3317  3419
        3421  3423  3425  3497  3531  3533  3535  3537  3539  3541  3544  3546  3548  3550  3552
        3554
MOV      740   741   743   750   751   753   759   760   761   765   768   769   775   776   778
         780   781   782   791   803   804   806   807   808   810   812   814   833   841   844
         850   851   852   853   854   855   862   863   864   867   868   869   870   871   872
         873   874   879   888   913   925   941   949   950   995   996  1011  1014  1021  1029
        1030  1049  1050  1062  1063  1064  1080  1081  1113  1118  1120  1131  1151  1152  1157
        1158  1162  1163  1164  1170  1184  1203  1204  1205  1212  1615  1617  1619  1630  1633
        1636  1639  1642  1645  1648  1651  1653  1671  1678  1689  1690  1710  1711  1717  1718
        1724  1725  1731  1732  1739  1740  1747  1748  1755  1756  1763  1764  1771  1772  1778
        1779  1785  1786  1792  1793  1800  1801  1808  1809  1816  1817  1824  1825  1831  1832
        1839  1840  1847  1848  1855  1856  1863  1864  1871  1872  1879  1880  1888  1889  1997
        1898  1906  1907  1916  1923  1924  1925  1926  1927  1928  1951  1957  1963  1969  1976
        1983  1991  1998  2004  2011  2018  2039  2064  2070  2076  2083  2090  2097  2104  2111
        2117  2138  2146  2153  2174  2181  2189  2198  2204  2210  2211  2218  2219  2226  2227
        2233  2234  2235  2247  2253  2259  2265  2271  2277  2283  2284  2295  2296  2302  2303
        2310  2317  2324  2331  2339  2340  2347  2348  2355  2356  2363  2364  2372  2373  2380
        2381  2388  2389  2396  2397  2404  2405  2412  2413  2419  2420  2430  2431  2438  2439
        2446  2447  2454  2455  2462  2463  2470  2471  2479  2480  2488  2489  2497  2498  2548
        2555  2562  2627  2634  2641  2648  2655  2676  2683  2694  2703  2709  2715  2716  2722
        2723  2730  2731  2738  2744  2750  2756  2757  2763  2764  2765  2772  2806  2817  2829
        2841  2853  2865  2897  2904  2937  2944  3004  3005  3012  3086  3089  3099  3102  3128
        3132  3142  3143  3144  3154  3155  3169  3170  3183  3184  3197  3198  3211  3212  3213
        3221  3231  3232  3239  3243  3246  3249  3251  3252  3259  3262  3263  3265  3267  3268
        3291  3292  3297  3300  3303  3304  3305  3306  3308  3311  3313  3316  3318  3319  3320
        3321  3343  3344  3345  3346  3351  3353  3354  3355  3364  3370  3375  3378  3406  3409
        3429  3430  3431  3432  3433  3434  3435  3436  3437  3438  3439  3440  3441  3442  3443
        3449  3450  3451  3452  3453  3455  3456  3457  3458  3459  3460  3461  3495  3496  3504
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DZQKBF.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
        3505  3513  3527  3543  3545  3547  3549  3551  3553  3556  3557  3558  3559  3560  3561
        3562  3563  3564  3565  3566  3567  3580  3581  3582  3583  3586
MOVB     956   857   858   859  1031  1046  1051  1065  1082  1165  1171  1206  1213  1703  2311
        2318  2325  2332  2530  2536  2542  2584  2608  2614  2620
NEG     1865  1873  2040  2175
NEGB    2456  2464  2585  2677
NOP     1920  3248  3271  3272  3273
RESET    785   792   802  3269
ROL     2905  2910  2911  2912
ROLB    2830  2842  2948  2949  2950  2974  2975  2976
ROR     2906  2907  2908  2909
RORB    2807  2818  2945  2946  2947  2971  2972  2973
RTI      754   896   915   926   943   951   973   999  1032  1052  1066  1083  1117  1122  1133
        1147  1156  1159  1166  1183  1186  1200  1208  3264  3276  3285  3331  3407  3410  3436
        3464  3581
RTS      752  2780  2932  2970  2996  3019  3384  3416  3418  3420  3422  3424  3426  3491  3500
        3503  3530  3555  3568  3590
SBC     1900  1909  2191
SBCB    2491  2500  3223
SCC     2816  2840  2864  3417
SEC     1881  1890  1899  1908  2182  2190  2472  2481  2490  2499  2684  2695  3133  3222
SUB     1773  1780  1787  1794  1992  1999  2005  2105  2112  2118  3014
SWAB    1041  1059  1074  1093  3103  3108  3119  3123
TRAP     583
TST      762   770   805   821   826   847   877  1114  1153  1167  1209  1803  1811  1819  1827
        1834  1842  1850  1858  1883  1892  1901  1910  2006  2013  2119  2148  2184  2192  2501
        2697  2788  3156  3171  3174  3202  3214  3283  3324  3343  3514
TSTB     842   845   865   903   906   921   931   934   952   974   985   997  1000  1015  1047
        2375  2399  2407  2415  2422  2433  2441  2449  2650  2689  3240  3295  3298  3301  3309
        3314  3322  3347  3376  3382
WAIT     891  3094  3095  3096  3097
.ENABL   576
.END    3593
.LIST    600
.MACR   2876
.NLIST     3
.REPT      4   596  1220  1417


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DZQKBF,DZQKBF.SEQ/SOL/CRF/DS:ERFZ/EN:ABS=DSKM:DZQKBF.P11
 RUN-TIME:  10 22 4 SECONDS
 RUN-TIME RATIO: 57/37=1.5
 CORE USED:  12K  (24 PAGES)
```

C07

Spooler runtime 12 Seconds, 364 KCS, 314 disk reads, 3 disk writes, 79 pages

[illegible] Date 14-Oct-75 15:[illegible]:18 [illegible]

000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000111111111111111111111111111111110

000000000111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111111112222222222333312

[illegible] 567890123456789012 **

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