PDP11

T17-4K SYSTEM EXERCISER

MD-11-DZQKB-G

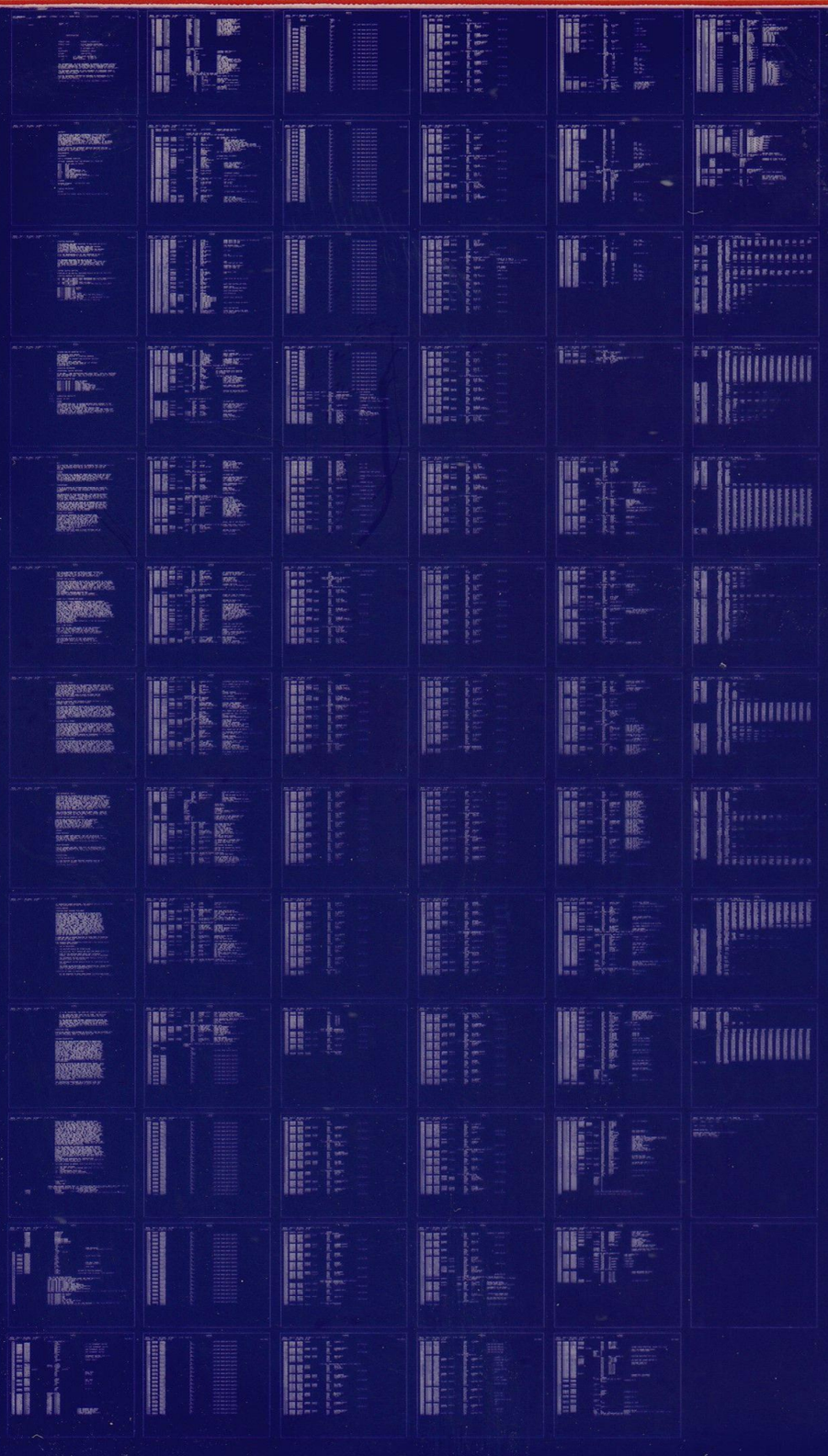
EP-DZQKB-G-DL-G

FICHE 1 OF 1

DEC 1977

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZQKB-G-D

PRODUCT NAME: T17-4K SYSTEM EXERCISER
THIS VERSION TEST DECTAPE UNIT 1 (NOT UNIT 0)

DATE: 01-OCTOBER-1977

MAINTAINER: DIAGNOSTIC GROUP

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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.VTOS
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 IESI 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 IN-
TERRUPT 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 NC "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 BITS 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
```

```
                016062                  IDSB=ICSR
                016766                  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
                000100                  .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
```

```
                                RFCSRH: 177461          ;HIGH BYTE ADDRESS OR CSR
                                RKDA:   177412          ;DISK ADDRESS REGISTER
                                RKWC:   177406          ;WORD COUNT REGISTER
                                RKBA:   177410          ;CURRENT ADDRESS REGISTER
                                RKCSR:  177404          ;STATUS REGISTER
                                RKCSRH: 177405          ;HIGH BYTE ADDRESS OR CSR
                                R0:     177300          ;ERR LOCATIONS
                                R1:     177302
                                SC:     177310
                                SFE:    177311
                                MUL:    177306
                                DIV:    177308
                                NOR:    177312
                                LSH:    177314
                                ASH:    177316

                                ;DECTAPE ADDRESSES
                                TC=177340
                                TCCM:   TC+2                    ;CONTROL AND FUNCTION
                                TCST:   TC                      ;GENERAL STATUS
                                TCDT:   TC+10
                                        BR      START           ;DATA
                                TCWC:   TC+4                    ;WORD COUNT
                                TCBA:   TC+6                    ;BUS ADDRESS
                                TCIV:   214                     ;DECTAPE INTERRUPT VECTOR
                                RPCA:   176722                  ;CYLINDER ADDRESS RP11 DISK
                                RPDAH:  176725                  ;HIGH BYTE OF DISK ADDRESS
                                RPDAR:  176724                  ;DISK ADDRESS
                                RPDSR:  176710                  ;DRIVE STATUS REGISTER
                                RPDAR:  176724                  ;DISK ADDRESS REGISTER
                                RPWC:   176716                  ;WORD COUNT REGISTER
                                RPBAR:  176720                  ;CURRENT ADDRESS REGISTER
                                RPCSR:  176714                  ;STATUS REGISTER
                                RPCSRH: 176715                  ;HIGH BYTE ADDRESS OR CSR
                                RPFUNCTION:     0               ;DISK COMMAND
                                ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
                                ;BY DOING A CHECK SUM ON THE DATA
                                TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
                                        MOV     %3,-(6)
                                        CLR     %3              ;SUM OF DATA
                                        MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
                                TC2:    ADD     (1)+,%3         ;EVEN ADD
                                        ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
                                        BEQ     TC2
                                        CMP     %1,#TCRBUF+1000         ;AT END OF BUFFER?
                                        BHI     .+4             ;YES BRANCH
                                        HLT                     ;DATA ERROR
                                        MOV     (6)+,%3         ;RESTORE THE REGISTERS
                                        MOV     (6)+,%1
                                        RTS     %7              ;EXIT
```

```
000472  012767  000240  014232  NOEAE:  MOV     #240,EAESRT             ;BRANCH AROUND EAE ROUTINE
000500  000002                          RTI                             ;JUMP OVER EAE SECTION

                                ;START UP FOR MINI MONITOR
                                ;RESTART HERE IF LINE PRINTER WAS ENABLED

000502  012767  016504  177314  START:  MOV     #PFAIL,24               ;SET POWER FAIL VECTOR
000510  012706  016762                  MOV     #BUFF,%6                ;SET UP STACK
000514  012767  000530  177262          MOV     #1$,4                           ;SET UP TIME OUT VECTOR
000522  005777  177446                  TST     @SRPTR                          ;TRY TO REFERENCE THE
                                                                                ;HARDWARE SWITCH REGISTER
000526  000404                          BR      2$                              ;BRANCH IF NO TIME OUT TRAP OCCURRS
000530  012767  000176  177436  1$:     MOV     #SOFTSR,SRPTR                   ;CHANGE THE SWITCH REGISTER POINTER
                                                                                ;TO POINT TO A SOFTWARE  SWITCH REGISTER
000536  022626                          CMP     (6)+,(6)+                       ;RESTORE THE STACK
000540  012767  000006  177236  2$:     MOV     #6,4                            ;RESTORE TIME OUT VECTOR
000546  017767  177422  000742          MOV     @SRPTR,REG1                     ;MOV SR TO REGISTER
00[illegible]54  005737  016570                  TST     @#SAVR6                 ;SET ON POWER FAIL
00[illegible]60  001403                          BEQ     ESTART
00[illegible]  005037  016570                  CLR     @#SAVR6
00[illegible]  104000                          HLT                             ;A POWER FAIL OCCURRED
00[illegible]70  005067  015644          ESTART: CLR     ICOUNT
000574  012706  016762                  MOV     #BUFF,%6                ;SET UP STACK
000600  012767  000642  015636          MOV     #START2,RETURN
000606  005067  015630                  CLR     SCOPEF
000612  012767  000340  177156          MOV     #340,STATUS                     ;LOCK OUT INTERRUPTS
000620  005067  014736                  CLR     PRFLAG                          ;PRINT ROUTINE BUSY
000624  016702  000666                  MOV     REG1,RSR                        ;SAVE SWITCHES
000630  012700  000100                  MOV     #100,R100                       ;INTERRUPT ENABLE
000634  012701  000101                  MOV     #101,R101                       ;INTERRUPT ENABLE AND GO
000640  104400                          SCOPE
000642  050077  177412          START2: BIS     R100,@TRCSR
000646  000005                          RESET
000650  030077  177404                  BIT     R100,@TRCSR                     ;INTERRUPT ENABLE
000654  001401                          BEQ     .+4
000656  104000                          HLT                                     ;RESET DID NOT CLEAR INTERRUPT ENABLE
000660  104400                          SCOPE
                                ;DOES "RESET" ON THE BUS LAST TOO LONG
000662  012706  016762                  MOV     #BUFF,%6                        ;SET UP STACK
000666  000005                          RESET
000670  050077  177370                  BIS     R100,@TTCSR                     ;SET A BIT
000674  030077  177364                  BIT     R100,@TTCSR                     ;IS IT SET
000700  001001                          BNE     .+4
000702  104000                          HLT                                     ;RESET IS ON BUS TOO LONG
000704  005077  177354                  CLR     @TTCSR
000710  104400                          SCOPE
000712  050077  177346                  BIS     R100,@TTCSR
000716  005077  177342                  CLR     @TTCSR                          ;IF BUS HANG, CHECK NO SACK TIMEOUT
000722  104400                          SCOPE
000724  000005                          RESET
000726  012767  004416  015510          MOV     #BEGIN,RETURN
000734  012737  000472  000004          MOV     #NOEAE,@#4                      ;TEST FOR EAE
000742  005777  177402                  TST     @MQ                             ;TRAP IF NONEXISTANT
000746  012767  001520  177030          MOV     #RTIA,4                         ;SET UP FOR NON-EXISTANT I/O
000754  012767  000340  177024          MOV     #340,6                          ;KEEP NEW PSW AT 340
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
001324  100427                          MOV     #ST8,4                  ;DON'T CHANGE 200
001326  012767  001404  176450          MOV     #137,SOLPAT             ;RESET FOR START OF LINE PATTERN
001334  012767  000137  000724          MOV     LP6+4,CLINCT            ;LINE COUNT
001342  016767  000612  000720          MOV     #40,CURPAT
001350  012767  000040  000706          MOV     #14,@LPDBR              ;LINE FEED TO POSITION BUFFER
001356  012777  000014  176720          MOV     #LPINTR,@#200           ;INTERRUPT VECTOR
001364  012737  002144  000200          MOV     #200,@#202              ;PROCESSOR LEVEL 4
001372  012737  000200  000202          MOV     R100,@LPCSR             ;INTERRUPT ENABLE
001400  010077  176676                  MOV     #TRPB                   ;NO "T" BIT FIRST PASS
001404  005037  015550          ST8:    CLR
                                ;IF OPERATION WITH DIAGNOSTIC PACKAGE OR ACT11
001410  005767  176426                  TST     42
001414  001415                          BEQ     ST8A            ;BRANCH IF NO MONITOR
001416  012767  001520  176360          MOV     #RTIA,4
001424  005077  176652                  CLR     @LPCSR          ;NO LINE PRINTER WITH MONITOR
001430  005077  176630                  CLR     @TTCSR          ;NO CONSOLE TEST WITH MONITOR
001434  122767  000002  176377          CMPB    #2,     41      ;IS IT RKDP
001442  001002                          BNE     ST8A
001444  005077  176674                  CLR     @RKCSR          ;YES DON'T TEST RK DISK
001450  004737  016764          ST8A:   JSR     %7,@#USER               ;FOR USER I/O PROGRAM
001454  004767  015306                  JSR     %7,DETI                 ;CHECK FOR CORE EXPANSION
001460  005067  176322                  CLR     6                       ;HALT FOR BUS ERROR
001464  012767  000006  176312          MOV     #6,4                    ;FOR USER I/O PROGRAM
001472  005067  176300                  CLR     STATUS                  ;ALLOW INTERRUPTS
001476  000401                          BR      .+4
                                MAINLINE:       WAIT                    ;WAIT HERE FOR INTERRUPTS
001502  037727  176466  002000          BIT     @SRPTR,#2000            ;INHIBIT PROCESSOR TEST
001510  001373                          BNE     MAINLINE
001512  000167  002700                  JMP     BEGIN
001516  000000          REG1:   0                               ;STATUS OF SELECTED DEVICES
001520  000002          RTIA:   RTI                             ;AN RTI FOR NON EXISTANT I O


                                ;TTY RECEIVER VALUES 0 TO 377

001522  105777  176532          TTYINR: TSTB    @TRCSR                  ;IS DONE SET
001526  100401                          BMI     .+4
001530  104000                          HLT                             ;FALSE RETURN FROM MAINLINE
001532  105777  176524                  TSTB    @TRDR                   ;TEST DATA FOR LEADER
001536  001413                          BEQ     TTYIN2                  ;IF LEADER GO BACK
001540  127767  176516  000026          CMPB    @TRDR,DATA1             ;NOT LEADER TEST FOR DATA
001546  001401                          BEQ     TTYIN3
001550  104000                          HLT                             ;DATA COMPARISON ERROR
001552  105267  000016          TTYIN3: INCB    DATA1                   ;INCREMENT DATA
001556  001003                  TTYIN4: BNE     TTYIN2
001560  012767  000001  000006  TTYIN1: MOV     #1,DATA1                ;BASE DATA
001566  005277  176466          TTYIN2: INC     @TRCSR                  ;START READER
001572  000002                          RTI                             ;RETURN TO MAINLINE

001574  000000          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
                                TYOUT1: MOV     DATA2,@TTDBR            ;OUTPUT TO DEVICE
                                        RTI                             ;RETURN TO MAINLINE

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

                                HSRINR: TSTB    @HRCSR                  ;IS DONE SET
                                        BMI     .+4
                                        HLT                             ;FALSE RETURN FROM MAINLINE
                                        TSTB    @HRDBR                  ;TEST DATA FOR LEADER
                                        BEQ     HSRIN2                  ;IF LEADER GO BACK
                                        CMPB    @HRDBR,DATA3            ;NOT LEADER TEST FOR DATA
                                        BEQ     .+4
                                        HLT                             ;DATA COMPARISON ERROR
                                        INCB    DATA3                   ;INCREMENT DATA
                                        BNE     HSRIN2
                                HSRIN1: MOV     #1,DATA3                ;BASE DATA
                                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)
                                HPOUT:  MOV     #0,DATA4                ;INITAL DATA
                                HPOUT1: MOV     DATA4,@HPDBR            ;OUTPUT TO DEVICE
                                        RTI                             ;RETURN TO MAINLINE
                                HPOUTR: TSTB    @HPCSR                  ;TEST FOR DONE
                                        BMI     .+4                     ;BRANCH IF FLAG FOUND
                                        HLT                             ;FALSE INTERRUPT RETURN
                                        BIC     DELAY,@HRCSR            ;CLEAR HSR INTERRUPT ENABLE
                                        INC     INTCNT                  ;COUNT INTERRUPTS
                                        CMP     INTCNT,#14              ;SAVE TO TURN READER ON?
                                        BNE     HPOUT2                  ;NO-NEED MORE TIME
                                        CLR     INTCNT                  ;YES RESET COUNTER
                                        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.
                                LK1:    CLR     @#TIME                  ;CLEAR LINE CLOCK TIMER
                                        BIS     #100,@LKCSR
                                        BIS     #100,@#STATUS
                                LK2:    RTI                             ;RETURN TO MAINLINE
                                LK3:    TSTB    @LKCSR                  ;TEST FOR DONE
                                        BMI     .+4
                                        HLT                             ;FALSE INTERRUPT
```

```
                                BIC     #200,@LKCSR
                        LK4:    INC     @#TIME                  ;ON INTERUPTS ENTER HERE
                                CMP     #3300.,@#TIME           ;4 LAPS OF 55 SECONDS
                                BHIS    LK2                     ;BRANCH IF TIME LESS THAN 55 SECONDS
                                BIC     #100,@LKCSR
                                BIC     #100,@#STATUS           ;LOWER PRIORITY
                                CMP     #3600.,@#TIME           ;ONE MINUTE UP
                                BEQ     LK1                     ;YES-RESET TIMER
                                TSTB    @LKCSR                  ;NO-SKIP ON FLAG TILL IT IS.
                                BPL     .-4
                                BIC     #200,@LKCSR             ;CLEARS THE FLAG
                                BR      LK4                     ;FOUND FLAG GO INCREMENT COUNTER
                        TIME:   0

                        ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER
                        ;INTERRUPT VECTOR IS 200
                        LP80=LP6+4

000120  016767  000142  000136  LP1:    MOV     SOLPAT,CURPAT           ;START OF LINE TO CURRENT
000126  016777  000132  176150  LP2:    MOV     CURPAT,@LPDBR           ;CURRENT PATTERN TO LINE PRINTER
000134  105777  176142                  TSTB    @LPCSR
000140  100405                          BMI     LP6
000142  000002                          RTI                             ;RETURN TO MAIN LINE
000144  105777  176132          LPINTR: TSTB    @LPCSR                  ;TEST FOR FLAG
000150  100401                          BMI     .+4
000152  104000                          HLT                             ;FALSE RETURN FROM MAIN LINE
000154  026727  000110  000117  LP6:    CMP     CLINCT,#79.             ;TEST FOR END OF LINE,
                                                                        ;CHANGE THIS VALUE FOR 132 COLUMN PRINTER
000162  001415                          BEQ     LP4                     ;GO GENERATE CR/LF
000164  005267  000100                  INC     CLINCT                  ;INCREMENT LINE POSITION COUNT
000170  026727  000070  000137          CMP     CURPAT,#137             ;TEST FOR MAXIMUM PATTERN
000176  001403                          BEQ     LP3                     ;YES - GO TO LP3 AND RESET
000200  005267  000060                  INC     CURPAT                  ;NO - INCREMENT TO NEXT PATTERN
000204  000750                          BR      LP2                     ;GO SEND IT TO LINE PRINTER
000206  012767  000040  000050  LP3:    MOV     #40,CURPAT              ;RESET PATTERN AND SEND TO PRINTER
000214  000744                          BR      LP2                     ;SENT TO LINE PRINTER
000216  005067  000046          LP4:    CLR     CLINCT                  ;RESET LINE COUNT
000222  012777  000012  176054          MOV     #12,@LPDBR              ;LINE FEED
000230  105777  176046                  TSTB    @LPCSR
000234  100375                          BPL     .-4
000236  026727  000024  000137          CMP     SOLPAT,#137             ;START OF LINE PATTERN
000244  001403                          BEQ     LP5
000246  005267  000014                  INC     SOLPAT                  ;INCREMENT START OF LINE
000252  000722                          BR      LP1
000254  012767  000040  000004  LP5:    MOV     #40,SOLPAT              ;RESET START OF LINE
000262  000716                          BR      LP1                     ;PRINT
000264  000000                  CURPAT: 0                               ;CURRENT CHARACTER BEING PRINTED
000266  000000                  SOLPAT: 0                               ;START OF LINE CHARACTER
000270  000000                  CLINCT: 0                               ;POSITION OF LINE

                        ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
000272  005077  176040  RKSTART:       CLR     @RKDAE                  ;INITIALIZE DISK - DAR-DAE
000276  016777  000360  176036  RK1:    MOV     LLIMIT,@RKBAR           ;CORE BASE
000304  012777  176000  176026          MOV     #RKWORDCT,@RKWC         ;LENGTH OF TRANSFER
000312  113777  002364  176024          MOVB    @#RKFUNCTION,@RKCSR     ;WRITE OR WRITE CHECK TO DISK
000320  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
```

```
                                        CMPB    #3,@RFDAE               ;DISK AT UPPER LIMIT? 7=2, 17=4, 37=8
                                        BNE     RF1                     ;NO
                                        CMP     @RFDAR,#174000          ;AS FAR ON DISK AS WE CAN GO
                                        BLOS    RF1                     ;NO
                                        SWAB    @#RFFUNCTION            ;CHANGE COMMAND
                                        BR      RFSTART                 ;RESTART NEW TRANSFER OF DISK
                                RFFUNCTION:     0                       ;DISK COMMAND
                                LLIMIT: BEGIN                           ;FIRST CORE ADDRESS OF TRANSFER
                                ;DT11 DEC TAPE
                                RD=4                                    ;READ DATA
                                WD=14                                   ;WRITE DATA
                                RB=2
                                BR=2                                    ;READ BLOCK
                                F=0                                     ;FORWARD
                                IE=500                                  ;INTERRUPT ENABLE AND UNIT - UNIT #1
                                DO=1                                    ;DO - THE FUNCTION
                                R=4000                                  ;REVERSE

                                TCFIRST:        0                       ;FIRST BLOCK TO BE SEARCHED FOR
                                TCLAST: 577.                            ;LAST BLOCK TO BE SEARCHED FOR
                                TCBLK:  0                               ;CURRENT BLOCK FOUND
                                TCEXPE: 0                               ;THE BLOCK THAT IS EXPECTED

                                ;GO TO FORWARD END ZONE
                        FENDZ:  MOV     #FENDZ,@TCIV            ;END ZONE VECTOR SETUP
                                TST     @TCST                   ;TEST FOR END ZONE
                                BMI     FEND1                   ;AT END ZONE?
                                INCB    @TCCM                   ;SET DO - NO DELAY
                                RTI                             ;NO - WAIT SOME MORE
                        FEND1:  MOV     #TCF1,@TCIV             ;YES - NEW VECTOR
                                BIC     #104000,@TCCM           ;SEARCH BLOCK FOWARD
                                MOV     TCFIRST,TCEXPE          ;COUNT WHEN THIS BLOCK IS FOUND
                        TCF1A:  INCB    @TCCM                   ;SET DO
                                RTI                             ;RETURN ON NEXT BLOCK
                        TCF1:   BIT     #100200,@TCCM           ;ANY ERROR ON READ?
                                BGT     .+4
                                HLT                             ;TC ERROR SET - FORWARD READ BLOCK
                                CMP     @TCDT,TCEXPE            ;IS THIS OUR BLOCK FOR SYNC
                                BLT     TCF1A                   ;NO-READ SOME MORE BLOCKS
                                BEQ     TCF2                    ;YES
                                HLT                             ;WE PASSED THE BLOCK

                        TCF2:   MOV     #TCF3,@TCIV             ;VECTOR FOR SEQUENTIAL READS
                                INCB    @TCCM                   ;SET DO
                                RTI                             ;RETURN AND TEST SEQENTIAL BLOCKS

                                ;FIND SEQUENTIAL BLOCK AT FOWARD DIRECTION
                        TCF3:   BIT     #100200,@TCCM           ;TEST ERROR AND READY
                                BGT     .+4
                                HLT                             ;FALSE INTERRUPT ON TC-11
                                CMP     @TCDT,TCLAST            ;HAVE WE TESTED ALL BLOCKS
                                BEQ     RENDZ                   ;YES DRIVE UNIT IN END ZONE TO START OVER
                                INC     TCEXPE                  ;NO-INCREMENT EXPECTED COUNT
                                CMP     @TCDT,TCEXPE            ;IS CURRENT BLOCK CORRECT
                                BEQ     .+4
                                HLT                             ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
```

```
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
```

```
1192  003274  026777  177364  175074          CMP     TCFIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1193  003302  001666                          BEQ     XFEND2          ;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          000100                          .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
```

```
        000011          N=N+1
003456  000011          N                       ;DECTAPE READ/WRITE BUFFER
003460  177767          -N
        000012          N=N+1
003462  000012          N                       ;DECTAPE READ/WRITE BUFFER
003464  177766          -N
        000013          N=N+1
003466  000013          N                       ;DECTAPE READ/WRITE BUFFER
003470  177765          -N
        000014          N=N+1
003472  000014          N                       ;DECTAPE READ/WRITE BUFFER
003474  177764          -N
        000015          N=N+1
003476  000015          N                       ;DECTAPE READ/WRITE BUFFER
003500  177763          -N
        000016          N=N+1
003502  000016          N                       ;DECTAPE READ/WRITE BUFFER
003504  177762          -N
        000017          N=N+1
003506  000017          N                       ;DECTAPE READ/WRITE BUFFER
003510  177761          -N
        000020          N=N+1
003512  000020          N                       ;DECTAPE READ/WRITE BUFFER
003514  177760          -N
        000021          N=N+1
003516  000021          N                       ;DECTAPE READ/WRITE BUFFER
003520  177757          -N
        000022          N=N+1
003522  000022          N                       ;DECTAPE READ/WRITE BUFFER
003524  177756          -N
        000023          N=N+1
003526  000023          N                       ;DECTAPE READ/WRITE BUFFER
003530  177755          -N
        000024          N=N+1
003532  000024          N                       ;DECTAPE READ/WRITE BUFFER
003534  177754          -N
        000025          N=N+1
003536  000025          N                       ;DECTAPE READ/WRITE BUFFER
003540  177753          -N
        000026          N=N+1
003542  000026          N                       ;DECTAPE READ/WRITE BUFFER
003544  177752          -N
        000027          N=N+1
003546  000027          N                       ;DECTAPE READ/WRITE BUFFER
003550  177751          -N
        000030          N=N+1
003552  000030          N                       ;DECTAPE READ/WRITE BUFFER
003554  177750          -N
        000031          N=N+1
003556  000031          N                       ;DECTAPE READ/WRITE BUFFER
003560  177747          -N
        000032          N=N+1
003562  000032          N                       ;DECTAPE READ/WRITE BUFFER
003564  177746          -N
        000033          N=N+1
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
```

```
1416            000101                          N=N+1
1417            000100                          .REPT   100
1418                                            N=N-1
1419                                            -N
1420                                            N               ;DEC TAPE READ/WRITE BUFFER
1421                                            .ENDR
1422            000100                          N=N-1
1423    004016  177700                          -N
1424    004020  000100                          N               ;DEC TAPE READ/WRITE BUFFER
1425            000077                          N=N-1
1426    004022  177701                          -N
1427    004024  000077                          N               ;DEC TAPE READ/WRITE BUFFER
1428            000076                          N=N-1
1429    004026  177702                          -N
1430    004030  000076                          N               ;DEC TAPE READ/WRITE BUFFER
1431            000075                          N=N-1
1432    004032  177703                          -N
1433    004034  000075                          N               ;DEC TAPE READ/WRITE BUFFER
1434            000074                          N=N-1
1435    004036  177704                          -N
1436    004040  000074                          N               ;DEC TAPE READ/WRITE BUFFER
1437            000073                          N=N-1
1438    004042  177705                          -N
1439    004044  000073                          N               ;DEC TAPE READ/WRITE BUFFER
1440            000072                          N=N-1
1441    004046  177706                          -N
1442    004050  000072                          N               ;DEC TAPE READ/WRITE BUFFER
1443            000071                          N=N-1
1444    004052  177707                          -N
1445    004054  000071                          N               ;DEC TAPE READ/WRITE BUFFER
1446            000070                          N=N-1
1447    004056  177710                          -N
1448    004060  000070                          N               ;DEC TAPE READ/WRITE BUFFER
1449            000067                          N=N-1
1450    004062  177711                          -N
1451    004064  000067                          N               ;DEC TAPE READ/WRITE BUFFER
1452            000066                          N=N-1
1453    004066  177712                          -N
1454    004070  000066                          N               ;DEC TAPE READ/WRITE BUFFER
1455            000065                          N=N-1
1456    004072  177713                          -N
1457    004074  000065                          N               ;DEC TAPE READ/WRITE BUFFER
1458            000064                          N=N-1
1459    004076  177714                          -N
1460    004100  000064                          N               ;DEC TAPE READ/WRITE BUFFER
1461            000063                          N=N-1
1462    004102  177715                          -N
1463    004104  000063                          N               ;DEC TAPE READ/WRITE BUFFER
1464            000062                          N=N-1
1465    004106  177716                          -N
1466    004110  000062                          N               ;DEC TAPE READ/WRITE BUFFER
1467            000061                          N=N-1
1468    004112  177717                          -N
1469    004114  000061                          N               ;DEC TAPE READ WRITE BUFFER
1470            000060                          N=N-1
1471    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  004332  177743          -N
1529  004334  000035          N                ;DEC TAPE READ/WRITE BUFFER
1530          000034          N=N-1
1531  004336  177744          -N
1532  004340  000034          N                ;DEC TAPE READ/WRITE BUFFER
1533          000033          N=N-1
1534  004342  177745          -N
1535  004344  000033          N                ;DEC TAPE READ/WRITE BUFFER
1536          000032          N=N-1
1537  004346  177746          -N
1538  004350  000032          N                ;DEC TAPE READ/WRITE BUFFER
1539          000031          N=N-1
1540  004352  177747          -N
1541  004354  000031          N                ;DEC TAPE READ/WRITE BUFFER
1542          000030          N=N-1
1543  004356  177750          -N
1544  004360  000030          N                ;DEC TAPE READ/WRITE BUFFER
1545          000027          N=N-1
1546  004362  177751          -N
1547  004364  000027          N                ;DEC TAPE READ/WRITE BUFFER
1548          000026          N=N-1
1549  004366  177752          -N
1550  004370  000026          N                ;DEC TAPE READ/WRITE BUFFER
1551          000025          N=N-1
1552  004372  177753          -N
1553  004374  000025          N                ;DEC TAPE READ/WRITE BUFFER
1554          000024          N=N-1
1555  004376  177754          -N
1556  004400  000024          N                ;DEC TAPE READ/WRITE BUFFER
1557          000023          N=N-1
1558  004402  177755          -N
1559  004404  000023          N                ;DEC TAPE READ/WRITE BUFFER
1560          000022          N=N-1
1561  004406  177756          -N
1562  004410  000022          N                ;DEC TAPE READ/WRITE BUFFER
1563          000021          N=N-1
1564  004412  177757          -N
1565  004414  000021          N                ;DEC TAPE READ/WRITE BUFFER
1566          000020          N=N-1
1567  004416  177760          -N
1568  004420  000020          N                ;DEC TAPE READ/WRITE BUFFER
1569          000017          N=N-1
1570  004422  177761          -N
1571  004424  000017          N                ;DEC TAPE READ/WRITE BUFFER
1572          000016          N=N-1
1573  004426  177762          -N
1574  004430  000016          N                ;DEC TAPE READ/WRITE BUFFER
1575          000015          N=N-1
1576  004432  177763          -N
1577  004434  000015          N                ;DEC TAPE READ/WRITE BUFFER
1578          000014          N=N-1
1579  004436  177764          -N
1580  004440  000014          N                ;DEC TAPE READ WRITE BUFFER
1581          000013          N=N-1
1582  004442  177765          -N
1583  004444  000013          N                ;DEC TAPE READ/WRITE BUFFER
```

```
                        000012                          N=N-1
                        177766                          -N
004346                  000012                          N               ;DEC TAPE READ/WRITE BUFFER
004350                  000011                          N=N-1
004352                  177767                          -N
004354                  000011                          N               ;DEC TAPE READ/WRITE BUFFER
                        000010                          N=N-1
004356                  177770                          -N
004360                  000010                          N               ;DEC TAPE READ/WRITE BUFFER
                        000007                          N=N-1
004362                  177771                          -N
004364                  000007                          N               ;DEC TAPE READ/WRITE BUFFER
                        000006                          N=N-1
004366                  177772                          -N
004370                  000006                          N               ;DEC TAPE READ/WRITE BUFFER
                        000005                          N=N-1
004372                  177773                          -N
004374                  000005                          N               ;DEC TAPE READ/WRITE BUFFER
                        000004                          N=N-1
004376                  177774                          -N
004400                  000004                          N               ;DEC TAPE READ/WRITE BUFFER
                        000003                          N=N-1
004402                  177775                          -N
004404                  000003                          N               ;DEC TAPE READ/WRITE BUFFER
                        000002                          N=N-1
004406                  177776                          -N
004410                  000002                          N               ;DEC TAPE READ/WRITE BUFFER
                        000001                          N=N-1
004412                  177777                          -N
004414                  000001                          N               ;DEC TAPE READ/WRITE BUFFER

004416  012767  004416  012020  BEGIN:  MOV     #BEGIN,RETURN           ;FOR SCOPING
004424  104400                  SCOPE
004426  012737  004000  016440          MOV     #4000,@#ICOUNT          ;ITERATION COUNT
                        ;TEST COMPARE INSTRUCTION INDEXED
004434  012700  177770                  MOV     #-10.,%0                ;MINUS 10 TO REG 0
004440  026027  016666  125252          CMP     A(0),#125252            ;(A INDEX BY MINUS 10) TO #125252
004446  001401                          BEQ     .+4
004450  104000                          HLT                             ;COMPARE WITH INDEX FAILED
004452  104400                          SCOPE

004454  022760  125252  016666          CMP     #125252,A(0)            ;A INDEXED
004462  001401                          BEQ     .+4
004464  104000                          HLT                             ;COMPARE FAILED DESTINATION INDEX
004466  104400                          SCOPE
                        ;SET "ISR" FOR DISKS AND KW11L TO CURRENT BANK
004470  010700                          MOV     %7,%0                   ;CURRENT BANK
004472  042700  007777                  BIC     #007777,%0              ;LEAVE ONLY BANK BITS
004476  062700  002022                  ADD     #LK3,%0                 ;ADD IN CLOCK ENTRANCE
004502  010037  000100                  MOV     %0,@#100                ;LINE CLOCK, KW11L
004506  042700  007777                  BIC     #007777,%0
004512  062700  002610                  ADD     #IRF,%0
004516  010037  000204                  MOV     %0,@#204                ;RF11 ISR
004522  042700  007777                  BIC     #007777,%0
004526  062700  002512                  ADD     #IRC,%0
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  002416          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                     ;COMPARE FAILED
1663  004646  104400                  SCOPE
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                     ;COMPARE FAILED
1669  004662  104400                  SCOPE
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                     ;COMPARE FAILED
1675  004702  104400                  SCOPE
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                     ;COMPARE FAILED
1682  004722  104400                  SCOPE
1683
1684  004724  026160  016666  016666  CMP     A(1),A(0)
1685  004732  001401                  BEQ     .+4
1686  004734  104000                  HLT                     ;COMPARE FAILED
1687  004736  104400                  SCOPE
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                     ;CMP FAILED
1694  004762  104400                  SCOPE
1695                                ;REGISTER 0 CONTAINS 177774 (-4
```

```
                                                        ;REGISTER 1 CONTAINS 000010
004764  026160  016666  016666          CMP     A(1),A(0)
004772  001401                          BEQ     .+4
004774  104000                          HLT                     ;COMPARE FAILED
004776  104400                          SCOPE
                              ;TEST MOVE ODD BYTE TO REGISTER
                              ;PROBLEM 115023?-7-MAR-72
005000  116700  011677                  MOVB    C+3,%0
005004  022700  000035                  CMP     #35,%0
005010  001401                          BEQ     .+4
005012  104000                          HLT
005014  104400                          SCOPE
                              ;TEST MOVE INSTRUCTION FOR INDEX
005016  012700  177770                  MOV     #-10,%0
005022  016067  016666  011660          MOV     A(0),TEMP
005030  026727  011654  125252          CMP     TEMP,#125252
005036  001401                          BEQ     .+4
005040  104000                          HLT                     ;COMPARE FAILED
005042  104400                          SCOPE

005044  012700  000010                  MOV     #+10,%0
005050  016067  016666  011632          MOV     A(0),TEMP
005056  026727  011626  052525          CMP     TEMP,#052525
005064  001401                          BEQ     .+4
005066  104000                          HLT                     ;MOV FAILED
005070  104400                          SCOPE

005072  012700  177770                  MOV     #-10,%0
005076  012760  125252  016710          MOV     #125252,TEMP(0)
005104  023727  016700  125252          CMP     @#C,#125252
005112  001401                          BEQ     .+4
005114  104000                          HLT                     ;MOV FAILED
005116  104400                          SCOPE

005120  012700  000010                  MOV     #+10,%0
005124  012760  052525  016710          MOV     #052525,TEMP(0)
005132  023727  016720  052525          CMP     @#TEMP+10,#052525
005140  001401                          BEQ     .+4
005142  104000                          HLT                     ;MOV FAILED
005144  104400                          SCOPE

                              ;TEST BIC INSTRUCTION FOR INDEXING
005146  012767  177777  011534          MOV     #-1,TEMP
005154  012700  177770                  MOV     #-10,%0
005160  046067  016666  011522          BIC     A(0),TEMP
005166  026727  011516  052525          CMP     TEMP,#052525
005174  001401                          BEQ     .+4
005176  104000                          HLT                     ;BIC FAILED
005200  104400                          SCOPE

005202  012767  177777  011500          MOV     #-1,TEMP
005210  012700  000010                  MOV     #10,%0
005214  046067  016666  011466          BIC     A(0),TEMP
005222  026727  011462  125252          CMP     TEMP,#125252
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
 1795  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  006764  012700  177770            MOV     #-10,%0
1865  006770  005460  016720            NEG     D(0)
1866  006774  022737  177777  016710    CMP     #-1,@#TEMP
1867  007002  001401                    BEQ     .+4
1868  007004  104000                    HLT                             ;NEG FAILED
1869  007006  104400                    SCOPE
1870
1871  007010  012737  000001  016710    MOV     #1,@#TEMP
1872  007016  012700  000010            MOV     #+10,%0
1873  007022  005460  016700            NEG     C(0)
1874  007026  022737  177777  016710    CMP     #-1,@#TEMP
1875  007034  001401                    BEQ     .+4
1876  007036  104000                    HLT                             ;NEG FAILED
1877  007040  104400                    SCOPE
1878
1879  007042  012737  177777  016710    MOV     #-1,@#TEMP
1880  007050  012700  177770            MOV     #-10,%0
1881  007054  000261                    SEC
1882  007056  005560  016720            ADC     D(0)
1883  007062  005737  016710            TST     @#TEMP
1884  007066  001401                    BEQ     .+4
1885  007070  104000                    HLT                             ;ADC FAILED
1886  007072  104400                    SCOPE
1887
1888  007074  012737  177777  016710    MOV     #-1,@#TEMP
1889  007102  012700  000010            MOV     #+10,%0
1890  007106  000261                    SEC
1891  007110  005560  016700            ADC     C(0)
1892  007114  005737  016710            TST     @#TEMP
1893  007120  001401                    BEQ     .+4
1894  007122  104000                    HLT                             ;ADC FAILED
1895  007124  104400                    SCOPE
1896
1897  007126  012737  000001  016710    MOV     #1,@#TEMP
1898  007134  012700  177770            MOV     #-10,%0
1899  007140  000261                    SEC
1900  007142  005660  016720            SBC     D(0)
1901  007146  005737  016710            TST     @#TEMP
1902  007152  001401                    BEQ     .+4
1903  007154  104000                    HLT                             ;SBC FAILED
1904  007156  104400                    SCOPE
1905
1906  007160  012737  000001  016710    MOV     #1,@#TEMP
1907  007166  012700  000010            MOV     #+10,%0
1908  007172  000261                    SEC
1909  007174  005660  016700            SBC     C(0)
1910  007200  005737  016710            TST     @#TEMP
1911  007204  001401                    BEQ     .+4
1912  007206  104000                    HLT                             ;SBC FAILED
1913  007210  104400                    SCOPE
1914
1915                          ;TEST JMP INDIRECT
1916  007212  010700                    MOV     %7,%0
1917  007214  062700  000010            ADD     #10,%0
1918  007220  000110                    JMP     @%0
1919  007222  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     @#8,#125252
1936  006262  001401                          BEQ     .+4
1937  006264  104000                          HLT                             ;CMP FAILED
1938  006266  104400                          SCOPE
1939
1940  006270  022737  125252  016656          CMP     #125252,@#8
1941  006276  001401                          BEQ     .+4
1942  006300  104000                          HLT                             ;CMP FAILED
1943  006302  104400                          SCOPE
1944
1945  006304  023737  016656  016656          CMP     @#8,@#8
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     @#8,%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     @#8,@#TEMP
 2072  007044  001401                    BEQ     .+4
 2073  007046  104000                    HLT                             ;MOV FAILED
 2074  007050  104400                    SCOPE
 2075
 2076  007052  017777  007602  007622    MOV     @8+2,@C+2
 2077  007060  023737  016656  016700    CMP     @#8,@#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     @8+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     @8+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     @8+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     8,@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     @8+2,@TEMP+2
 2119  007256  005737  016710            TST     @#TEMP
 2120  007262  001401                    BEQ     .+4
```

```
2131  007264  104000                          HLT                     ;SUB FAILED
2132  007266  104400                          SCOPE
2133
2134                                  ;TEST ADD INDIRECT WITH INDEXING
2135  007270  005000                          CLR     X0
2136  007272  062700  007362                  ADD     @#.+2,X0
2137  007276  027700  125252                  CMP     #125252,X0
2138  007302  001401                          BEQ     .+4
2139  007304  104000                          HLT                     ;ADD FAILED
2140  007306  104400                          SCOPE
2141
2142  007310  005037  016710                  CLR     @#TEMP
2143  007314  062777  125252  007370          ADD     #125252,TEMP+2
2144  007322  027737  125252  016710          CMP     #125252,@#TEMP
2145  007330  001401                          BEQ     .+4
2146  007332  104000                          HLT                     ;ADD FAILED
2147  007334  104400                          SCOPE
2148  007336  012737  125252  016710          MOV     #125252,@#TEMP
2149  007344  062777  007344  007340          ADD     2A+6,TEMP+2
2150  007352  023727  016710  177777          CMP     @#TEMP,#-1
2151  007360  001401                          BEQ     .+4
2152  007362  104000                          HLT                     ;ADD FAILED
2153  007364  104400                          SCOPE
2154
2155                                  ;TEST UNARYS INDIRECT WITH INDEXING
2156  007366  012737  177777  016710          MOV     #-1,@#TEMP
2157  007374  005077  007312                  CLR     TEMP+2
2158  007400  005737  016710                  TST     @#TEMP
2159  007404  001401                          BEQ     .+4
2160  007406  104000                          HLT                     ;TST FAILED
2161  007410  104400                          SCOPE
2162
2163  007412  012737  125252  016710          MOV     #125252,@#TEMP
2164  007420  005177  007266                  COM     TEMP+2
2165  007424  022737  052525  016710          CMP     #052525,@#TEMP
2166  007432  001401                          BEQ     .+4
2167  007434  104000                          HLT                     ;COM FAILED
2168  007436  104400                          SCOPE
2169
2170  007440  005037  016710                  CLR     @#TEMP
2171  007444  005277  007242                  INC     @TEMP+2
2172  007450  022737  000001  016710          CMP     #1,@#TEMP
2173  007456  001401                          BEQ     .+4
2174  007460  104000                          HLT                     ;INC FAILED
2175  007462  104400                          SCOPE
2176
2177  007464  005037  016710                  CLR     @#TEMP
2178  007470  005377  007216                  DEC     @TEMP+2
2179  007474  023727  016710  177777          CMP     @#TEMP,#-1
2180  007502  001401                          BEQ     .+4
2181  007504  104000                          HLT                     ;DEC FAILED
2182  007506  104400                          SCOPE
2183
2184  007510  012737  000001  016710          MOV     #1,@#TEMP
2185  007516  005477  007170                  NEG     @TEMP+2
2186  007522  022737  177777  016710          CMP     #-1,@#TEMP
```

```
2177   007630  001401                          BEQ     .+4
2178   007632  104000                          HLT                             ;NEG FAILED
2179   007634  104400                          SCOPE
2180
2181   007636  012737  177777  016710          MOV     #-1,@#TEMP
2182   007644  000261                          SEC
2183   007646  005577  007140                  ADC     @TEMP+2
2184   007652  005737  016710                  TST     @#TEMP
2185   007656  001401                          BEQ     .+4
2186   007660  104000                          HLT                             ;ADC FAILED
2187   007662  104400                          SCOPE
2188
2189   007664  012737  000001  016710          MOV     #1,@#TEMP
2190   007672  000261                          SEC
2191   007674  005677  007112                  SBC     @TEMP+2
2192   007700  005737  016710                  TST     @#TEMP
2193   007704  001401                          BEQ     .+4
2194   007706  104000                          HLT                             ;SBC FAILED
2195   007710  104400                          SCOPE
2196
2197                                  ;TEST OF COMBINED INDEXING AND INDIRECT
2198   007712  012700  177772                  MOV     #-6,%0
2199   007716  027027  016666  125252          CMP     @A(0),#125252
2200   007724  001401                          BEQ     .+4
2201   007726  104000                          HLT                             ;CMP FAILED
2202   007730  104400                          SCOPE
2203
2204   007732  012700  177772                  MOV     #-6,%0
2205   007736  022770  125252  016666          CMP     #125252,@A(0)
2206   007744  001401                          BEQ     .+4
2207   007746  104000                          HLT                             ;CMP FAILED
2208   007750  104400                          SCOPE
2209
2210   007752  012700  177772                  MOV     #-6,%0
2211   007756  012701  000002                  MOV     #+2,%1
2212   007762  027071  016666  016666          CMP     @A(0),@A 1)
2213   007770  001401                          BEQ     .+4
2214   007772  104000                          HLT                             ;CMP FAILED
2215   007774  104400                          SCOPE
2216
2217                                  ;TEST BIC INSTRUCTION
2218   007776  012700  000006                  MOV     #+6,%0
2219   008002  012767  177777  007000          MOV     #-1,TEMP
2220   008010  047067  016666  006772          BIC     @A(0),TEMP
2221   008016  022767  125252  006764          CMP     #125252,TEMP
2222   008024  001401                          BEQ     .+4
2223   008026  104000                          HLT                             ;BIC FAILED
2224   008030  104400                          SCOPE
2225
2226   008032  012700  177772                  MOV     #-6,%0
2227   008036  012737  177777  016700          MOV     #-1,@#C
2228   008044  042770  125252  016710          BIC     #125252,@TEMP(0)
2229   008052  023727  016700  052525          CMP     @#C,#052525
2230   008060  001401                          BEQ     .+4
2231   008062  104000                          HLT                             ;BIC FAILED
2232   008064  104400                          SCOPE
```

```
2233  010116  012737  177777  016700          MOV     #-1,@#C
2234  010124  012700  177772                  MOV     #-6,%0
2235  010130  012701  177772                  MOV     #-6,%1
2236  010134  040701  016666  016710          BIC     @A(0),@TEMP(1)
2237  010142  022737  052525  016700          CMP     #052525,@#C
2238  010150  001401                          BEQ     .+4
2239  010152  104000                          HLT                             ;BIC FAILED
2240  010154  104400                          SCOPE
2241
2242  010156  122727  000000  000001          CMPB    #0,#1           ;T7 FIX
2243  010164  002401                          BLT     .+4
2244  010166  104000                          HLT                             ;CMPB FAILED
2245  010170  104400                          SCOPE
2246                          ;TEST COMPARE INSTRUCTION INDEXED
2247  010172  012700  177770                  MOV     #-10,,0                 ;MINUS 10 TO REG 0
2248  010176  126027  016666  000252          CMPB    A(0),#000252            ;(A INDEX BY MINUS 10) TO #125252
2249  010204  001401                          BEQ     .+4
2250  010206  104000                          HLT                             ;COMPARE WITH INDEX FAILED
2251  010210  104400                          SCOPE
2252
2253  010212  012700  177770                  MOV     #-10,%0                 ;FOR INDEX
2254  010216  122760  000252  016666          CMPB    #000252,A(0)            ;A INDEXED
2255  010224  001401                          BEQ     .+4
2256  010226  104000                          HLT                             ;CMPB FAILED
2257  010230  104400                          SCOPE
2258
2259  010232  012700  000010                  MOV     #10,%0                  ;INDEX
2260  010236  126027  016666  000125          CMPB    A(0),#000125
2261  010244  001401                          BEQ     .+4
2262  010246  104000                          HLT                             ;CMPB FAILED
2263  010250  104400                          SCOPE
2264
2265  010252  012700  000010                  MOV     #10,%0
2266  010256  122760  000125  016666          CMPB    #000125,A(0
2267  010264  001401                          BEQ     .+4
2268  010266  104000                          HLT                             ;CMPB FAILED
2269  010270  104400                          SCOPE
2270
2271  010272  012700  177770                  MOV     #-10,%0
2272  010276  126060  016666  016666          CMPB    A(0),A(0)
2273  010304  001401                          BEQ     +4
2274  010306  104000                          HLT                             ;CMPB FAILED
2275  010310  104400                          SCOPE
2276
2277  010312  012700  000010                  MOV     #+10,%0
2278  010316  126060  016666  016666          CMPB    A(0),A(0)
2279  010324  001401                          BEQ     .+4
2280  010326  104000                          HLT                             ;CMPB FAILED
2281  010330  104400                          SCOPE
2282
2283  010332  012700  177770                  MOV     #-10,%0
2284  010336  012701  000004                  MOV     #+4,%1
2285  010342  126061  016666  016666          CMPB    A(0),A(1)
2286  010350  001401                          BEQ     .+4
2287  010352  104000                          HLT                             ;CMPB FAILED
2288  010354  104400                          SCOPE
```

```
2299
2300  010324  126160  016666  016666          CMPB    A(1),A(0)
2301  010332  001401                          BEQ     .+4
2302  010334  104000                          HLT                             ;CMPB FAILED
2303  010340  104400                          SCOPE
2304
2305  010342  012700  177774                  MOV     #-4,%0
2306  010346  012701  000010                  MOV     #+10,%1
2307  010352  126061  016666  016666          CMPB    A(0),A(1)
2308  010360  001401                          BEQ     .+4
2309  010362  104000                          HLT                             ;CMPB FAILED
2310  010364  104400                          SCOPE
2311
2312  010366  012700  177774                  MOV     #-4,%0
2313  010372  012701  000010                  MOV     #10,%1
2314  010376  126160  016666  016666          CMPB    A(1),A(0)
2315  010404  001401                          BEQ     .+4
2316  010406  104000                          HLT                             ;CMPB FAILED
2317  010410  104400                          SCOPE
2318                              ;TEST MOVE INSTRUCTION FOR INDEX
2319
2320  010412  012700  177770                  MOV     #-10,%0
2321  010416  116067  016666  006364          MOVB    A(0),TEMP
2322  010424  126727  006360  000252          CMPB    TEMP,#000252
2323  010432  001401                          BEQ     .+4
2324  010434  104000                          HLT                             ;MOVB FAILED
2325  010436  104400                          SCOPE
2326
2327  010440  012700  000010                  MOV     #+10,%0
2328  010444  116067  016666  006336          MOVB    A(0),TEMP
2329  010452  126727  006332  000125          CMPB    TEMP,#000125
2330  010460  001401                          BEQ     .+4
2331  010462  104000                          HLT                             ;MOVB FAILED
2332  010464  104400                          SCOPE
2333
2334  010466  012700  177770                  MOV     #-10,%0
2335  010472  112760  125252  016710          MOVB    #125252,TEMP(0)
2336  010500  123727  016700  125252          CMPB    @#C,#125252
2337  010506  001401                          BEQ     .+4
2338  010510  104000                          HLT                             ;MOVB FAILED
2339  010512  104400                          SCOPE
2340
2341  010514  012700  000010                  MOV     #+10,%0
2342  010520  112760  052525  016710          MOVB    #052525,TEMP(0)
2343  010526  123727  016720  052525          CMPB    @#TEMP+10,#052525
2344  010534  001401                          BEQ     .+4
2345  010536  104000                          HLT                             ;MOVB FAILED
2346  010540  104400                          SCOPE
2347
2348                              ;TEST BIC INSTRUCTION FOR INDEXING
2349  010542  012767  177777  006240          MOV     #-1,TEMP
2350  010550  012700  177770                  MOV     #-10,%0
2351  010554  146067  016666  006226          BICB    A(0),TEMP
2352  010562  126727  006222  177525          CMPB    TEMP,#177525
2353  010570  001401                          BEQ     .+4
2354  010572  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    0(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    0(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    0(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    0(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    0(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    @#8,#000252
2509  011470  001401                          BEQ     .+4
2510  011472  104000                          HLT                             ;CMPB FAILED
2511  011474  104400                          SCOPE
2512
```

```
 2513  011476  123727  016657  000252          CMPB    @#8+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,@#8
 2520  011520  001401                          BEQ     .+4
 2521  011522  104000                          HLT                             ;CMPB FAILED
 2522  011524  104400                          SCOPE
 2523
 2524  011526  123737  016656  016656          CMPB    @#8,@#8
 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    @#8,%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    8,@#TEMP
 2538  011574  001401                          BEQ     .+4
 2539  011576  104000                          HLT                             ;MOVB FAILED
 2540  011600  104400                          SCOPE
 2541
 2542  011602  113737  016656  016700          MOVB    @#8,@#C
 2543  011610  126737  005042  016700          CMPB    8,@#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
```

```
                                ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
012156  012700  177777          MOV     #-1,%0
012162  147700  004472          BICB    @#+2,%0
012166  120027  052525          CMPB    %0,#52525
012172  001401                  BEQ     .+4
012174  104000                  HLT                             ;BICB FAILED
012176  104400                  SCOPE

012200  012737  177777  016710  MOV     #-1,@#TEMP
012206  147777  125252  004476  BICB    #125252,@TEMP+2
012214  122737  052525  016710  CMPB    #52525,@#TEMP
012222  001401                  BEQ     .+4
012224  104000                  HLT                             ;BICB FAILED
012226  104400                  SCOPE

012230  012737  177777  016700  MOV     #-1,@#C
012236  147777  004416  004436  BICB    @#+2,@C+2
012244  126737  004426  016700  CMPB    A+10,@#C
012252  001401                  BEQ     .+4
012254  104000                  HLT                             ;BICB FAILED
012256  104400                  SCOPE
                                ;TEST UNARYS INDIRECT WITH INDEXING
012260  012737  177777  016710  MOV     #-1,@#TEMP
012266  105077  004420          CLRB    @TEMP+2
012272  105737  016710          TSTB    @#TEMP
012276  001401                  BEQ     .+4
012300  104000                  HLT                             ;CLRB FAILED
012302  104400                  SCOPE

012304  012737  125252  016710  MOV     #125252,@#TEMP
012312  105177  004374          COMB    @TEMP+2
012316  122737  052525  016710  CMPB    #052525,@#TEMP
012324  001401                  BEQ     .+4
012326  104000                  HLT                             ;COMB FAILED
012330  104400                  SCOPE

012332  005037  016710          CLR     @#TEMP
012336  105277  004350          INCB    @TEMP+2
012342  122737  000001  016710  CMPB    #1,@#TEMP
012350  001401                  BEQ     .+4
012352  104000                  HLT                             ;INCB FAILED
012354  104400                  SCOPE

012356  005037  016710          CLR     @#TEMP
012362  105377  004324          DECB    @TEMP+2
012366  123727  016710  177777  CMPB    @#TEMP,#-1
012374  001401                  BEQ     .+4
012376  104000                  HLT                             ;DECB FAILED
012400  104400                  SCOPE

012402  012737  000001  016710  MOV     #1,@#TEMP
012410  105477  004276          NEGB    @TEMP+2
012414  122737  177777  016710  CMPB    #-1,@#TEMP
012422  001401                  BEQ     .+4
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          JSB     %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
```

```
                013330  104000                  HLT                     ;ROTATE ODD BYTE FAILED
                013332  104400                  SCOPE
                013334  000257                  CCC                     ;CLEAR C
                013336  012767  177777  003344  MOV     #-1,TEMP
                013344  106267  003341          ASRB    TEMP+1
                013350  103401                  BCS     .+4
                013352  104000                  HLT                     ;C NOT SET
                013354  102001                  BVC     .+4
                013356  104000                  HLT                     ;V NOT CLEARED
                013360  026727  003324  177777  CMP     TEMP,#-1
                013366  001401                  BEQ     .+4
                013370  104000                  HLT                     ;SHIFT FAILED
                013372  104400                  SCOPE
                013374  000277                  SCC
                013376  012767  177777  003304  MOV     #-1,TEMP
                013404  106367  003301          ASLB    TEMP+1
                013410  103401                  BCS     .+4
                013412  104000                  HLT                     ;C NOT SET
                013414  102001                  BVC     .+4
                013416  104000                  HLT                     ;V NOT CLEARED
                013420  026727  003264  177377  CMP     TEMP,#177377
                013426  001401                  BEQ     .+4
                013430  104000                  HLT                     ;SHIFT BYTE FAILED
                013432  104400                  SCOPE
                                        ;TEST COMBINATION OF N, C AND V
                                        .MACR   TNCV
                                        BPL     .+12
                                        BCC     .+10
                                        BVC     .+30                    ;Z=1
                                        HLT                             ;Z=1, C=1
                                        BR      .+24                    ;Z=C, BUT V=1
                                        BCC     .+16                    ;Z=0
                                        BVS     .+20                    ;Z=0, C=1
                                        HLT                             ;Z NOT EQUAL C, V=1
                                        BR      .+14                    ;Z=1, C=0
                                        BVS     .+12                    ;Z NOT EQUAL C, V=1
                                        HLT
                                        BR      .+6                     ;Z=0, C=0
                                        BVC     .+4                     ;Z=C, BUT V=1
                                        HLT
                                        SCOPE
                                        .ENDM
                013434  005037  016440          CLR     @#ICOUNT                ;NO ITERATION

                                        ;TEST ROTATING NUMBERS
                013440  104400                  SCOPE
                013442  012767  177777  000142  MOV     #-1,REFF                ;INITIALIZE BASE NUMBER
                013450  005267  000136  TSROT:  INC     REFF                    ;INCREMENT NUMBER
                013454  004767  000012          JSR     %7,ROTALL               ;GO TO COMPARE ROUTINE
                013460  026727  000126  100077  CMP     REFF,#100077            ;TEST ALL VALUES
                013466  001370                  BNE     TSROT                   ;NO TEST THEM ALL
                013470  000452                  BR      TSRT2A                  ;WE ARE DONE

                013472  016767  000114  000114  ROTALL: MOV     REFF,TEST
```

```
                                        ROL     TEST
                                        TNCV
                                        BPL     .+12
                                        BCC     .+20            ;Z=1
                                        BVC     .+30            ;Z=1, C=1
                                        HLT                     ;Z=C, BUT V=1
                                        BR      .+24
                                        BCC     .+16            ;Z=0
                                        BVS     .+20            ;Z=0, C=1
                                        HLT                     ;Z NOT EQUAL C, V=1
                                        BR      .+14
                                        BVS     .+12            ;Z=1, C=0
                                        HLT                     ;Z NOT EQUAL C, V=1
                                        BR      .+6
                                        BVC     .+4             ;Z=0, C=0
                                        HLT                     ;Z=C, BUT V=1
                                        SCOPE
013576  026767  000012  000006          CMP     TEST,REFF
013604  001401                          BEQ     .+4
013606  104000                          HLT                     ;INITIAL NOT EQUAL TO FINAL
013610  000207                          RTS     %7              ;ROTATE WORD FAILED
013612  000000                  REFF:   0                       ;GOOD DATA
013614  000000                  TEST:   0                       ;BAD DATA
        013612                          REF=REFF
                                ;TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS
013616  012767  177777  177766  TSRT2A: MOV     #-1,REFF
013624  005267  177762          TSROT2: INC     REFF
013630  004767  000016                  JSR     %7,ROTBE
013634  004767  000122                  JSR     %7,ROTBO
013640  022767  177777  177744          CMP     #-1,REFF
013646  001366                          BNE     TSROT2
013650  000505                          BR      ROTEN1
013652  016767  177734  177734  ROTBE:  MOV     REFF,TEST
013660  106067  177730                  RORB    TEST            ;ROTATE BYTE EVEN
013664  106067  177724                  RORB    TEST
013670  106067  177720                  RORB    TEST
013674  106167  177714                  ROLB    TEST
013700  106167  177710                  ROLB    TEST
013704  106167  177704                  ROLB    TEST
013710                                  TNCV
013710  100004                          BPL     .+12
013712  103007                          BCC     .+20            ;Z=1
013714  102013                          BVC     .+30            ;Z=1, C=1
013716  104000                          HLT                     ;Z=C, BUT V=1
013720  000411                          BR      .+24
013722  103006                          BCC     .+16            ;Z=0
013724  102407                          BVS     .+20            ;Z=0, C=1
013726  104000                          HLT                     ;Z NOT EQUAL C, V=1
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  000252                          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 OCD
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     @X6,NUMA
  3005  014104  012767  000001  177500          MOV     #1,REF
  3006  014112  005267  177474          ARITST: INC     REF
```

```
3007  014116  004767  000014            ISB     %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  026227  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  012716  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  000502                  JMP     @#START
3275  015550  000000          TRPB:   0
3276  015552  000002          YESRT:  RTI                                     ;RETURN TO PROGRAM FROM TRAP - CAN BE AN RT
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
      015626  024646                  CMP     -(6),-(6)               ;REPOSITION THE STACK
3294  015630  042767  000140  162140  BIC     #140,STATUS
      015636  105777  000220          TSTB    @TCSR           ;WAIT FOR FLAG
      015642  100375                  BPL     .-4
      015644  012777  000215  000206  MOV     #215,@TDBR      ;FILLER CHARACTER.
      015652  105777  000204          TSTB    @TCSR
      015656  100375                  BPL     .-4
      015660  012777  000212  000172  MOV     #212,@TDBR              ;LINE FEED
      015666  105777  000170          TSTB    @TCSR
      015672  100375                  BPL     .-4
      015674  010267  000152          MOV     %2,SAVR2                ;SAVE R2
      015700  010367  000150          MOV     %3,SAVR3                ;SAVE R3
      015704  010467  000146          MOV     %4,SAVR4                ;SAVE R4
      015710  016702  000150          MOV     SAVPC,%2
      015714  004767  000150          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
      015720  012777  000240  000132  MOV     #240,@TDBR
      015726  105777  000130          TSTB    @TCSR                   ;SPACE BETWEEN WORDS
      015732  100375                  BPL     .-4
      015734  016702  000126          MOV     SAVCC,%2
      015740  004767  000124          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
      015744  012777  000240  000106  MOV     #240,@TDBR
      015752  105777  000104          TSTB    @TCSR
      015756  100375                  BPL     .-4
      015760  016702  000460          MOV     RETURN,%2               ;WHERE CPU TEST IS AT
      015764  004767  000100          JSR     %7,PRTAB
      015770  016702  000056          MOV     SAVR2,%2                ;RESTORE REGISTERS
      015774  016703  000054          MOV     SAVR3,%3
      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  162432          JMP     START                   ;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
3360  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
```

```
                                        MOV     @AC,(%0)+
                                        MOV     @MQ,(%0)+
                                        MOV     @SC,(%0)+
                                        MOV     %0,-(%6)
                                        MOV     %6,SAVR6                ;STORE STACK POSITION, POWER FAIL FLAG
                                        MOV     @#RESTART,24
                                        HALT                            ;HALT ON POWER DOWN NORMAL
                                SAVR6:  0                               ;STACK IS SAVED HERE
                                HAC:    0
                                HMQ:    0
                                HSC:    0
                                RESTART:        MOV     SAVR6,%6        ;RESTORE REGISTER OFF STACK
                                        MOV     (%6)+,%0
                                        MOV     -(%0),@SC
                                        MOV     -(%0),@MQ               ;MQ MUST BE LOADED BEFORE AC
                                        MOV     -(%0),@AC
                                        CLR     @#6                     ;RESTORE TIME OUT
                                        MOV     (6)+,24                 ;WHEN POWERING UP
                                        MOV     (6)+,%5
                                        MOV     (6)+,%4
                                        MOV     (6)+,%3
                                        MOV     (6)+,%2
                                        MOV     (6)+,%1
                                        MOV     (6)+,%0
                                        CLR     @#SAVR6
                                        HLT                             ;POWER FAIL OCCURRED
                                        RTI                             ;RETURN TO MAIN LINE
                                B:      125252
                                ;FIXED VALUES FOR USE IN TEST
                                        B                       ;ADDRESS OF B
                                        052525

                                .=B+10
                                A:      -1
                                        A+4

                                .=A+4
                                        125252
                                        A+10                    ;ADDRESS OF A+10
                                        052525
                                ;FOR STORAGE
                                C:      0
                                        C                       ;ADDRESS OF C

                                .=C+10
                                TEMP:   0
                                        TEMP                    ;ADDRESS OF TEMP

                                .=TEMP+6
                                        TEMP+10                 ;ADDRESS OF TEMP+10 OR "D"
                                D:      0
                                .=.+40
                                FIN:    0                       ;BUFFER FOR SP
                                USER:   RTS     %7              ;OVERLAY USER ROUTINE HERE IF 4KW, USE BANK1 IF 8KW
                                ;PDP-11 MEMORY DETERMINATION AND SETUP
                                ;USE WITH VARIABLE CORE QUANTITY SYSTEMS
```

```
                016766                          .=FIN + 4               ;APPLICABLE TO SYSTEM TEST 2:
016766  016767  016767  000416  176564  DET1:   MOV     @#BEGIN,TRP0+2
016772  016773  016767  000401  176346          MOV     #401,SRPBEL     ;BR .+4
017000  017001  004767  000416                  JSR     %7,MAMF
017004  017005  027767  000042  016766          CMP     #42,#DET1       ;CHECK FOR DOP1
017012  017013  103401                          BLOS    .+4
017014  017015  000207                          RTS     %7              ;NO CORE EXPANSION WITH DOP1
017016  017017  032777  001000  161146          BIT     #1000,@SRPTR    ;CHECK VARIABLE CORE SWITCH
017024  017025  001401                          BEQ     DET4            ;USE VARIABLE CORE ROUTINE
017026  017027  000207                          RTS     %7              ;4K ONLY
017030  017031  012767  017100  160744  DET4:   MOV     #DET2,4         ;TRAP VECTOR SETUP
017036  017037  012767  000340  160740          MOV     #340,6          ;TRAP STATUS SETUP
017044  017045  026527  037770          EIGHT:  BIT     @#37770         ;CHECK FOR 8K
017052  017053  026527  057770          TWELVE: BIT     @#57770         ;CHECK FOR 12K
017060  017061  026527  077770          SXTEEN: BIT     @#077770        ;CHECK FOR 16K
017066  017067  026527  117770          TWENTY: BIT     @#117770        ;CHECK FOR 20K
017074  017075  026527  137770          TWOFOR: BIT     @#137770        ;CHECK FOR 24K
017102  017103  026527  157770          TWOEIG: BIT     @#157770        ;CHECK FOR 28K
017110  017111  000430                          BR      STRT28
017112  017113  016502          DET2:   MOV     (6)+,%2                 ;RETRIEVE TRAP PC
017114  017115  005726                  TST     (6)+                    ;DISCARD TRAP STATUS WORD
017116  017117  022702  017052          CMP     @EIGHT+4,%2
017122  017123  001543                  BEQ     DET3                    ;4K
017124  017125  022702  017056          CMP     @TWELVE+4,%2
017132  017133  001437                  BEQ     STRT8                   ;8K
017134  017135  022702  017062          CMP     @SXTEEN+4,%2
017142  017143  001431                  BEQ     STRT12                  ;12K
017144  017145  022702  017066          CMP     @TWENTY+4,%2
017152  017153  001423                  BEQ     STRT16                  ;16K
017154  017155  022702  017072          CMP     @TWOFOR+4,%2
017162  017163  001415                  BEQ     STRT20                  ;20K
017164  017165  000411                  BR      STRT24                  ;24K
017166  017167  005000          MOVE:   CLR     %0                      ;SET UP MAIN CORE CURRENT
017170  017171  012021                  MOV     (0)+,(1)+               ;MOVE WORD
017172  017173  020027  016764          CMP     %0,@#FIN+2              ;MOVE COMPLETE?
017176  017177  001374                  BNE     .-6                     ;MOVE ANOTHER WORD
017200  017201  000207                  RTS     %7                      ;MOVE COMPLETE
017202  017203  004767  000040  STRT28: JSR     %7,XFER28               ;START 28K TRANSFER
017206  017207  000450                  BR      MOD24                   ;START 24K MODIFY
017210  017211  004767  000042  STRT24: JSR     %7,XFER24               ;START 24K TRANSFER
017214  017215  000453                  BR      MOD20                   ;START 20K MODIFY
017216  017217  004767  000044  STRT20: JSR     %7,XFER20               ;START 20K TRANSFER
017222  017223  000456                  BR      MOD16                   ;START 16K MODIFY
017224  017225  004767  000046  STRT16: JSR     %7,XFER16               ;START 16K TRANSFER
017230  017231  000461                  BR      MOD12                   ;START 12K MODIFY
017232  017233  004767  000050  STRT12: JSR     %7,XFER12               ;START 12K TRANSFER
017236  017237  000464                  BR      MOD8                    ;START 8K MODIFY
017240  017241  004767  000052  STRT8:  JSR     %7,XFER8                ;START 8K TRANSFER
017244  017245  000467                  BR      MOD4                    ;START 4K MODIFY
017246  017247  012701  140000  XFER28: MOV     #140000,%1              ;SET UP MOVE START LOCATION
017252  017253  004767  177710          JSR     %7,MOVE                 ;GO TO MOVE SUBROUTINE
017256  017257  012701  120000  XFER24: MOV     #120000,%1
017262  017263  004767  177700          JSR     %7,MOVE
017266  017267  012701  100000  XFER20: MOV     #100000,%1
017272  017273  004767  177670          JSR     %7,MOVE
017276  017277  012701  060000  XFER16: MOV     #60000,%1
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017756  004737  177760                  JSR     %7,MOVE
017762  012701  040000          XFER12: MOV     #40000,%1
017766  004737  177750                  JSR     %7,MOVE
017772  012701  020000          XFER8:  MOV     #20000,%1
017776  004737  177640                  JSR     %7,MOVE
020002  000207                          RTS     %7              ;RETURN FROM TRANSFERS
020004  012767  144424  116244  MOD24:  MOV     #BEGIN+140006,TRPA+120002
020012  012767  000240  116236          MOV     #NOP,SKIPEL+120000
020020  012767  124424  076230  MOD20:  MOV     #BEGIN+120006,TRPA+100002
020026  012767  000240  076212          MOV     #NOP,SKIPEL+100000
020034  012767  104424  057214  MOD16:  MOV     #BEGIN+100006,TRPA+60002
020042  012767  000240  057176          MOV     #NOP,SKIPEL+60000
020050  012767  064424  036200  MOD12:  MOV     #BEGIN+60006,TRPA+40002
020056  012767  000240  035762          MOV     #NOP,SKIPEL+40000
020064  012767  044424  016164  MOD8:   MOV     #BEGIN+40006,TRPA+20002
020072  012767  000240  015746          MOV     #NOP,SKIPEL+20000
020100  012767  024424  177150  MOD4:   MOV     #BEGIN+20006,TRPA+2
020106  012767  000240  177132          MOV     #NOP,SKIPEL
020114  000207                  DET3:   RTS     %7              ;RETURN FROM MODIFY
                                ;ROUTINE TO SET ACTION ENABLE ON MA/MF PARITY MEMORIES
                                ;CALL:  JSR     PC,.MAMF

                        172100          PARCSR= 172100          ;ADDRESS OF FIRST MA/MF PA
                        000114          PE VEC= 114             ;ADDRESS OF PARITY INTERRL
                        000004          ERRVEC=4
                        000000          R0=%0
                        000006          SP=%6
                        000002          R2=%2
                        000007          PC=%7

020120  012737  000006  000004  .MAMF:  MOV     @#ERRVEC+2,@#ERRVEC
020126  012737  000002  000006          MOV     #RTI,@#ERRVEC+2
020134  012700  172100                  MOV     #PARCSR,R0      ;GET FIRST CSR ADDRESS
020140  012702  000001                  MOV     #1,R2

                                                                ;SET TIME OUT INDICATOR
020144  012720  000001          1$:     MOV     #1,(R0)+        ;SET ACTION ENABLE IF AVAI
                                                                ;BRANCH IF CSR NOT AVAILAB
020150  006302                          ASL     R2              ;SHIFT AVAILABILITY INDICA
020152  103374                          BCC     1$
020154  000207                          RTS     PC
020156  104000          .PARSRV:HLT                             ;PARITY ERROR
020160  000137  000502                  JMP     @#START
                        000001          .END
```

```
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  2685  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#
ARITEN  014200  3010  3021#
ARITST  014112  3006#  3009
ASCNT   016350  3344*  3368*  3375*  3379*  3390#
ASH     000340   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  3320  3322#
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#
EXPRIN  016050  3329  3331#
F       =000000  1102#
FENCZ   002674   670  863  1113#  1148
```

```
FEND1   002716          1115    1118#
FIN     016762           586    3339    3490#   3494    3528
H2C     016572          3437    3446#
HDFMM   016326          3380    3382#
HLT   = 104000           502#    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    1945    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    2128    2136    2142    2150    2157    2164    2171    2178    2186
                        2194    2201    2207    2214    2223    2231    2238    2244    2250    2256    2262    2268    2274
                        2280    2287    2293    2299    2306    2314    2321    2328    2335    2344    2352    2360    2368
                        2377    2385    2393    2401    2409    2417    2424    2431    2439    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    2658    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    2963    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     834*    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#
LPI     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#
LP80    =  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#
                       1606    1607   1608#  1609   1610   1611#  1612   1613
NOERR      000472       753#    804
NOP     =  000240       581#   3129#  3557   3559   3561   3563   3565   3567
NOP        000364       715#   3185*
NUMA       014176      3004*   3013   3014   3020#
PARCSR= 172100         3572#   3582
```

```
PARVEC= 000114  3573#
PFAIL   016504   605    759    3231   3429#
PRFLAG  015562   778*  3279#  3283   3286*  3327*
PRINT   015564   608   3283#
PRINT1  016020  3290   3324#
PRTAB   016070  3307   3312   3317   3341#
R     = 000000   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  000350   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
RENO2   003062  1140   1151#  1181
RENO1   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
RQ*ALL  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#
RPDAH   000412   729#
```

```
RPDAR   000420   732#
RPDSR   000416   731#   847    849#
RPFUNC  000432   737#   855#   1051   1059#
RPSTAT  002366  1046#  1056   1060
RPWC    000422   733#  1050#
RPWORD= 176000   591#  1050
RPI     002402  1049#  1058
RTIA    001520   806    850    879    896#
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   016070   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
                1886   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   312?   3140   3148   3152   316?
                3182   3196   3210   3220   322?
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#
SRE     000356   712#  3162   3177   3205
SRPTR   000174   659#   762    765#   769    892   3257   3288   3324   3328   3399   340?   350?
STAR    016156  3352   3354#  3374
START   000502   662    724    759#  3274   3330   3592
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#   1834    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*
TSTART  014100      3004*
TTCSR   000264       683*   793*   794    797*   799*   800*   817*   881*   921    3236
TTDBR   000266       684*   925*
TTYIN0  001522       643    903*
TTYIN1  001560       913*
TTYIN2  001566       907    912    914*
TTYIN3  001552       909    911*
TTYINT  001556       912*
TWELVE  017052      3507*  3517
TWENTY  017062      3509*  3521
TWOBIG  017072      3511*
TWOFOR  017066      3510*  3523
TYOUTR  001576       645    921*
TYOUT1  001612       925*
USER    016764       885   3491*
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*
WRTGC   016220      3358   3363*
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XFER02  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
.M2MF   0:742C             3497    3580#
.PARSR  0:7456              655    3591#
```

```
.MAIN.  MACY11 30(1046)  16-SEP-77  12:59  PAGE 78
DZQKBG.P11    16-SEP-77 12:58          CROSS REFERENCE TABLE -- MACRO NAMES                    SEQ 0078

TNCV     28768   2913    2951    2977


. ABS.  017464     000


 ERRORS DETECTED:  0

 DZQKBG.BIN,DZQKBG.LST/CRF/SOL/NL:TOC=DZQKBG.P11
 RUN-TIME:  3  6  1 SECONDS
 RUN-TIME RATIO: 228/11=20.4
 CORE USED:  11K  (21 PAGES)
```