PDP 11

T17-4K SYSTEM EXERCISER

CZQKBHO

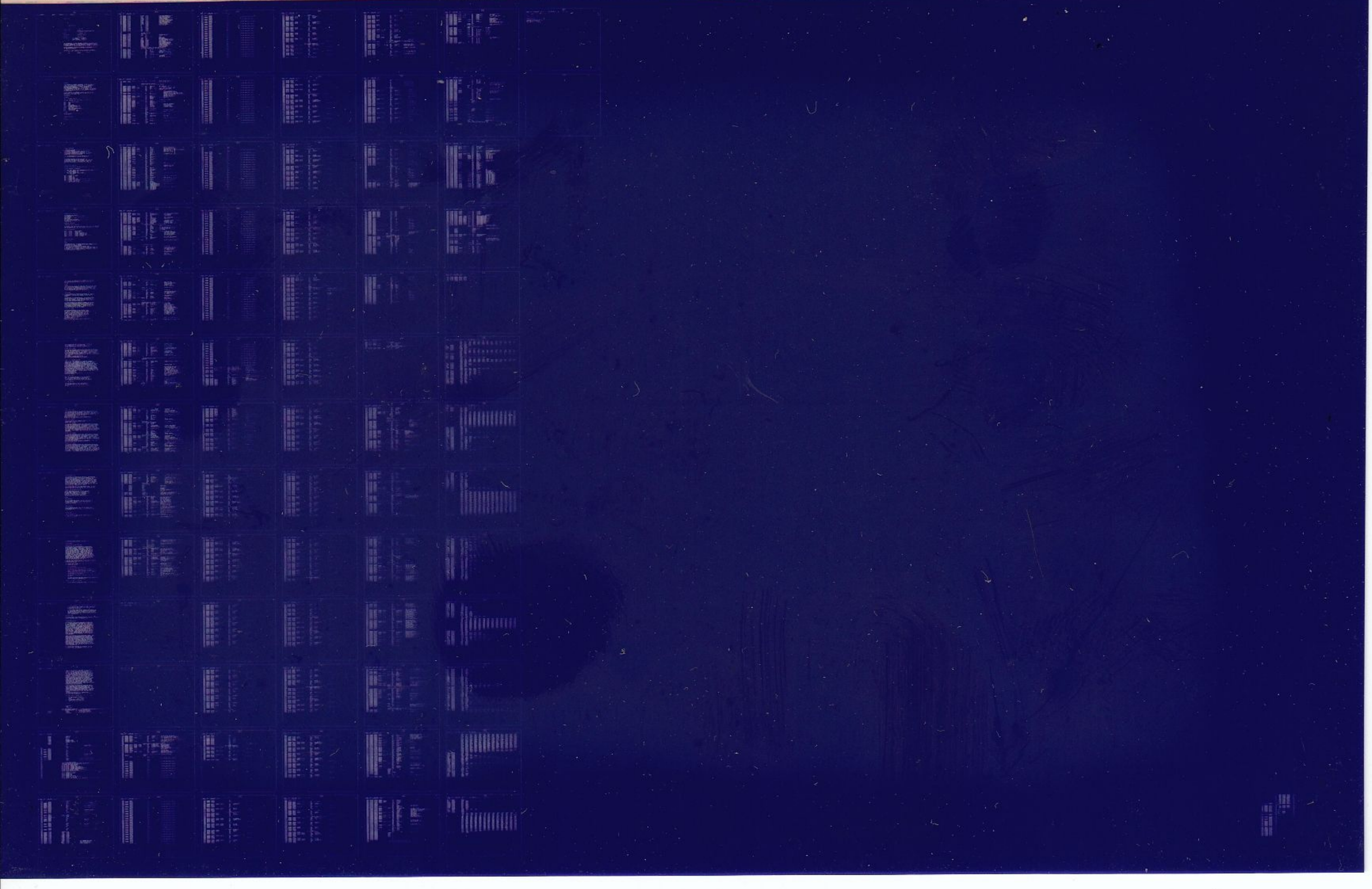
AH-9032H-MC

FICHE 1 OF 1

APR 1978

digital

MADE IN USA



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.NLIST SEQ
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IDENTIFICATION

PRODUCT CODE: AC-9031H-MC

PRODUCT NAME: CZQKBH0 T17-4K SYSTEM EXERCISER
THIS VERSION TEST DECTAPE UNIT 1 (NOT UNIT 0)

DATE: 01-FEBRUARY-1978

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 BUF.ERS ARE RELOCATED TO THE CURRENT BANK.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE

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

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES 4K OF MEMORY

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

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

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

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

4.1 CONTROL SWITCH SETTING

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

4.2 STARTING ADDRESS OR ADDRESSES

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

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

4.3 PROGRAM AND/OR OPERATOR ACTION

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

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

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

5.1.2 SWITCH SETTINGS ARE

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

5.1.3

5.2. SUBROUTINE ABSTRACTS

5.2.1 BEGIN SA 200

5.2.2 SCOPE

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

5.2.3 HLT

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

5.2.4 TRTRAP

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

5.2.5 TRAPCATCHER

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

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

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

5.2.6 TTYIN1 (TTY INPUT)

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

5.2.7 TYOUT (TTY OUTPUT)

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

5.2.8 RFSTART (RF-11 DISK)

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

5.2.9 FENDZ (TC11 FORWARD END ZONE)

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

5.2.10 LCLK (LINE CLOCK)

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

5.2.11 LP1 (LINE PRINTER)

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

5.2.12 HSRIN1 (PC11 INPUT)

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

5.2.13 HPOUT (PC11 OUTPUT)

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

5.2.14 RKSTART (RK-11 DISK)

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

5.2.15 RCSTART (RC-11 DISK)

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

5.2.16 RPSTART (RP-11 DISK)

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

5.2.17 CORE EXPANSION (DET1)

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

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

5.3 PROGRAM AND/OR OPERATOR ACTION

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

6. ERRORS

6.1 ERROR PRINTOUT

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

6.2 ERROR RECOVERY

FOR TTY READER AND HSR, TAPE MUST BE REPOSITIONED TO LEADER BEFORE RESTARTING TEST. IT YOU DESIRE TO HAVE THE PROGRAM RESTART ON AN ERROR MAKE SWITCH REGISTER BIT8 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 BE
A REGISTER OR MEMORY LOCATION. THESE WILL BE SWAPPED
BETWEEN SOURCE AND DESTINATION.

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

THE CORE LAYOUT IS BROKEN INTO FIVE DISTINCT PARTS:

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

10. LISTING

11. FLOW CHART(S)

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                        .ENDR
                        .ENABLE ABS

                ;PDP11 PRELIMINARY SYSTEM TEST --- TTY-PC11-LP11,RF11,TC11,KW11L,RK11,RC11,RP11 AND KE11
                ;TEST SIMULTANEOUS RUNNING OF I/O, WITH PROCESSOR INSTRUCTION TEST AND WITH
                ;WITH TRACE BIT ENABLED TO BE CONSIDER MAINLINE CODE
000240                  NOP=240                 ;SYSTEM NULL OPERATION
104000                  HLT=EMT         ;TRAP USED FOR ERROR PRINTOUT
104400                  SCOPE=TRAP              ;TRAP USED SCOPE LOOP AND ITERATION OF SUB PROBLEMS
177776                  CC=177776
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                016104          IDSR=ICSR
                017004          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
                                .LIST   SEQ,ME
                000014          .=14
 000014         000016          .+2
 000016         000000          HALT                    ;FALSE TRACE TRAP
                000024          .=24
 000024         016526          PFAIL
 000026         000340          340
                000030          .=30
 000030         015606          PRINT                   ;FOR HALT TRAPS
 000032         000340          340                     ;HIGHEST PRIORITY
                000034          .=34
 000034         016406          SCOPEC                  ;USER TRAP
 000036         000000          0
                000046          .=46
 000046         015556          LOGICA                  ;RETURN TO MONITOR ADDRESS
                000052          .=52
 000052         040000          040000                  ;EXECUTION TIME IS MEMORY SIZE DEPENDENT


                                ;(R6) IS THE STACK POINTER
                                ;((R6)) IS THE PC+2 OF LOCATION WHERE THE TRAP ORIGINATED
                                ;FOR NORMAL OPERATION RUN WITH ALL SWITCHES DOWN
                                ;SR 15=1 OR UP---HALT ON ERROR
                                ;SR 14=1 OR UP---SCOPE LOOP
                                ;SR 13=1 OR UP---INHIBIT PRINT OUT
                                ;SR 12=1 OR UP---INHIBIT TRACE TRAPPING
                                ;SR 11=1 OR UP---INHIBIT SUB-PROBLEM ITERATION
                                ;SR 10=1 OR UP---INHIBIT PROCESSOR TEST
                                ;SR 09=1 OR UP INHIBIT VARIABLE CORE EXPANSION
                                ;SR 08=1 OR UP RESTART ON ERROR
                                ;SPECIAL DELETE SWITCHES-SET RESPECTIVE SWITCH TO A 1 TO INHIBIT INITIATION OF DEVICE

                                ;SW 0=1 INHIBIT TTY OUTPUT
                                ;SW 1=1 INHIBIT TTY INPUT
                                ;SW 2=1 INHIBIT HSP
                                ;SW 3=1 INHIBIT HSR
                                ;SW 4=1 INHIBIT LINE CLOCK
                                ;SW 5=1 INHIBIT RC, RF, RK, RP DISKS
                                ;SW 6=1 INHIBIT TC11 DECTAPE
                                ;SW 7=1 INHIBIT LINE PRINTER --- IF LINE PRINTER IS USED, MUST RESTART AT 502
                                ;IF EAE EXIST IT WILL BE AUTOMATICALLY SELECTED.
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                                ;PDP11 SIMULTANEOUS I/O
            000060                      .=60
000060      001544                      TTYINR                  ;TTY IN INTERRUPT VECTOR
000062      000200                      200
000064      001620                      TYOUTR                  ;TTY OUT INTERRUPT VECTOR
000066      000200                      200
000070      001646                      HSRINR                  ;HSR INTERRUPT VECTOR
000072      000200                      200
000074      001740                      HPOUTR                  ;HSP INTERRUPT VECTOR
000076      000200                      200
            000100                      .=100
000100      002044                      LK3                     ;INTERRUPT VECTOR LINE CLOCK
000102      000300                      300                     ;LEVEL SIX PRIORITY
            000004                      .=4
000004      017500                      .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      002632                      IRF                     ;RF11 DISK
000206      000240                      240                     ;LEVEL 5
000210      002534                      IRC                     ;RC DISK
000212      000240                      240

            000214                      .=214
000214      002716                      FENDZ                   ;DEC TAPE
000216      000300                      300                     ;LEVEL 6
            000220                      .=220
000220      002344                      IRK                     ;RK DISK
000222      000240                      240

            000254                      .=254
000254      002450                      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
                                RCDAR:  177442          ;DISK ADDRESS REGISTER
                                RCWC:   177450          ;WORD COUNT REGISTER
                                RCBAR:  177452          ;CURRENT ADDRESS REGISTER
                                RCCSR:  177446          ;STATUS REGISTER
                                RCCSRH: 177447          ;HIGH BYTE ADDRESS OR CSR
                                RKDAH:  177413          ;HIGH BYTE OF DISK ADDRESS
                                RKDAE:  177412          ;DISK ADDRESS REGISTER
                                RKWC:   177406          ;WORD COUNT REGISTER
                                RKBAR:  177410          ;CURRENT ADDRESS REGISTER
                                RKCSR:  177404          ;STATUS REGISTER
                                RKCSRH: 177405          ;HIGH BYTE ADDRESS OR CSR
                                MQ:     177304          ;EAE LOCATIONS
                                AC:     177302
                                SC:     177310
                                SRE:    177311
                                MUL:    177306
                                DIV:    177300
                                NOR:    177312
                                LSH:    177314
                                ASH:    177316

                                ;DECTAPE ADDRESSES
                        177340  TC=177340
000372  177342                  TCCM:   TC+2            ;CONTROL AND FUNCTION
000374  177340                  TCST:   TC              ;GENERAL STATUS
000376  177350                  TCDT:   TC+10
000400  000440                          BR      START   ;DATA
000402  177344                  TCWC:   TC+4            ;WORD COUNT
000404  177346                  TCBA:   TC+6            ;BUS ADDRESS
000406  000214                  TCIV:   214             ;DECTAPE INTERRUPT VECTOR
000410  176722                  RPCA:   176722          ;CYLINDER ADDRESS RP11 DISK
000412  176725                  RPDAH:  176725          ;HIGH BYTE OF DISK ADDRESS
000414  176724                  RPDAE:  176724          ;DISK ADDRESS
000416  176710                  RPDSR:  176710          ;DRIVE STATUS REGISTER
000420  176724                  RPDAR:  176724          ;DISK ADDRESS REGISTER
000422  176716                  RPWC:   176716          ;WORD COUNT REGISTER
000424  176720                  RPBAR:  176720          ;CURRENT ADDRESS REGISTER
000426  176714                  RPCSR:  176714          ;STATUS REGISTER
000430  176715                  RPCSRH: 176715          ;HIGH BYTE ADDRESS OR CSR
000432  000000                  RPFUNCTION:     0       ;DISK COMMAND
                                ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
                                ;BY DOING A CHECK SUM ON THE DATA
000434  010146                  TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
000436  010346                          MOV     %3,-(6)
000440  005003                          CLR     %3              ;SUM OF DATA
000442  012701  003440                  MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
000446  062103                  TC2:    ADD     (1)+,%3         ;EVEN ADD
000450  062103                          ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
000452  001775                          BEQ     TC2
000454  020127  004440                  CMP     %1,#TCRBUF+1000         ;AT END OF BUFFER?
000460  101001                          BHI     .+4             ;YES BRANCH
000462  104000                          HLT                     ;DATA ERROR
000464  012603                          MOV     (6)+,%3         ;RESTORE THE REGISTERS
000466  012601                          MOV     (6)+,%1
000470  000207                          RTS     %7              ;EXIT
```

```
   754  000472  012767  000240  014254  NOEAE:  MOV     #240,EAESRT     ;BRANCH AROUND EAE ROUTINE
   755  000500  000002                  RTI                             ;JUMP OVER EAE SECTION
   756
   757                                  ;SIABI UP FOR MINI MONITOR
   758                                  ;RESTART HERE IF LINE PRINTER WAS ENABLED
   759
   760  000502  012767  016526  177314  START:  MOV     #PFAIL,24       ;SET POWER FAIL VECTOR
   761  000510  012706  017004          MOV     #BUFF,%6        ;SET UP STACK
   762  000514  012767  000546  177262  MOV     #1$,4                   ;SET UP TIME OUT VECTOR
   763  000522  023737  000042  000046  CMP     @#42,   @#46    ;UNDER ACT11 AUTO MODE?
   764  000530  001403                  BEQ     3$              ;YES-SKIP TITLE PRINT-OUT
   765  000532  004767  016750          JSR     %7,     TYPE    ;PRINT TITLE
   766  000536  017546                  MSG
   767  000540  005777  177430  3$:     TST     @SRPTR                  ;TRY TO REFERENCE THE
   768                                                                  ;HARDWARE SWITCH REGISTER
   769  000544  000404                  BR      2$                      ;BRANCH IF NO TIME OUT TRAP OCCURRS
   770  000546  012767  000176  177420  1$:     MOV     #SOFTSR,SRPTR   ;CHANGE THE SWITCH REGISTER POINTER
   771                                                                  ;TO POINT TO A SOFTWARE  SWITCH REGISTER
   772  000554  022626                  CMP     (6)+,(6)+               ;RESTORE THE STACK
   773  000556  012767  000006  177220  2$:     MOV     #6,4            ;RESTORE TIME OUT VECTOR
   774  000564  017767  177404  000746  MOV     @SRPTR,REG1             ;MOV SR TO REGISTER
   775  000572  005737  016612          TST     @#SAVR6         ;SET ON POWER FAIL
   776  000576  001403                  BEQ     ESTART
   777  000600  005037  016612          CLR     @#SAVR6
   778  000604  104000                  HLT                             ;A POWER FAIL OCCURRED
   779  000606  005067  015650  ESTART: CLR     ICOUNT
   780  000612  012706  017004          MOV     #BUFF,%6        ;SET UP STACK
   781  000616  012767  000660  015642  MOV     #START2,RETURN
   782  000624  005067  015634          CLR     SCOPEF
   783  000630  012767  000340  177140  MOV     #340,STATUS             ;LOCK OUT INTERRUPTS
   784  000636  005067  014742          CLR     PRFLAG                  ;PRINT ROUTINE BUSY
   785  000642  016702  000672          MOV     REG1,RSR                ;SAVE SWITCHES
   786  000646  012700  000100          MOV     #100,R100               ;INTERRUPT ENABLE
   787  000652  012701  000101          MOV     #101,R101               ;INTERRUPT ENABLE AND GO
   788  000656  104400                  SCOPE
   789  000660  050077  177374  START2: BIS     R100,@TRCSR
   790  000664  000005                  RESET
   791  000666  030077  177366          BIT     R100,@TRCSR             ;INTERRUPT ENABLE
   792  000672  001401                  BEQ     .+4
   793  000674  104000                  HLT                             ;RESET DID NOT CLEAR INTERRUPT ENABLE
   794  000676  104400                  SCOPE
   795                                  ;DOES "RESET" ON THE BUS LAST TOO LONG
   796  000700  012706  017004          MOV     #BUFF,%6        ;SET UP STACK
   797  000704  000005                  RESET
   798  000706  050077  177352          BIS     R100,@TTCSR             ;SET A BIT
   799  000712  030077  177346          BIT     R100,@TTCSR             ;IS IT SET
   800  000716  001001                  BNE     .+4
   801  000720  104000                  HLT                             ;RESET IS ON BUS TOO LONG
   802  000722  005077  177336          CLR     @TTCSR
   803  000726  104400                  SCOPE
   804  000730  050077  177330          BIS     R100,@TTCSR
   805  000734  005077  177324          CLR     @TTCSR                  ;IF BUS HANG, CHECK NO SACK TIMEOUT
   806  000740  104400                  SCOPE
   807  000742  000005                  RESET
   808  000744  012767  004440  015514  MOV     #BEGIN,RETURN
   809  000752  012737  000472  000004  MOV     #NOEAE,@#4              ;TEST FOR EAE
```

```
  810  000760  005777  177364                    TST     @MQ             ;TRAP IF NONEXISTANT
  811  000764  012767  001542  177012            MOV     #RTIA,4         ;SET UP FOR NON-EXISTANT I/O
  812  000772  012767  000340  177006            MOV     #340,6          ;KEEP NEW PSW AT 340
  813  001000  012767  000001  000610            MOV     #1,DATA1        ;BASE DATA FOR TTY READER OR KEYBOARD
  814  001006  005067  000632                    CLR     DATA2           ;BASE DATA FOR TTY PUNCH OR TELEPRINTER
  815  001012  012767  000001  000700            MOV     #1,DATA3        ;BASE DATA FOR HSR
  816  001020  005067  000770                    CLR     DATA4           ;BASE DATA FOR HSP
  817  001024  012706  017004                    MOV     #BUFF,%6
  818  001030  005067  000764                    CLR     DELAY
  819  001034  012767  000340  176734            MOV     #340,STATUS     ;FOR READER STALL - HSR -
  820  001042  030227  000001                    BIT     RSR,#1          ;LOCK OUT INTERRUPTS
  821  001046  001002                            BNE     ST1
  822  001050  050077  177210                    BIS     R100,@TTCSR     ;TTY OUT
  823  001054  030227  000002            ST1:    BIT     RSR,#2
  824  001060  001002                            BNE     ST2
  825  001062  050177  177172                    BIS     R101,@TRCSR     ;TTY IN
  826  001066  005777  177202            ST2:    TST     @HPCSR          ;TEST FOR OUT OF TAPE
  827  001072  100405                            BMI     ST3
  828  001074  030227  000004                    BIT     RSR,#4
  829  001100  001002                            BNE     ST3
  830  001102  050077  177166                    BIS     R100,@HPCSR     ;HSP
  831  001106  005777  177156            ST3:    TST     @HRCSR          ;TEST FOR OUT OF TAPE
  832  001112  100412                            BMI     ST4
  833  001114  000402                            BR      ST3A
  834  001116  017440                            DET3                    ;RESERVED FOR OVERLAYS
  835  001120  017440                            DET3                    ;1020 GTP OVER LAY
  836  001122  030227  000010            ST3A:   BIT     RSR,#10         ;1022 GTP OVER LAY
  837  001126  001004                            BNE     ST4
  838  001130  010067  000664                    MOV     R100,DELAY      ;FOR STALL HSR
  839  001134  050177  177130                    BIS     R101,@HRCSR     ;HSR
  840  001140  030227  000020            ST4:    BIT     RSR,#20
  841  001144  001004                            BNE     ST5
  842  001146  005067  000766                    CLR     TIME
  843  001152  050077  177122                    BIS     R100,@LKCSR     ;LINE CLOCK 50 OR 60 CYCLES
  844  001156  030227  000040            ST5:    BIT     RSR,#40
  845  001162  001053                            BNE     ST6
  846  001164  012767  001226  176612            MOV     #ST5A,4
  847  001172  105777  177230                    TSTB    @RPCSR          ;WAIT FOR CONTROLLER READY
  848  001176  100375                            BPL     .-4
  849  001200  012777  000015  177220            MOV     #15,@RPCSR      ;RESET DRIVE
  850  001206  105777  177214                    TSTB    @RPCSR          ;WAIT FOR CONTROLLER READY
  851  001212  100375                            BPL     .-4
  852  001214  005777  177176                    TST     @RPDSR          ;WAIT FOR ACCESS READY
  853  001220  100375                            BPL     .-4
  854  001222  005077  177170                    CLR     @RPDSR          ;CLR ATTENTION
  855  001226  012767  001542  176550  ST5A:    MOV     #RTIA,4
  856  001234  012777  000037  177060            MOV     #37,@RCDAR
  857  001242  012767  043503  001432            MOV     #43503,RFFUNCTION ;WRITE CHECK/WRITE RF
  858  001250  012767  043503  001314            MOV     #43503,RCFUNCTION
  859  001256  012767  043503  001122            MOV     #43503,RKFUNCTION
  860  001264  012767  043503  177140            MOV     #43503,RPFUNCTION
  861  001272  110077  177020                    MOVB    R100,@RFCSR     ;TELL DISK TO READ OR WRITE
  862  001276  110077  177042                    MOVB    R100,@RKCSR
  863  001302  110077  177022                    MOVB    R100,@RCCSR
  864  001306  110077  177114                    MOVB    R100,@RPCSR
  865  001312  030200                    ST6:    BIT     RSR,R100        ;TEST FOR DECTAPE
```

```
866  001314  001011                          BNE     ST7
867  001316  012767  002706  001370          MOV     #TCFIRST,TCEXPE         ;FIRST BLOCK SHOULD BE ZERO
868  001324  012777  002716  177054          MOV     #FENDZ,@TCIV            ;GO TO END ZONE ON INTERRUPT
869  001332  012777  004503  177032          MOV     #R+IE+RB+DO,@TCCM       ;MOVE REVERSE
870  001340  105702                  ST7:    TSTB    RSR                     ;LINE PRINTER
871  001342  100427                          BMI     ST8
872  001344  012767  001422  176432          MOV     #ST6,4                  ;DON'T CHANGE 200
873  001352  012767  000137  000730          MOV     #137,SOLPAT             ;RESET FOR START OF LINE PATTERN
874  001360  016767  000616  000724          MOV     LP6+4,CLINCT            ;LINE COUNT
875  001366  012767  000040  000712          MOV     #40,CURPAT
876  001374  012777  000014  176702          MOV     #14,@LPDBR              ;LINE FEED TO POSITION BUFFER
877  001402  012737  002166  000200          MOV     #LPINTR,@#200           ;INTERRUPT VECTOR
878  001410  012737  000200  000202          MOV     #200,@#202              ;PROCESSOR LEVEL 4
879  001416  010077  176660                  MOV     R100,@LPCSR             ;INTERRUPT ENABLE
880  001422  005037  015572          ST8:    CLR     @#TRPB                  ;NO "T" BIT FIRST PASS
881                                  ;IF OPERATION WITH DIAGNOSTIC PACKAGE OR ACT11
882  001426  005767  176410                  TST     42
883  001432  001417                          BEQ     ST8A            ;BRANCH IF NO MONITOR
884  001434  012767  001542  176342          MOV     #RTIA,4
885  001442  005077  176634                  CLR     @LPCSR          ;NO LINE PRINTER WITH MONITOR
886  001446  005077  176606                  CLR     @TRCSR          ;NO LSR WITH MONITOR
887  001452  005077  176606                  CLR     @TTCSR          ;NO CONSOLE TEST WITH MONITOR
888  001456  122767  000002  176355          CMPB    #2,     41      ;IS IT RKDP
889  001464  001002                          BNE     ST8A
890  001466  005077  176652                  CLR     @RKCSR          ;YES DON'T TEST RK DISK
891  001472  004737  017006          ST8A:   JSR     %7,@#USER               ;FOR USER I/O PROGRAM
892  001476  004767  015306                  JSR     %7,DET1                 ;CHECK FOR CORE EXPANSION
893  001502  005067  176300                  CLR     6                       ;HALT FOR BUS ERROR
894  001506  012767  000006  176270          MOV     #6,4                    ;FOR USER I/O PROGRAM
895  001514  005067  176256                  CLR     STATUS                  ;ALLOW INTERRUPTS
896  001520  000401                          BR      .+4
897  001522  000001          MAINLINE:       WAIT                            ;WAIT HERE FOR INTERRUPTS
898  001524  037727  176444  002000          BIT     @SRPTR,#2000            ;INHIBIT PROCESSOR TEST
899  001532  001373                          BNE     MAINLINE
900  001534  000167  002700                  JMP     BEGIN
901  001540  000000          REG1:   0                                       ;STATUS OF SELECTED DEVICES
902  001542  000002          RTIA:   RTI                                     ;AN RTI FOR NON EXISTANT I/O
903
904
905
906
907
908                                  ;TTY RECEIVER VALUES 0 TO 377
909  001544  105777  176510          TTYINR: TSTB    @TRCSR                  ;IS DONE SET
910  001550  100401                          BMI     .+4
911  001552  104000                          HLT                             ;FALSE RETURN FROM MAINLINE
912  001554  105777  176502                  TSTB    @TRDR                   ;TEST DATA FOR LEADER
913  001560  001413                          BEQ     TTYIN2                  ;IF LEADER GO BACK
914  001562  127767  176474  000026          CMPB    @TRDR,DATA1             ;NOT LEADER TEST FOR DATA
915  001570  001401                          BEQ     TTYIN3
916  001572  104000                          HLT                             ;DATA COMPARISON ERROR
917  001574  105267  000016          TTYIN3: INCB    DATA1                   ;INCREMENT DATA
918  001600  001003          TTYIN4: BNE     TTYIN2
919  001602  012767  000001  000006  TTYIN1: MOV     #1,DATA1                ;BASE DATA
920  001610  005277  176444          TTYIN2: INC     @TRCSR                  ;START READER
921  001614  000002                          RTI                             ;RETURN TO MAINLINE
```

F02


```
        001616  000000                          DATA1:  XX                          ;EXPECTED DATA

                                                ;TTY TRANSMITTER PRINT VALUES 0 TO 377

        001620  105777  176440                  TYOUTR: TSTB    @TTCSR              ;TEST FOR DONE
        001624  100401                                  BMI     .+4                 ;BRANCH IF FLAG FOUND
        001626  104000                                  HLT                         ;FALSE INTERRUPT RETURN
        001630  105267  000010                          INCB    DATA2               ;INCREMENT DATA
        001634  016777  000004  176424          TYOUT1: MOV     DATA2,@TTDBR        ;OUTPUT TO DEVICE
        001642  000002                                  RTI                         ;RETURN TO MAINLINE

        001644  000000                          DATA2:  XX                          ;TRANSMITTED DATA
                                                ;HSR SECTION VALUES 0 TO 377

        001646  105777  176416                  HSRINR: TSTB    @HRCSR              ;IS DONE SET
        001652  100401                                  BMI     .+4
        001654  104000                                  HLT                         ;FALSE RETURN FROM MAINLINE
        001656  105777  176410                          TSTB    @HRDBR              ;TEST DATA FOR LEADER
        001662  001413                                  BEQ     HSRIN2              ;IF LEADER GO BACK
        001664  127767  176402  000026                  CMPB    @HRDBR,DATA3        ;NOT LEADER TEST FOR DATA
        001672  001401                                  BEQ     .+4
        001674  104000                                  HLT                         ;DATA COMPARISON ERROR
        001676  105267  000016                          INCB    DATA3               ;INCREMENT DATA
        001702  001003                                  BNE     HSRIN2
        001704  012767  000001  000006          HSRIN1: MOV     #1,DATA3            ;BASE DATA
        001712  005277  176352                  HSRIN2: INC     @HRCSR              ;START READER
        001716  000002                                  RTI                         ;RETURN TO MAINLINE

        001720  000000                          DATA3:  XX                          ;EXPECTED DATA

                                                ;HS PUNCH SECTION, VALUES 0 TO 377
                                                ;ENABLE READER ON FIX COUNT OF PUNCH ONLY (14 TIMES)
        001722  012767  000000  000064          HPOUT:  MOV     #0,DATA4            ;INITAL DATA
        001730  016777  000060  176340          HPOUT1: MOV     DATA4,@HPDBR        ;OUTPUT TO DEVICE
        001736  000002                                  RTI                         ;RETURN TO MAINLINE
        001740  105777  176330                  HPOUTR: TSTB    @HPCSR              ;TEST FOR DONE
        001744  100401                                  BMI     .+4                 ;BRANCH IF FLAG FOUND
        001746  104000                                  HLT                         ;FALSE INTERRUPT RETURN
        001750  046777  000044  176312                  BIC     DELAY,@HRCSR        ;CLEAR HSR INTERRUPT ENABLE
        001756  005267  000034                          INC     INTCNT              ;COUNT INTERRUPTS
        001762  026727  000030  000014                  CMP     INTCNT,#14          ;SAVE TO TURN READER ON?
        001770  001005                                  BNE     HPOUT2              ;NO-NEED MORE TIME
        001772  005067  000020                          CLR     INTCNT              ;YES RESET COUNTER
        001776  056777  000016  176264                  BIS     DELAY,@HRCSR        ;SET READER INT ENABLE
        002004  105267  000004                  HPOUT2: INCB    DATA4               ;INCREMENT DATA
        002010  001744                                  BEQ     HPOUT               ;AT UPPER LIMIT START OVER
        002012  000746                                  BR      HPOUT1              ;FINISH REST OF DATA

        002014  000000                          DATA4:  XX
        002016  000000                          INTCNT: 0
        002020  000000                          DELAY:  0                           ;EQUAL 100 IF HSR RUNNING

                                                ;TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
        002022  005037  002140                  LK1:    CLR     @#TIME              ;CLEAR LINE CLOCK TIMER
        002026  052777  000100  176244                  BIS     #100,@LKCSR
```

```
                                        BIS     #100,@#STATUS
                                LK2:    RTI                             ;RETURN TO MAINLINE
002034  052737  000100  177776  LK3:    TSTB    @LKCSR                  ;TEST FOR DONE
002042  000002                          BMI     .+4
002044  105777  176230                  HLT                             ;FALSE INTERRUPT
002050  100401
002052  104000
002054  042777  000200  176216          BIC     #200,@LKCSR
002062  005237  002140          LK4:    INC     @#TIME                  ;ON INTERUPTS ENTER HERE
002066  022737  006344  002140          CMP     #3300.,@#TIME           ;A LAPS OF 55 SECONDS
002074  103362                          BHIS    LK2                     ;BRANCH IF TIME LESS THAN 55 SECONDS
002076  042777  000100  176174          BIC     #100,@LKCSR
002104  042737  000100  177776          BIC     #100,@#STATUS           ;LOWER PRIORITY
002112  022737  007020  002140          CMP     #3600.,@#TIME           ;ONE MINUTE UP
002120  001740                          BEQ     LK1                     ;YES-RESET TIMER
002122  105777  176152                  TSTB    @LKCSR                  ;NO-SKIP ON FLAG TILL IT IS.
002126  100375                          BPL     .-4
002130  042777  000200  176142          BIC     #200,@LKCSR             ;CLEARS THE FLAG
002136  000751                          BR      LK4                     ;FOUND FLAG GO INCREMENT COUNTER
002140  000000                  TIME:   0

                                ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER
                                ;INTERRUPT VECTOR IS 200
                        002202  LP80=LP6+4

002142  016767  000142  000136  LP1:    MOV     SOLPAT,CURPAT           ;START OF LINE TO CURRENT
002150  016777  000132  176126  LP2:    MOV     CURPAT,@LPDBR           ;CURRENT PATTERN TO LINE PRINTER
002156  105777  176120                  TSTB    @LPCSR
002162  100405                          BMI     LP6
002164  000002                          RTI                             ;RETURN TO MAIN LINE
002166  105777  176110          LPINTR: TSTB    @LPCSR                  ;TEST FOR FLAG
002172  100401                          BMI     .+4
002174  104000                          HLT                             ;FALSE RETURN FROM MAIN LINE
002176  026727  000110  000117  LP6:    CMP     CLINCT,#79.             ;TEST FOR END OF LINE
                                                                        ;CHANGE THIS VALUE FOR 132 COLUMN PRINTER
002204  001415                          BEQ     LP4                     ;GO GENERATE CR/LF
002206  005267  000100                  INC     CLINCT                  ;INCREMENT LINE POSITION COUNT
002212  026727  000070  000137          CMP     CURPAT,#137             ;TEST FOR MAXIMUM PATTERN
002220  001403                          BEQ     LP3                     ;YES - GO TO LP3 AND RESET
002222  005267  000060                  INC     CURPAT                  ;NO - INCREMENT TO NEXT PATTERN
002226  000750                          BR      LP2                     ;GO SEND IT TO LINE PRINTER
002230  012767  000040  000050  LP3:    MOV     #40,CURPAT              ;RESET PATTERN AND SEND TO PRINTER
002236  000744                          BR      LP2                     ;SENT TO LINE PRINTER
002240  005067  000046          LP4:    CLR     CLINCT                  ;RESET LINE COUNT
002244  012777  000012  176032          MOV     #12,@LPDBR              ;LINE FEED
002252  105777  176024                  TSTB    @LPCSR
002256  100375                          BPL     .-4
002260  026727  000024  000137          CMP     SOLPAT,#137             ;START OF LINE PATTERN
002266  001403                          BEQ     LP5
002270  005267  000014                  INC     SOLPAT                  ;INCREMENT START OF LINE
002274  000722                          BR      LP1
002276  012767  000040  000004  LP5:    MOV     #40,SOLPAT              ;RESET START OF LINE
002304  000716                          BR      LP1                     ;PRINT
002306  000000                  CURPAT: 0                               ;CURRENT CHARACTER BEING PRINTED
002310  000000                  SOLPAT: 0                               ;START OF LINE CHARACTER
002312  000000                  CLINCT: 0                               ;POSITION OF LINE

                                ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
```

```
1034  002314  005077  176016            RKSTART:        CLR     @RKDAE          ;INITIALIZE DISK - DAR-DAE
1035  002320  016777  000360  176014    RK1:    MOV     LLIMIT,@RKBAR           ;CORE BASE
1036  002326  012777  176000  176004            MOV     #RKWORDCT,@RKWC         ;LENGTH OF TRANSFER
1037  002334  113777  002406  176002            MOVB    @#RKFUNCTION,@RKCSR     ;WRITE OR WRITE CHECK TO DISK
1038  002342  000002                            RTI                             ;RETURN TO MAINLINE CODE
1039  002344  032777  100200  175772    IRK:    BIT     #100200,@RKCSR          ;INTERRUPT VECTOR POINTS HERE
1040  002352  003002                            BGT     .+6
1041  002354  104000                            HLT                             ;RK-11 ERROR FLAG UP OR READY NOT UP
1042  002356  000756                            BR      RKSTART
1043  002360  032777  000037  175750            BIT     #37,@RKDAE              ;DISK AT UPPER LIMIT?
1044  002366  001354                            BNE     RK1                     ;NO
1045  002370  122777  000031  175736            CMPB    #31,@RKDAH
1046  002376  001350                            BNE     RK1
1047  002400  000337  002406                    SWAB    @#RKFUNCTION            ;NO
1048  002404  000743                            BR      RKSTART                 ;CHANGE COMMAND
1049                                                                            ;RESTART NEW TRANSFER OF DISK
1050  002406  000000            RKFUNCTION:     0                               ;DISK COMMAND
1051                            ;RP11 DISK SERVICE ROUTINE
1052  002410  112777  000001  176010  RPSTART:MOVB    #1,@RPCSR               ;INITIALIZE DISK - DAR-DAE
1053  002416  105777  176004                  TSTB    @RPCSR
1054  002422  100375                            BPL     .-4
1055  002424  016777  000254  175772    RP1:    MOV     LLIMIT,@RPBAR           ;INITIAL CORE ADDRESS
1056  002432  012777  176000  175762            MOV     #RPWORDCT,@RPWC         ;LENGTH OF TRANSFER
1057  002440  113777  000432  175760            MOVB    @#RPFUNCTION,@RPCSR     ;WRITE OR WRITE CHECK TO DISK
1058  002446  000002                            RTI                             ;RETURN TO MAINLINE CODE
1059  002450  032777  100200  175750    IRP:    BIT     #100200,@RPCSR                 ;INTERRUPT VECTOR POINTS HERE
1060  002456  003002                            BGT     .+6
1061  002460  104000                            HLT                             ;RP11 READY NOT UP OR ERROR
1062  002462  000752                            BR      RPSTART
1063  002464  122777  000312  175716            CMPB    #312,@RPCA              ;CYLINDER NO. 312, 624 FOR RP03
1064  002472  001354                            BNE     RP1                     ;NO
1065  002474  000337  000432                    SWAB    @#RPFUNCTION            ;CHANGE COMMAND
1066  002500  000743                            BR      RPSTART                 ;RESTART NEW TRANSFER OF DISK
1067                            ;RC11 DISK SERVICE ROUTINE
1068  002502  012777  000040  175612  RCSTART: MOV     #40,@RCDAR              ;INITIALIZE DISK - DAR-DAE
1069  002510  016777  000170  175610  RC2:    MOV     LLIMIT,@RCBAR           ;CORE BASE
1070  002516  012777  176040  175600            MOV     #RCWORDCT,@RCWC         ;LENGTH OF TRANSFER
1071  002524  113777  002572  175576            MOVB    @#RCFUNCTION,@RCCSR     ;WRITE OR WRITE CHECK TO DISK
1072  002532  000002                            RTI                             ;RETURN TO MAINLINE CODE
1073  002534  037727  175570  100200  IRC:     BIT     @RCCSR,#100200          ;INTERRUPT VECTOR POINTS HERE
1074  002542  003002                            BGT     .+6
1075  002544  104000                            HLT                             ;RC11 READY NOT UP OR ERROR IS UP
1076  002546  000755                            BR      RCSTART
1077  002550  005277  175546                    INC     @RCDAR                  ;TO INCREASE XFER RATE
1078  002554  022777  002000  175540            CMP     #2000,@RCDAR            ;DISK AT UPPER LIMIT, 4000=2, 6000=3, 10000=4
1079  002562  001352                            BNE     RC2                     ;NO
1080  002564  000337  002572                    SWAB    @#RCFUNCTION            ;CHANGE COMMAND
1081  002570  000744                            BR      RCSTART                 ;RESTART NEW TRANSFER OF DISK
1082  002572  000000            RCFUNCTION:     0                               ;DISK COMMAND
1083                            ;RF11 DISK
1084  002574  105277  175520    RFSTART:        INCB    @RFCSRH                 ;INITIALIZE DISK - DAR-DAE
1085  002600  062777  000040  175502                ADD     #40,@RFDAR              ;INCREASE DUTY CYCLE
1086  002606  016777  000072  175500    RF1:    MOV     LLIMIT,@RFCAR           ;CORE BASE
1087  002614  012777  176040  175470            MOV     #RFWORDCT,@RFWC         ;LENGTH OF TRANSFER
1088  002622  113777  002702  175466            MOVB    @#RFFUNCTION,@RFCSR     ;WRITE OR WRITE CHECK TO DISK
1089  002630  000002                            RTI                             ;RETURN TO MAINLINE CODE
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1090  002632  037727  175460  100200  IRF:    BIT     @RFCSR,#100200          ;INTERRUPT VECTOR POINTS HERE
1091  002640  003002                          BGT     .+6
1092  002642  104000                          HLT                             ;RF11 READY NOT UP OR ERROR UP
1093  002644  000753                          BR      RFSTART
1094  002646  062777  000040  175434          ADD     #40,@RFDAR              ;INCREASE DUTY CYCLE
1095  002654  122777  000003  175424          CMPB    #3,@RFDAE               ;DISK AT UPPER LIMIT? 7=2, 17=4, 37=8
1096  002662  001351                          BNE     RF1                     ;NO
1097  002664  027727  175420  174000          CMP     @RFDAR,#174000          ;AS FAR ON DISK AS WE CAN GO
1098  002672  101745                          BLOS    RF1                     ;NO
1099  002674  000337  002702                  SWAB    @#RFFUNCTION            ;CHANGE COMMAND
1100  002700  000735                          BR      RFSTART                 ;RESTART NEW TRANSFER OF DISK
1101  002702  000000          RFFUNCTION:     0                               ;DISK COMMAND
1102  002704  004440          LLIMIT: BEGIN                                   ;FIRST CORE ADDRESS OF TRANSFER
1103                          ;DT11 DEC TAPE
1104          000004          RD=4                            ;READ DATA
1105          000014          WD=14                           ;WRITE DATA
1106          000002          RB=2
1107          000002          BR=2                            ;READ BLOCK
1108          000000          F=0                             ;FORWARD
1109          000500          IE=500                          ;INTERRUPT ENABLE AND UNIT - UNIT #1
1110          000001          DO=1                            ;DO - THE FUNCTION
1111          004000          R=4000                          ;REVERSE
1112
1113  002706  000000          TCFIRST:        0               ;FIRST BLOCK TO BE SEARCHED FOR
1114  002710  001101          TCLAST: 577.                    ;LAST BLOCK TO BE SEARCHED FOR
1115  002712  000000          TCBLK:  0                       ;CURRENT BLOCK FOUND
1116  002714  000000          TCEXPE: 0                       ;THE BLOCK THAT IS EXPECTED
1117
1118                          ;GO TO FORWARD END ZONE
1119  002716  012777  002716  175462  FENDZ:  MOV     #FENDZ,@TCIV    ;END ZONE VECTOR SETUP
1120  002724  005777  175444          TST     @TCST                   ;TEST FOR END ZONE
1121  002730  100403                  BMI     FEND1                   ;AT END ZONE?
1122  002732  105277  175434          INCB    @TCCM                   ;SET DO - NO DELAY
1123  002736  000002                  RTI                             ;NO - WAIT SOME MORE
1124  002740  012777  002770  175440  FEND1:  MOV     #TCF1,@TCIV     ;YES - NEW VECTOR
1125  002746  042777  104000  175416          BIC     #104000,@TCCM   ;SEARCH BLOCK FOWARD
1126  002754  016767  177726  177732          MOV     TCFIRST,TCEXPE  ;COUNT WHEN THIS BLOCK IS FOUND
1127  002762  105277  175404          TCF1A:  INCB    @TCCM           ;SET DO
1128  002766  000002                  RTI                             ;RETURN ON NEXT BLOCK
1129  002770  032777  100200  175374  TCF1:   BIT     #100200,@TCCM   ;ANY ERROR ON READ?
1130  002776  003001                  BGT     .+4
1131  003000  104000                  HLT                             ;TC ERROR SET - FORWARD READ BLOCK
1132  003002  027767  175370  177704          CMP     @TCDT,TCEXPE    ;IS THIS OUR BLOCK FOR SYNC
1133  003010  002764                  BLT     TCF1A                   ;NO-READ SOME MORE BLOCKS
1134  003012  001401                  BEQ     TCF2                    ;YES
1135  003014  104000                  HLT                             ;WE PASSED THE BLOCK
1136
1137  003016  012777  003032  175362  TCF2:   MOV     #TCF3,@TCIV     ;VECTOR FOR SEQUENTIAL READS
1138  003024  105277  175342          INCB    @TCCM                   ;SET DO
1139  003030  000002                  RTI                             ;RETURN AND TEST SEQENTIAL BLOCKS
1140
1141                          ;FIND SEQUENTIAL BLOCK AT FOWARD DIRECTION
1142  003032  032777  100200  175332  TCF3:   BIT     #100200,@TCCM   ;TEST ERROR AND READY
1143  003040  003001                  BGT     .+4
1144  003042  104000                  HLT                             ;FALSE INTERRUPT ON TC-11
1145  003044  027767  175326  177636          CMP     @TCDT,TCLAST    ;HAVE WE TESTED ALL BLOCKS
```

```
1146  003052  001414                        BEQ     RENDZ           ;YES DRIVE UNIT IN END ZONE TO START OVER
1147  003054  005267  177634                INC     TCEXPE          ;NO-INCREMENT EXPECTED COUNT
1148  003060  027767  175312  177626        CMP     @TCDT,TCEXPE    ;IS CURRENT BLOCK CORRECT
1149  003066  001401                        BEQ     .+4
1150  003070  104000                        HLT                     ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
1151  003072  000427                        BR      TCWBK           ;THIS ROUTINE WRITES A BLOCK
1152  003074  105277  175272        TCF4:   INCB    @TCCM           ;SET DO
1153  003100  000002                        RTI
1154  003102  000705                XFENDZ: BR      FENDZ           ;INDIRECT LINK
1155
1156                                 ;MOVE TAPE TO REVERSE END ZONE
1157  003104  012777  003104  175274 RENDZ:  MOV     #RENDZ,@TCIV    ;END ZONE VECTOR SETUP
1158  003112  016767  177572  177574        MOV     TCLAST,TCEXPE   ;SET UP FOR REVERSE SEARCH
1159  003120  005777  175250                TST     @TCST           ;IN END ZONE
1160  003124  100403                        BMI     REND1           ;YES - START TO TURN UNIT AROUND
1161  003126  105277  175240                INCB    @TCCM           ;SET DO
1162  003132  000002                        RTI                     ;NO - WAIT TILL WE ARE
1163  003134  012777  004503  175230 REND1:  MOV     #R+IE+RB+DO,@TCCM ;FUNCTION = READ BLOCK, REVERSE AND GO
1164  003142  012777  003232  175236        MOV     #TCR1,@TCIV     ;SET UP NEW INTERRUPT VECTOR
1165  003150  000002                        RTI
1166
1167                                 ;WRITE FORWARD ALL BLOCKS EXCEPT 0
1168  003152  012777  003204  175226 TCWBK:  MOV     #TCWB1,@TCIV    ;INTERRUPT VECTOR FOR WRITE
1169  003160  012777  177400  175214        MOV     #-400,@TCWC     ;ONE BLOCK
1170  003166  012777  003440  175210        MOV     #TCWBUF,@TCBA   ;THE WRITE BUFFER ADDRESS
1171  003174  112777  000515  175170        MOVB    #IE+WD+DO,@TCCM ;WRITE THE BLOCK
1172  003202  000002                        RTI                     ;RETURN WHEN BLOCK IS WRITTEN
1173  003204  005777  175162        TCWB1:  TST     @TCCM           ;ANY ERRORS
1174  003210  100001                        BPL     .+4
1175  003212  104000                        HLT
1176  003214  012777  003032  175164        MOV     #TCF3,@TCIV     ;SEARCH BLOCK VECTOR
1177  003222  112777  000502  175142        MOVB    #IE+RB,@TCCM    ;READ BLOCK
1178  003230  000721                        BR      TCF4            ;FIND THE NEXT BLOCK
1179
1180  003232  032777  100200  175132 TCR1:   BIT     #100200,@TCCM   ;TEST FOR ERROR AND READY
1181  003240  003001                        BGT     .+4
1182  003242  104000                        HLT                     ;DECTAPE ERROR ON READ BLOCK REVERSE
1183  003244  027767  175126  177442        CMP     @TCDT,TCEXPE    ;IS IT OUR FIRST BLOCK
1184  003252  001406                        BEQ     TCR2            ;YES - GO TEST THE REST
1185  003254  002002                        BGE     TCR1A           ;NO - HAVE WE PASSED THE BLOCK
1186  003256  104000                        HLT                     ;WE PASS OUR BLOCK
1187  003260  000711                        BR      RENDZ           ;GO TO END ZONE AND TRY AGAIN
1188  003262  105277  175104        TCR1A:  INCB    @TCCM           ;SET DO
1189  003266  000002                        RTI                     ;WE FOUND OUR FIRST BLOCK
1190  003270  012777  003304  175110 TCR2:   MOV     #TCR3,@TCIV     ;SET UP INTERRUPT TO TEST ALL BLOCKS
1191  003276  105277  175070                INCB    @TCCM           ;SET DO
1192  003302  000002                        RTI                     ;WAIT FOR NEXT BLOCK TO INTERRUPT
1193
1194                                 ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
```

```
 1195  003304  032777  100200  175060  TCR3:   BIT     #100200,@TCCM   ;TEST FOR READ AND ERROR
 1196  003312  003001                  BGT     .+4
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  1197  003314  104000                    HLT                    ;ERROR READING SEQUENTIAL BLOCK IN REVERSE
```

```
1198   003316  026777  177364  175052          CMP     TCFIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1199   003324  001666                          BEQ     XFENDZ          ;YES - GO TO END ZONE TO RESTART
1200   003326  005367  177362                  DEC     TCEXPE          ;NO - DECREMENT BLOCK NUMBER
1201   003332  027767  175040  177354          CMP     @TCDT,TCEXPE    ;TEST SEQUENTAIL BLOCK IN REVERSE
1202   003340  001401                          BEQ     .+4
1203   003342  104000                          HLT                     ;TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1204   003344  000403                          BR      TCRBK           ;THIS ROUTINE READ A BLOCK
1205   003346  105277  175020          TCR4:   INCB    @TCCM           ;SET DO
1206   003352  000002                          RTI                     ;LETS TRY A NEW BLOCK
1207
1208                                  ;READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1209   003354  012777  003412  175024 TCRBK:  MOV     #TCRB1,@TCIV    ;SET UP INTERRUPT VECTOR
1210   003362  012777  177400  175012         MOV     #-400,@TCWC     ;READ ONE BLOCK
1211   003370  012777  003440  175006         MOV     #TCRBUF,@TCBA   ;WHERE BUFFER IS
1212   003376  112777  000505  174766         MOVB    #IE+RD+DO,@TCCM ;READ THE BLOCK
1213   003404  004767  175024                  JSR     %7,TC1          ;CHECK DATA BUFFER
1214   003410  000002                          RTI                     ;EXIT - RETURN WHEN BLOCK IS READ
1215   003412  005777  174754          TCRB1:  TST     @TCCM           ;AND ERRORS
1216   003416  100001                          BPL     .+4
1217   003420  104000                          HLT                     ;DECTAPE ERROR
1218   003422  012777  003304  174756         MOV     #TCR3,@TCIV     ;NEW VECTOR FOR BLOCK SEARCH
1219   003430  112777  000502  174734         MOVB    #IE+RB,@TCCM    ;READ BLOCK FUNCTION
1220   003436  000743                          BR      TCR4            ;RETURN TO BLOCK SEARCH
1221
1222                                  ;THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1223   003440                         TCWBUF:
1224   003440                         TCRBUF:
1225                   000001                 N=1
1226                   000100                 .REPT   100
1227                                          N                       ;DECTAPE READ/WRITE BUFFER
1228                                          -N
1229                                          N=N+1
1230                                          .ENDR
1231   003440  000001                         N                       ;DECTAPE READ/WRITE BUFFER
1232   003442  177777                         -N
1233                   000002                 N=N+1
1234   003444  000002                         N                       ;DECTAPE READ/WRITE BUFFER
1235   003446  177776                         -N
1236                   000003                 N=N+1
1237   003450  000003                         N                       ;DECTAPE READ/WRITE BUFFER
1238   003452  177775                         -N
1239                   000004                 N=N+1
1240   003454  000004                         N                       ;DECTAPE READ/WRITE BUFFER
1241   003456  177774                         -N
1242                   000005                 N=N+1
1243   003460  000005                         N                       ;DECTAPE READ/WRITE BUFFER
1244   003462  177773                         -N
1245                   000006                 N=N+1
1246   003464  000006                         N                       ;DECTAPE READ/WRITE BUFFER
1247   003466  177772                         -N
1248                   000007                 N=N+1
1249   003470  000007                         N                       ;DECTAPE READ/WRITE BUFFER
1250   003472  177771                         -N
1251                   000010                 N=N+1
1252   003474  000010                         N                       ;DECTAPE READ/WRITE BUFFER
1253   003476  177770                         -N
```

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1254                 000011                    N=N+1
1255    003500       000011                    N                    .DECTAPE READ/WRITE BUFFER
1256    003502       177767                    -N
1257                 000012                    N=N+1
1258    003504       000012                    N                    ;DECTAPE READ/WRITE BUFFER
1259    003506       177766                    -N
1260                 000013                    N=N+1
1261    003510       000013                    N                    ;DECTAPE READ/WRITE BUFFER
1262    003512       177765                    -N
1263                 000014                    N=N+1
1264    003514       000014                    N                    ;DECTAPE READ/WRITE BUFFER
1265    003516       177764                    -N
1266                 000015                    N=N+1
1267    003520       000015                    N                    ;DECTAPE READ/WRITE BUFFER
1268    003522       177763                    -N
1269                 000016                    N=N+1
1270    003524       000016                    N                    ;DECTAPE READ/WRITE BUFFER
1271    003526       177762                    -N
1272                 000017                    N=N+1
1273    003530       000017                    N                    ;DECTAPE READ/WRITE BUFFER
1274    003532       177761                    -N
1275                 000020                    N=N+1
1276    003534       000020                    N                    ;DECTAPE READ/WRITE BUFFER
1277    003536       177760                    -N
1278                 000021                    N=N+1
1279    003540       000021                    N                    ;DECTAPE READ/WRITE BUFFER
1280    003542       177757                    -N
1281                 000022                    N=N+1
1282    003544       000022                    N                    ;DECTAPE READ/WRITE BUFFER
1283    003546       177756                    -N
1284                 000023                    N=N+1
1285    003550       000023                    N                    ;DECTAPE READ/WRITE BUFFER
1286    003552       177755                    -N
1287                 000024                    N=N+1
1288    003554       000024                    N                    ;DECTAPE READ/WRITE BUFFER
1289    003556       177754                    -N
1290                 000025                    N=N+1
1291    003560       000025                    N                    ;DECTAPE READ/WRITE BUFFER
1292    003562       177753                    -N
1293                 000026                    N=N+1
1294    003564       000026                    N                    ;DECTAPE READ/WRITE BUFFER
1295    003566       177752                    -N
1296                 000027                    N=N+1
1297    003570       000027                    N                    ;DECTAPE READ/WRITE BUFFER
1298    003572       177751                    -N
1299                 000030                    N=N+1
1300    003574       000030                    N                    ;DECTAPE READ/WRITE BUFFER
1301    003576       177750                    -N
1302                 000031                    N=N+1
1303    003600       000031                    N                    ;DECTAPE READ/WRITE BUFFER
1304    003602       177747                    -N
1305                 000032                    N=N+1
1306    003604       000032                    N                    ;DECTAPE READ/WRITE BUFFER
1307    003606       177746                    -N
1308                 000033                    N=N+1
1309    003610       000033                    N                    ;DECTAPE READ/WRITE BUFFER
```

```
1310   003612   177745                  -N
1311            000034                  N=N+1
1312   003614   000034                  N                ;DECTAPE READ/WRITE BUFFER
1313   003616   177744                  -N
1314            000035                  N=N+1
1315   003620   000035                  N                ;DECTAPE READ/WRITE BUFFER
1316   003622   177743                  -N
1317            000036                  N=N+1
1318   003624   000036                  N                ;DECTAPE READ/WRITE BUFFER
1319   003626   177742                  -N
1320            000037                  N=N+1
1321   003630   000037                  N                ;DECTAPE READ/WRITE BUFFER
1322   003632   177741                  -N
1323            000040                  N=N+1
1324   003634   000040                  N                ;DECTAPE READ/WRITE BUFFER
1325   003636   177740                  -N
1326            000041                  N=N+1
1327   003640   000041                  N                ;DECTAPE READ/WRITE BUFFER
1328   003642   177737                  -N
1329            000042                  N=N+1
1330   003644   000042                  N                ;DECTAPE READ/WRITE BUFFER
1331   003646   177736                  -N
1332            000043                  N=N+1
1333   003650   000043                  N                ;DECTAPE READ/WRITE BUFFER
1334   003652   177735                  -N
1335            000044                  N=N+1
1336   003654   000044                  N                ;DECTAPE READ/WRITE BUFFER
1337   003656   177734                  -N
1338            000045                  N=N+1
1339   003660   000045                  N                ;DECTAPE READ/WRITE BUFFER
1340   003662   177733                  -N
1341            000046                  N=N+1
1342   003664   000046                  N                ;DECTAPE READ/WRITE BUFFER
1343   003666   177732                  -N
1344            000047                  N=N+1
1345   003670   000047                  N                ;DECTAPE READ/WRITE BUFFER
1346   003672   177731                  -N
1347            000050                  N=N+1
1348   003674   000050                  N                ;DECTAPE READ/WRITE BUFFER
1349   003676   177730                  -N
1350            000051                  N=N+1
1351   003700   000051                  N                ;DECTAPE READ/WRITE BUFFER
1352   003702   177727                  -N
1353            000052                  N=N+1
1354   003704   000052                  N                ;DECTAPE READ/WRITE BUFFER
1355   003706   177726                  -N
1356            000053                  N=N+1
1357   003710   000053                  N                ;DECTAPE READ/WRITE BUFFER
1358   003712   177725                  -N
1359            000054                  N=N+1
1360   003714   000054                  N                ;DECTAPE READ/WRITE BUFFER
1361   003716   177724                  -N
1362            000055                  N=N+1
1363   003720   000055                  N                ;DECTAPE READ/WRITE BUFFER
1364   003722   177723                  -N
1365            000056                  N=N+1
```

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1366  003724  000056                N                       ;DECTAPE READ/WRITE BUFFER
1367  003726  177722                -N
1368          000057                N=N+1
1369  003730  000057                N                       ;DECTAPE READ/WRITE BUFFER
1370  003732  177721                -N
1371          000060                N=N+1
1372  003734  000060                N                       ;DECTAPE READ/WRITE BUFFER
1373  003736  177720                -N
1374          000061                N=N+1
1375  003740  000061                N                       ;DECTAPE READ/WRITE BUFFER
1376  003742  177717                -N
1377          000062                N=N+1
1378  003744  000062                N                       ;DECTAPE READ/WRITE BUFFER
1379  003746  177716                -N
1380          000063                N=N+1
1381  003750  000063                N                       ;DECTAPE READ/WRITE BUFFE..
1382  003752  177715                -N
1383          000064                N=N+1
1384  003754  000064                N                       ;DECTAPE READ/WRITE BUFFER
1385  003756  177714                -N
1386          000065                N=N+1
1387  003760  000065                N                       ;DECTAPE READ/WRITE BUFFER
1388  003762  177713                -N
1389          000066                N=N+1
1390  003764  000066                N                       ;DECTAPE READ/WRITE BUFFER
1391  003766  177712                -N
1392          000067                N=N+1
1393  003770  000067                N                       ;DECTAPE READ/WRITE BUFFER
1394  003772  177711                -N
1395          000070                N=N+1
1396  003774  000070                N                       ;DECTAPE READ/WRITE BUFFER
1397  003776  177710                -N
1398          000071                N=N+1
1399  004000  000071                N                       ;DECTAPE READ/WRITE BUFFER
1400  004002  177707                -N
1401          000072                N=N+1
1402  004004  000072                N                       ;DECTAPE READ/WRITE BUFFER
1403  004006  177706                -N
1404          000073                N=N+1
1405  004010  000073                N                       ;DECTAPE READ/WRITE BUFFER
1406  004012  177705                -N
1407          000074                N=N+1
1408  004014  000074                N                       ;DECTAPE READ/WRITE BUFFER
1409  004016  177704                -N
1410          000075                N=N+1
1411  004020  000075                N                       ;DECTAPE READ/WRITE BUFFER
1412  004022  177703                -N
1413          000076                N=N+1
1414  004024  000076                N                       ;DECTAPE READ/WRITE BUFFER
1415  004026  177702                -N
1416          000077                N=N+1
1417  004030  000077                N                       ;DECTAPE READ/WRITE BUFFER
1418  004032  177701                -N
1419          000100                N=N+1
1420  004034  000100                N                       ;DECTAPE READ/WRITE BUFFER
1421  004036  177700                -N
```

```
1422            000101                          N=N+1
1423            000100                          .REPT   100
1424                                            N=N-1
1425                                            -N
1426                                            N                       ;DEC TAPE READ/WRITE BUFFER
1427                                            .ENDR
1428            000100                          N=N-1
1429  004040    177700                          -N
1430  004042    000100                          N                       ;DEC TAPE READ/WRITE BUFFER
1431            000077                          N=N-1
1432  004044    177701                          -N
1433  004046    000077                          N                       ;DEC TAPE READ/WRITE BUFFER
1434            000076                          N=N-1
1435  004050    177702                          -N
1436  004052    000076                          N                       ;DEC TAPE READ/WRITE BUFFER
1437            000075                          N=N-1
1438  004054    177703                          -N
1439  004056    000075                          N                       ;DEC TAPE READ/WRITE BUFFER
1440            000074                          N=N-1
1441  004060    177704                          -N
1442  004062    000074                          N                       ;DEC TAPE READ/WRITE BUFFER
1443            000073                          N=N-1
1444  004064    177705                          -N
1445  004066    000073                          N                       ;DEC TAPE READ/WRITE BUFFER
1446            000072                          N=N-1
1447  004070    177706                          -N
1448  004072    000072                          N                       ;DEC TAPE READ/WRITE BUFFER
1449            000071                          N=N-1
1450  004074    177707                          -N
1451  004076    000071                          N                       ;DEC TAPE READ/WRITE BUFFER
1452            000070                          N=N-1
1453  004100    177710                          -N
1454  004102    000070                          N                       ;DEC TAPE READ/WRITE BUFFER
1455            000067                          N=N-1
1456  004104    177711                          -N
1457  004106    000067                          N                       ;DEC TAPE READ/WRITE BUFFER
1458            000066                          N=N-1
1459  004110    177712                          -N
1460  004112    000066                          N                       ;DEC TAPE READ/WRITE BUFFER
1461            000065                          N=N-1
1462  004114    177713                          -N
1463  004116    000065                          N                       ;DEC TAPE READ/WRITE BUFFER
1464            000064                          N=N-1
1465  004120    177714                          -N
1466  004122    000064                          N                       ;DEC TAPE READ/WRITE BUFFER
1467            000063                          N=N-1
1468  004124    177715                          -N
1469  004126    000063                          N                       ;DEC TAPE READ/WRITE BUFFER
1470            000062                          N=N-1
1471  004130    177716                          -N
1472  004132    000062                          N                       ;DEC TAPE READ/WRITE BUFFER
1473            000061                          N=N-1
1474  004134    177717                          -N
1475  004136    000061                          N                       ;DEC TAPE READ/WRITE BUFFER
1476            000060                          N=N-1
1477  004140    177720                          -N
```

```
1478  004142  000060                N
1479          000057                N=N-1
1480  004144  177721                -N
1481  004146  000057                N                ;DEC TAPE READ/WRITE BUFFER
1482          000056                N=N-1
1483  004150  177722                -N
1484  004152  000056                N                ;DEC TAPE READ/WRITE BUFFER
1485          000055                N=N-1
1486  004154  177723                -N
1487  004156  000055                N                ;DEC TAPE READ/WRITE BUFFER
1488          000054                N=N-1
1489  004160  177724                -N
1490  004162  000054                N                ;DEC TAPE READ/WRITE BUFFER
1491          000053                N=N-1
1492  004164  177725                -N
1493  004166  000053                N                ;DEC TAPE READ/WRITE BUFF_R
1494          000052                N=N-1
1495  004170  177726                -N
1496  004172  000052                N                ;DEC TAPE READ/WRITE BUFFER
1497          000051                N=N-1
1498  004174  177727                -N
1499  004176  000051                N                ;DEC TAPE READ/WRITE BUFFER
1500          000050                N=N-1
1501  004200  177730                -N
1502  004202  000050                N                ;DEC TAPE READ/WRITE BUFFER
1503          000047                N=N-1
1504  004204  177731                -N
1505  004206  000047                N                ;DEC TAPE READ/WRITE BUFFER
1506          000046                N=N-1
1507  004210  177732                -N
1508  004212  000046                N                ;DEC TAPE READ/WRITE BUFFER
1509          000045                N=N-1
1510  004214  177733                -N
1511  004216  000045                N                ;DEC TAPE READ/WRITE BUFFER
1512          000044                N=N-1
1513  004220  177734                -N
1514  004222  000044                N                ;DEC TAPE READ/WRITE BUFFER
1515          000043                N=N-1
1516  004224  177735                -N
1517  004226  000043                N                ;DEC TAPE READ/WRITE BUFFER
1518          000042                N=N-1
1519  004230  177736                -N
1520  004232  000042                N                ;DEC TAPE READ/WRITE BUFFER
1521          000041                N=N-1
1522  004234  177737                -N
1523  004236  000041                N                ;DEC TAPE READ/WRITE BUFFER
1524          000040                N=N-1
1525  004240  177740                -N
1526  004242  000040                N                ;DEC TAPE READ/WRITE BUFFER
1527          000037                N=N-1
1528  004244  177741                -N
1529  004246  000037                N                ;DEC TAPE READ/WRITE BUFFER
1530          000036                N=N-1
1531  004250  177742                -N
1532  004252  000036                N                ;DEC TAPE READ/WRITE BUFFER
1533          000035                N=N-1
```

```
1534   004254   177743                  -N
1535   004256   000035                  N                       ;DEC TAPE READ/WRITE BUFFER
1536            000034                  N=N-1
1537   004260   177744                  -N
1538   004262   000034                  N                       ;DEC TAPE READ/WRITE BUFFER
1539            000033                  N=N-1
1540   004264   177745                  -N
1541   004266   000033                  N                       ;DEC TAPE READ/WRITE BUFFER
1542            000032                  N=N-1
1543   004270   177746                  -N
1544   004272   000032                  N                       ;DEC TAPE READ/WRITE BUFFER
1545            000031                  N=N-1
1546   004274   177747                  -N
1547   004276   000031                  N                       ;DEC TAPE READ/WRITE BUFFER
1548            000030                  N=N-1
1549   004300   177750                  -N
1550   004302   000030                  N                       ;DEC TAPE READ/WRITE BUFFER
1551            000027                  N=N-1
1552   004304   177751                  -N
1553   004306   000027                  N                       ;DEC TAPE READ/WRITE BUFFER
1554            000026                  N=N-1
1555   004310   177752                  -N
1556   004312   000026                  N                       ;DEC TAPE READ/WRITE BUFFER
1557            000025                  N=N-1
1558   004314   177753                  -N
1559   004316   000025                  N                       ;DEC TAPE READ/WRITE BUFFER
1560            000024                  N=N-1
1561   004320   177754                  -N
1562   004322   000024                  N                       ;DEC TAPE READ/WRITE BUFFER
1563            000023                  N=N-1
1564   004324   177755                  -N
1565   004326   000023                  N                       ;DEC TAPE READ/WRITE BUFFER
1566            000022                  N=N-1
1567   004330   177756                  -N
1568   004332   000022                  N                       ;DEC TAPE READ/WRITE BUFFER
1569            000021                  N=N-1
1570   004334   177757                  -N
1571   004336   000021                  N                       ;DEC TAPE READ/WRITE BUFFER
1572            000020                  N=N-1
1573   004340   177760                  -N
1574   004342   000020                  N                       ;DEC TAPE READ/WRITE BUFFER
1575            000017                  N=N-1
1576   004344   177761                  -N
1577   004346   000017                  N                       ;DEC TAPE READ/WRITE BUFFER
1578            000016                  N=N-1
1579   004350   177762                  -N
1580   004352   000016                  N                       ;DEC TAPE READ/WRITE BUFFER
1581            000015                  N=N-1
1582   004354   177763                  -N
1583   004356   000015                  N                       ;DEC TAPE READ/WRITE BUFFER
1584            000014                  N=N-1
1585   004360   177764                  -N
1586   004362   000014                  N                       ;DEC TAPE READ/WRITE BUFFER
1587            000013                  N=N-1
1588   004364   177765                  -N
1589   004366   000013                  N                       ;DEC TAPE READ/WRITE BUFFER
```

```
 1590                   000012                                  N=N-1
 1591  004370   177766                                         -N
 1592  004372   000012                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1593                   000011                                  N=N-1
 1594  004374   177767                                         -N
 1595  004376   000011                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1596                   000010                                  N=N-1
 1597  004400   177770                                         -N
 1598  004402   000010                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1599                   000007                                  N=N-1
 1600  004404   177771                                         -N
 1601  004406   000007                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1602                   000006                                  N=N-1
 1603  004410   177772                                         -N
 1604  004412   000006                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1605                   000005                                  N=N-1
 1606  004414   177773                                         -N
 1607  004416   000005                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1608                   000004                                  N=N-1
 1609  004420   177774                                         -N
 1610  004422   000004                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1611                   000003                                  N=N-1
 1612  004424   177775                                         -N
 1613  004426   000003                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1614                   000002                                  N=N-1
 1615  004430   177776                                         -N
 1616  004432   000002                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1617                   000001                                  N=N-1
 1618  004434   177777                                         -N
 1619  004436   000001                                         N                       ;DEC TAPE READ/WRITE BUFFER
 1620
 1621  004440   012767  004440  012020  BEGIN:  MOV     #BEGIN,RETURN                   ;FOR SCOPING
 1622  004446   104400          SCOPE
 1623  004450   012737  004000  016462          MOV     #4000,@#ICOUNT                  ;ITERATION COUNT
 1624                   ;TEST COMPARE INSTRUCTION INDEXED
 1625  004456   012700  177770                  MOV     #-10,%0                         ;MINUS 10 TO REG 0
 1626  004462   026027  016710  125252          CMP     A(0),#125252                    ;(A INDEX BY MINUS 10) TO #125252
 1627  004470   001401                          BEQ     .+4
 1628  004472   104000                          HLT                                     ;COMPARE WITH INDEX FAILED
 1629  004474   104400          SCOPE
 1630
 1631  004476   022760  125252  016710          CMP     #125252,A(0)                    ;A INDEXED
 1632  004504   001401                          BEQ     .+4
 1633  004506   104000                          HLT                                     ;COMPARE FAILED DESTINATION INDEX
 1634  004510   104400          SCOPE
 1635
 1636  004512   010700                  ;SET "ISR" FOR DISKS AND KW11L TO CURRENT BANK
                                          MOV     %7,%0                           ;CURRENT BANK
 1637  004514   042700  007777                  BIC     #007777,%0                      ;LEAVE ONLY BANK BITS
 1638  004520   062700  002044                  ADD     #LK3,%0                         ;ADD IN CLOCK ENTRANCE
 1639  004524   010037  000100                  MOV     %0,@#100                        ;LINE CLOCK, KW11L
 1640  004530   042700  007777                  BIC     #007777,%0
 1641  004534   062700  002632                  ADD     #IRF,%0
 1642  004540   010037  000204                  MOV     %0,@#204                        ;RF11 ISR
 1643  004544   042700  007777                  BIC     #007777,%0
 1644  004550   062700  002534                  ADD     #IRC,%0
 1645  004554   010037  000210                  MOV     %0,@#210                        ;RC11, ISR
```

```
1646  004560  042700  007777          BIC     #007777,%0
1647  004564  062700  002344          ADD     #IRK,%0
1648  004570  010037  000220          MOV     %0,@#220        ;RK11 ISR
1649  004574  042700  007777          BIC     #7777,%0
1650  004600  062700  002450          ADD     #IRP,%0
1651  004604  010037  000254          MOV     %0,@#254        ;RP11 ISR
1652  004610  042700  007777          BIC     #007777,%0
1653  004614  063700  002704          ADD     @#LLIMIT,%0
1654  004620  010067  176060          MOV     %0,LLIMIT       ;CHANGE DISK NPR BUFFER
1655  004624  042700  007777          BIC     #007777,%0
1656  004630  062700  017004          ADD     #BUFF,%0
1657  004634  010006                  MOV     %0,%6           ;CHANGE STACK TO EXISTING BANK
1658
1659  004636  012700  000010          MOV     #10,%0          ;INDEX
1660  004642  026027  016710  052525  CMP     A(0),#052525
1661  004650  001401                  BEQ     .+4
1662  004652  104000                  HLT                     ;COMPARE FAILED
1663  004654  104400                  SCOPE
1664
1665
1666  004656  022760  052525  016710  CMP     #052525,A(0)    ;REGISTER 0 CONTAINS 000010
1667  004664  001401                  BEQ     .+4
1668  004666  104000                  HLT                     ;COMPARE FAILED
1669  004670  104400                  SCOPE
1670
1671
1672  004672  026060  016710  016710  CMP     A(0),A(0)       ;REGISTER 0 CONTAINS 000010
1673  004700  001401                  BEQ     .+4
1674  004702  104000                  HLT                     ;COMPARE FAILED
1675  004704  104400                  SCOPE
1676
1677  004706  012700  177770          MOV     #-10,%0
1678  004712  026060  016710  016710  CMP     A(0),A(0)
1679  004720  001401                  BEQ     .+4
1680  004722  104000                  HLT                     ;COMPARE FAILED
1681  004724  104400                  SCOPE
1682
1683                                  ;REGISTER 0 CONTAINS 177770 (-10)
1684  004726  012701  000004          MOV     #+4,%1
1685  004732  026061  016710  016710  CMP     A(0),A(1)
1686  004740  001401                  BEQ     .+4
1687  004742  104000                  HLT                     ;COMPARE FAILED
1688  004744  104400                  SCOPE
1689
1690  004746  026160  016710  016710  CMP     A(1),A(0)
1691  004754  001401                  BEQ     .+4
1692  004756  104000                  HLT                     ;COMPARE FAILED
1693  004760  104400                  SCOPE
1694
1695  004762  012700  177774          MOV     #-4,%0
1696  004766  012701  000010          MOV     #+10,%1
1697  004772  026061  016710  016710  CMP     A(0),A(1)
1698  005000  001401                  BEQ     .+4
1699  005002  104000                  HLT                     ;CMP FAILED
1700  005004  104400                  SCOPE
1701                                  ;REGISTER 0 CONTAINS 177774 (-4)
```

```
 1702
 1703  005006  026160  016710  016710          CMP     A(1),A(0)                       ;REGISTER 1 CONTAINS 000010
 1704  005014  001401                          BEQ     .+4
 1705  005016  104000                          HLT                                     ;COMPARE FAILED
 1706  005020  104400                          SCOPE
 1707                                  ;TEST MOVE ODD BYTE TO REGISTER
 1708                                  ;PROBLEM 1150237-7-MAR-72
 1709  005022  116700  011677                  MOVB    C+3,%0
 1710  005026  022700  000035                  CMP     #35,%0
 1711  005032  001401                          BEQ     .+4
 1712  005034  104000                          HLT
 1713  005036  104400                          SCOPE
 1714
 1715                                  ;TEST MOVE INSTRUCTION FOR INDEX
 1716  005040  012700  177770                  MOV     #-10,%0
 1717  005044  016067  016710  011660          MOV     A(0),TEMP
 1718  005052  026727  011654  125252          CMP     TEMP,#125252
 1719  005060  001401                          BEQ     .+4
 1720  005062  104000                          HLT                                     ;COMPARE FAILED
 1721  005064  104400                          SCOPE
 1722
 1723  005066  012700  000010                  MOV     #+10,%0
 1724  005072  016067  016710  011632          MOV     A(0),TEMP
 1725  005100  026727  011626  052525          CMP     TEMP,#052525
 1726  005106  001401                          BEQ     .+4
 1727  005110  104000                          HLT                                     ;MOV FAILED
 1728  005112  104400                          SCOPE
 1729
 1730  005114  012700  177770                  MOV     #-10,%0
 1731  005120  012760  125252  016732          MOV     #125252,TEMP(0)
 1732  005126  023727  016722  125252          CMP     @#C,#125252
 1733  005134  001401                          BEQ     .+4
 1734  005136  104000                          HLT                                     ;MOV FAILED
 1735  005140  104400                          SCOPE
 1736
 1737  005142  012700  000010                  MOV     #+10,%0
 1738  005146  012760  052525  016732          MOV     #052525,TEMP(0)
 1739  005154  023727  016742  052525          CMP     @#TEMP+10,#052525
 1740  005162  001401                          BEQ     .+4
 1741  005164  104000                          HLT                                     ;MOV FAILED
 1742  005166  104400                          SCOPE
 1743
 1744                                  ;TEST BIC INSTRUCTION FOR INDEXING
 1745  005170  012767  177777  011534          MOV     #-1,TEMP
 1746  005176  012700  177770                  MOV     #-10,%0
 1747  005202  046067  016710  011522          BIC     A(0),TEMP
 1748  005210  026727  011516  052525          CMP     TEMP,#052525
 1749  005216  001401                          BEQ     .+4
 1750  005220  104000                          HLT                                     ;BIC FAILED
 1751  005222  104400                          SCOPE
 1752
 1753  005224  012767  177777  011500          MOV     #-1,TEMP
 1754  005232  012700  000010                  MOV     #10,%0
 1755  005236  046067  016710  011466          BIC     A(0),TEMP
 1756  005244  026727  011462  125252          CMP     TEMP,#125252
 1757  005252  001401                          BEQ     .+4
```

```
 1758  005254  104000                          HLT                                     ;BIC FAILED
 1759  005256  104400                          SCOPE
 1760
 1761  005260  012737  177777  016742          MOV     #-1,@#TEMP+10
 1762  005266  012700  000010                  MOV     #10,%0
 1763  005272  042760  125252  016732          BIC     #125252,TEMP(0)
 1764  005300  023727  016742  052525          CMP     @#TEMP+10,#52525
 1765  005306  001401                          BEQ     .+4
 1766  005310  104000                          HLT                                     ;BIC FAILED
 1767  005312  104400                          SCOPE
 1768
 1769  005314  012700  177770                  MOV     #-10,%0
 1770  005320  012767  177777  011374          MOV     #-1,TEMP-10
 1771  005326  042767  052525  011366          BIC     #052525,TEMP-10
 1772  005334  026727  011362  125252          CMP     TEMP-10,#125252
 1773  005342  001401                          BEQ     .+4
 1774  005344  104000                          HLT                                     ;BIC FAILED
 1775  005346  104400                          SCOPE
 1776                          ;TEST SUBTRACT INSTRUCTION FOR INDEXING
 1777  005350  012767  125252  011354          MOV     #125252,TEMP
 1778  005356  012700  177770                  MOV     #-10,%0
 1779  005362  166067  016710  011342          SUB     A(0),TEMP
 1780  005370  001401                          BEQ     .+4
 1781  005372  104000                          HLT                                     ;SUB FAILED
 1782  005374  104400                          SCOPE
 1783
 1784  005376  012737  125252  016732          MOV     #125252,@#TEMP
 1785  005404  012700  177770                  MOV     #-10,%0
 1786  005410  166760  011264  016742          SUB     B,TEMP+10(0)
 1787  005416  001401                          BEQ     .+4
 1788  005420  104000                          HLT                                     ;SUB FAILED
 1789  005422  104400                          SCOPE
 1790
 1791  005424  012767  052525  011300          MOV     #052525,TEMP
 1792  005432  012700  000010                  MOV     #10,%0
 1793  005436  166067  016710  011266          SUB     A(0),TEMP
 1794  005444  001401                          BEQ     .+4
 1795  005446  104000                          HLT                                     ;SUB FAILED
 1796  005450  104400                          SCOPE
 1797
 1798  005452  012737  052525  016732          MOV     #052525,@#TEMP
 1799  005460  012700  000010                  MOV     #10,%0
 1800  005464  166760  011230  016722          SUB     A+10,C(0)
 1801  005472  001401                          BEQ     .+4
 1802  005474  104000                          HLT                                     ;SUB FAILED
 1803  005476  104400                          SCOPE
 1804
 1805                          ;TEST UNARYS INDEXED
 1806  005500  012737  177777  016732          MOV     #-1,@#TEMP
 1807  005506  012700  177770                  MOV     #-10,%0
 1808  005512  005060  016742                  CLR     D(0)
 1809  005516  005737  016732                  TST     @#TEMP
 1810  005522  001401                          BEQ     .+4
 1811  005524  104000                          HLT                                     ;CLR FAILED
 1812  005526  104400                          SCOPE
 1813
```

```
1814  005530  012737  177777  016732          MOV     #-1,@#TEMP
1815  005536  012700  000010                  MOV     #+10,%0
1816  005542  005060  016722                  CLR     C(0)
1817  005546  005737  016732                  TST     @#TEMP
1818  005552  001401                          BEQ     .+4
1819  005554  104000                          HLT                             ;CLR FAILED
1820  005556  104400                          SCOPE
1821
1822  005560  012737  177777  016732          MOV     #-1,@#TEMP
1823  005566  012700  177770                  MOV     #-10,%0
1824  005572  005160  016742                  COM     D(0)
1825  005576  005737  016732                  TST     @#TEMP
1826  005602  001401                          BEQ     .+4
1827  005604  104000                          HLT                             ;COM FAILED
1828  005606  104400                          SCOPE
1829
1830  005610  012737  177777  016732          MOV     #-1,@#TEMP
1831  005616  012700  000010                  MOV     #10,%0
1832  005622  005160  016722                  COM     C(0)
1833  005626  005737  016732                  TST     @#TEMP
1834  005632  001401                          BEQ     .+4
1835  005634  104000                          HLT                             ;COM FAILED
1836  005636  104400                          SCOPE
1837  005640  012737  177777  016732          MOV     #-1,@#TEMP
1838  005646  012700  177770                  MOV     #-10,%0
1839  005652  005260  016742                  INC     D(0)
1840  005656  005737  016732                  TST     @#TEMP
1841  005662  001401                          BEQ     .+4
1842  005664  104000                          HLT                             ;INC FAILED
1843  005666  104400                          SCOPE
1844
1845  005670  012737  177777  016732          MOV     #-1,@#TEMP
1846  005676  012700  000010                  MOV     #+10,%0
1847  005702  005260  016722                  INC     C(0)
1848  005706  005737  016732                  TST     @#TEMP
1849  005712  001401                          BEQ     .+4
1850  005714  104000                          HLT                             ;INC FAILED
1851  005716  104400                          SCOPE
1852
1853  005720  012737  000001  016732          MOV     #1,@#TEMP
1854  005726  012700  177770                  MOV     #-10,%0
1855  005732  005360  016742                  DEC     D(0)
1856  005736  005737  016732                  TST     @#TEMP
1857  005742  001401                          BEQ     .+4
1858  005744  104000                          HLT                             ;DEC FAILED
1859  005746  104400                          SCOPE
1860
1861  005750  012737  000001  016732          MOV     #1,@#TEMP
1862  005756  012700  000010                  MOV     #10,%0
1863  005762  005360  016722                  DEC     C(0)
1864  005766  005737  016732                  TST     @#TEMP
1865  005772  001401                          BEQ     .+4
1866  005774  104000                          HLT                             ;DEC FAILED
1867  005776  104400                          SCOPE
1868
1869  006000  012737  000001  016732          MOV     #1,@#TEMP
```

```
1870  006006  012700  177770          MOV     #-10,%0
1871  006012  005460  016742          NEG     D(0)
1872  006016  022737  177777  016732  CMP     #-1,@#TEMP
1873  006024  001401                  BEQ     .+4
1874  006026  104000                  HLT                             ;NEG FAILED
1875  006030  104400                  SCOPE
1876
1877  006032  012737  000001  016732  MOV     #1,@#TEMP
1878  006040  012700  000010          MOV     #+10,%0
1879  006044  005460  016722          NEG     C(0)
1880  006050  022737  177777  016732  CMP     #-1,@#TEMP
1881  006056  001401                  BEQ     .+4
1882  006060  104000                  HLT                             ;NEG FAILED
1883  006062  104400                  SCOPE
1884
1885  006064  012737  177777  016732  MOV     #-1,@#TEMP
1886  006072  012700  177770          MOV     #-10,%0
1887  006076  000261                  SEC
1888  006100  005560  016742          ADC     D(0)
1889  006104  005737  016732          TST     @#TEMP
1890  006110  001401                  BEQ     .+4
1891  006112  104000                  HLT                             ;ADC FAILED
1892  006114  104400                  SCOPE
1893
1894  006116  012737  177777  016732  MOV     #-1,@#TEMP
1895  006124  012700  000010          MOV     #+10,%0
1896  006130  000261                  SEC
1897  006132  005560  016722          ADC     C(0)
1898  006136  005737  016732          TST     @#TEMP
1899  006142  001401                  BEQ     .+4
1900  006144  104000                  HLT                             ;ADC FAILED
1901  006146  104400                  SCOPE
1902
1903  006150  012737  000001  016732  MOV     #1,@#TEMP
1904  006156  012700  177770          MOV     #-10,%0
1905  006162  000261                  SEC
1906  006164  005660  016742          SBC     D(0)
1907  006170  005737  016732          TST     @#TEMP
1908  006174  001401                  BEQ     .+4
1909  006176  104000                  HLT                             ;SBC FAILED
1910  006200  104400                  SCOPE
1911
1912  006202  012737  000001  016732  MOV     #1,@#TEMP
1913  006210  012700  000010          MOV     #+10,%0
1914  006214  000261                  SEC
1915  006216  005660  016722          SBC     C(0)
1916  006222  005737  016732          TST     @#TEMP
1917  006226  001401                  BEQ     .+4
1918  006230  104000                  HLT                             ;SBC FAILED
1919  006232  104400                  SCOPE
1920
1921
1922  006234  010700          ;TEST JMP INDIRECT
1923  006236  062700  000010          MOV     %7,%0
1924  006242  000110                  ADD     #10,%0
1925  006244  104000                  JMP     @%0
                                      HLT                             ;JMP FAILED
```

SEQ 0038

```
 1926  006246  000240                          NOP
 1927  006250  104400                          SCOPE
 1928
 1929  006252  010600                          MOV     %6,%0
 1930  006254  010001                          MOV     %0,%1
 1931  006256  010102                          MOV     %1,%2
 1932  006260  010203                          MOV     %2,%3
 1933  006262  010304                          MOV     %3,%4
 1934  006264  010405                          MOV     %4,%5
 1935  006266  020605                          CMP     %6,%5
 1936  006270  001401                          BEQ     .+4
 1937  006272  104000                          HLT                             ;MOV REGISTOR FAILED
 1938  006274  104400                          SCOPE
 1939                                  ;TEST INDIRECT ADDRESSING
 1940                                  ;TEST COMPARE INSTRUCTION
 1941  006276  023727  016700  125252          CMP     @#8,#125252
 1942  006304  001401                          BEQ     .+4
 1943  006306  104000                          HLT                             ;CMP FAILED
 1944  006310  104400                          SCOPE
 1945
 1946  006312  022737  125252  016700          CMP     #125252,@#8
 1947  006320  001401                          BEQ     .+4
 1948  006322  104000                          HLT                             ;CMP FAILED
 1949  006324  104400                          SCOPE
 1950
 1951  006326  023737  016700  016700          CMP     @#8,@#8
 1952  006334  001401                          BEQ     .+4
 1953  006336  104000                          HLT                             ;CMP FAILED
 1954  006340  104400                          SCOPE
 1955
 1956                                  ;TEST MOVE INSTRUCTIONS
 1957  006342  013700  016700                  MOV     @#8,%0
 1958  006346  022700  125252                  CMP     #125252,%0
```

```
 1959  006352  001401                          BEQ     .+4
 1960  006354  104000                          HLT                             ;MOV FAILED
 1961  006356  104400                          SCOPE
 1962
 1963  006360  012737  125252  016732          MOV     #125252,@#TEMP
 1964  006366  023737  016700  016732          CMP     @#B,@#TEMP
 1965  006374  001401                          BEQ     .+4
 1966  006376  104000                          HLT                             ;MOV FAILED
 1967  006400  104400                          SCOPE
 1968
 1969  006402  013737  016700  016722          MOV     @#B,@#C
 1970  006410  023737  016700  016722          CMP     @#B,@#C
 1971  006416  001401                          BEQ     .+4
 1972  006420  104000                          HLT                             ;MOV FAILED
 1973  006422  104400                          SCOPE
 1974                          ;TEST BIC INSTRUCTION INDIRECT
 1975  006424  012700  177777                  MOV     #-1,%0
 1976  006430  043700  016700                  BIC     @#B,%0
 1977  006434  020027  052525                  CMP     %0,#052525
 1978  006440  001401                          BEQ     .+4
 1979  006442  104000                          HLT                             ;BIC FAILED
 1980  006444  104400                          SCOPE
 1981
 1982  006446  012737  177777  016732          MOV     #-1,@#TEMP
 1983  006454  042737  125252  016732          BIC     #125252,@#TEMP
 1984  006462  022737  052525  016732          CMP     #052525,@#TEMP
 1985  006470  001401                          BEQ     .+4
 1986  006472  104000                          HLT                             ;BIC FAILED
 1987  006474  104400                          SCOPE
 1988
 1989  006476  012737  177777  016722          MOV     #-1,@#C
 1990  006504  043737  016700  016722          BIC     @#B,@#C
 1991  006512  023727  016722  052525          CMP     @#C,#52525
 1992  006520  001401                          BEQ     .+4
 1993  006522  104000                          HLT                             ;BIC FAILED
 1994  006524  104400                          SCOPE
 1995
 1996                          ;TEST SUBTRACT INSTRUCTION
 1997  006526  012700  125252                  MOV     #125252,%0
 1998  006532  163700  016700                  SUB     @#B,%0
 1999  006536  020027  000000                  CMP     %0,#0
 2000  006542  001401                          BEQ     .+4
 2001  006544  104000                          HLT                             ;SUB FAILED
 2002  006546  104400                          SCOPE
 2003
 2004  006550  012737  125252  016732          MOV     #125252,@#TEMP
 2005  006556  166737  010116  016732          SUB     B,@#TEMP
 2006  006564  001401                          BEQ     .+4
 2007  006566  104000                          HLT                             ;SUB FAILED
 2008  006570  104400                          SCOPE
 2009
 2010  006572  012767  125252  010132          MOV     #125252,TEMP
 2011  006600  163767  016700  010124          SUB     @#B,TEMP
 2012  006606  005767  010120                  TST     TEMP
 2013  006612  001401                          BEQ     .+4
 2014  006614  104000                          HLT                             ;SUB FAILED
```

```
 2015  006616  104400                          SCOPE
 2016                                ;TEST UNARYS INDIRECT
 2017  006620  012737  177777  016732          MOV     #-1,@#TEMP
 2018  006626  005037  016732                  CLR     @#TEMP
 2019  006632  005737  016732                  TST     @#TEMP
 2020  006636  001401                          BEQ     .+4
 2021  006640  104000                          HLT                             ;TST FAILED
 2022  006642  104400                          SCOPE
 2023
 2024  006644  012737  125252  016732          MOV     #125252,@#TEMP
 2025  006652  005137  016732                  COM     @#TEMP
 2026  006656  022737  052525  016732          CMP     #052525,@#TEMP
 2027  006664  001401                          BEQ     .+4
 2028  006666  104000                          HLT                             ;COM FAILED
 2029  006670  104400                          SCOPE
 2030
 2031  006672  005037  016732                  CLR     @#TEMP
 2032  006676  005237  016732                  INC     @#TEMP
 2033  006702  022737  000001  016732          CMP     #1,@#TEMP
 2034  006710  001401                          BEQ     .+4
 2035  006712  104000                          HLT                             ;INC FAILED
 2036  006714  104400                          SCOPE
 2037
 2038  006716  005037  016732                  CLR     @#TEMP
 2039  006722  005377  010006                  DEC     @TEMP+2
 2040  006726  023727  016732  177777          CMP     @#TEMP,#-1
 2041  006734  001401                          BEQ     .+4
 2042  006736  104000                          HLT                             ;DEC FAILED
 2043  006740  104400                          SCOPE
 2044
 2045  006742  012737  000001  016732          MOV     #1,@#TEMP
 2046  006750  005437  016732                  NEG     @#TEMP
 2047  006754  022737  177777  016732          CMP     #-1,@#TEMP
 2048  006762  001401                          BEQ     .+4
 2049  006764  104000                          HLT
 2050  006766  104400                          SCOPE                           ;NEG FAILED
 2051
 2052
 2053                                ;TEST INDIRECT ADDRESSING WITH INDEXING
 2054                                ;TEST COMPARE INSTRUCTION
 2054  006770  027727  007706  125252          CMP     @B+2,#125252
 2055  006776  001401                          BEQ     .+4
 2056  007000  104000                          HLT
 2057  007002  104400                          SCOPE                           ;CMP FAILED
 2058
 2059  007004  022777  125252  007670          CMP     #125252,@B+2
 2060  007012  001401                          BEQ     .+4
 2061  007014  104000                          HLT
 2062  007016  104400                          SCOPE                           ;CMP FAILED
 2063
 2064  007020  027777  007656  007654          CMP     @B+2,@B+2
 2065  007026  001401                          BEQ     .+4
 2066  007030  104000                          HLT
 2067  007032  104400                          SCOPE                           ;CMP FAILED
 2068
 2069
 2070  007034  017700  007642                  MOV     @B+2,%0
```

```
2071   007040  022700  125252          CMP     #125252,%0
2072   007044  001401                  BEQ     .+4
2073   007046  104000                  HLT                             ;MOV FAILED
2074   007050  104400                  SCOPE
2075
2076   007052  012777  125252  007654  MOV     #125252,@TEMP+2
2077   007060  023737  016700  016732  CMP     @#B,@#TEMP
2078   007066  001401                  BEQ     .+4
2079   007070  104000                  HLT                             ;MOV FAILED
2080   007072  104400                  SCOPE
2081
2082   007074  017777  007602  007622  MOV     @B+2,@C+2
2083   007102  023737  016700  016722  CMP     @#B,@#C
2084   007110  001401                  BEQ     .+4
2085   007112  104000                  HLT
2086   007114  104400                  SCOPE
2087
2088                                  ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2089   007116  012700  177777          MOV     #-1,%0
2090   007122  047700  007554          BIC     @B+2,%0
2091   007126  020027  052525          CMP     %0,#52525
2092   007132  001401                  BEQ     .+4
2093   007134  104000                  HLT                             ;BIC FAILED
2094   007136  104400                  SCOPE
2095
2096   007140  012737  177777  016732  MOV     #-1,@#TEMP
2097   007146  042777  125252  007560  BIC     #125252,@TEMP+2
2098   007154  022737  052525  016732  CMP     #52525,@#TEMP
2099   007162  001401                  BEQ     .+4
2100   007164  104000                  HLT                             ;BIC FAILED
2101   007166  104400                  SCOPE
2102
2103   007170  012737  177777  016722  MOV     #-1,@#C
2104   007176  047777  007500  007520  BIC     @B+2,@C+2
2105   007204  026737  007510  016722  CMP     A+10,@#C
2106   007212  001401                  BEQ     .+4
2107   007214  104000                  HLT                             ;BIC FAILED
2108   007216  104400                  SCOPE
2109
2110   007220  012700  125252          MOV     #125252,%0
2111   007224  167700  007452          SUB     @B+2,%0
2112   007230  020027  000000          CMP     %0,#0
2113   007234  001401                  BEQ     .+4
2114   007236  104000                  HLT                             ;SUB FAILED
2115   007240  104400                  SCOPE
2116
2117   007242  012737  125252  016732  MOV     #125252,@#TEMP
2118   007250  166777  007424  007456  SUB     B,@TEMP+2
2119   007256  001401                  BEQ     .+4
2120   007260  104000                  HLT                             ;SUB FAILED
2121   007262  104400                  SCOPE
2122
2123   007264  012737  125252  016732  MOV     #125252,@#TEMP
2124   007272  167777  007404  007434  SUB     @B+2,@TEMP+2
2125   007300  005737  016732          TST     @#TEMP
2126   007304  001401                  BEQ     .+4
```

```
007306  104000                  HLT                             ;SUB FAILED
007310  104400                  SCOPE
                        ;TEST ADD INDIRECT WITH INDEXING
007312  005000                  CLR     %0
007314  067700  007362          ADD     @B+2,%0
007320  022700  125252          CMP     #125252,%0
007324  001401                  BEQ     .+4
007326  104000                  HLT                             ;ADD FAILED
007330  104400                  SCOPE
007332  005037  016732          CLR     @#TEMP
007336  062777  125252  007370  ADD     #125252,@TEMP+2
007344  022737  125252  016732  CMP     #125252,@#TEMP
007352  001401                  BEQ     .+4
007354  104000                  HLT                             ;ADD FAILED
007356  104400                  SCOPE
007360  012737  125252  016732  MOV     #125252,@#TEMP
007366  067777  007324  007340  ADD     @A+6,@TEMP+2
007374  023727  016732  177777  CMP     @#TEMP,#-1
007402  001401                  BEQ     .+4
007404  104000                  HLT                             ;ADD FAILED
007406  104400                  SCOPE
                        ;TEST UNARYS INDIRECT WITH INDEXING
007410  012737  177777  016732  MOV     #-1,@#TEMP
007416  005077  007312          CLR     @TEMP+2
007422  005737  016732          TST     @#TEMP
007426  001401                  BEQ     .+4
007430  104000                  HLT                             ;TST FAILED
007432  104400                  SCOPE
007434  012737  125252  016732  MOV     #125252,@#TEMP
007442  005177  007266          COM     @TEMP+2
007446  022737  052525  016732  CMP     #052525,@#TEMP
007454  001401                  BEQ     .+4
007456  104000                  HLT                             ;COM FAILED
007460  104400                  SCOPE
007462  005037  016732          CLR     @#TEMP
007466  005277  007242          INC     @TEMP+2
007472  022737  000001  016732  CMP     #1,@#TEMP
007500  001401                  BEQ     .+4
007502  104000                  HLT                             ;INC FAILED
007504  104400                  SCOPE
007506  005037  016732          CLR     @#TEMP
007512  005377  007216          DEC     @TEMP+2
007516  023727  016732  177777  CMP     @#TEMP,#-1
007524  001401                  BEQ     .+4
007526  104000                  HLT                             ;DEC FAILED
007530  104400                  SCOPE
007532  012737  000001  016732  MOV     #1,@#TEMP
007540  005477  007170          NEG     @TEMP+2
007544  022737  177777  016732  CMP     #-1,@#TEMP
```

```
2183  007552  001401                          BEQ     .+4
2184  007554  104000                          HLT
2185  007556  104400                          SCOPE                           ;NEG FAILED
2186
2187  007560  012737  177777  016732          MOV     #-1,@#TEMP
2188  007566  000261                          SEC
2189  007570  005577  007140                  ADC     @TEMP+2
2190  007574  005737  016732                  TST     @#TEMP
2191  007600  001401                          BEQ     .+4
2192  007602  104000                          HLT
2193  007604  104400                          SCOPE                           ;ADC FAILED
2194
2195  007606  012737  000001  016732          MOV     #1,@#TEMP
2196  007614  000261                          SEC
2197  007616  005677  007112                  SBC     @TEMP+2
2198  007622  005737  016732                  TST     @#TEMP
2199  007626  001401                          BEQ     .+4
2200  007630  104000                          HLT
2201  007632  104400                          SCOPE                           ;SBC FAILED
2202
2203                          ;TEST OF COMBINED INDEXING AND INDIRECT
2204  007634  012700  177772                  MOV     #-6,%0
2205  007640  027027  016710  125252          CMP     @A(0),#125252
2206  007646  001401                          BEQ     .+4
2207  007650  104000                          HLT
2208  007652  104400                          SCOPE                           ;CMP FAILED
2209
2210  007654  012700  177772                  MOV     #-6,%0
2211  007660  022770  125252  016710          CMP     #125252,@A(0)
2212  007666  001401                          BEQ     .+4
2213  007670  104000                          HLT
2214  007672  104400                          SCOPE                           ;CMP FAILED
2215
2216  007674  012700  177772                  MOV     #-6,%0
2217  007700  012701  000002                  MOV     #+2,%1
2218  007704  027071  016710  016710          CMP     @A(0),@A(1)
2219  007712  001401                          BEQ     .+4
2220  007714  104000                          HLT
2221  007716  104400                          SCOPE                           ;CMP FAILED
2222
2223                          ;TEST BIC INSTRUCTION
2224  007720  012700  000006                  MOV     #+6,%0
2225  007724  012767  177777  007000          MOV     #-1,TEMP
2226  007732  047067  016710  006772          BIC     @A(0),TEMP
2227  007740  022767  125252  006764          CMP     #125252,TEMP
2228  007746  001401                          BEQ     .+4
2229  007750  104000                          HLT
2230  007752  104400                          SCOPE                           ;BIC FAILED
2231
2232  007754  012700  177772                  MOV     #-6,%0
2233  007760  012737  177777  016722          MOV     #-1,@#C
2234  007766  042770  125252  016732          BIC     #125252,@TEMP(0)
2235  007774  023727  016722  052525          CMP     @#C,#052525
2236  010002  001401                          BEQ     .+4
2237  010004  104000                          HLT
2238  010006  104400                          SCOPE                           ;BIC FAILED
```

```
2239  010010  012737  177777  016722          MOV     #-1,@#C
2240  010016  012700  177772                  MOV     #-6,%0
2241  010022  012701  177772                  MOV     #-6,%1
2242  010026  047071  016710  016732          BIC     @A(0),@TEMP(1)
2243  010034  022737  052525  016722          CMP     #052525,@#C
2244  010042  001401                          BEQ     .+4
2245  010044  104000                          HLT                             ;BIC FAILED
2246  010046  104400                          SCOPE
2247
2248  010050  122727  000000  000001          CMPB    #0,#1                   ;T7 FIX
2249  010056  002401                          BLT     .+4
2250  010060  104000                          HLT                             ;CMPB FAILED
2251  010062  104400                          SCOPE
2252                        ;TEST COMPARE INSTRUCTION INDEXED
2253  010064  012700  177770                  MOV     #-10,%0                 ;MINUS 10 TO REG 0
2254  010070  126027  016710  000252          CMPB    A(0),#000252            ;(A INDEX BY MINUS 10) TO #125252
2255  010076  001401                          BEQ     .+4
2256  010100  104000                          HLT                             ;COMPARE WITH INDEX FAILED
2257  010102  104400                          SCOPE
2258
2259  010104  012700  177770                  MOV     #-10,%0                 ;FOR INDEX
2260  010110  122760  000252  016710          CMPB    #000252,A(0)            ;A INDEXED
2261  010116  001401                          BEQ     .+4
2262  010120  104000                          HLT                             ;CMPB FAILED
2263  010122  104400                          SCOPE
2264
2265  010124  012700  000010                  MOV     #10,%0                  ;INDEX
2266  010130  126027  016710  000125          CMPB    A(0),#000125
2267  010136  001401                          BEQ     .+4
2268  010140  104000                          HLT                             ;CMPB FAILED
2269  010142  104400                          SCOPE
2270
2271  010144  012700  000010                  MOV     #10,%0
2272  010150  122760  000125  016710          CMPB    #000125,A(0)
2273  010156  001401                          BEQ     .+4
2274  010160  104000                          HLT                             ;CMPB FAILED
2275  010162  104400                          SCOPE
2276
2277  010164  012700  177770                  MOV     #-10,%0
2278  010170  126060  016710  016710          CMPB    A(0),A(0)
2279  010176  001401                          BEQ     .+4
2280  010200  104000                          HLT                             ;CMPB FAILED
2281  010202  104400                          SCOPE
2282
2283  010204  012700  000010                  MOV     #+10,%0
2284  010210  126060  016710  016710          CMPB    A(0),A(0)
2285  010216  001401                          BEQ     .+4
2286  010220  104000                          HLT                             ;CMPB FAILED
2287  010222  104400                          SCOPE
2288
2289  010224  012700  177770                  MOV     #-10,%0
2290  010230  012701  000004                  MOV     #+4,%1
2291  010234  126061  016710  016710          CMPB    A(0),A(1)
2292  010242  001401                          BEQ     .+4
2293  010244  104000                          HLT                             ;CMPB FAILED
2294  010246  104400                          SCOPE
```

```
2295
2296  010250  126160  016710  016710          CMPB    A(1),A(0)
2297  010256  001401                          BEQ     .+4
2298  010260  104000                          HLT                             ;CMPB FAILED
2299  010262  104400                          SCOPE
2300
2301  010264  012700  177774                  MOV     #-4,%0
2302  010270  012701  000010                  MOV     #+10.%1
2303  010274  126061  016710  016710          CMPB    A(0),A(1)
2304  010302  001401                          BEQ     .+4
2305  010304  104000                          HLT                             ;CMPB FAILED
2306  010306  104400                          SCOPE
2307
2308  010310  012700  177774                  MOV     #-4,%0
2309  010314  012701  000010                  MOV     #10,%1
2310  010320  126160  016710  016710          CMPB    A(1),A(0)
2311  010326  001401                          BEQ     .+4
2312  010330  104000                          HLT                             ;CMPB FAILED
2313  010332  104400                          SCOPE
2314                                  ;TEST MOVE INSTRUCTION FOR INDEX
2315
2316  010334  012700  177770                  MOV     #-10,%0
2317  010340  116067  016710  006364          MOVB    A(0),TEMP
2318  010346  126727  006360  000252          CMPB    TEMP,#000252
2319  010354  001401                          BEQ     .+4
2320  010356  104000                          HLT                             ;MOVB FAILED
2321  010360  104400                          SCOPE
2322
2323  010362  012700  000010                  MOV     #+10,%0
2324  010366  116067  016710  006336          MOVB    A(0),TEMP
2325  010374  126727  006332  000125          CMPB    TEMP,#000125
2326  010402  001401                          BEQ     .+4
2327  010404  104000                          HLT                             ;MOVB FAILED
2328  010406  104400                          SCOPE
2329
2330  010410  012700  177770                  MOV     #-10,%0
2331  010414  112760  125252  016732          MOVB    #125252,TEMP(0)
2332  010422  123727  016722  125252          CMPB    @#C,#125252
2333  010430  001401                          BEQ     .+4
2334  010432  104000                          HLT                             ;MOVB FAILED
2335  010434  104400                          SCOPE
2336
2337  010436  012700  000010                  MOV     #+10,%0
2338  010442  112760  052525  016732          MOVB    #052525,TEMP(0)
2339  010450  123727  016742  052525          CMPB    @#TEMP+10,#052525
2340  010456  001401                          BEQ     .+4
2341  010460  104000                          HLT                             ;MOVB FAILED
2342  010462  104400                          SCOPE
2343
2344                                  ;TEST BIC INSTRUCTION FOR INDEXING
2345  010464  012767  177777  006240          MOV     #-1,TEMP
2346  010472  012700  177770                  MOV     #-10,%0
2347  010476  146067  016710  006226          BICB    A(0),TEMP
2348  010504  126727  006222  177525          CMPB    TEMP,#177525
2349  010512  001401                          BEQ     .+4
2350  010514  104000                          HLT                             ;BICB FAILED
```

```
2351  010516  104400                          SCOPE
2352
2353  010520  012767  177777  006204          MOV     #-1,TEMP
2354  010526  012700  000010                  MOV     #10,%0
2355  010532  146067  016710  006172          BICB    A(0),TEMP
2356  010540  126727  006166  007652          CMPB    TEMP,#007652
2357  010546  001401                          BEQ     .+4
2358  010550  104000                          HLT                             ;BICB FAILED
2359  010552  104400                          SCOPE
2360
2361  010554  012737  177777  016742          MOV     #-1,@#TEMP+10
2362  010562  012700  000010                  MOV     #10,%0
2363  010566  142760  125252  016732          BICB    #125252,TEMP(0)
2364  010574  123727  016742  002525          CMPB    @#TEMP+10,#2525
2365  010602  001401                          BEQ     .+4
2366  010604  104000                          HLT                             ;BICB FAILED
2367  010606  104400                          SCOPE
2368
2369  010610  012700  177770                  MOV     #-10,%0
2370  010614  012767  177777  006100          MOV     #-1,TEMP-10
2371  010622  142767  052525  006072          BICB    #052525,TEMP-10
2372  010630  126727  006066  125252          CMPB    TEMP-10,#125252
2373  010636  001401                          BEQ     .+4
2374  010640  104000                          HLT                             ;BICB FAILED
2375  010642  104400                          SCOPE
2376
2377                          ;TEST UNARYS INDEXED
2378  010644  012737  177777  016732          MOV     #-1,@#TEMP
2379  010652  012700  177770                  MOV     #-10,%0
2380  010656  105060  016742                  CLRB    D(0)
2381  010662  105737  016732                  TSTB    @#TEMP
2382  010666  001401                          BEQ     .+4
2383  010670  104000                          HLT                             ;CLRB FAILED
2384  010672  104400                          SCOPE
2385
2386  010674  012737  177777  016732          MOV     #-1,@#TEMP
2387  010702  012700  177770                  MOV     #-10,%0
2388  010706  105060  016742                  CLRB    D(0)
2389  010712  023727  016732  177400          CMP     @#TEMP,#177400
2390  010720  001401                          BEQ     .+4
2391  010722  104000                          HLT                             ;CLRB FAILED
2392  010724  104400                          SCOPE
2393
2394  010726  012737  177777  016732          MOV     #-1,@#TEMP
2395  010734  012700  177771                  MOV     #-7,%0
2396  010740  105060  016742                  CLRB    D(0)
2397  010744  023727  016732  000377          CMP     @#TEMP,#000377
2398  010752  001401                          BEQ     .+4
2399  010754  104000                          HLT                             ;CLRB FAILED
2400  010756  104400                          SCOPE
2401
2402  010760  012737  177777  016732          MOV     #-1,@#TEMP
2403  010766  012700  000010                  MOV     #+10,%0
2404  010772  105060  016722                  CLRB    C(0)
2405  010776  105737  016732                  TSTB    @#TEMP
2406  011002  001401                          BEQ     .+4
```

```
2407  011004  104000                          HLT                             ;CLRB FAILED
2408  011006  104400                          SCOPE
2409
2410  011010  012737  177777  016732          MOV     #-1,@#TEMP
2411  011016  012700  177770                  MOV     #-10.,%0
2412  011022  105160  016742                  COMB    D(0)
2413  011026  105737  016732                  TSTB    @#TEMP
2414  011032  001401                          BEQ     .+4
2415  011034  104000                          HLT                             ;COMB FAILED
2416  011036  104400                          SCOPE
2417
2418  011040  012737  177777  016732          MOV     #-1,@#TEMP
2419  011046  012700  000010                  MOV     #10.,%0
2420  011052  105160  016722                  COMB    C(0)
2421  011056  105737  016732                  TSTB    @#TEMP
2422  011062  001401                          BEQ     .+4
2423  011064  104000                          HLT                             ;COMB FAILED
2424  011066  104400                          SCOPE
2425  011070  012737  177777  016732          MOV     #-1,@#TEMP
2426  011076  012700  177770                  MOV     #-10.,%0
2427  011102  105260  016742                  INCB    D(0)
2428  011106  105737  016732                  TSTB    @#TEMP
2429  011112  001401                          BEQ     .+4
2430  011114  104000                          HLT                             ;INCB FAILED
2431  011116  023727  016732  177400          CMP     @#TEMP,#177400
2432  011124  001401                          BEQ     .+4
2433  011126  104000                          HLT                             ;INCB FAILED
2434  011130  104400                          SCOPE
2435
2436  011132  012737  177777  016732          MOV     #-1,@#TEMP
2437  011140  012700  000010                  MOV     #+10.,%0
2438  011144  105260  016722                  INCB    C(0)
2439  011150  105737  016732                  TSTB    @#TEMP
2440  011154  001401                          BEQ     .+4
2441  011156  104000                          HLT                             ;INCB FAILED
2442  011160  104400                          SCOPE
2443
2444  011162  012737  000001  016732          MOV     #1,@#TEMP
2445  011170  012700  177770                  MOV     #-10.,%0
2446  011174  105360  016742                  DECB    D(0)
2447  011200  105737  016732                  TSTB    @#TEMP
2448  011204  001401                          BEQ     .+4
2449  011206  104000                          HLT                             ;DECB FAILED
2450  011210  104400                          SCOPE
2451
2452  011212  012737  000001  016732          MOV     #1,@#TEMP
2453  011220  012700  000010                  MOV     #10.,%0
2454  011224  105360  016722                  DECB    C(0)
2455  011230  105737  016732                  TSTB    @#TEMP
2456  011234  001401                          BEQ     .+4
2457  011236  104000                          HLT                             ;DECB FAILED
2458  011240  104400                          SCOPE
2459
2460  011242  012737  000001  016732          MOV     #1,@#TEMP
2461  011250  012700  177770                  MOV     #-10.,%0
2462  011254  105460  016742                  NEGB    D(0)
```

```
2463  011260  023727  016732  000377          CMP     @#TEMP,#377
2464  011266  001401                          BEQ     .+4
2465  011270  104000                          HLT                             ;NEGB FAILED
2466  011272  104400                          SCOPE
2467
2468  011274  012737  000001  016732          MOV     #1,@#TEMP
2469  011302  012700  000010                  MOV     #+10.,%0
2470  011306  105460  016722                  NEGB    C(0)
2471  011312  023727  016732  000377          CMP     @#TEMP,#377
2472  011320  001401                          BEQ     .+4
2473  011322  104000                          HLT                             ;NEGB FAILED
2474  011324  104400                          SCOPE
2475
2476  011326  012737  177777  016732          MOV     #-1,@#TEMP
2477  011334  012700  177770                  MOV     #-10,%0
2478  011340  000261                          SEC
2479  011342  105560  016742                  ADCB    D(0)
2480  011346  023727  016732  177400          CMP     @#TEMP,#177400
2481  011354  001401                          BEQ     .+4
2482  011356  104000                          HLT                             ;ADCB FAILED
2483  011360  104400                          SCOPE
2484
2485  011362  012737  177777  016732          MOV     #-1,@#TEMP
2486  011370  012700  000010                  MOV     #+10,%0
2487  011374  000261                          SEC
2488  011376  105560  016722                  ADCB    C(0)
2489  011402  023727  016732  177400          CMP     @#TEMP,#177400
2490  011410  001401                          BEQ     .+4
2491  011412  104000                          HLT                             ;ADCB FAILED
2492  011414  104400                          SCOPE
2493
2494  011416  012737  000401  016732          MOV     #401,@#TEMP
2495  011424  012700  177771                  MOV     #-7,%0
2496  011430  000261                          SEC
2497  011432  105660  016742                  SBCB    D(0)
2498  011436  022737  000001  016732          CMP     #1,@#TEMP
2499  011444  001401                          BEQ     .+4
2500  011446  104000                          HLT                             ;SBCB FAILED
2501  011450  104400                          SCOPE
2502
2503  011452  012737  000001  016732          MOV     #1,@#TEMP
2504  011460  012700  000010                  MOV     #+10,%0
2505  011464  000261                          SEC
2506  011466  105660  016722                  SBCB    C(0)
2507  011472  005737  016732                  TST     @#TEMP
2508  011476  001401                          BEQ     .+4
2509  011500  104000                          HLT                             ;SBCB FAILED
2510  011502  104400                          SCOPE
2511
2512                                  ;TEST INDIRECT ADDRESSING
2513                                  ;TEST COMPARE INSTRUCTION
2514  011504  123727  016700  000252          CMPB    @#B,#000252
2515  011512  001401                          BEQ     .+4
2516  011514  104000                          HLT                             ;CMPB FAILED
2517  011516  104400                          SCOPE
2518
```

```
2519  011520  123727  016701  000252          CMPB    @#B+1,#252
2520  011526  001401                          BEQ     .+4
2521  011530  104000                          HLT
2522  011532  104400                          SCOPE                           ;CMPB FAILED
2523
2524
2525  011534  122737  125252  016700          CMPB    #125252,@#B
2526  011542  001401                          BEQ     .+4
2527  011544  104000                          HLT
2528  011546  104400                          SCOPE                           ;CMPB FAILED
2529
2530  011550  123737  016700  016700          CMPB    @#B,@#B
2531  011556  001401                          BEQ     .+4
2532  011560  104000                          HLT
2533  011562  104400                          SCOPE                           ;CMPB FAILED
2534
2535                                  ;TEST MOVE INSTRUCTIONS
2536  011564  113700  016700                  MOVB    @#B,%0
2537  011570  122700  000252                  CMPB    #000252,%0
2538  011574  001401                          BEQ     .+4
2539  011576  104000                          HLT
2540  011600  104400                          SCOPE                           ;MOVB FAILED
2541
2542  011602  112737  125252  016732          MOVB    #125252,@#TEMP
2543  011610  126737  005064  016732          CMPB    B,@#TEMP
2544  011616  001401                          BEQ     .+4
2545  011620  104000                          HLT
2546  011622  104400                          SCOPE                           ;MOVB FAILED
2547
2548  011624  113737  016700  016722          MOVB    @#B,@#C
2549  011632  126737  005042  016722          CMPB    B,@#C
2550  011640  001401                          BEQ     .+4
2551  011642  104000                          HLT
2552  011644  104400                          SCOPE                           ;MOVB FAILED
2553                                  ;TEST UNARYS INDIRECT
2554  011646  012737  177777  016732          MOV     #-1,@#TEMP
2555  011654  105037  016732                  CLRB    @#TEMP
2556  011660  023727  016732  177400          CMP     @#TEMP,#177400
2557  011666  001401                          BEQ     .+4
2558  011670  104000                          HLT
2559  011672  104400                          SCOPE                           ;CLRB FAILED
2560
2561  011674  012737  125252  016732          MOV     #125252,@#TEMP
2562  011702  105137  016732                  COMB    @#TEMP
2563  011706  022737  125125  016732          CMP     #125125,@#TEMP
2564  011714  001401                          BEQ     .+4
2565  011716  104000                          HLT
2566  011720  104400                          SCOPE                           ;COMB FAILED
2567
2568  011722  012737  125252  016732          MOV     #125252,@#TEMP
2569  011730  105137  016733                  COMB    @#TEMP+1
2570  011734  022737  052652  016732          CMP     #052652,@#TEMP
2571  011742  001401                          BEQ     .+4
2572  011744  104000                          HLT
2573  011746  104400                          SCOPE                           ;COMB FAILED
2574
```

```
2575  011750  005037  016732                  CLR     @#TEMP
2576  011754  105237  016733                  INCB    @#TEMP+1
2577  011760  022737  000400  016732          CMP     #400,@#TEMP
2578  011766  001401                          BEQ     .+4
2579  011770  104000                          HLT                             ;INCB FAILED
2580  011772  104400                          SCOPE
2581
2582  011774  005037  016732                  CLR     @#TEMP
2583  012000  105377  004730                  DECB    @TEMP+2
2584  012004  023727  016732  000377          CMP     @#TEMP,#377
2585  012012  001401                          BEQ     .+4
2586  012014  104000                          HLT                             ;DECB FAILED
2587  012016  104400                          SCOPE
2588
2589  012020  005037  016732                  CLR     @#TEMP
2590  012024  112737  000001  016733          MOVB    #1,@#TEMP+1
2591  012032  105437  016733                  NEGB    @#TEMP+1
2592  012036  022737  177400  016732          CMP     #177400,@#TEMP
2593  012044  001401                          BEQ     .+4
2594  012046  104000                          HLT                             ;NEGB FAILED
2595  012050  104400                          SCOPE
2596
2597                                  ;TEST INDIRECT ADDRESSING WITH INDEXING
2598                                  ;TEST COMPARE INSTRUCTION
2599  012052  127727  004624  125252          CMPB    @B+2,#125252
2600  012060  001401                          BEQ     .+4
2601  012062  104000                          HLT                             ;CMPB FAILED
2602  012064  104400                          SCOPE
2603
2604  012066  122777  125252  004606          CMPB    #125252,@B+2
2605  012074  001401                          BEQ     .+4
2606  012076  104000                          HLT                             ;CMPB FAILED
2607  012100  104400                          SCOPE
2608
2609  012102  127777  004574  004572          CMPB    @B+2,@B+2
2610  012110  001401                          BEQ     .+4
2611  012112  104000                          HLT                             ;CMPB FAILED
2612  012114  104400                          SCOPE
2613                                  ;TEST MOVE INSTRUCTIONS
2614  012116  117700  004560                  MOVB    @B+2,%0
2615  012122  122700  125252                  CMPB    #125252,%0
2616  012126  001401                          BEQ     .+4
2617  012130  104000                          HLT                             ;MOVB FAILED
2618  012132  104400                          SCOPE
2619
2620  012134  112777  125252  004572          MOVB    #125252,@TEMP+2
2621  012142  126737  004532  016732          CMPB    B,@#TEMP
2622  012150  001401                          BEQ     .+4
2623  012152  104000                          HLT                             ;MOVB FAILED
2624  012154  104400                          SCOPE
2625
2626  012156  117777  004520  004540          MOVB    @B+2,@C+2
2627  012164  126737  004510  016722          CMPB    B,@#C
2628  012172  001401                          BEQ     .+4
2629  012174  104000                          HLT                             ;MOVB FAILED
2630  012176  104400                          SCOPE
```

```
2631
2632
2633  012200  012700  177777                ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2634  012204  147700  004472                      MOV     #-1,%0
2635  012210  120027  052525                      BICB    @B+2,%0
2636  012214  001401                              CMPB    %0,#52525
2637  012216  104000                              BEQ     .+4
2638  012220  104400                              HLT                             ;BICB FAILED
2639                                              SCOPE
2640  012222  012737  177777  016732              MOV     #-1,@#TEMP
2641  012230  142777  125252  004476              BICB    #125252,@TEMP+2
2642  012236  122737  052525  016732              CMPB    #52525,@#TEMP
2643  012244  001401                              BEQ     .+4
2644  012246  104000                              HLT                             ;BICB FAILED
2645  012250  104400                              SCOPE
2646
2647  012252  012737  177777  016722              MOV     #-1,@#C
2648  012260  147777  004416  004436              BICB    @B+2,@C+2
2649  012266  126737  004426  016722              CMPB    A+10,@#C
2650  012274  001401                              BEQ     .+4
2651  012276  104000                              HLT                             ;BICB FAILED
2652  012300  104400                              SCOPE
2653                                    ;TEST UNARYS INDIRECT WITH INDEXING
2654  012302  012737  177777  016732              MOV     #-1,@#TEMP
2655  012310  105077  004420                      CLRB    @TEMP+2
2656  012314  105737  016732                      TSTB    @#TEMP
2657  012320  001401                              BEQ     .+4
2658  012322  104000                              HLT                             ;CLRB FAILED
2659  012324  104400                              SCOPE
2660
2661  012326  012737  125252  016732              MOV     #125252,@#TEMP
2662  012334  105177  004374                      COMB    @TEMP+2
2663  012340  122737  052525  016732              CMPB    #052525,@#TEMP
2664  012346  001401                              BEQ     .+4
2665  012350  104000                              HLT                             ;COMB FAILED
2666  012352  104400                              SCOPE
2667
2668  012354  005037  016732                      CLR     @#TEMP
2669  012360  105277  004350                      INCB    @TEMP+2
2670  012364  122737  000001  016732              CMPB    #1,@#TEMP
2671  012372  001401                              BEQ     .+4
2672  012374  104000                              HLT                             ;INCB FAILED
2673  012376  104400                              SCOPE
2674
2675  012400  005037  016732                      CLR     @#TEMP
2676  012404  105377  004324                      DECB    @TEMP+2
2677  012410  123727  016732  177777              CMPB    @#TEMP,#-1
2678  012416  001401                              BEQ     .+4
2679  012420  104000                              HLT                             ;DECB FAILED
2680  012422  104400                              SCOPE
2681
2682  012424  012737  000001  016732              MOV     #1,@#TEMP
2683  012432  105477  004276                      NEGB    @TEMP+2
2684  012436  122737  177777  016732              CMPB    #-1,@#TEMP
2685  012444  001401                              BEQ     .+4
2686  012446  104000                              HLT                             ;NEGB FAILED
```

```
 2687  012450  104400                          SCOPE
 2688
 2689  012452  012737  177777  016732          MOV     #-1,@#TEMP
 2690  012460  000261                          SEC
 2691  012462  105577  004246                  ADCB    @TEMP+2
 2692  012466  022737  177400  016732          CMP     #177400,@#TEMP
 2693  012474  001401                          BEQ     .+4
 2694  012476  104000                          HLT                             ;ADCB FAILED
 2695  012500  105737  016732                  TSTB    @#TEMP
 2696  012504  001401                          BEQ     .+4
 2697  012506  104000                          HLT                             ;TSTB FAILED
 2698  012510  104400                          SCOPE
 2699
 2700  012512  012737  000001  016732          MOV     #1,@#TEMP
 2701  012520  000261                          SEC
 2702  012522  105377  004206                  DECB    @TEMP+2
 2703  012526  005737  016732                  TST     @#TEMP
 2704  012532  001401                          BEQ     .+4
 2705  012534  104000                          HLT                             ;DECB FAILED
 2706  012536  104400                          SCOPE
 2707
 2708                                  ;TEST OF COMBINED INDEXING AND INDIRECT
 2709  012540  012700  177772                  MOV     #-6,%0
 2710  012544  127027  016710  125252          CMPB    @A(0),#125252
 2711  012552  001401                          BEQ     .+4
 2712  012554  104000                          HLT                             ;CMPB FAILED
 2713  012556  104400                          SCOPE
 2714
 2715  012560  012700  177772                  MOV     #-6,%0
 2716  012564  122770  125252  016710          CMPB    #125252,@A(0)
 2717  012572  001401                          BEQ     .+4
 2718  012574  104000                          HLT                             ;CMPB FAILED
 2719  012576  104400                          SCOPE
 2720
 2721  012600  012700  177772                  MOV     #-6,%0
 2722  012604  012701  000002                  MOV     #+2,%1
 2723  012610  127071  016710  016710          CMPB    @A(0),@A(1)
 2724  012616  001401                          BEQ     .+4
 2725  012620  104000                          HLT
 2726  012622  104400                          SCOPE                           ;CMPB FAILED
 2727
 2728                                  ;TEST BIC INSTRUCTION
 2728  012624  012700  000006                  MOV     #+6,%0
 2729  012630  012767  177777  004074          MOV     #-1,TEMP
 2730  012636  147067  016710  004066          BICB    @A(0),TEMP
 2731  012644  122767  125252  004060          CMPB    #125252,TEMP
 2732  012652  001401                          BEQ     .+4
 2733  012654  104000                          HLT                             ;BICB FAILED
 2734  012656  104400                          SCOPE
 2735
 2736  012660  012700  177772                  MOV     #-6,%0
 2737  012664  012737  177777  016722          MOV     #-1,@#C
 2738  012672  142770  125252  016732          BICB    #125252,@TEMP(0)
 2739  012700  123727  016722  000125          CMPB    @#C,#000125
 2740  012706  001401                          BEQ     .+4
 2741  012710  104000                          HLT                             ;BICB FAILED
 2742  012712  104400                          SCOPE
```

```
2743
2744  012714  012700  016702                MOV     #B+2,%0         ;ADDRESS OF ADDRESS OF B
2745  012720  023067  003754                CMP     @(0)+,B
2746  012724  001401                        BEQ     .+4
2747  012726  104000                        HLT                     ;CMP FAILED
2748  012730  104400                        SCOPE
2749
2750  012732  012700  016704                MOV     #B+4,%0
2751  012736  025067  003736                CMP     @-(0),B
2752  012742  001401                        BEQ     .+4
2753  012744  104000                        HLT                     ;CMP FAILED
2754  012746  104400                        SCOPE
2755
2756  012750  012700  016704                MOV     #B+4,%0
2757  012754  125067  003720                CMPB    @-(0),B
2758  012760  001401                        BEQ     .+4
2759  012762  104000                        HLT                     ;CMPB FAILED
2760  012764  104400                        SCOPE
2761
2762  012766  012700  016726                MOV     #C+4,%0
2763  012772  012737  177777  016722        MOV     #-1,@#C
2764  013000  105050                        CLRB    @-(0)
2765  013002  023727  016722  177400        CMP     @#C,#177400
2766  013010  001401                        BEQ     .+4
2767  013012  104000                        HLT                     ;CLRB FAILED
2768  013014  104400                        SCOPE
2769  013016  012737  177777  016722        MOV     #-1,@#C
2770  013024  012700  177772                MOV     #-6,%0
2771  013030  012701  177772                MOV     #-6,%1
2772  013034  147071  016710  016732        BICB    @A(0),@TEMP(1)
2773  013042  022737  177525  016722        CMP     #177525,@#C
2774  013050  001401                        BEQ     .+4
2775  013052  104000                        HLT                     ;BICB FAILED
2776  013054  104400                        SCOPE
2777
2778  013056  012700  052525        ;TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
2779                                        MOV     #52525,%0       ;THIS IS CHECK LATER IN PROGRAM
2780
2781  013062  004767  000002        ;TEST JSR INSTRUCTION
2782  013066  000405                        JSR     %7, TJSR2       ;PLACE PC ON STACK
2783  013070  121627  013066        TJSR1:  BR      TJSR3           ;RETURN HERE ON RTS %7
2784  013074  001401                TJSR2:  CMPB    @%6,#TJSR1      ;CHECK FOR CORRECT PC ON STACK
2785  013076  104000                        BEQ     .+4
2786  013100  000207                        HLT                     ;INCORRECT PC ON STACK
2787  013102  104400                        RTS     %7              ;RETURN TO INST AFTER JSR
2788                                TJSR3:  SCOPE
2789  013104  000257
2790  013106  004717                        CCC
2791  013110  121627  013110                JSR     %7,@%7          ;INSTRUCTION UNDER TEST
2792  013114  001401                        CMPB    @%6,#TJSR3+6            ;TEST THE STACK
2793  013116  104000                        BEQ     .+4
2794  013120  005726                        HLT                     ;PC OF JSR DID NOT GO TO STACK
2795  013122  104400                        TST     (6)+            ;REPOSITION THE STACK
2796                                        SCOPE
2797                          ;TEST NESTED SUBROUTINES
2798  013124  000257                        CCC                     ;CLEAR CONDITION CODES
```

```
 2799  013126  004767  003366                    JSR     %7,SUBR6
 2800  013132  100401                            BMI     .+4
 2801  013134  104000                            HLT                     ;JSR OR RTS FAILED
 2802  013136  001401                            BEQ     .+4
 2803  013140  104000                            HLT                     ;JSR OR RTS FAILED
 2804  013142  102401                            BVS     .+4
 2805  013144  104000                            HLT                     ;JSR OR RTS FAILED
 2806  013146  103401                            BCS     .+4
 2807  013150  104000                            HLT                     ;JSR OR RTS FAILED
 2808  013152  104400                            SCOPE
 2809                                  ;TEST ROTATE ODD BYTE
 2810  013154  104400                            SCOPE
 2811  013156  000257                            CCC                     ;CLEAR "C"
 2812  013160  012767  123456  003544            MOV     #123456,TEMP
 2813  013166  106067  003541                    RORB    TEMP+1          ;ROTATE ODD BYTE
 2814  013172  103401                            BCS     .+4
 2815  013174  104000                            HLT                     ;C NOT SET
 2816  013176  102401                            BVS     .+4
 2817  013200  104000                            HLT                     ;V NOT SET
 2818  013202  022767  051456  003522            CMP     #051456,TEMP
 2819  013210  001401                            BEQ     .+4
 2820  013212  104000                            HLT                     ;ROTATE FAILED
 2821  013214  104400                            SCOPE
 2822  013216  000277                            SCC                     ;SET C
 2823  013220  012767  123456  003504            MOV     #123456,TEMP
 2824  013226  106067  003501                    RORB    TEMP+1
 2825  013232  103401                            BCS     .+4
 2826  013234  104000                            HLT                     ;C NOT SET
 2827  013236  102001                            BVC     .+4
 2828  013240  104000                            HLT                     ;V NOT CLEARED
 2829  013242  022767  151456  003462            CMP     #151456,TEMP
 2830  013250  001401                            BEQ     .+4
 2831  013252  104000                            HLT                     ;ROTATE FAILED
 2832  013254  104400                            SCOPE
 2833
 2834  013256  000257                            CCC
 2835  013260  012767  123456  003444            MOV     #123456,TEMP
 2836  013266  106167  003441                    ROLB    TEMP+1
 2837  013272  103401                            BCS     .+4
 2838  013274  104000                            HLT                     ;C NOT SET
 2839  013276  102401                            BVS     .+4
 2840  013300  104000                            HLT                     ;V NOT SET
 2841  013302  022767  047056  003422            CMP     #047056,TEMP
 2842  013310  001401                            BEQ     .+4
 2843  013312  104000                            HLT                     ;ROTATE BYTE FAILED
 2844  013314  104400                            SCOPE
 2845
 2846  013316  000277                            SCC                     ;SET C
 2847  013320  012767  123456  003404            MOV     #123456,TEMP
 2848  013326  106167  003401                    ROLB    TEMP+1
 2849  013332  103401                            BCS     .+4
 2850  013334  104000                            HLT                     ;C NOT SET
 2851  013336  102401                            BVS     .+4
 2852  013340  104000                            HLT                     ;V NOT SET
 2853  013342  022767  047456  003362            CMP     #047456,TEMP
 2854  013350  001401                            BEQ     .+4
```

```
2855  013352  104000                          HLT                             ;ROTATE ODD BYTE FAILED
2856  013354  104400                          SCOPE
2857
2858  013356  000257                          CCC                             ;CLEAR C
2859  013360  012767  177777  003344          MOV     #-1,TEMP
2860  013366  106267  003341                  ASRB    TEMP+1
2861  013372  103401                          BCS     .+4
2862  013374  104000                          HLT
2863  013376  102001                          BVC     .+4                     ;C NOT SET
2864  013400  104000                          HLT                             ;V NOT CLEARED
2865  013402  026727  003324  177777          CMP     TEMP,#-1
2866  013410  001401                          BEQ     .+4
2867  013412  104000                          HLT                             ;SHIFT FAILED
2868  013414  104400                          SCOPE
2869
2870  013416  000277                          SCC
2871  013420  012767  177777  003304          MOV     #-1,TEMP
2872  013426  106367  003301                  ASLB    TEMP+1
2873  013432  103401                          BCS     .+4
2874  013434  104000                          HLT
2875  013436  102001                          BVC     .+4                     ;C NOT SET
2876  013440  104000                          HLT                             ;V NOT CLEARED
2877  013442  026727  003264  177377          CMP     TEMP,#177377
2878  013450  001401                          BEQ     .+4
2879  013452  104000                          HLT                             ;SHIFT BYTE FAILED
2880  013454  104400                          SCOPE
2881                                ;TEST COMBINATION OF N, C AND V
2882                                          .MACR   TNCV
2883                                          BPL     .+12
2884                                          BCC     .+20                    ;Z=1
2885                                          BVC     .+30                    ;Z=1, C=1
2886                                          HLT                             ;Z=C, BUT V=1
2887                                          BR      .+24
2888                                          BCC     .+16                    ;Z=0
2889                                          BVS     .+20                    ;Z=0, C=1
2890                                          HLT                             ;Z NOT EQUAL C, V=1
2891                                          BR      .+14
2892                                          BVS     .+12                    ;Z=1, C=0
2893                                          HLT                             ;Z NOT EQUAL C, V=1
2894                                          BR      .+6
2895                                          BVC     .+4                     ;Z=0, C=0
2896                                          HLT                             ;Z=C, BUT V=1
2897                                          SCOPE
2898                                          .ENDM
2899  013456  005037  016462                  CLR     @#ICOUNT                        ;NO ITERATION
2900
2901                                ;TEST ROTATING NUMBERS
2902  013462  104400                          SCOPE
2903  013464  012767  177777  000142          MOV     #-1,REFF                ;INITIALIZE BASE NUMBER
2904  013472  005267  000136          TSROT:  INC     REFF                    ;INCREMENT NUMBER
2905  013476  004767  000012                  JSR     %7,ROTALL               ;GO TO COMPARE ROUTINE
2906  013502  026727  000126  100077          CMP     REFF,#100077            ;TEST ALL VALUES
2907  013510  001370                          BNE     TSROT                   ;NO TEST THEM ALL
2908  013512  000452                          BR      TSRT2A                  ;WE ARE DONE
2909
2910  013514  016767  000114  000114  ROTALL: MOV     REFF,TEST
```

```
2911   013522   006167   000110                    ROL     TEST
2912   013526   006067   000104                    ROR     TEST
2913   013532   006067   000100                    ROR     TEST
2914   013536   006067   000074                    ROR     TEST
2915   013542   006067   000070                    ROR     TEST
2916   013546   006167   000064                    ROL     TEST
2917   013552   006167   000060                    ROL     TEST
2918   013556   006167   000054                    ROL     TEST
2919   013562                                      TNCV
2920   013562   100004                             BPL     .+12
2921   013564   103007                             BCC     .+20            ;Z=1
2922   013566   102013                             BVC     .+30            ;Z=1, C=1
2923   013570   104000                             HLT                     ;Z=C, BUT V=1
2924   013572   000411                             BR      .+24
2925   013574   103006                             BCC     .+16            ;Z=0
2926   013576   102407                             BVS     .+20            ;Z=0, C=1
2927   013600   104000                             HLT                     ;Z NOT EQUAL C, V=1
2928   013602   000405                             BR      .+14
2929   013604   102404                             BVS     .+12            ;Z=1, C=0
2930   013606   104000                             HLT                     ;Z NOT EQUAL C, V=1
2931   013610   000402                             BR      .+6
2932   013612   102001                             BVC     .+4             ;Z=0, C=0
2933   013614   104000                             HLT                     ;Z=C, BUT V=1
2934   013616   104400                             SCOPE
2935   013620   026767   000012   000006           CMP     TEST,REFF
2936   013626   001401                             BEQ     .+4
2937   013630   104000                             HLT                     ;INITIAL NOT EQUAL TO FINAL
2938   013632   000207                             RTS     %7              ;ROTATE WORD FAILED
2939   013634   000000                     REFF:   0                       ;GOOD DATA
2940   013636   000000                     TEST:   0                       ;BAD DATA
2941            013634                             REF=REFF
2942
2943   013640   012767   177777   177766  TSRT2A: MOV     #-1,REFF        ;TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS
2944   013646   005267   177762          TSROT2: INC     REFF
2945   013652   004767   000016                  JSR     %7,ROTBE
2946   013656   004767   000122                  JSR     %7,ROTBO
2947   013662   022767   177777   177744         CMP     #-1,REFF
2948   013670   001366                          BNE     TSROT2
2949   013672   000505                          BR      ROTEN1
2950   013674   016767   177734   177734  ROTBE: MOV     REFF,TEST
2951   013702   106067   177730                  RORB    TEST            ;ROTATE BYTE EVEN
2952   013706   106067   177724                  RORB    TEST
2953   013712   106067   177720                  RORB    TEST
2954   013716   106167   177714                  ROLB    TEST
2955   013722   106167   177710                  ROLB    TEST
2956   013726   106167   177704                  ROLB    TEST
2957   013732                                      TNCV
2958   013732   100004                             BPL     .+12
2959   013734   103007                             BCC     .+20            ;Z=1
2960   013736   102013                             BVC     .+30            ;Z=1, C=1
2961   013740   104000                             HLT                     ;Z=C, BUT V=1
2962   013742   000411                             BR      .+24
2963   013744   103006                             BCC     .+16            ;Z=0
2964   013746   102407                             BVS     .+20            ;Z=0, C=1
2965   013750   104000                             HLT                     ;Z NOT EQUAL C, V=1
2966   013752   000405                             BR      .+14
```

```
 2967   013754   102404                          BVS     .+12            ;Z=1, C=0
 2968   013756   104000                          HLT                     ;Z NOT EQUAL C, V=1
 2969   013760   000402                          BR      .+6
 2970   013762   102001                          BVC     .+4             ;Z=0, C=0
 2971   013764   104000                          HLT                     ;Z=C, BUT V=1
 2972   013766   104400                          SCOPE
 2973   013770   026767   177642   177636        CMP     TEST,REFF
 2974   013776   001401                          BEQ     .+4
 2975   014000   104000                          HLT
 2976   014002   000207                          RTS     %7
 2977   014004   106067   177627        ROTBO:   RORB    TEST+1          ;ROTATE BYTE ODD
 2978   014010   106067   177623                 RORB    TEST+1
 2979   014014   106067   177617                 RORB    TEST+1
 2980   014020   106167   177613                 ROLB    TEST+1
 2981   014024   106167   177607                 ROLB    TEST+1
 2982   014030   106167   177603                 ROLB    TEST+1
 2983   014034                                   TNCV
 2984   014034   100004                          BPL     .+12
 2985   014036   103007                          BCC     .+20            ;Z=1
 2986   014040   102013                          BVC     .+30            ;Z=1, C=1
 2987   014042   104000                          HLT                     ;Z=C, BUT V=1
 2988   014044   000411                          BR      .+24
 2989   014046   103006                          BCC     .+16            ;Z=0
 2990   014050   102407                          BVS     .+20            ;Z=0, C=1
 2991   014052   104000                          HLT                     ;Z NOT EQUAL C, V=1
 2992   014054   000405                          BR      .+14
 2993   014056   102404                          BVS     .+12            ;Z=1, C=0
 2994   014060   104000                          HLT                     ;Z NOT EQUAL C, V=1
 2995   014062   000402                          BR      .+6
 2996   014064   102001                          BVC     .+4             ;Z=0, C=0
 2997   014066   104000                          HLT                     ;Z=C, BUT V=1
 2998   014070   104400                          SCOPE
 2999   014072   026767   177540   177534        CMP     TEST,REFF
 3000   014100   001401                          BEQ     .+4
 3001   014102   104000                          HLT
 3002   014104   000207                          RTS     %7
```

```
 3003  014106  104400                  ROTEN1: SCOPE
 3004                                  :WILL ALLOW TWO FAST PASSES
 3005  014110  005227  177776                  INC     #177776
 3006  014114  100002                          BPL     .+6
 3007  014116  000167  000632                  JMP     EAESRT
 3008                                  :ADD AND SUBTRACT ALL NUMBERS AGAINST FIXED NUMBERS
 3009                                  ;A+B=C, C-A=B, BF SHOULD EQUAL BI
 3010  014122  011667  000072          ↑STARI: MOV     @%6,NUMA
 3011  014126  012767  000001  177500          MOV     #1,REF
 3012  014134  005267  177474          ARITST: INC     REF
```

```
3013  014140  004767  000014                    JSR     %7,ADSUB
3014  014144  022767  177777  177462            CMP     #-1,REFF
3015  014152  001370                            BNE     ARITST
3016  014154  000422                            BR      ARIEND
3017  014156  104400                            SCOPE
3018  014160  016767  177450  177450  ADSUB:    MOV     REF,TEST
3019  014166  066767  000026  177442            ADD     NUMA,TEST
3020  014174  166767  000020  177434            SUB     NUMA,TEST
3021  014202  026767  177426  177426            CMP     REF,TEST
3022  014210  001401                            BEQ     .+4
3023  014212  104000                            HLT
3024  014214  104400                            SCOPE
3025  014216  000207                            RTS     %7
3026  014220  000000                  NUMA:     0
3027  014222  104400                  ARIEND:   SCOPE
3028
3029                                            ;TEST ALL COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
3030  014224  005002                  COMPAR:   CLR     %2                      ;INIT %2
3031  014226  005001                            CLR     %1                      ;INIT %1
3032  014230  020201                  CMP1:     CMP     %2,%1                   ;ARE THE EQUAL
3033  014232  001401                            BEQ     .+4
3034  014234  104000                            HLT                             ;R0 AND R1 DID NOT COMPARE
3035  014236  020227  177777                    CMP     %2,#-1                  ;AT UPPER LIMIT
3036  014242  001403                            BEQ     CMP2                    ;YES EXIT
3037  014244  005202                            INC     %2                      ;INCREMENT TO NEXT NUMBER
3038  014246  005201                            INC     %1
3039  014250  000767                            BR      CMP1
3040  014252  104400                  CMP2:     SCOPE
3041                                            ;TEST COMPLIMENTING ALL NUMBERS
3042  014254  005067  002452                    CLR     TEMP                    ;BASE DATA
3043  014260  005067  002452                    CLR     TEMP+4                  ;BASE REFERENCE
3044  014264  005167  002442          TCOM:     COM     TEMP                    ;COMPLIMENT DATA
3045  014270  005367  002442                    DEC     TEMP+4                  ;DECREMENT REFERENCE
3046  014274  026767  002432  002434            CMP     TEMP,TEMP+4             ;COMPARE
3047  014302  001401                            BEQ     .+4                     ;TEST
3048  014304  104000                            HLT                             ;COMPLIMENT OR DECREMENT FAILED
3049  014306  005167  002420                    COM     TEMP
3050  014312  005267  002414                    INC     TEMP                    ;INCREMENT AND TEST FOR DONE
3051  014316  001362                            BNE     TCOM                    ;NOT FINISHED GO LOOP
3052  014320  104400                            SCOPE
3053
3054                                            ;TEST COMB (EVEN BYTE)
3055  014322  005067  002404                    CLR     TEMP                    ;BASE DATA
3056  014326  005067  002404                    CLR     TEMP+4                  ;REFERENCE DATA
3057  014332  105167  002374          TCOM2:    COMB    TEMP
3058  014336  005367  002374                    DEC     TEMP+4
3059  014342  126767  002364  002366            CMPB    TEMP,TEMP+4             ;COMPARE
3060  014350  001401                            BEQ     .+4
3061  014352  104000                            HLT                             ;COMPLIMENT OR INCREMENT BYTE FAILED
3062  014354  105167  002352                    COMB    TEMP
3063  014360  105267  002346                    INCB    TEMP
3064  014364  001362                            BNE     TCOM2
3065  014366  104400                            SCOPE
3066
3067  014370  005067  002336                    CLR     TEMP                    ;BASE DATA
3068  014374  005067  002336                    CLR     TEMP+4                  ;REFERENCE DATA
```

```
3069  014400  105167  002327          TCOM3:  COMB    TEMP+1          ;ODD BYTE
3070  014404  005367  002326                  DEC     TEMP+4
3071  014410  126767  002317  002320          CMPB    TEMP+1,TEMP+4
3072  014416  001401                          BEQ     .+4
3073  014420  104000                          HLT                     ;COMPLIMENT BYTE FAILED
3074  014422  105167  002305                  COMB    TEMP+1
3075  014426  105267  002301                  INCB    TEMP+1
3076  014432  001362                          BNE     TCOM3
3077  014434  104400                          SCOPE
3078
3079                                  ;TEST COMPARE ALL VALUE EVEN BYTE WITH ODD
3080  014436  005067  002270                  CLR     TEMP            ;BASE VALUE
3081  014442  126767  002264  002263  TSCOMB: CMPB    TEMP,TEMP+1     ;COMPARE
3082  014450  001401                          BEQ     .+4
3083  014452  104000                          HLT                     ;COMPARE FAILED
3084  014454  002001                          BGE     .+4
3085  014456  104000                          HLT                     ;V IS NOT = TO N
3086  014460  003401                          BLE     .+4
3087  014462  104000                          HLT                     ;V IS SET
3088  014464  062767  000401  002240          ADD     #401,TEMP
3089  014472  022767  177777  002232          CMP     #-1,TEMP
3090  014500  001360                          BNE     TSCOMB
3091  014502  104400                          SCOPE
3092  014504  012737  004000  016462          MOV     #4000,@#ICOUNT
3093  014512  104400          WAIT3:  SCOPE
3094  014514                  WAIT5:
3095  014514  012737  000010  016462          MOV     #10,@#ICOUNT
3096
3097                                  ;TEST TO SEE IF I/O DEVICES WERE SELECTED
3098  014522  122737  000377  001540          CMPB    #377,@#REG1             ;SELECTED DEVICES STORED IN REG1
3099  014530  001404                          BEQ     WAIT4           ;BRANCH IF NO DEVICES SELECTED
3100  014532  000001                          WAIT                    ;INTERRUPTS WILL OCCUR
3101  014534  000001                          WAIT                    ;IF DEVICES ARE SELECTED
3102  014536  000001                          WAIT
3103  014540  000001                          WAIT
3104  014542  104400          WAIT4:  SCOPE
3105  014544  012737  004000  016462          MOV     #4000,@#ICOUNT
3106
3107                                  ;TEST SWAB
3108  014552  012767  000200  177056          MOV     #0200,TEST
3109  014560  000367  177052                  SWAB    TEST
3110  014564  100001                          BPL     .+4
3111  014566  104000                          HLT
3112  014570  001401                          BEQ     .+4
3113  014572  104000                          HLT
3114  014574  000367  177036                  SWAB    TEST
3115  014600  100401                          BMI     .+4
3116  014602  104000                          HLT
3117  014604  001001                          BNE     .+4
3118  014606  104000                          HLT
3119  014610  104400                          SCOPE
3120  014612  005037  016462                  CLR     @#ICOUNT
3121
3122                                  ;TEST ALL COMBINATIONS OF SWAB
3123  014616  005067  177014                  CLR     TEST            ;NUMBER UNDER TEST
3124  014622  005067  177006                  CLR     REF             ;REFERENCE NUMBER
```

```
3125  014626  000367  177004          SWABA:  SWAB    TEST            ;OPERATION UNDER TEST
3126  014632  026767  177000  176774          CMP     TEST,REF        ;TEST SWAB INSTRUCTION
3127  014640  001401                          BEQ     .+4
3128  014642  104000                          HLT                     ;SWAB FAILED
3129  014644  000367  176766                  SWAB    TEST
3130  014650  005267  176760                  INC     REF             ;INCREMENT REFERENCE NUMBER
3131  014654  105267  176757                  INCB    TEST+1          ;INC TEST NUMBER
3132  014660  001362                          BNE     SWABA           ;LOOP TILL DONE
3133  014662  104400                          SCOPE
3134  014664  012737  004000  016462          MOV     #4000,@#ICOUNT
3135          000240          NOP=240
3136          177776          CC=177776
3137
3138  014672  012767  177777  002032          MOV     #-1,TEMP
3139  014700  000261                          SEC
3140  014702  105567  002025                  ADCB    TEMP+1
3141  014706  103401                          BCS     .+4
3142  014710  104000                          HLT                     ;ADCB FAILED
3143  014712  022767  000377  002012          CMP     #377,TEMP
3144  014720  001401                          BEQ     .+4
3145  014722  104000                          HLT                     ;ADCB FAILED
3146  014724  104400                          SCOPE
3147                          ;PROBLEM 11S 030C 17 AUG 1972
3148  014726  012703  000100                  MOV     #100,%3
3149  014732  012705  016732                  MOV     #TEMP,%5
3150  014736  012737  177777  016732          MOV     #-1,@#TEMP
3151  014744  030315                          BIT     %3,@%5
3152  014746  001001                          BNE     .+4
3153  014750  104000                          HLT                     ;BIT FAILED
3154  014752  104400                          SCOPE
3155  014754  000402          EAESRT: BR      .+6                     ;NOP IF NO EAE
3156  014756  000167  000362                  JMP     ENDEAE
3157                          ;TEST LEFT SHIFT
3158  014762  104400                          SCOPE                   ;TEST OF LOGICAL SHIFT
3159  014764  005077  163360                  CLR     @MQ             ;LOAD MQ WITH 0
3160  014770  012777  125252  163354          MOV     #125252,@AC     ;LOAD AC WITH 125252
3161  014776  012777  177760  163362          MOV     #-16.,@LSH      ;LOAD SHIFT COUNT (LSH) WITH -16
3162  015004  005777  163342                  TST     @AC             ;COMPARE AC WITH 0
3163  015010  001401                          BEQ     .+4             ;GO TO HLT IF BAD
3164  015012  104000                          HLT
3165  015014  022777  125252  163326          CMP     #125252,@MQ     ;COMPARE MQ WITH 125252
3166  015022  001401                          BEQ     .+4             ;GO TO HLT IF BAD
3167  015024  104000                          HLT
3168  015026  122777  000020  163322          CMPB    #20,@SRE                ;COMPARE SR WITH 2
3169  015034  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3170  015036  104000                          HLT                     ;HALT ON ERROR (LEFT SHIFT)
3171
3172                          ;TEST RIGHT SHIFT
3173  015040  104400                          SCOPE                   ;TEST OF ARITHMETIC SHIFT
3174  015042  005077  163302                  CLR     @MQ             ;LOAD MQ WITH 0
3175  015046  012777  177777  163276          MOV     #-1,@AC         ;LOAD AC WITH -1
3176  015054  012777  000020  163306          MOV     #16.,@ASH       ;LOAD SHIFT COUNT (ASH) WITH 16.
3177  015062  005777  163264                  TST     @AC             ;COMPARE AC WITH 100000
3178  015066  100401                          BMI     .+4             ;SKIP HLT IF GOOD
3179  015070  104000                          HLT                     ;HALT ON ERROR
3180  015072  005777  163252                  TST     @MQ             ;COMPARE MQ WITH 0
```

```
3181  015076  001401                        BEQ     .+4             ;SKIP HLT IF GOOD
3182  015100  104000                        HLT                     ;HALT ON ERROR
3183  015102  122777  000110  163246        CMPB    #110,@SPE       ;COMPARE SR WITH 10
3184  015110  001401                        BEQ     .+4             ;SKIP HLT IF GOOD
3185  015112  104000                        HLT                     ;HALT ON ERROR (RIGHT SHIFT)
3186
3187                                ;TEST NORMALIZE
3188  015114  104400                        SCOPE                   ;TEST OF NORMALIZE
3189  015116  012777  125252  163224        MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3190  015124  012777  170000  163220        MOV     #170000,@AC     ;LOAD AC WITH 170000
3191  015132  005077  163226                CLR     @NOR            ;START NORMALIZE
3192  015136  022777  100005  163206        CMP     #100005,@AC     ;COMPARE AC WITH 100005
3193  015144  001401                        BEQ     .+4             ;SKIP HLT IF GOOD
3194  015146  104000                        HLT                     ;HALT ON ERROR
3195  015150  022777  052520  163172        CMP     #52520,@MQ      ;COMPARE MQ WITH 52520
3196  015156  001401                        BEQ     .+4             ;SKIP HLT IF GOOD
3197  015160  104000                        HLT                     ;HALT ON ERROR
3198  015162  122777  000003  163164        CMPB    #3,@SC          ;COMPARE SC WITH 3
3199  015170  001401                        BEQ     .+4             ;SKIP HLT IF GOOD
3200  015172  104000                        HLT                     ;HALT ON ERROR (NORMALIZE)
3201                              ;TEST MULTIPLY
3202  015174  104400                        SCOPE                   ;TEST OF MULTIPLY
3203  015176  012777  125252  163144        MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3204  015204  012777  040000  163146        MOV     #40000,@MUL     ;LOAD MUL WITH 40000
3205  015212  022777  165252  163132        CMP     #165252,@AC     ;COMPARE AC WITH 1652
3206  015220  001401                        BEQ     .+4             ;SKIP IF GOOD
3207  015222  104000                        HLT                     ;HALT ON ERROR
3208  015224  005777  163120                TST     @MQ             ;COMPARE MQ WITH 10000
3209  015230  100401                        BMI     .+4             ;SKIP HLT IF GOOD
3210  015232  104000                        HLT                     ;HALT ON ERROR
3211  015234  122777  000300  163114        CMPB    #300,@SRE       ;COMPARE SR WITH 300
3212  015242  001401                        BEQ     .+4             ;SKIP HLT IF GOOD
3213  015244  104000                        HLT                     ;HALT ON ERROR (MULTIPLY)
3214
3215
3216  015246  104400                ;TEST DIVIDE
3217  015250  012777  125252  163072        SCOPE                   ;TEST OF DIVIDE
3218  015256  012777  177777  163066        MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3219  015264  012777  000002  163070        MOV     #-1,@AC         ;LOAD AC WITH -1
3220  015272  005777  163054                MOV     #2,@DIV         ;LOAD DIV WITH 2 AND DIVIDE
3221  015276  001401                        TST     @AC             ;COMPARE AC WITH 0 (QUOTIANT)
3222  015300  104000                        BEQ     .+4             ;SKIP HLT IF GOOD
3223  015302  022777  152525  163040        HLT                     ;HALT ON ERROR
3224  015310  001401                        CMP     #152525,@MQ     ;COMPARE MQ WITH 152525
3225  015312  104000                        BEQ     .+4             ;SKIP HLT IF GOOD
3226  015314  104400                        HLT                     ;DIVIDE ERROR
3227  015316  012767  177777  001406        SCOPE
3228  015324  000261                        MOV     #-1,TEMP
3229  015326  105667  001401                SEC
3230  015332  022767  177377  001372        SBCB    TEMP+1
3231  015340  001401                        CMP     #177377,TEMP
3232  015342  104000                        BEQ     .+4
3233  015344  104400                        HLT
3234  015346  022700  052525        ENDEAE: SCOPE
3235  015352  001401                        CMP     #52525,%0
3236  015354  104000                        BEQ     .+4
                                            HLT                     ;SOME OPERATION DESTROYED %0
```

```
3237  015356  012737  016526  000024          MOV     #PFAIL,@#24             ;POWER FAIL VECTOR
3238  015364  012737  000340  000026          MOV     #340,@#26               ;PROCESSOR PRIORITY
3239
3240  015372  000401                  SKPBEL: BR      .+4                     ;SKIP OVER BELL-NOP ON CORE EXPANSION
3241  015374  000501                          BR      TRPA
3242  015376  032777  000100  162660          BIT     #100,@TTCSR
3243  015404  001006                          BNE     SBELL                   ;DON'T RING BELL IF TTY IS BUSY
3244                                  ;BELL ON PASS COMPLETE
3245  015406  012777  000207  000466  BELL:   MOV     #207,@TDBR
3246  015414  105777  000464                  TSTB    @TCSR
3247  015420  100375                          BPL     .-4
3248  015422  005227  000000          SBELL:  INC     #0                      ;PASS COUNT LOCATION
3249  015426  010700                          MOV     %7,%0                   ;SET UP RESERVED INSTRUCTION
3250  015430  042700  017777                  BIC     #17777,%0               ;OFFSET
3251  015434  062700  015460                  ADD     #BEG20,%0
3252  015440  010037  000010                  MOV     %0,@#10
3253  015444  006701                          6701                            ;ATTEMPT TO EXECUTE SIGN EXTEND
3254  015446  000240                          NOP
3255  015450  012737  000006  015574          MOV     #6,@#YESRT              ;NO TRAP, PROCESSOR IS NOT=20,15,05
3256  015456  000403                          BR      BEGANY
3257  015460  012737  000002  015574  BEG20:  MOV     #2,@#YESRT              ;TRAP OCCURRED
3258  015466  012737  000012  000010  BEGANY: MOV     #12,@#10                ;RESTORE HALT FOR RESERVED INC
3259                                  ;ROUTINE TO CHECK FOR TRACE TRAP TO BE RUN WITH PROGRAM
3260
3261                                  ;SAVE OLD CONTENTS, SET UP FOR TRACE TRAP
3262  015474  005046                  YESTR:  CLR     -(6)
3263  015476  032777  010000  162470          BIT     #10000,@SRPTR           ;INHIBIT "T" TRAP IF SET
3264  015504  001013                          BNE     ACT
3265  015506  012737  015574  000014          MOV     #YESRT,@#14             ;T TRAP VECTOR
3266  015514  005167  000052                  COM     TRPB
3267  015520  001405                          BEQ     ACT
3268  015522  012716  000020                  MOV     #20,(6)                 ;SET TRACE TRAP
3269  015526  012746  004440          YESTR1: MOV     #BEGIN,-(6)             ;START OF TEST WITH TRACE ON
3270  015532  000002                  YESTR2: RTI
3271  015534  013700  000042          ACT:    MOV     @#42,%0                 ;ARE WE UNDER ACT?
3272  015540  001772                          BEQ     YESTR1                  ;NO
3273  015542  012737  015554  000014          MOV     #CLEAR,@#14             ;TO BANK ZERO
3274  015550  012707  015554                  MOV     #CLEAR,%7
3275  015554  000005                  CLEAR:  RESET                           ;CLER  THE WORLD
3276  015556  004710                  LOGICA: JSR     %7,@%0                  ;YES
3277  015560  000240                          NOP                             ;FOR ACT 11
3278  015562  000240                          NOP
3279  015564  000240                          NOP
3280  015566  000137  000502                  JMP     @#START
3281  015572  000000                  TRPB:   0
3282  015574  000002                  YESRT:  RTI                             ;RETURN TO PROGRAM FROM TRAP - CAN BE AN RTT
3283  015576  000000                          HALT                            ;RTI FAILED
3284  015600  000137  004440          TRPA:   JMP     @#BEGIN                 ;BEGIN MODIFY BY EXPANSION
3285  015604  000000                  PRFLAG: 0                               ;PRINT ROUTINE BUSY IF NOT ZERO
3286
3287
3288                                  ;ENTERED WITH SYSTEM TRAP CALL(HLT)
                                      ;PRINT OUT THE ERROR PC AND STATUS REGISTER
3289  015606  005767  177772  PRINT:  TST     PRFLAG                          ;IS ROUTINE BUSY
3290  015612  001401                  BEQ     .+4
3291  015614  000002                  RTI                                     ;YES EXIT
3292  015616  005267  177762          INC     PRFLAG                          ;NO SET FLAG
```

```
3293  015622  005227  000000          INC     #0                      ;ERROR COUNT LOCATION
3294  015626  037727  162342  020000  BIT     @SRPTR,#20000           ;TEST FOR INHIBIT PRINT OUT
3295  015634  001401                  BEQ     .+4                     ;BRANCH TO PRINT
3296  015636  000501                  BR      PRINT1                  ;INHIBIT, RETURN TO MAIN STREAM
3297  015640  012667  000242          MOV     (6)+,SAVPC              ;PC OF FAILING ROUTINE
3298  015644  012667  000240          MOV     (6)+,SAVCC              ;CC OF ERROR CONDITION
3299  015650  024646                  CMP     -(6),-(6)               ;REPOSITION THE STACK
3300  015652  042767  000140  162116  BIC     #140,STATUS
3301  015660  105777  000220          TSTB    @TCSR           ;WAIT FOR FLAG
3302  015664  100375                  BPL     .-4
3303  015666  012777  000215  000206  MOV     #215,@TDBR      ;FILLER CHARACTER.
3304  015674  105777  000204          TSTB    @TCSR
3305  015700  100375                  BPL     .-4
3306  015702  012777  000212  000172  MOV     #212,@TDBR              ;LINE FEED
3307  015710  105777  000170          TSTB    @TCSR
3308  015714  100375                  BPL     .-4
3309  015716  010267  000152          MOV     %2,SAVR2                ;SAVE R2
3310  015722  010367  000150          MOV     %3,SAVR3                ;SAVE R3
3311  015726  010467  000146          MOV     %4,SAVR4                ;SAVE R4
3312  015732  016702  000150          MOV     SAVPC,%2
3313  015736  004767  000150          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
3314  015742  012777  000240  000132  MOV     #240,@TDBR
3315  015750  105777  000130          TSTB    @TCSR                   ;SPACE BETWEEN WORDS
3316  015754  100375                  BPL     .-4
3317  015756  016702  000126          MOV     SAVCC,%2
3318  015762  004767  000124          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
3319  015766  012777  000240  000106  MOV     #240,@TDBR
3320  015774  105777  000104          TSTB    @TCSR
3321  016000  100375                  BPL     .-4
3322  016002  016702  000460          MOV     RETURN,%2               ;WHERE CPU TEST IS AT
3323  016006  004767  000100          JSR     %7,PRTAB
3324  016012  016702  000056          MOV     SAVR2,%2                ;RESTORE REGISTERS
3325  016016  016703  000054          MOV     SAVR3,%3
3326  016022  016704  000052          MOV     SAVR4,%4
3327  016026  012777  000377  000046  MOV     #377,@TDBR
3328  016034  105777  000044          TSTB    @TCSR
3329  016040  100375                  BPL     .-4
3330  016042  005777  162126  PRINT1: TST     @SRPTR                  ;TEST FOR HALT SWITCH
3331  016046  100001                  BPL     .+4
3332  016050  000000                  HALT                            ;HALT ON ERROR SET
3333  016052  005067  177526          CLR     PRFLAG                  ;CLEAR FLAG WHEN DONE
3334  016056  032777  000400  162110  BIT     #400,@SRPTR
3335  016064  001402                  BEQ     EXPRINT
3336  016066  000167  162410          JMP     START                   ;RESTART ON ERROR
3337  016072  000002  EXPRINT: RTI                                   ;RETURN TO MAIN STREAM
3338  016074  000000  SAVR2:  0
3339  016076  000000  SAVR3:  0
3340  016100  000000  SAVR4:  0
3341  016102  177566  TDBR:   177566                                  ;DATA
3342  016104  177564  TCSR:   177564                                  ;STATUS
3343  016106  000000  SAVPC:  0
3344  016110  000000  SAVCC:  0
3345          017004          BUFF=FIN                                ;END OF PROGRAM-SP AREA.
3346
3347  016112  005067  000252  PRTAB:  CLR     BINCT
3348  016116  005067  000244          CLR     WGTCT
```

```
3349  016122  012704  016374                        MOV     #LIST,%4        ;GET LIST ADDRESS
3350  016126  012767  000005  000236                MOV     #5,ASCNT
3351  016134  012767  000007  000220                MOV     #7,SEVEN
3352  016142  012767  000001  000214                MOV     #1,DECML
3353  016150  105777  177730            WAIT1:     TSTB    @TCSR
3354  016154  100375                               BPL     WAIT1
3355  016156  005702                               TST     %2
3356  016160  100404                               BMI     MINUS
3357  016162  012777  000260  177712                MOV     #260,@TDBR      ;NEG SIGN PRINT 1
3358  016170  000403                               BR      STAR            ;POS SIGN PRINT 0
3359  016172  012777  000261  177702  MINUS:       MOV     #261,@TDBR
3360  016200  016703  000156            STAR:      MOV     SEVEN,%3        ;PUT MASK IN R3
3361  016204  010267  000150                       MOV     %2,TOODLE       ;GET READY TO DOODLE NUMBER IN TOODLE
3362  016210  005167  000144                       COM     TOODLE          ;COMPENSATES FOR COMPLEMENT DURING BIC
3363  016214  046703  000140                       BIC     TOODLE,%3       ;AND IN OCTAL CHARACTER
3364  016220  001410                               BEQ     WRTOC           ;ZERO, WRITE 0 IN LIST
3365  016222  066767  000136  000136  MKNUM:       ADD     DECML,WGTCT     ;COUNT UP TO
3366  016230  005267  000134                       INC     BINCT           ;AND RECORD
3367  016234  026703  000126                       CMP     WGTCT,%3        ;SAME BINARY WEIGHT
3368  016240  001370                               BNE     MKNUM           ;KEEP COUNTN
3369  016242  062767  000260  000120  WRTOC:      ADD     #260,BINCT      ;ADD ASCII PREFIX
3370  016250  016724  000114                       MOV     BINCT,(4)+      ;WRITE ASCII CHAR IN LIST
3371  016254  066767  000102  000102               ADD     SEVEN,DECML     ;EXPAND BINARY WEIGHT
3372  016262  005067  000100                       CLR     WGTCT
3373  016266  005067  000076                       CLR     BINCT
3374  016272  005367  000074                       DEC     ASCNT
3375  016276  001410                               BEQ     XLIST           ;5 CHAR IN LIST
3376  016300  012703  000003                       MOV     #3,%3           ;SET X3 FOR ADD LOOP
3377  016304  066767  000052  000050  MOADD:      ADD     SEVEN,SEVEN     ;MAKING SEVENTY BY SEVEN
3378  016312  005303                               DEC     %3
3379  016314  001373                               BNE     MOADD
3380  016316  000730                               BR      STAR
3381  016320  012767  000005  000044  XLIST:      MOV     #5,ASCNT        ;NX SEVEN SET GET NX OCTAL
3382  016326  105777  177552            WAIT2:     TSTB    @TCSR           ;SEND 5 CHAR TO TTY
3383  016332  100375                               BPL     WAIT2
3384  016334  014477  177542                       MOV     -(4),@TDBR
3385  016340  005367  000026                       DEC     ASCNT
3386  016344  001401                               BEQ     HDFHM           ;FINISH PRINTING GET NXT NUM
3387  016346  000767                               BR      WAIT2
3388  016350  105777  177530            HDFHM:     TSTB    @TCSR
3389  016354  100375                               BPL     .-4
3390  016356  000207                               RTS     %7              ;HEAD FOR HOME
3391  016360  000000            TOODLE:    0
3392  016362  000000            SEVEN:     0
3393  016364  000000            DECML:     0
3394  016366  000000            WGTCT:     0
3395  016370  000000            BINCT:     0
3396  016372  000000            ASCNT:     0
3397  016374  000000            LIST:      0
3398  016376  000000                       0
3399  016400  000000                       0
3400  016402  000000                       0
3401  016404  000000                       0
3402
3403                    ;SCOPE LOOP ROUTINE ENTERED BY USER TRAP
3404                    ;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 4000 TIMES
```

```
 3405  016406  032777  040000  161560  SCOPEC: BIT     #40000,@SRPTR           ;TEST SR FOR SCOPE
 3406  016414  001012                          BNE     SCOPEB                  ;YES SCOPE
 3407  016416  032777  004000  161550          BIT     #4000,@SRPTR            ;NO - TEST FOR ITERATION
 3408  016424  001011                          BNE     SCOPEG                  ;INHIBIT ITERATION
 3409  016426  026767  000032  000026          CMP     SCOPEF,ICOUNT
 3410  016434  001405                          BEQ     SCOPEG                  ;EXIT - DONE
 3411  016436  005267  000022                  INC     SCOPEF                  ;INCREMENT COUNT
 3412  016442  016716  000020          SCOPEB: MOV     RETURN,@#6              ;REPOSITION THE STACK
 3413  016446  000002                          RTI                             ;SCOPE RETURN
 3414  016450  005067  000010          SCOPEG: CLR     SCOPEF                  ;CLEAR COUNT
 3415  016454  011667  000006                  MOV     @#6,RETURN              ;SAVE SCOPE RETURN POINTER
 3416  016460  000002                          RTI                             ;RETURN INLINE-NEXT TEST
 3417  016462  004000                  ICOUNT: 4000
 3418  016464  000000                  SCOPEF: 0                               ;COUNT LOCATION FOR ITERATION LOOP
 3419  016466  004440                  RETURN: BEGIN                           ;ADDRESS OF LAST TEST
 3420
 3421                                  ;GROUP OF NESTED SUBROUTINES
 3422  016470  000207                  SUBR1:  RTS     %7                      ;ONE INSTRUCTION
 3423  016472  000277                  SUBR2:  SCC                             ;ONE DEEP
 3424  016474  000205                          RTS     %5
 3425  016476  004537  016472          SUBR3:  JSR     %5,@#SUBR2              ;TWO DEEP
 3426  016502  000204                          RTS     %4
 3427  016504  004467  177766          SUBR4:  JSR     %4,SUBR3                ;THREE DEEP
 3428  016510  000203                          RTS     %3
 3429  016512  004367  177766          SUBR5:  JSR     %3,SUBR4                ;FOUR DEEP
 3430  016516  000202                          RTS     %2
 3431  016520  004267  177766          SUBR6:  JSR     %2,SUBR5                ;FIVE DEEP
 3432  016524  000207                          RTS     %7
 3433
 3434                                  ;ENTER HERE OR POWER FAIL
 3435  016526  010046                  PFAIL:  MOV     %0,-(6)                 ;SAVE REGISTER OR STACK
 3436  016530  010146                          MOV     %1,-(6)                 ;WHEN POWERING DOWN
 3437  016532  010246                          MOV     %2,-(6)
 3438  016534  010346                          MOV     %3,-(6)
 3439  016536  010446                          MOV     %4,-(6)
 3440  016540  010546                          MOV     %5,-(6)
 3441  016542  016746  161256                  MOV     24,-(6)
 3442  016546  012737  000002  000006          MOV     #RTI,@#6                ;IN CASE OF NO EAE
 3443  016554  012700  016614                  MOV     #HAC,%0
```

```
3444  016560  017720  161566                  MOV     @AC,(%0)+
3445  016564  017720  161560                  MOV     @MQ,(%0)+
3446  016570  017720  161560                  MOV     @SC,(%0)+
3447  016574  010046                          MOV     %0,-(%6)
3448  016576  010667  000010                  MOV     %6,SAVR6                ;STORE STACK POSITION, POWER FAIL FLAG
3449  016602  012767  016622  161214          MOV     #RESTART,24
3450  016610  000000                          HALT                            ;HALT ON POWER DOWN NORMAL
3451  016612  000000              SAVR6:      0                               ;STACK IS SAVED HERE
3452  016614  000000              HAC:        0
3453  016616  000000              HMQ:        0
3454  016620  000000              HSC:        0
3455  016622  016706  177764      RESTART:            MOV     SAVR6,%6        ;RESTORE REGISTER OFF STACK
3456  016626  012600                          MOV     (%6)+,%0
3457  016630  014077  161520                  MOV     -(%0),@SC
3458  016634  014077  161510                  MOV     -(%0),@MQ               ;MQ MUST BE LOADED BEFORE AC
3459  016640  014077  161506                  MOV     -(%0),@AC
3460  016644  005037  000006                  CLR     @#6                     ;RESTORE TIME OUT
3461  016650  012667  161150                  MOV     (6)+,24                 ;WHEN POWERING UP
3462  016654  012605                          MOV     (6)+,%5
3463  016656  012604                          MOV     (6)+,%4
3464  016660  012603                          MOV     (6)+,%3
3465  016662  012602                          MOV     (6)+,%2
3466  016664  012601                          MOV     (6)+,%1
3467  016666  012600                          MOV     (6)+,%0
3468  016670  005037  016612                  CLR     @#SAVR6
3469  016674  104000                          HLT                             ;POWER FAIL OCCURRED
3470  016676  000002                          RTI                             ;RETURN TO MAIN LINE
3471  016700  125252              B:          125252
3472                            ;FIXED VALUES FOR USE IN TEST
3473  016702  016700                          B                               ;ADDRESS OF B
3474  016704  052525                          052525
3475
3476          016710                        .=B+10
3477  016710  177777              A:          -1
3478  016712  016714                          A+4
3479
3480          016714                        .=A+4
3481  016714  125252                          125252
3482  016716  016720                          A+10                            ;ADDRESS OF A+10
3483  016720  052525                          052525
3484                            ;FOR STORAGE
3485  016722  000000              C:          0
3486  016724  016722                          C                               ;ADDRESS OF C
3487
3488          016732                        .=C+10
3489  016732  000000              TEMP:       0
3490  016734  016732                          TEMP                            ;ADDRESS OF TEMP
3491
3492          016740                        .=TEMP+6
3493  016740  016742                          TEMP+10                         ;ADDRESS OF TEMP+10 OR "D"
3494  016742  000000              D:          0
3495          017004                        .=.+40
3496  017004  000000              FIN:        0                               ;BUFFER FOR SP
3497  017006  000207              USER:       RTS     %7                      ;OVERLAY USER ROUTINE HERE IF 4KW, USE BANK1 IF 8KW
3498                            ;PDP-11 MEMORY DETERMINATION AND SETUP
3499                            ;USE WITH VARIABLE CORE QUANTITY SYSTEMS
```

```
                017010                  .=FIN + 4                       ;APPLICABLE TO SYSTEM TEST 21
017010  012767  004440  176564  DET1:   MOV     #BEGIN,TRPA+2
017016  012767  000401  176346          MOV     #401,SKPBEL             ;BR .+4
017024  004767  000412                  JSR     %7,MAMF
017030  023727  000042  017010          CMP     @#42,#DET1              ;CHECK FOR DDP1
017036  101401                          BLOS    .+4
017040  000207                          RTS     %7                      ;NO CORE EXPANSION WITH DDP1
017042  032777  001000  161124          BIT     #1000,@SRPTR            ;CHECK VARIABLE CORE SWITCH
017050  001401                          BEQ     DET4                    ;USE VARIABLE CORE ROUTINE
017052  000207                          RTS     %7                      ;4K ONLY
017054  012767  017122  160722  DET4:   MOV     #DET2,4                 ;TRAP VECTOR SETUP
017062  012767  000340  160716          MOV     #340,6                  ;TRAP STATUS SETUP
017070  005537  037770          EIGHT:  ADC     @#37770                 ;CHECK FOR 8K
017074  005537  057770          TWELVE: ADC     @#57770                 ;CHECK FOR 12K
017100  005537  077770          SXTEEN: ADC     @#077770                ;CHECK FOR 16K
017104  005537  117770          TWENTY: ADC     @#117770                ;CHECK FOR 20K
017110  005537  137770          TWOFOR: ADC     @#137770                ;CHECK FOR 24K
017114  005537  157770          TWOEIG: ADC     @#157770                ;CHECK FOR 28K
017120  000430                  STRT28  BR      STRT28
017122  012602          DET2:   MOV     (6)+,%2                 ;RETRIEVE TRAP PC
017124  005726                  TST     (6)+                    ;DISCARD TRAP STATUS WORD
017126  022702  017074          CMP     #EIGHT+4,%2
017132  001542                  BEQ     DET3                    ;4K
017134  022702  017100          CMP     #TWELVE+4,%2
017140  001437                  BEQ     STRT8                           ;8K
017142  022702  017104          CMP     #SXTEEN+4,%2
017146  001431                  BEQ     STRT12                  ;12K
017150  022702  017110          CMP     #TWENTY+4,%2
017154  001423                  BEQ     STRT16                  ;16K
017156  022702  017114          CMP     #TWOFOR+4,%2
017162  001415                  BEQ     STRT20                  ;20K
017164  000411                  BR      STRT24                  ;24K
017166  005000          MOVE:   CLR     %0                      ;SET UP MAIN CORE CURRENT
017170  012021                  MOV     (0)+,(1)+               ;MOVE WORD
017172  020027  017006          CMP     %0,#FIN+2               ;MOVE COMPLETE?
017176  001374                  BNE     .-6                     ;MOVE ANOTHER WORD
017200  000207                  RTS     %7                      ;MOVE COMPLETE
017202  004767  000040  STRT28: JSR     %7,XFER28               ;START 28K TRANSFER
017206  000450                  BR      MOD24                   ;START 24K MODIFY
017210  004767  000042  STRT24: JSR     %7,XFER24               ;START 24K TRANSFER
017214  000453                  BR      MOD20                   ;START 20K MODIFY
017216  004767  000044  STRT20: JSR     %7,XFER20               ;START 20K TRANSFER
017222  000456                  BR      MOD16                   ;START 16K MODIFY
017224  004767  000046  STRT16: JSR     %7,XFER16               ;START 16K TRANSFER
017230  000461                  BR      MOD12                   ;START 12K MODIFY
017232  004767  000050  STRT12: JSR     %7,XFER12               ;START 12K TRANSFER
017236  000464                  BR      MOD8                    ;START 8K MODIFY
017240  004767  000052  STRT8:  JSR     %7,XFER8                ;START 8K TRANSFER
017244  000467                  BR      MOD4                    ;START 4K MODIFY
017246  012701  140000  XFER28: MOV     #140000,%1              ;SET UP MOVE START LOCATION
017252  004767  177710          JSR     %7,MOVE                 ;GO TO MOVE SUBROUTINE
017256  012701  120000  XFER24: MOV     #120000,%1
017262  004767  177700          JSR     %7,MOVE
017266  012701  100000  XFER20: MOV     #100000,%1
017272  004767  177670          JSR     %7,MOVE
017276  012701  060000  XFER16: MOV     #60000,%1
```

```
3556   017302   004767   177660                 XFER12: JSR     %7,MOVE
3557   017306   012701   040000                         MOV     #40000,%1
3558   017312   004767   177650                 XFER8:  JSR     %7,MOVE
3559   017316   012701   020000                         MOV     #20000,%1
3560   017322   004767   177640                         JSR     %7,MOVE
3561   017326   000207                                  RTS     %7              ;RETURN FROM TRANSFERS
3562   017330   012767   144446   116244        MOD24:  MOV     #BEGIN+140006,TRPA+120002
3563   017336   012767   000240   116026                MOV     #NOP,SKPBEL+120000
3564   017344   012767   124446   076230        MOD20:  MOV     #BEGIN+120006,TRPA+100002
3565   017352   012767   000240   076012                MOV     #NOP,SKPBEL+100000
3566   017360   012767   104446   056214        MOD16:  MOV     #BEGIN+100006,TRPA+60002
3567   017366   012767   000240   055776                MOV     #NOP,SKPBEL+60000
3568   017374   012767   064446   036200        MOD12:  MOV     #BEGIN+60006,TRPA+40002
3569   017402   012767   000240   035762                MOV     #NOP,SKPBEL+40000
3570   017410   012767   044446   016164        MOD8:   MOV     #BEGIN+40006,TRPA+20002
3571   017416   012767   000240   015746                MOV     #NOP,SKPBEL+20000
3572   017424   012767   024446   176150        MOD4:   MOV     #BEGIN+20006,TRPA+2
3573   017432   012767   000240   175732                MOV     #NOP,SKPBEL
3574   017440   000207                         DET3:   RTS     %7              ;RETURN FROM MODIFY
3575                                           ;ROUTINE TO SET ACTION ENABLE ON MA/MF PARITY MEMORIES
3576                                           ;CALL:  JSR     PC,.MAMF
3577
3578            172100                                 PARCSR= 172100          ;ADDRESS OF FIRST MA/MF PA
3579            000114                                 PARVEC= 114             ;ADDRESS OF PARITY INTERRU
3580            000004                                 ERRVEC=4
3581            000000                                 R0=%0
3582            000006                                 SP=%6
3583            000002                                 R2=%2
3584            000007                                 PC=%7
3585
3586   017442   012737   000006   000004   .MAMF:  MOV     #ERRVEC+2,@#ERRVEC
3587   017450   012737   000002   000006                MOV     #RTI,@#ERRVEC+2
3588   017456   012700   172100                        MOV     #PARCSR,R0      ;GET FIRST CSR ADDRESS
3589   017462   012702   000001                        MOV     #1,R2
3590
3591                                                                           ;SET TIME OUT INDICATOR
3592   017466   012720   000001             1$:        MOV     #1,(R0)+        ;SET ACTION ENABLE IF AVAI
3593                                                                           ;BRANCH IF CSR NOT AVAILAB
3594   017472   006302                                 ASL     R2              ;SHIFT AVAILABILITY INDICA
3595   017474   103374                                 BCC     1$
3596   017476   000207                                 RTS     PC
3597   017500   104000                         .PARSRV:HLT                     ;PARITY ERROR
3598   017502   000137   000502                        JMP     @#START
3599                                           ;ROUTINE TO OUTPUT TITLE
3600
3601   017506   011601                         TYPE:   MOV     (%6),   %1
3602   017510   011101                                 MOV     (%1),   %1
3603   017512   062716   000002                        ADD     #2      (%6)
3604   017516   112167   000022             LOOP:   MOVB    (%1)+,  CHAR
3605   017522   001001                                 BNE     1$
3606   017524   000207                                 RTS     %7
3607   017526   105777   160532             1$:     TSTB    @TTCSR
3608   017532   100375                                 BPL     1$
3609   017534   116777   000004   160524              MOVB    CHAR,   @TTDBR
3610   017542   000765                                 BR      LOOP
3611   017544   000000                         CHAR:   0
```

F06

SEQ 0070

```
  3612  017546  006412  055103  045521  MSG:    .ASCIZ<12><15>/CZQKB-H T17-4K SYSTEM EXERCISER/<12><15>
  3613  017554  026502  020110  030524
  3614  017562  026467  045464  051440
  3615  017570  051531  042524  020115
  3616  017576  054105  051105  044503
  3617  017604  042523  005122  000015
  3618          000001                  .END
```

CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0071

```
A       016710  1626  1631  1660  1666  1672  1678  1685  1690  1697  1703  1717  1724  1747
                1755  1779  1793  1800  2105  2145  2205  2211  2218  2226  2242  2254  2260
                2266  2272  2278  2284  2291  2296  2303  2310  2317  2324  2347  2355  2649
                2710  2716  2723  2730  2772  3477#  3478  3480  3482
AC      000352   711#  3160*  3162  3175*  3177  3190*  3192  3205  3218*  3220  3444  3459*
ACT     015534  3264  3267  3271#
ADSUB   014160  3013  3018#
ARIEND  014222  3016  3027#
ARITST  014134  3012#  3015
ASCNT   016372  3350*  3374*  3381*  3385*  3396#
ASH     000370   718#  3176*
B       016700  1786  1941  1946  1951  1957  1964  1969  1970  1976  1990  1998  2005  2011
                2054  2059  2064  2070  2077  2082  2083  2090  2104  2111  2118  2124  2132
                2514  2519  2525  2530  2536  2543  2548  2549  2599  2604  2609  2614  2621
                2626  2627  2634  2648  2744  2745  2750  2751  2756  2757  3471#  3473  3476
BEGANY  015466  3256  3258#
BEGIN   004440   808   900  1102  1621#  3269  3284  3419  3501  3562  3564  3566  3568  3570
                3572
BEG20   015460  3251  3257#
BELL    015406  3245#
BINCT   016370  3347*  3366*  3369*  3370  3373*  3395#
BR      =000002  1107#
BUFF    =017004   587#   761   780   796   817  1656  3345#
C       016722  1709  1732  1800*  1816*  1832*  1847*  1863*  1879*  1897*  1915*  1969*  1970  1989*
                1990*  1991  2082*  2083  2103*  2104*  2105  2233*  2235  2239*  2243  2332  2404*
                2420*  2438*  2454*  2470*  2488*  2506*  2548*  2549  2626*  2627  2647*  2648*  2649
                2737*  2739  2762  2763*  2765  2769*  2773  3485#  3486  3488
CC      =177776   585#  3136#
CHAR    017544  3604*  3609  3611#
CLEAR   015554  3273  3274  3275#
CLINCT  002312   874*  1009  1012*  1019*  1031#
CMP1    014230  3032#  3039
CMP2    014252  3036  3040#
COMPAR  014224  3030#
CURPAT  002306   875*  1001*  1002  1013  1015*  1017*  1029#
D       016742  1808*  1824*  1839*  1855*  1871*  1888*  1906*  2380*  2388*  2396*  2412*  2427*  2445*
                2462*  2479*  2497*  3494#
DATA1   001616   813*   914   917*   919*   923#
DATA2   001644   814*   930*   931   934#
DATA3   001720   815*   942   945*   947*   951#
DATA4   002014   816*   955*   956   967*   971#
DECML   016364  3352*  3365  3371*  3393#
DELAY   002020   818*   838*   961   966   973#
DET1    017010   892  3501#  3504
DET2    017122  3510  3519#
DET3    017440   834   835  3522  3574#
DET4    017054  3508  3510#
DIV     000362   715#  3219*
DO      =000001   869  1110#  1163  1171  1212
EAESRT  014754   754*  3007  3155#
EIGHT   017070  3512#  3521
ENDEAE  015344  3156  3233#
ERRVEC= 000004  3580#  3586*  3587*
ESTART  000606   776   779#
EXPRIN  016072  3335  3337#
F       =000000  1108#
```

CROSS REFERENCE TABLE -- USER SYMBOLS


```
FENDZ   002716          671     868    1119#    1154
FENDI   002740         1121    1124#
FIN     017004          587    3345    3496#    3500    3534
HAC     016614         3443    3452#
HCFHM   016350         3386    3388#
HLT   = 104000          583#    750     778      793     801     911     916     929     939     944     960     982     1008
                       1041    1061    1075     1092    1131    1135    1144    1150    1175    1182    1186    1197    1203
                       1217    1628    1633     1662    1668    1674    1680    1687    1692    1699    1705    1712    1720
                       1727    1734    1741     1750    1758    1766    1774    1781    1788    1795    1802    1811    1819
                       1827    1835    1842     1850    1858    1866    1874    1882    1891    1900    1909    1918    1925
                       1937    1943    1948     1953    1960    1966    1972    1979    1986    1993    2001    2007    2014
                       2021    2028    2035     2042    2049    2056    2061    2066    2073    2079    2085    2093    2100
                       2107    2114    2120     2127    2135    2142    2148    2156    2163    2170    2177    2184    2192
                       2200    2207    2213     2220    2229    2237    2245    2250    2256    2262    2268    2274    2280
                       2286    2293    2298     2305    2312    2320    2327    2334    2341    2350    2358    2366    2374
                       2383    2391    2399     2407    2415    2423    2430    2433    2441    2449    2457    2465    2473
                       2482    2491    2500     2509    2516    2521    2527    2532    2539    2545    2551    2558    2565
                       2572    2579    2586     2594    2601    2606    2611    2617    2623    2629    2637    2644    2651
                       2658    2665    2672     2679    2686    2694    2697    2705    2712    2718    2725    2733    2741
                       2747    2753    2759     2767    2775    2785    2793    2801    2803    2805    2807    2815    2817
                       2820    2826    2828     2831    2838    2840    2843    2850    2852    2855    2862    2864    2867
                       2874    2876    2879     2923    2927    2930    2933    2937    2961    2965    2968    2971    2975
                       2987    2991    2994     2997    3001    3023    3034    3048    3061    3073    3083    3085    3087
                       3111    3113    3116     3118    3128    3142    3145    3153    3164    3167    3170    3179    3182
                       3185    3194    3197     3200    3207    3210    3213    3222    3225    3232    3236    3469    3597
HMQ     016616         3453#
HPCSR   000274          688#    826     830*     958
HPDBR   000276          689#    956*
HPOUT   001722          955#    968
HPOUTR  001740          650     958#
HPOUT1  001730          956#    969
HPOUT2  002004          964     967#
HRCSR   000270          686#    831     839*     937     948*    961*    966*
HRDBR   000272          687#    940     942
HSC     016620         3454#
HSRINR  001646          648     937#
HSRIN1  001704          947#
HSRIN2  001712          941     946     948#
ICOUNT  016462          779*   1623*   2899*    3092*   3095*   3105*   3120*   3134*   3409    3417#
IE    = 000500          869    1109#   1163     1171    1177    1212    1219
INTCNT  002016          962*    963     965*     972#
IRC     002534          667    1073#   1644
IRF     002632          665    1090#   1641
IRK     002344          674    1039#   1647
IRP     002450          678    1059#   1650
LIST    016374         3349    3397#
LKCSR   000300          690#    843*    977*     980     983*    987*    991     993*
LK1     002022          976#    990
LK2     002042          979#    986
LK3     002044          653     980#   1638
LK4     002062          984#    994
LLIMIT  002704         1035    1055    1069     1086    1102#   1653    1654*
LOGICA  015556          615    3276#
LOOP    017516         3604#   3610
LPCSR   000302          691#    879*    885*     1003    1006    1021
LPDBR   000304          692#    876*   1002*    1020*
```

CROSS REFERENCE TABLE -- USER SYMBOLS


```
LPINTR  002166            877   1006*
LP1     002142           1001*  1026   1028
LP2     002150           1002*  1016   1018
LP3     002230           1014   1017*
LP4     002240           1011   1019*
LP5     002276           1024   1027*
LP6     002176            874    999   1004   1009*
LP80  = 002202            999*
LSH     000366            717*  3161*
MAINLI  001522            897*   899
MINUS   016172           3356   3359*
MKNUM   016222           3365*  3368
MOADD   016304           3377*  3379
MOD12   017374           3544   3568*
MOD16   017360           3542   3566*
MOD20   017344           3540   3564*
MOD24   017330           3538   3562*
MOD4    017424           3548   3572*
MOD8    017410           3546   3570*
MOVE    017166           3532*  3550   3552   3554   3556   3558   3560
MQ      000350            710*   810   3159*  3165   3174*  3180   3189*  3195   3203*  3208   3217*  3223   3445
                         3458*
MSG     017546            766   3612*
MUL     000360            714*  3204*
N     = 000001           1225*  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*  1417   1418   1419*  1420   1421   1422*  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   1614*  1615   1616   1617*  1618   1619
NOEAE   000472            754*   809
NOP   = 000240            582*  3135*  3563   3565   3567   3569   3571   3573
```

CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0074

```
NOR      000364            716#   3191*
NUMA     014220           3010*   3019    3020    3026#
PARCSR=  172100           3578#   3588
PARVEC=  000114           3579#
PFAIL    016526            606     760    3237    3435#
PRFLAG   015604            784*   3285#   3289    3292*   3333*
PRINT    015606            609    3289#
PRINT1   016042           3296    3330#
PRTAB    016112           3313    3318    3323    3347#
R      = 004000            869    1111#   1163
RB     = 000002            869    1106#   1163    1177    1219
RCBAR    000326            701#   1069*
RCCSR    000330            702#    863*   1071*   1073
RCCSRH   000332            703#
RCDAR    000322            699#    856*   1068*   1077*   1078
RCFUNC   002572            858*   1071    1080*   1082#
RCSTAR   002502           1068#   1076    1081
RCWC     000324            700#   1070*
RCWORD=  176040            593#   1070
RC2      002510           1069#   1079
RD     = 000004           1104#   1212
REF    = 013634           2941#   3011*   3012*   3018    3021    3124*   3126    3130*
REFF     013634           2903*   2904*   2906    2910    2935    2939#   2941    2943*   2944*   2947    2950    2973    2999
                          3014
REG1     001540            774*    785     901#   3098
RENDZ    003104           1146    1157#   1187
RENDI    003134           1160    1163#
RESTAR   016622           3449    3455#
RETURN   016466            781*    808*   1621*   3322    3412    3415*   3419#
RFCAR    000314            696#   1086*
RFCSR    000316            697#    861*   1088*   1090
RFCSRH   000320            698#   1084*
RFDAE    000306            693#   1095
RFDAR    000310            694#   1085*   1094*   1097
RFFUNC   002702            857*   1088    1099*   1101#
RFSTAR   002574           1084#   1093    1100
RFWC     000312            695#   1087*
RFWORD=  176040            594#   1087
RF1      002606           1086#   1096    1098
RKBAR    000342            707#   1035*
RKCSR    000344            708#    862*    890*   1037*   1039
RKCSRH   000346            709#
RKDAE    000336            705#   1034*   1043
RKDAH    000334            704#   1045
RKFUNC   002406            859*   1037    1047*   1050#
RKSTAR   002314           1034#   1042    1048
RKWC     000340            706#   1036*
RKWORD=  176000            591#   1036
RK1      002320           1035#   1044    1046
ROTALL   013514           2905    2910#
ROTBE    013674           2945    2950#
ROTBO    014004           2946    2977#
ROTEN1   014106           2949    3003#
RPBAR    000424            735#   1055*
RPCA     000410            729#   1063
RPCSR    000426            736#    847     849*    850     864*   1052*   1053    1057*   1059
```

```
RPCSRH   000430   737#
RPDAE    000414   731#
RPDAH    000412   730#
RPDAR    000420   733#
RPDSR    000416   732#   852    854*
RPFUNC   000432   738#   860*   1057   1065*
RPSTAR   002410  1052#  1062    1066
RPWC     000422   734#  1056*
RPWORD=  176000   592#  1056
RP1      002424  1055#  1064
RTIA     001542   811    855     884    902#
SAVCC    016110  3298*  3317   3344#
SAVPC    016106  3297*  3312   3343#
SAVR2    016074  3309*  3324   3338#
SAVR3    016076  3310*  3325   3339#
SAVR4    016100  3311*  3326   3340#
SAVR6    016612   775    777*  3448*  3451#  3455   3468*
SBELL    015422  3243   3248#
SC       000354   712#  3198   3446   3457*
SCOPE =  104400   584#   788    794    803    806   1622   1629   1634   1663   1669   1675   1681   1688
                 1693   1700   1706   1713   1721   1728   1735   1742   1751   1759   1767   1775   1782
                 1789   1796   1803   1812   1820   1828   1836   1843   1851   1859   1867   1875   1883
                 1892   1901   1910   1919   1927   1938   1944   1949   1954   1961   1967   1973   1980
                 1987   1994   2002   2008   2015   2022   2029   2036   2043   2050   2057   2062   2067
                 2074   2080   2086   2094   2101   2108   2115   2121   2128   2136   2143   2149   2157
                 2164   2171   2178   2185   2193   2201   2208   2214   2221   2230   2238   2246   2251
                 2257   2263   2269   2275   2281   2287   2294   2299   2306   2313   2321   2328   2335
                 2342   2351   2359   2367   2375   2384   2392   2400   2408   2416   2424   2434   2442
                 2450   2458   2466   2474   2483   2492   2501   2510   2517   2522   2528   2533   2540
                 2546   2552   2559   2566   2573   2580   2587   2595   2602   2607   2612   2618   2624
                 2630   2638   2645   2652   2659   2666   2673   2680   2687   2698   2706   2713   2719
                 2726   2734   2742   2748   2754   2760   2768   2776   2787   2795   2808   2810   2821
                 2832   2844   2856   2868   2880   2902   2934   2972   2998   3003   3017   3024   3027
                 3040   3052   3065   3077   3091   3093   3104   3119   3133   3146   3154   3158   3173
                 3188   3202   3216   3226   3233
SCOPEB   016442   3406   3412#
SCOPEC   016406    612   3405#
SCOPEF   016464    782*  3409   3411*  3414*  3418#
SCOPEG   016450   3408   3410   3414#
SEVEN    016362  3351*  3360   3371   3377*  3392#
SKPBEL   015372  3240#  3502*  3563*  3565*  3567*  3569*  3571*  3573*
SOFTSR   000176   661#   770
SOLPAT   002310   873*  1001   1023   1025*  1027*  1030#
SRE      000356   713#  3168   3183   3211
SRPTR    000174   660#   767    770*   774    898   3263   3294   3330   3334   3405   3407   3507
STAR     016200  3358   3360#  3380
START    000502   663    725    760#  3280   3336   3598
START2   000660   781    789#
STATUS=  177776   681#   783*   819*   895*   978*   988*  3300*
STRT12   017232  3526   3545#
STRT16   017224  3528   3543#
STRT20   017216  3530   3541#
STRT24   017210  3531   3539#
STRT28   017202  3518   3537#
STRTB    017240  3524   3547#
ST1      001054   821    823#
```

```
ST2     001066            824     826#
ST3     001106            827     829     831#
ST3A    001122            833     836#
ST4     001140            832     837     840#
ST5     001156            841     844#
ST5A    001226            846     855#
ST6     001312            845     865#
ST7     001340            866     870#
ST8     001422            871     872     880#
ST8A    001472            883     889     891#
SUBR1   016470           3422#
SUBR2   016472           3423#   3425
SUBR3   016476           3425#   3427
SUBR4   016504           3427#   3429
SUBR5   016512           3429#   3431
SUBR6   016520           2799    3431#
SWABA   014626           3125#   3132
SXTEEN  017100           3514#   3525
TC      = 177340          721#    722     723     724     726     727
TCBA    000404            727#   1170*   1211*
TCBLK   002712           1115#
TCCM    000372            722#    869*   1122*   1125*   1127*   1129    1138*   1142    1152*   1161*   1163*   1171*   1173
                         1177*   1180    1188*   1191*   1195    1205*   1212*   1215    1219*
TCDT    000376            724#   1132    1145    1148    1183    1198    1201
TCEXPE  002714            867*   1116#   1126*   1132    1147*   1148    1158*   1183    1200*   1201
TCFIRS  002706            867    1113#   1126    1198
TCF1    002770           1124    1129#
TCF1A   002762           1127#   1133
TCF2    003016           1134    1137#
TCF3    003032           1137    1142#   1176
TCF4    003074           1152#   1178
TCIV    000406            728#    868*   1119*   1124*   1137*   1157*   1164*   1168*   1176*   1190*   1209*   1218*
TCLAST  002710           1114#   1145    1158
TCOM    014264           3044#   3051
TCOM2   014332           3057#   3064
TCOM3   014400           3069#   3076
TCRBK   003354           1204    1209#
TCRBUF  003440            744     748    1211    1224#
TCRBI   003412           1209    1215#
TCRI    003232           1164    1180#
TCRIA   003262           1185    1188#
TCR2    003270           1184    1190#
TCR3    003304           1190    1195#   1218
TCR4    003346           1205#   1220
TCSR    016104            586    3246    3301    3304    3307    3315    3320    3328    3342#   3353    3382    3388
TCST    000374            723#   1120    1159
TCWBK   003152           1151    1168#
TCWBUF  003440           1170    1223#
TCWBI   003204           1168    1173#
TCWC    000402            726#   1169*   1210*
TC1     000434            741#   1213
TC2     000446            745#    747
TDBR    016102           3245*   3303*   3306*   3314*   3319*   3327*   3341#   3357*   3359*   3384*
TDSR    = 016104           586#
TEMP    016732           1717*   1718    1724*   1725    1731*   1738*   1739    1745*   1747*   1748    1753*   1755*   1756
                         1761*   1763*   1764    1770*   1771*   1772    1777*   1779*   1784*   1786*   1791*   1793*   1798*
```

```
                    1806*   1809    1814*   1817    1822*   1825    1830*   1833    1837*   1840    1845*   1848    1853*
                    1856    1861*   1864    1869*   1872    1877*   1880    1885*   1889    1894*   1898    1903*   1907
                    1912*   1916    1963*   1964    1982*   1983*   1984    2004*   2005*   2010*   2011*   2012    2017*
                    2018*   2019    2024*   2025*   2026    2031*   2032*   2033    2038*   2039*   2040    2045*   2046*
                    2047    2076*   2077    2096*   2097*   2098    2117*   2118*   2123*   2124*   2125    2138*   2139*
                    2140    2144*   2145*   2146    2152*   2153*   2154    2159*   2160*   2161    2166*   2167*   2168
                    2173*   2174*   2175    2180*   2161*   2182    2187*   2189*   2190    2195*   2197*   2198    2225*
                    2226*   2227    2234*   2242*   2317*   2318    2324*   2325    2331*   2338*   2339    2345*   2347*
                    2348    2353*   2355*   2356    2361*   2363*   2364    2370*   2371*   2372    2378*   2381    2386*
                    2389    2394*   2397    2402*   2405    2410*   2413    2418*   2421    2425*   2428    2431    2436*
                    2439    2444*   2447    2452*   2455    2460*   2463    2468*   2471    2476*   2480    2485*   2489
                    2494*   2498    2503*   2507    2542*   2543    2554*   2555*   2556    2561*   2562*   2563    2568*
                    2569*   2570    2575*   2576*   2577    2582*   2583*   2584    2589*   2590*   2591*   2592    2620*
                    2621    2640*   2641*   2642    2654*   2655*   2656    2661*   2662*   2663    2668*   2669*   2670
                    2675*   2676*   2677    2682*   2683*   2684    2689*   2691*   2692    2695    2700*   2702*   2703
                    2729*   2730*   2731    2738*   2772*   2812*   2813*   2818    2823*   2824*   2829    2835*   2836*
                    2841    2847*   2848*   2853    2859*   2860*   2865    2871*   2872*   2877    3042*   3043*   3044*
                    3045*   3046    3049*   3050*   3055*   3056*   3057*   3058*   3059    3062*   3063*   3067*   3068*
                    3069*   3070*   3071    3074*   3075*   3080*   3081    3088*   3089    3138*   3140*   3143    3149
                    3150*   3227*   3229*   3230    3489*   3490    3492    3493
TEST    013636      2910*   2911*   2912*   2913*   2914*   2915*   2916*   2917*   2918*   2935    2940*   2950*   2951*
                    2952*   2953*   2954*   2955*   2956*   2973    2977*   2978*   2979*   2980*   2981*   2982*   2999
                    3018*   3019*   3020*   3021    3108*   3109*   3114*   3123*   3125*   3126    3129*   3131*
TIME    002140       842*    976*    984*    985     989     995*
TJSR1   013066     2782*   2783
TJSR2   013070     2781    2783*
TJSR3   013102     2782    2787*   2791
TOODLE  016360     3361*   3362*   3363    3391*
TRCSR   000260      682*    789*    791     825*    886*    909     920*
TRDR    000262      683*    912     914
TRPA    015600     3241    3284*   3501*   3562*   3564*   3566*   3568*   3570*   3572*
TRPB    015572      880*   3266*   3281*
TSCOMB  014442     3081*   3090
TSROT   013472     2904*   2907
TSROT2  013646     2944*   2948
TSRT2A  013640     2908    2943*
TSTARI  014122     3010*
TTCSR   000264      684*    798*    799     802*    804*    805*    822*    887*    927     3242    3607
TTDBR   000266      685*    931*   3609*
TTYINR  001544       644     909*
TTYIN1  001602       919*
TTYIN2  001610       913     918     920*
TTYIN3  001574       915     917*
TTYIN4  001600       918*
TWELVE  017074     3513*   3523
TWENTY  017104     3515*   3527
TWOEIC  017114     3517*
TWOFOR  017110     3516*   3529
TYOUTR  001620       646     927*
TYOUT1  001634       931*
TYPE    017506       765    3601*
USER    017006       891    3497*
WAIT1   016150     3353*   3354
WAIT2   016326     3382*   3383    3387
WAIT3   014512     3093*
WAIT4   014542     3099    3104*
```

```
WAITS   014514  3094#
WD    = 000014  1105#  1171
WGTCT   016366  3348*  3365*  3367  3372*  3394#
WRTOC   016242  3364   3369#
XFENDZ  003102  1154#  1199
XFER12  017306  3545   3557#
XFER16  017276  3543   3555#
XFER20  017266  3541   3553#
XFER24  017256  3539   3551#
XFER28  017246  3537   3549#
XFER8   017316  3547   3559#
XLIST   016320  3375   3381#
XX    = 000000   595#   923   934   951   971
YESRT   015574  3255*  3257*  3265  3282#
YESTR   015474  3262#
YESTR1  015526  3269#  3272
YESTR2  015532  3270#
.     = 017612   596#   601   602#  603   605#  608#  611#  614#  616#  643#  652#  655#  659#
                 662#   664#  670#  673#  677#  749   792   800   848   851   853   896   910
                 928    938   943   959   981   992   1007  1022  1040  1054  1060  1074  1091
                1130   1143  1149  1174  1181  1196  1202  1216  1627  1632  1661  1667  1673
                1679   1686  1691  1698  1704  1711  1719  1726  1733  1740  1749  1757  1765
                1773   1780  1787  1794  1801  1810  1818  1826  1834  1841  1849  1857  1865
                1873   1881  1890  1899  1908  1917  1936  1942  1947  1952  1959  1965  1971
                1978   1985  1992  2000  2006  2013  2020  2027  2034  2041  2048  2055  2060
                2065   2072  2078  2084  2092  2099  2106  2113  2119  2126  2134  2141  2147
                2155   2162  2169  2176  2183  2191  2199  2206  2212  2219  2228  2236  2244
                2249   2255  2261  2267  2273  2279  2285  2292  2297  2304  2311  2319  2326
                2333   2340  2349  2357  2365  2373  2382  2390  2398  2406  2414  2422  2429
                2432   2440  2448  2456  2464  2472  2481  2490  2499  2508  2515  2520  2526
                2531   2538  2544  2550  2557  2564  2571  2578  2585  2593  2600  2605  2610
                2616   2622  2628  2636  2643  2650  2657  2664  2671  2678  2685  2693  2696
                2704   2711  2717  2724  2732  2740  2746  2752  2758  2766  2774  2784  2792
                2800   2802  2804  2806  2814  2816  2819  2825  2827  2830  2837  2839  2842
                2849   2851  2854  2861  2863  2866  2873  2875  2878  2920  2921  2922  2924
                2925   2926  2928  2929  2931  2932  2936  2958  2959  2960  2962  2963  2964
                2966   2967  2969  2970  2974  2984  2985  2986  2988  2989  2990  2992  2993
                2995   2996  3000  3006  3022  3033  3047  3060  3072  3082  3084  3086  3110
                3112   3115  3117  3127  3141  3144  3152  3155  3163  3166  3169  3178  3181
                3184   3193  3196  3199  3206  3209  3212  3221  3224  3231  3235  3240  3247
                3290   3295  3302  3305  3308  3316  3321  3329  3331  3389  3476#  3480#  3488#
                3492#  3495#  3500#  3505  3535
.MAMF   017442  3503   3586#
.PARSR  017500   656   3597#
```

```
.MAIN.  MACY11 30A(1052)  20-JAN-78  11:05  PAGE 81
CZQKBH.P11    20-JAN-78 11:05          CROSS REFERENCE TABLE -- MACRO NAMES                    SEQ 0079

TNCV     2882#   2919    2957    2983


. ABS.  017612     000

 ERRORS DETECTED:  0

 CZQKBH.BIN,CZQKBH.LST/CRF/SOL/NL:TOC=CZQKBH.P11
 RUN-TIME:  3  7  1 SECONDS
 RUN-TIME RATIO: 91/12=7.3
 CORE USED:  11K  (21 PAGES)
```