PDP 11

T17-4K SYSTEM EXERCISER

CZQKBHO

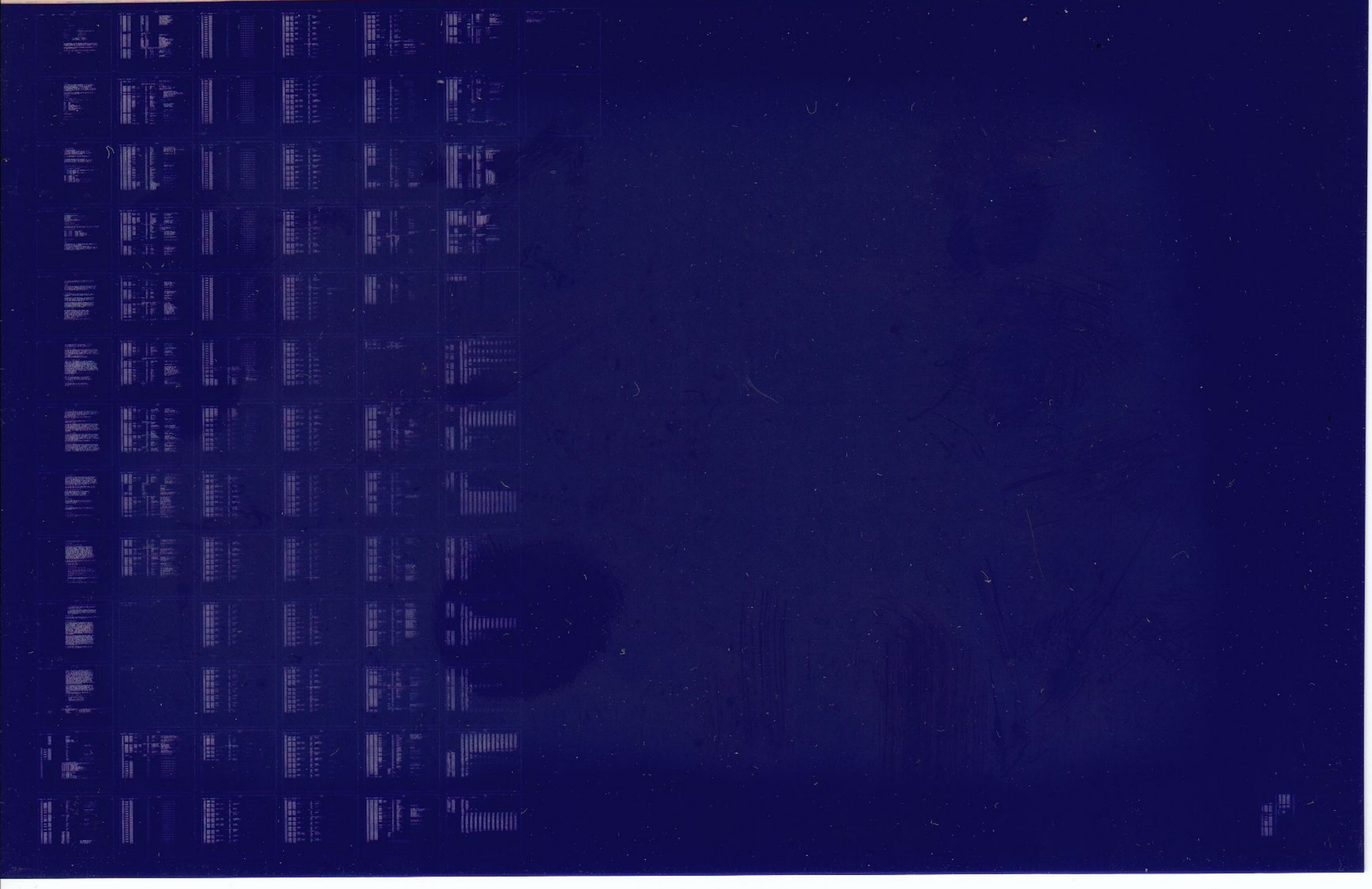
AH-9032H-MC

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: CZQKBHO T17-4K SYSTEM EXERCISER
THIS VERSION TEST DECTAPE UNIT 1 [illegible]

DATE: 01-FEBRUARY-1978

MAINTAINER: DIAGNOSTIC GROUP

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1. ABSTRACT

THIS PROGRAM IS A MEMORY EXPANDABLE INTERACTIVE BUS EXER-
CISER 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 NECESSAR
TO CORRECT THE MALFUNCTION WITH THE RESPECTIVE DIAGNOSTIC
FOR THAT DEVICE.

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

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE

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

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES
4K OF MEMORY

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

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 LOCKS 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 TTYOUT (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 PRE 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 LPI (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 LPBC FROM [illegible]

5.2.12 HSRIN1 PC11 INPUT

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

5.2.13 HPOUT (PC11 OUTPUT)

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

5.2.14 RKSTART (RK-11 DISK)

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

5.2.15 RCSTART (RC-11 DISK)

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

5.2.16 RPSTART (RP-11 DISK)

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

5.2.7 CORE EXPANSION DET.

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 DE.I E.I'E PRI TER 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 JSEP 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
```

```
 698  000320  177461          RFCSRH: 177461          ;HIGH BYTE ADDRESS OR CSR
 699  000322  177442          RCDAR:  177442          ;DISK ADDRESS REGISTER
 700  000324  177450          RCWC:   177450          ;WORD COUNT REGISTER
 701  000326  177452          RCBAR:  177452          ;CURRENT ADDRESS REGISTER
 702  000330  177446          RCCSR:  177446          ;STATUS REGISTER
 703  000332  177447          RCCSRH: 177447          ;HIGH BYTE ADDRESS OR CSR
 704  000334  177413          RKDAH:  177413          ;HIGH BYTE OF DISK ADDRESS
 705  000336  177412          RKDAE:  177412          ;DISK ADDRESS REGISTER
 706  000340  177406          RKWC:   177406          ;WORD COUNT REGISTER
 707  000342  177410          RKBAR:  177410          ;CURRENT ADDRESS REGISTER
 708  000344  177404          RKCSR:  177404          ;STATUS REGISTER
 709  000346  177405          RKCSRH: 177405          ;HIGH BYTE ADDRESS OR CSR
 710  000350  177304          MQ:     177304          ;EAE LOCATIONS
 711  000352  177302          AC:     177302
 712  000354  177310          SC:     177310
 713  000356  177311          SRE:    177311
 714  000360  177306          MUL:    177306
 715  000362  177300          DIV:    177300
 716  000364  177312          NOR:    177312
 717  000366  177314          LSH:    177314
 718  000370  177316          ASH:    177316
 719
 720                          ;DECTAPE ADDRESSES
 721          177340          TC=177340
 722  000372  177342          TCCM:   TC+2            ;CONTROL AND FUNCTION
 723  000374  177340          TCST:   TC              ;GENERAL STATUS
 724  000376  177350          TCDT:   TC+10
 725  000400  000440                  BR      START   ;DATA
 726  000402  177344          TCWC:   TC+4            ;WORD COUNT
 727  000404  177346          TCBA:   TC+6            ;BUS ADDRESS
 728  000406  000214          TCIV:   214             ;DECTAPE INTERRUPT VECTOR
 729  000410  176722          RPCA:   176722          ;CYLINDER ADDRESS RP11 DISK
 730  000412  176725          RPDAH:  176725          ;HIGH BYTE OF DISK ADDRESS
 731  000414  176724          RPDAE:  176724          ;DISK ADDRESS
 732  000416  176710          RPDSR:  176710          ;DRIVE STATUS REGISTER
 733  000420  176724          RPDAR:  176724          ;DISK ADDRESS REGISTER
 734  000422  176716          RPWC:   176716          ;WORD COUNT REGISTER
 735  000424  176720          RPBAR:  176720          ;CURRENT ADDRESS REGISTER
 736  000426  176714          RPCSR:  176714          ;STATUS REGISTER
 737  000430  176715          RPCSRH: 176715          ;HIGH BYTE ADDRESS OR CSR
 738  000432  000000          RPFUNCTION:     0       ;DISK COMMAND
 739                          ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
 740                          ;BY DOING A CHECK SUM ON THE DATA
 741  000434  010146          TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
 742  000436  010346                  MOV     %3,-(6)
 743  000440  005003                  CLR     %3              ;SUM OF DATA
 744  000442  012701  003440          MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
 745  000446  062103          TC2:    ADD     (1)+,%3         ;EVEN ADD
 746  000450  062103                  ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
 747  000452  001775                  BEQ     TC2
 748  000454  020127  004440          CMP     %1,#TCRBUF+1000         ;AT END OF BUFFER?
 749  000460  101001                  BHI     .+4             ;YES BRANCH
 750  000462  104000                  HLT                     ;DATA ERROR
 751  000464  012603                  MOV     (6)+,%3         ;RESTORE THE REGISTERS
 752  000466  012601                  MOV     (6)+,%1
 753  000470  000207                  RTS     %7              ;EXIT
```

```
000472  012767  000240  014254  NOEAE:  MOV     #240,EAESRT     ;BRANCH AROUND EAE ROUTINE
000500  000002                          RTI                     ;JUMP OVER EAE SECTION


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

000502  012767  016526  177314  START:  MOV     #PFAIL,24       ;SET POWER FAIL VECTOR
000510  012706  017004                  MOV     #BUFF,%6        ;SET UP STACK
000514  012767  000546  177262          MOV     #1$,4                   ;SET UP TIME OUT VECTOR
000522  023737  000042  000046          CMP     @#42,   @#46    ;UNDER ACT11 AUTO MODE?
000530  001403                          BEQ     3$              ;YES-SKIP TITLE PRINT-OUT
000532  004767  016750                  JSR     %7,     TYPE    ;PRINT TITLE
000536  017546                          MSG
000540  005777  177430          3$:     TST     @SRPTR                  ;TRY TO REFERENCE THE
                                                                ;HARDWARE SWITCH REGISTER
000544  000404                          BR      2$                      ;BRANCH IF NO TIME OUT TRAP OCCURRS
000546  012767  000176  177420  1$:     MOV     #SOFTSR,SRPTR           ;CHANGE THE SWITCH REGISTER POINTER
                                                                ;TO POINT TO A SOFTWARE  SWITCH REGISTER
000554  022626                          CMP     (6)+,(6)+               ;RESTORE THE STACK
000556  012767  000006  177220  2$:     MOV     #6,4                    ;RESTORE TIME OUT VECTOR
000564  017767  177404  000746          MOV     @SRPTR,REG1             ;MOV SR TO REGISTER
000572  005737  016612                  TST     @#SAVR6         ;SET ON POWER FAIL
000576  001403                          BEQ     ESTART
000600  005037  016612                  CLR     @#SAVR6
000604  104000                          HLT                     ;A POWER FAIL OCCURRED
000606  005067  015650          ESTART: CLR     ICOUNT
000612  012706  017004                  MOV     #BUFF,%6        ;SET UP STACK
000616  012767  000660  015642          MOV     #START2,RETURN
000624  005067  015634                  CLR     SCOPEF
000630  012767  000340  177140          MOV     #340,STATUS             ;LOCK OUT INTERRUPTS
000636  005067  014742                  CLR     PRFLAG                  ;PRINT ROUTINE BUSY
000642  016702  000672                  MOV     REG1,RSR                ;SAVE SWITCHES
000646  012700  000100                  MOV     #100,R100               ;INTERRUPT ENABLE
000652  012701  000101                  MOV     #101,R101               ;INTERRUPT ENABLE AND GO
000656  104400                          SCOPE
000660  050077  177374          START2: BIS     R100,@TRCSR
000664  000005                          RESET
000666  030077  177366                  BIT     R100,@TRCSR             ;INTERRUPT ENABLE
000672  001401                          BEQ     .+4
000674  104000                          HLT                     ;RESET DID NOT CLEAR INTERRUPT ENABLE
000676  104400                          SCOPE
                                ;DOES "RESET" ON THE BUS LAST TOO LONG
000700  012706  017004                  MOV     #BUFF,%6                ;SET UP STACK
000704  000005                          RESET
000706  050077  177352                  BIS     R100,@TTCSR             ;SET A BIT
000712  030077  177346                  BIT     R100,@TTCSR             ;IS IT SET
000716  001001                          BNE     .+4
000720  104000                          HLT                     ;RESET IS ON BUS TOO LONG
000722  005077  177336                  CLR     @TTCSR
000726  104400                          SCOPE
000730  050077  177330                  BIS     R100,@TTCSR
000734  005077  177324                  CLR     @TTCSR                  ;IF BUS HANG, CHECK NO BACK TIMEOUT
000740  104400                          SCOPE
000742  000005                          RESET
000744  012767  004440  015514          MOV     #BEGIN,RETURN
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            ;RESERVED FOR OVERLAYS
834  001116  017440                          DET3                    ;1020 GTP OVER LAY
835  001120  017440                          DET3                    ;1022 GTP OVER LAY
836  001122  030227  000010          ST3A:   BIT     RSR,#10
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  000756                  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     #STSA,4
847  001172  105777  177230          ST5A:   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  STSA:   MOV     #RTIA,4
856  001234  012777  000037  177060          MOV     #37,@RCDAR
857  001242  012767  043503  001432          MOV     #43503,RFFUNCTION       ;WRITE CHECK/WRITE PF
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,TCB+PE         ;FIRST BLOCK SHOULD BE TCB
868  001324  012777  002716  177054          MOV     #FENDZ,@TCIV            ;GO TO END ZONE ON INTERRUPT
869  001332  012777  004503  177032          MOV     #R+IE+RB+DO,@TCSM       ;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  015570          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,DETI                         ;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   005777  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
```

```
                                DATA1:  ..                              ;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        LKT1:   CLR     @#TIME                  ;CLEAR LINE CLOCK TIMER
002026  052777  000100  176244        BIS     #100,@LKCSR
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 978  002034  052737  000100  177776          BIS     #100,@#STATUS
 979  002042  000002                  LK2:    RTI
 980  002044  105777  176230          LK3:    TSTB    @LKCSR          ;RETURN TO MAINLINE
 981  002050  100401                          BMI     .+4             ;TEST FOR DONE
 982  002052  104000                          HLT                     ;FALSE INTERRUPT
 983  002054  042777  000200  176216          BIC     #200,@LKCSR
 984  002062  005237  002140          LK4:    INC     @#TIME          ;ON INTERUPTS ENTER HERE
 985  002066  023737  006344  002140          CMP     #3300.,@#TIME   ;A LAPS OF 55 SECONDS
 986  002074  103362                          BHIS    LK2             ;BRANCH IF TIME LESS THAN 55 SECONDS
 987  002076  042777  000100  176174          BIC     #100,@LKCSR
 988  002104  042737  000100  177776          BIC     #100,@#STATUS   ;LOWER PRIORITY
 989  002112  022737  007020  002140          CMP     #3600.,@#TIME   ;ONE MINUTE UP
 990  002120  001740                          BEQ     LK1             ;YES-RESET TIMER
 991  002122  105777  176152                  TSTB    @LKCSR          ;NO-SKIP ON FLAG TILL IT IS.
 992  002126  100375                          BPL     .-4
 993  002130  042777  000200  176142          BIC     #200,@LKCSR     ;CLEARS THE FLAG
 994  002136  000751                          BR      LK4             ;FOUND FLAG GO INCREMENT COUNTER
 995  002140  000000                  TIME:   0
 996
 997                                          ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER
 998                                          ;INTERRUPT VECTOR IS 200
 999          002202                          LP80=LP6+4
1000
1001  002142  016767  000142  000136  LP1:    MOV     SOLPAT,CURPAT   ;START OF LINE TO CURRENT
1002  002150  016777  000132  176126  LP2:    MOV     CURPAT,@LPDBR   ;CURRENT PATTERN TO LINE PRINTER
1003  002156  105777  176120                  TSTB    @LPCSR
1004  002162  100405                          BMI     LP6
1005  002164  000002                          RTI                     ;RETURN TO MAIN LINE
1006  002166  105777  176110          LPINTR: TSTB    @LPCSR          ;TEST FOR FLAG
1007  002172  100401                          BMI     .+4
1008  002174  104000                          HLT                     ;FALSE RETURN FROM MAIN LINE
1009  002176  026727  000110  000117  LP6:    CMP     CLINCT,#79.     ;TEST FOR END OF LINE
1010                                                                  ;CHANGE THIS VALUE FOR 132 COLUMN PRINTER
1011  002204  001415                          BEQ     LP4             ;GO GENERATE CR/LF
1012  002206  005267  000100                  INC     CLINCT          ;INCREMENT LINE POSITION COUNT
1013  002212  026727  000070  000137          CMP     CURPAT,#137     ;TEST FOR MAXIMUM PATTERN
1014  002220  001403                          BEQ     LP3             ;YES - GO TO LP3 AND RESET
1015  002222  005267  000060                  INC     CURPAT          ;NO - INCREMENT TO NEXT PATTERN
1016  002226  000750                          BR      LP2             ;GO SEND IT TO LINE PRINTER
1017  002230  012767  000040  000050  LP3:    MOV     #40,CURPAT      ;RESET PATTERN AND SEND TO PRINTER
1018  002236  000744                          BR      LP2             ;SENT TO LINE PRINTER
1019  002240  005067  000046          LP4:    CLR     CLINCT          ;RESET LINE COUNT
1020  002244  012777  000012  176032          MOV     #12,@LPDBR      ;LINE FEED
1021  002252  105777  176024                  TSTB    @LPCSR
1022  002256  100375                          BPL     .-4
1023  002260  026727  000024  000137          CMP     SOLPAT,#137     ;START OF LINE PATTERN
1024  002266  001403                          BEQ     LP5
1025  002270  005267  000014                  INC     SOLPAT          ;INCREMENT START OF LINE
1026  002274  000722                          BR      LP1
1027  002276  012767  000040  000004  LP5:    MOV     #40,SOLPAT      ;RESET START OF LINE
1028  002304  000716                          BR      LP1             ;PRINT
1029  002306  000000          CURPAT: 0               ;CURRENT CHARACTER BEING PRINTED
1030  002310  000000          SOLPAT: 0               ;START OF LINE CHARACTER
1031  002312  000000          CLINCT: 0               ;POSITION OF LINE
1032
1033                                          ;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
 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
```

```
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
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 0.
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
```

J02


```
003052  001414                          BEQ     RENDZ               ;YES DRIVE UNIT IN END ZONE T  START  EP
003054  005267  177634                  INC     TCEXPE              ;NO-INCREMENT EXPECTED COUNT
003060  027767  175312  177626          CMP     @TCDT,TCEXPE        ;IS CURRENT BLOCK CORRECT
003066  001401                          BEQ     .+4
003070  104000                          HLT                         ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
003072  000427                          BR      TCWBK               ;THIS ROUTINE WRITES A BLOCK
003074  105277  175272          TCF4:   INCB    @TCCM               ;SET DO
003100  000002                          RTI
003102  000705                  XFENDZ: BR      FENDZ               ;INDIRECT LINK

                                ;MOVE TAPE TO REVERSE END ZONE
003104  012777  003104  175274  RENDZ:  MOV     #RENDZ,@TCIV        ;END ZONE VECTOR SETUP
003112  016767  177572  177574          MOV     TCLAST,TCEXPE       ;SET UP FOR REVERSE SEARCH
003120  005777  175250                  TST     @TCST               ;IN END ZONE
003124  100403                          BMI     REND1               ;YES - START TO TURN UNIT AROUND
003126  105277  175240                  INCB    @TCCM               ;SET DO
003132  000002                          RTI                         ;NO - WAIT TILL WE ARE
003134  012777  004503  175230  REND1:  MOV     #R+IE+RB+DO,@TCCM   ;FUNCTION = READ BLOCK, REVERSE AND GO
003142  012777  003232  175236          MOV     #TCR1,@TCIV         ;SET UP NEW INTERRUPT VECTOR
003150  000002                          RTI
                                ;WRITE FORWARD ALL BLOCKS EXCEPT 0

003152  012777  003204  175226  TCWBK:  MOV     #TCWB1,@TCIV        ;INTERRUPT VECTOR FOR WRITE
003160  012777  177400  175214          MOV     #-400,@TCWC         ;ONE BLOCK
003166  012777  003440  175210          MOV     #TCWBUF,@TCBA       ;THE WRITE BUFFER ADDRESS
003174  112777  000515  175170          MOVB    #IE+WD+DO,@TCCM     ;WRITE THE BLOCK
003202  000002                          RTI                         ;RETURN WHEN BLOCK IS WRITTEN
003204  005777  175162          TCWB1:  TST     @TCCM               ;ANY ERRORS
003210  100001                          BPL     .+4
003212  104000                          HLT
003214  012777  003032  175164          MOV     #TCF3,@TCIV         ;SEARCH BLOCK VECTOR
003222  112777  000502  175142          MOVB    #IE+RB,@TCCM        ;READ BLOCK
003230  000721                          BR      TCF4                ;FIND THE NEXT BLOCK

003232  032777  100200  175132  TCR1:   BIT     #100200,@TCCM       ;TEST FOR ERROR AND READY
003240  003001                          BGT     .+4
003242  104000                          HLT                         ;DECTAPE ERROR ON READ BLOCK REVERSE
003244  027767  175126  177442          CMP     @TCDT,TCEXPE        ;IS IT OUR FIRST BLOCK
003252  001406                          BEQ     TCR2                ;YES - GO TEST THE REST
003254  002002                          BGE     TCR1A               ;NO - HAVE WE PASSED THE BLOCK
003256  104000                          HLT                         ;WE PASS OUR BLOCK
003260  000711                          BR      RENDZ               ;GO TO END ZONE AND TRY AGAIN
003262  105277  175104          TCR1A:  INCB    @TCCM               ;SET DO
003266  000002                          RTI                         ;WE FOUND OUR FIRST BLOCK
003270  012777  003304  175110  TCR2:   MOV     #TCR3,@TCIV         ;SET UP INTERRUPT TO TEST ALL BLOCKS
003276  105277  175070                  INCB    @TCCM               ;SET DO
003302  000002                          RTI                         ;WAIT FOR NEXT BLOCK TO INTERRUPT

                                ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
```

```
  1135  003304  032777  100200  175060  TCR3:   BIT     #100200,@TCCM   ;TEST FOR READ AND ERROR
  1136  003312  003001                          BGT     .+4
```

L02


```
??RT  003314  104000        HLT        ;ERR R READING SEQUENTIAL ?? ? IN REVERSE
```

```
1198  003316  026777  177364  175052          CMP     TCFIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1199  003324  001666                          BEQ     XFEND2          ;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
1223  003440                                  ;THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1224  003440                          TCWBUF:
1225                  000001          TCRBUF: 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
```

```
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 BUFFFR
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
```

```
                000101                   N=N+1
                000100                   .REPT      100
                                         N=N-1
                                         -N
                                         N                      ;DEC TAPE READ WRITE BUFFER
                                         .ENDR
                000100                   N=N-1
      004040    177700                   -N
      004042    000100                   N                      ;DEC TAPE READ WRITE BUFFER
                000077                   N=N-1
      004044    177701                   -N
      004046    000077                   N                      ;DEC TAPE READ/WRITE BUFFER
                000076                   N=N-1
      004050    177702                   -N
      004052    000076                   N                      ;DEC TAPE READ/WRITE BUFFER
                000075                   N=N-1
      004054    177703                   -N
      004056    000075                   N                      ;DEC TAPE READ/WRITE BUFFER
                000074                   N=N-1
      004060    177704                   -N
      004062    000074                   N                      ;DEC TAPE READ/WRITE BUFFER
                000073                   N=N-1
      004064    177705                   -N
      004066    000073                   N                      ;DEC TAPE READ/WRITE BUFFER
                000072                   N=N-1
      004070    177706                   -N
      004072    000072                   N                      ;DEC TAPE READ/WRITE BUFFER
                000071                   N=N-1
      004074    177707                   -N
      004076    000071                   N                      ;DEC TAPE READ/WRITE BUFFER
                000070                   N=N-1
      004100    177710                   -N
      004102    000070                   N                      ;DEC TAPE READ/WRITE BUFFER
                000067                   N=N-1
      004104    177711                   -N
      004106    000067                   N                      ;DEC TAPE READ/WRITE BUFFER
                000066                   N=N-1
      004110    177712                   -N
      004112    000066                   N                      ;DEC TAPE READ/WRITE BUFFER
                000065                   N=N-1
      004114    177713                   -N
      004116    000065                   N                      ;DEC TAPE READ/WRITE BUFFER
                000064                   N=N-1
      004120    177714                   -N
      004122    000064                   N                      ;DEC TAPE READ/WRITE BUFFER
                000063                   N=N-1
      004124    177715                   -N
      004126    000063                   N                      ;DEC TAPE READ/WRITE BUFFER
                000062                   N=N-1
      004130    177716                   -N
      004132    000062                   N                      ;DEC TAPE READ/WRITE BUFFER
                000061                   N=N-1
      004134    177717                   -N
      004136    000061                   N                      ;DEC TAPE READ/WRITE BUFFER
                000060                   N=N-1
      004140    177720                   -N
```

SEQ 0030

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

;DEC TAPE READ WRITE BUFFER

;DEC TAPE READ WRITE BUFFER

;DEC TAPE READ WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFF_R

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BJFFER

;DEC TAPE READ/WRITE BUFFER

;DEC TAPE READ/WRITE BUFFER

```
.534   004254   177743
.535   004256   000035
.536            000034
.537   004260   177744
.538   004262   000034
.539            000033
.540   004264   177745
.541   004266   000033
.542            000032
1543   004270   177746
.544   004272   000032
.545            000031
1546   004274   177747
1547   004276   000031
.548            000030
.549   004300   177750
1550   004302   000030
.551            000027
1552   004304   177751
1553   004306   000027
.554            000026
1555   004310   177752
.556   004312   000026
.557            000025
1558   004314   177753
.559   004316   000025
1560            000024
1561   004320   177754
.562   004322   000024
1563            000023
1564   004324   177755
1565   004326   000023
1566            000022
.567   004330   177756
1568   004332   000022
1569            000021
.570   004334   177757
1571   004336   000021
1572            000020
1573   004340   177760
.574   004342   000020
.575            000017
.576   004344   177761
.577   004346   000017
.578            000016
.579   004350   177762
.580   004352   000016
.581            000015
1582   004354   177763
1583   004356   000015
.584            000014
.585   004360   177764
.586   004362   000014
.587            000013
1588   004364   177765
.589   004366   000013
```

```
.
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
N=N-1
-N
N
```

```
;DEC TAPE READ WRITE BUFFER
;DEC TAPE READ WRITE BUFFER
;DEC TAPE READ WRITE BUFFER
;DEC TAPE READ WRITE BUFFER
;DEC TAPE READ WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ/WRITE BUFFER
;DEC TAPE READ WRITE BUFFER
```

SEQ 0032

```
1590                    000012                          N=N-1
1591    004370          177766                          -N
1592    004372          000012                          N
1593                    000011                          N=N-1
1594    004374          177767                          -N
1595    004376          000011                          N
1596                    000010                          N=N-1
1597    004400          177770                          -N
1598    004402          000010                          N
1599                    000007                          N=N-1
1600    004404          177771                          -N
1601    004406          000007                          N
1602                    000006                          N=N-1
1603    004410          177772                          -N
1604    004412          000006                          N
1605                    000005                          N=N-1
1606    004414          177773                          -N
1607    004416          000005                          N
1608                    000004                          N=N-1
1609    004420          177774                          -N
1610    004422          000004                          N
1611                    000003                          N=N-1
1612    004424          177775                          -N
1613    004426          000003                          N
1614                    000002                          N=N-1
1615    004430          177776                          -N
1616    004432          000002                          N
1617                    000001                          N=N-1
1618    004434          177777                          -N
1619    004436          000001                          N
1620
1621    004440  012767  004440  012020  BEGIN:  MOV     #BEGIN,RETURN           ;DEC TAPE READ WRITE BUFFER
1622    004446  104400                  SCOPE
1623    004450  012737  004000  016462          MOV     #4000,@#ICOUNT          ;FOR SCOPING
1624                                    ;TEST COMPARE INSTRUCTION INDEXED       ;ITERATION COUNT
1625    004456  012700  177770                  MOV     #-10,R0                 ;MINUS 10 TO REG 0
1626    004462  026027  016710  125252          CMP     A(R0),#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 INDE-
1634    004510  104400                          SCOPE
1635                                    ;SET "ISR" FOR DISKS AND KW11L TO CURRENT BANK
1636    004512  010700                          MOV     PC,R0                   ;CURRENT BANK
1637    004514  042700  007777                  BIC     #007777,R0              ;LEAVE ONLY BANK BITS
1638    004520  062700  002044                  ADD     #LK3,R0                 ;ADD IN CLOCK ENTRANCE
1639    004524  010037  000100                  MOV     R0,@#100                ;LINE CLOCK, KW11L
1640    004530  042700  007777                  BIC     #007777,R0
1641    004534  062700  002632                  ADD     #IRF,R0
1642    004540  010037  000204                  MOV     R0,@#204                ;RF11 ISR
1643    004544  042700  007777                  BIC     #007777,R0
1644    004550  062700  002534                  ADD     #IRC,R0
1645    004554  010037  000210                  MOV     R0,@#210                ;R... ISR
```

```
1646  004560  042700  007777          BI      #007777,-
1647  004564  062700  002344          ADD     #IRP,%0
1648  004570  010037  000220          MOV     %0,@#220          ;RP1: :SR
1649  004574  042700  007777          BIC     #7777,%0
1650  004600  062700  002450          ADD     #IRP,%0
1651  004604  010037  000254          MOV     %0,@#254          ;RP1: :SR
1652  004610  042700  007777          BIC     #007777,%0
1653  004614  063700  002704          ADD     @#LLIMIT,%0
1654  004620  010067  176060          MOV     %0,LLIMIT         ;CHANGE DISK VPR 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 RAM
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                                ;REGISTER 0 CONTAINS 000010
1666  004656  022760  052525  016710  CMP     #052525,A(0)
1667  004664  001401                  BEQ     .+4
1668  004666  104000                  HLT                       ;COMPARE FAILED
1669  004670  104400                  SCOPE
1670
1671                                ;REGISTER 0 CONTAINS 000010
1672  004672  026060  016710  016710  CMP     A(0),A(0)
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  016700                  CMP     A,1,R0          ;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 11S0237-7-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 INDE
1716  005040  012700  177770                  MOV     #-10,%0
1717  005044  016067  016710  001660          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                          ;TEST JMP INDIRECT
1922  006234  010700                  MOV     %7,%0
1923  006236  062700  000010          ADD     #10,%0
1924  006242  000110                  JMP     @%0
1925  006244  104000                  HLT                     ;JMP FAILED
```

M03


```
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
1961  006356  104400                        SCOPE                           ;MOV FAILED
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
1967  006400  104400                        SCOPE                           ;MOV FAILED
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
1973  006422  104400                        SCOPE                           ;MOV FAILED
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
1980  006444  104400                        SCOPE                           ;BIC FAILED
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
1987  006474  104400                        SCOPE                           ;BIC FAILED
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
1994  006524  104400                        SCOPE                           ;BIC FAILED
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
2002  006546  104400                        SCOPE                           ;SUB FAILED
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
2008  006570  104400                        SCOPE                           ;SUB FAILED
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                                  ;TEST INDIRECT ADDRESSING WITH INDEXING
2053                                  ;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                                  ;TEST MOVE INSTRUCTIONS
2070  007034  017700  007642                  MOV     @B+2,%0
```

```
2071  007040  022700  125252          CMP     #125252,R0
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     @#8,@#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     @#8,@#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,R0
2090  007122  047700  007554          BIC     @B+2,R0
2091  007126  020027  052525          CMP     R0,#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,R0
2111  007224  167700  007452          SUB     @B+2,R0
2112  007230  020027  000000          CMP     R0,#0
2113  007234  001401                  BEQ     .+4
2114  007236  104000                  HLT
2115  007240  104400                  SCOPE                           ;SUB FAILED
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
2121  007262  104400                  SCOPE                           ;SUB FAILED
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
```

```
2127  007306  104000                        HLT                             ;SUB FAILED
2128  007310  104400                        SCOPE
2129
2130                                  ;TEST ADD INDIRECT WITH INDEXING
2131  007312  005000                        CLR     %0
2132  007314  067700  007362                ADD     @B+2,%0
2133  007320  022700  125252                CMP     #125252,%0
2134  007324  001401                        BEQ     .+4
2135  007326  104000                        HLT                             ;ADD FAILED
2136  007330  104400                        SCOPE
2137
2138  007332  005037  016732                CLR     @#TEMP
2139  007336  062777  125252  007370        ADD     #125252,@TEMP+2
2140  007344  022737  125252  016732        CMP     #125252,@#TEMP
2141  007352  001401                        BEQ     .+4
2142  007354  104000                        HLT                             ;ADD FAILED
2143  007356  104400                        SCOPE
2144  007360  012737  125252  016732        MOV     #125252,@#TEMP
2145  007366  067777  007324  007340        ADD     @A+6,@TEMP+2
2146  007374  023727  016732  177777        CMP     @#TEMP,#-1
2147  007402  001401                        BEQ     .+4
2148  007404  104000                        HLT                             ;ADD FAILED
2149  007406  104400                        SCOPE
2150
2151                                  ;TEST UNARYS INDIRECT WITH INDEXING
2152  007410  012737  177777  016732        MOV     #-1,@#TEMP
2153  007416  005077  007312                CLR     @TEMP+2
2154  007422  005737  016732                TST     @#TEMP
2155  007426  001401                        BEQ     .+4
2156  007430  104000                        HLT                             ;TST FAILED
2157  007432  104400                        SCOPE
2158
2159  007434  012737  125252  016732        MOV     #125252,@#TEMP
2160  007442  005177  007266                COM     @TEMP+2
2161  007446  022737  052525  016732        CMP     #052525,@#TEMP
2162  007454  001401                        BEQ     .+4
2163  007456  104000                        HLT                             ;COM FAILED
2164  007460  104400                        SCOPE
2165
2166  007462  005037  016732                CLR     @#TEMP
2167  007466  005277  007242                INC     @TEMP+2
2168  007472  022737  000001  016732        CMP     #1,@#TEMP
2169  007500  001401                        BEQ     .+4
2170  007502  104000                        HLT                             ;INC FAILED
2171  007504  104400                        SCOPE
2172
2173  007506  005037  016732                CLR     @#TEMP
2174  007512  005377  007216                DEC     @TEMP+2
2175  007516  023727  016732  177777        CMP     @#TEMP,#-1
2176  007524  001401                        BEQ     .+4
2177  007526  104000                        HLT                             ;DEC FAILED
2178  007530  104400                        SCOPE
2179
2180  007532  012737  000001  016732        MOV     #1,@#TEMP
2181  007540  005477  007170                NEG     @TEMP+2
2182  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 #:25252
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    0(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    0(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    0(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    0(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                             ;CMPB FAILED
2522  011532  104400                          SCOPE
2523
2524
2525  011534  122737  125252  016700          CMPB    #125252,@#B
2526  011542  001401                          BEQ     .+4
2527  011544  104000                          HLT                             ;CMPB FAILED
2528  011546  104400                          SCOPE
2529
2530  011550  123737  016700  016700          CMPB    @#B,@#B
2531  011556  001401                          BEQ     .+4
2532  011560  104000                          HLT                             ;CMPB FAILED
2533  011562  104400                          SCOPE
2534
2535                                  ;TEST MOVE INSTRUCTIONS
2536  011564  113700  016700                  MOVB    @#B,%0
2537  011570  122700  000252                  CMPB    #C00252,%0
2538  011574  001401                          BEQ     .+4
2539  011576  104000                          HLT                             ;MOVB FAILED
2540  011600  104400                          SCOPE
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                             ;MOVB FAILED
2546  011622  104400                          SCOPE
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                             ;MOVB FAILED
2552  011644  104400                          SCOPE
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                             ;CLRB FAILED
2559  011672  104400                          SCOPE
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                             ;COMB FAILED
2566  011720  104400                          SCOPE
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                             ;COMB FAILED
2573  011746  104400                          SCOPE
```

```
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    @8+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    @8+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                             ;CMPB FAILED
 2726  012622  104400                          SCOPE
 2727                                  ;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
```

```
        012714  012700  016702                          MOV     #B+2,%0         ;ADDRESS OF ADDRESS OF B
        012720  023067  003754                          CMP     @(0)+,B
        012724  001401                                  BEQ     .+4
        012726  104000                                  HLT                             ;CMP FAILED
        012730  104400                                  SCOPE

        012732  012700  016704                          MOV     #B+4,%0
        012736  025067  003736                          CMP     @-(0),B
        012742  001401                                  BEQ     .+4
        012744  104000                                  HLT                             ;CMP FAILED
        012746  104400                                  SCOPE

        012750  012700  016704                          MOV     #B+4,%0
        012754  125067  003720                          CMPB    @-(0),B
        012760  001401                                  BEQ     .+4
        012762  104000                                  HLT                             ;CMPB FAILED
        012764  104400                                  SCOPE

        012766  012700  016726                          MOV     #C+4,%0
        012772  012737  177777  016722                  MOV     #-1,@#C
        013000  105050                                  CLRB    @-(0)
        013002  023727  016722  177400                  CMP     @#C,#177400
        013010  001401                                  BEQ     .+4
        013012  104000                                  HLT                             ;CLRB FAILED
        013014  104400                                  SCOPE
        013016  012737  177777  016722                  MOV     #-1,@#C
        013024  012700  177772                          MOV     #-6,%0
        013030  012701  177772                          MOV     #-6,%1
        013034  147071  016710  016732                  BICB    @A(0),@TEMP(1)
        013042  022737  177525  016722                  CMP     #177525,@#C
        013050  001401                                  BEQ     .+4
        013052  104000                                  HLT                             ;BICB FAILED
        013054  104400                                  SCOPE
                                                ;TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
        013056  012700  052525                          MOV     #52525,%0       ;THIS IS CHECK LATER IN PROGRAM
                                                ;TEST JSR INSTRUCTION

        013062  004767  000002                          JSR     %7,TJSR2        ;PLACE PC ON STACK
        013066  000405                          TJSR1:  BR      TJSR3           ;RETURN HERE ON RTS %7
        013070  121627  013066                  TJSR2:  CMPB    @%6,#TJSR1      ;CHECK FOR CORRECT PC ON STACK
        013074  001401                                  BEQ     .+4
        013076  104000                                  HLT                     ;INCORRECT PC ON STACK
        013100  000207                                  RTS     %7              ;RETURN TO INST AFTER JSR
        013102  104400                          TJSR3:  SCOPE

        013104  000257                                  CCC
        013106  004717                                  JSR     %7,@%7          ;INSTRUCTION UNDER TEST
        013110  121627  013110                          CMPB    @%6,#TJSR3+6            ;TEST THE STACK
        013114  001401                                  BEQ     .+4
        013116  104000                                  HLT                     ;PC OF JSR DID NOT GO TO STACK
        013120  005726                                  TST     (6)+            ;REPOSITION THE STACK
        013122  104400                                  SCOPE
                                                ;TEST NESTED SUBROUTINES

        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                     ;C NOT SET
2863  013376  102001                          BVC     .+4
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                     ;C NOT SET
2875  013436  102001                          BVC     .+4
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        ;TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS
2944  013646  005267  177762      TSRT2A:   MOV     #-1,REFF
2945  013652  004767  000016      TSROT2:   INC     REFF
2946  013656  004767  000122                JSR     %7,ROTBE
2947  013662  022767  177777  177744        JSR     %7,ROTBO
2948  013670  001366                        CMP     #-1,REFF
2949  013672  000505                        BNE     TSROT2
2950  013674  016767  177734  177734        BR      ROTEN1
2951  013702  106067  177730      ROTBE:    MOV     REFF,TEST
2952  013706  106067  177724                RORB    TEST                    ;ROTATE BYTE EVEN
2953  013712  106067  177720                RORB    TEST
2954  013716  106167  177714                RORB    TEST
2955  013722  106167  177710                ROLB    TEST
2956  013726  106167  177704                ROLB    TEST
2957  013732                                ROLB    TEST
2958  013732  100004                        TNCV
2959  013734  103007                        BPL     .+12
2960  013736  102013                        BCC     .+20                    ;Z=1
2961  013740  104000                        BVC     .+30                    ;Z=1, C=1
2962  013742  000411                        HLT                             ;Z=C, BUT V=1
2963  013744  103006                        BR      .+24
2964  013746  102407                        BCC     .+16                    ;Z=0
2965  013750  104000                        BVS     .+20                    ;Z=0, C=1
2966  013752  000405                        HLT                             ;Z NOT EQUAL C, V=1
                                            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  177536          CMP     TES ,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         ASTART: 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  177[illegible]  .-[illegible]6        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                                            ;TEST COMB (ODD BYTE)
[illegible]  [illegible]  005067  002336                    CLR     TEMP                    ;BASE DATA
[illegible]  [illegible]  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  .-6---4         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    TES+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,@SR5        ;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
3174  015042  005077  163302                  CLR     @MQ             ;TEST OF ARITHMETIC SHIFT
3175  015046  012777  177777  163276          MOV     #-1,@AC         ;LOAD MQ WITH 0
3176  015054  012777  000020  163306          MOV     #16.,@ASH       ;LOAD AC WITH -1
3177  015062  005777  163264                  TST     @AC             ;LOAD SHIFT COUNT (ASH) WITH 16.
3178  015066  100401                          BMI     .+4             ;COMPARE AC WITH 100000
3179  015070  104000                          HLT                     ;SKIP HLT IF GOOD
3180  015072  005777  163252                  TST     @MQ             ;HALT ON ERROR
                                                                      ;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
3202   015174   104400                    ;TEST MULTIPLY
3203   015176   012777   125252   163144        SCOPE                   ;TEST OF MULTIPLY
3204   015204   012777   040000   163146        MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3205   015212   022777   165252   163132        MOV     #40000,@MUL     ;LOAD MUL WITH 40000
3206   015220   001401                          CMP     #165252,@AC     ;COMPARE AC WITH 1652
3207   015222   104000                          BEQ     .+4             ;SKIP IF GOOD
3208   015224   005777   163120                 HLT                     ;HALT ON ERROR
3209   015230   100401                          TST     @MQ             ;COMPARE MQ WITH 10000
3210   015232   104000                          BMI     .+4             ;SKIP HLT IF GOOD
3211   015234   122777   000300   163114        HLT                     ;HALT ON ERROR
3212   015242   001401                          CMPB    #300,@SRE       ;COMPARE SR WITH 300
3213   015244   104000                          BEQ     .+4             ;SKIP HLT IF GOOD
3214                                            HLT                     ;HALT ON ERROR (MULTIPLY)
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   052525   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 BUS
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 BIT
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
```

SEQ 0085

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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 IF 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 ITERAT: .
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 TES*
3417  016462  004000          ICOUNT: 4000
3418  016464  000000          SCOPEF: 0                                       ;COUNT LOCATION FOR ITERATION LOOP
3419  016466  004440          RETURN: BEGIN                                   ;ADDRESS OF LAST TES*
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 BANK 1 IF 8K
3498                            ;PDP-11 MEMORY DETERMINATION AND SETUP
3499                            ;USE WITH VARIABLE CORE QUANTITY SYSTEMS
```

```
3500                    017010
3501  017010  012767  004440  176564  DET1:   MOV     #BEGIN,TRPA+2
3502  017016  012767  000401  176346          MOV     #401,SKPBEL     ;BR .+4
3503  017024  004767  000412                  JSR     %7,MAMF
3504  017030  023727  000042  017010          CMP     @#42,#DET1      ;CHECK FOR DDP1
3505  017036  101401                          BLOS    .+4
3506  017040  000207                          RTS     %7              ;NO CORE EXPANSION WITH DDP1
3507  017042  032777  001000  161124          BIT     #1000,@SRPTR    ;CHECK VARIABLE CORE SWITCH
3508  017050  001401                          BEQ     DET4            ;USE VARIABLE CORE ROUTINE
3509  017052  000207                          RTS     %7              ;4K ONLY
3510  017054  012767  017122  160722  DET4:   MOV     #DET2,4         ;TRAP VECTOR SETUP
3511  017062  012767  000340  160716          MOV     #340,6          ;TRAP STATUS SETUP
3512  017070  005537  037770          EIGHT:  ADC     @#37770         ;CHECK FOR 8K
3513  017074  005537  057770          TWELVE: ADC     @#57770         ;CHECK FOR 12K
3514  017100  005537  077770          SXTEEN: ADC     @#077770        ;CHECK FOR 16K
3515  017104  005537  117770          TWENTY: ADC     @#117770        ;CHECK FOR 20K
3516  017110  005537  137770          TWOFOR: ADC     @#137770        ;CHECK FOR 24K
3517  017114  005537  157770          TWOEIG: ADC     @#157770        ;CHECK FOR 28K
3518  017120  000430                  BR      STRT28
3519  017122  012602                  DET2:   MOV     (6)+,%2         ;RETRIEVE TRAP PC
3520  017124  005726                          TST     (6)+            ;DISCARD TRAP STATUS WORD
3521  017126  022702  017074                  CMP     #EIGHT+4,%2
3522  017132  001542                          BEQ     DET3            ;4K
3523  017134  022702  017100                  CMP     #TWELVE+4,%2
3524  017140  001437                          BEQ     STRT8                   ;8K
3525  017142  022702  017104                  CMP     #SXTEEN+4,%2
3526  017146  001431                          BEQ     STRT12          ;12K
3527  017150  022702  017110                  CMP     #TWENTY+4,%2
3528  017154  001423                          BEQ     STRT16          ;16K
3529  017156  022702  017114                  CMP     #TWOFOR+4,%2
3530  017162  001415                          BEQ     STRT20          ;20K
3531  017164  000411                          BR      STRT24          ;24K
3532  017166  005000                  MOVE:   CLR     %0              ;SET UP MAIN CORE CURRENT
3533  017170  012021                          MOV     (0)+,(1)+       ;MOVE WORD
3534  017172  020027  017006                  CMP     %0,#FIN+2       ;MOVE COMPLETE?
3535  017176  001374                          BNE     .-6             ;MOVE ANOTHER WORD
3536  017200  000207                          RTS     %7              ;MOVE COMPLETE
3537  017202  004767  000040          STRT28: JSR     %7,XFER28       ;START 28K TRANSFER
3538  017206  000450                          BR      M0024           ;START 24K MODIFY
3539  017210  004767  000042          STRT24: JSR     %7,XFER24       ;START 24K TRANSFER
3540  017214  000453                          BR      M0020           ;START 20K MODIFY
3541  017216  004767  000044          STRT20: JSR     %7,XFER20       ;START 20K TRANSFER
3542  017222  000456                          BR      M0016           ;START 16K MODIFY
3543  017224  004767  000046          STRT16: JSR     %7,XFER16       ;START 16K TRANSFER
3544  017230  000461                          BR      M0012           ;START 12K MODIFY
3545  017232  004767  000050          STRT12: JSR     %7,XFER12       ;START 12K TRANSFER
3546  017236  000464                          BR      M0008           ;START 8K MODIFY
3547  017240  004767  000052          STRT8:  JSR     %7,XFER8        ;START 8K TRANSFER
3548  017244  000467                          BR      M0004           ;START 4K MODIFY
3549  017246  012701  140000          XFER28: MOV     #140000,%1      ;SET UP MOVE START LOCATION
3550  017252  004767  177710                  JSR     %7,MOVE         ;GO TO MOVE SUBROUTINE
3551  017256  012701  120000          XFER24: MOV     #120000,%1
3552  017262  004767  177700                  JSR     %7,MOVE
3553  017266  012701  100000          XFER20: MOV     #100000,%1
3554  017272  004767  177670                  JSR     %7,MOVE
3555  017276  012701  060000          XFER16: MOV     #60000,%1
```

```
3556  017302  004767  177660              JSR     %7,MOVE
3557  017306  012701  040000      *FER12: MOV     #40000,%1
3558  017312  004767  177650              JSR     %7,MOVE
3559  017316  012701  020000      *FER8:  MOV     #20000,%1
3560  017322  004767  177640              JSR     %7,MOVE
3561  017326  000207                      RTS     %7                      ;RETURN FROM [illegible]
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 MODIF[illegible]
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


```
 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
```

G06

CROSS REFERENCE TABLE -- USER SYMBOLS

```
-       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  2261
                2266  2272  2278  2284  2291  2296  2303  2310  2317  2324  2342  2356  2643
                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#
ARIENC  014222  3016  3027#
ARITST  014134  3012#  3015
ASCNV   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  2622
                2626  2627  2634  2648  2744  2745  2750  2751  2756  2757  3471#  3473  3476
BEGAIN  013466  3256  3258#
BEGIN   004440   808   900  1102  1621#  3269  3284  3419  3501  3562  3564  3566  3568  3572
BEG2C   015460  3251  3257#
BEGIN   015406  3245#
BINCT   016370  3347*  3366*  3369*  3370  3373*  3395#
BR      = 000002  1107#
BUFF    = 017004   587#   761   780   796   817  1656  3345#
.       016722  1709  1732  1800*  1816*  1832*  1847*  1863*  1879*  1897*  1915*  1963*  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  2644*  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*  2437*  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#
DFT1    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#
EXPIN   016072  3335  3337#
F       = 030000  1108#
```

```
FENDZ   002716   671   868  1119#  1154
FENDI   002740  1121  1124#
FIN     017004   587  3345  3496#  3500  3534
HMQ     016614  3443  3452#
HPCFHM  016350  3386  3388#
HP      = 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  1935  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
                3453#
HMQ     016616
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#
HSRINI  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
IPF     002632   665  1090#  1641
IRK     002344   674  1039#  1647
IRP     002450   678  1059#  1650
LIST    016374  3349  3397#
LKCSR   000300   690#   843*   977*   990   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
LPDBP   000304   692#   876*  1002*  1020*
```

[illegible] 11:05 CROSS REFERENCE TABLE -- USER SYMBOLS

CROSS REFERENCE TABLE -- USER SYMBOLS

```
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    000308            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
RPCSP    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    3175
                       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#
STRT8   017240         3524    3547#
ST1     001054          821     823#
```

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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
SIXTEEN 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*
TCRB1   003412  1209   1215*
TCR1    003232  1164   1180*
TCR1A   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*
TCWB1   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
"ES"	013636	3150*	3227*	3229*	3230	3489*	3490	3492	3493					
		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*							
TJSR	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*											
TSTART	014122	3010*												
TTCSR	000264	684*	798*	799	802*	804*	805*	822*	887*	927	3242	3607		
TTDBR	000266	685*	931*	3609*										
TTYINR	001540	644	909*											
TTYINI	001602	919*												
TTYIN2	001610	913	918	920*										
TTYIN3	001574	915	917*											
TTYIN4	001600	918*												
TWELVE	017074	3513*	3523											
TWENTY	017104	3515*	3527											
TWOEIG	017114	3517*												
TWOFOR	017110	3516*	3529											
TYOUTR	001620	646	927*											
TYOUTI	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*											

CROSS REFERENCE TABLE -- USER SYMBOLS

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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#
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TNCV 2882# 2919 295" 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)