

PDP 11

T17-4K SYSTEM EXERCISER
CZQKBHO

AH-9032H-MC
COPYRIGHT ©72-78
FICHE 1 OF 1

APR 1978
digital
MADE IN USA

This microfiche card contains a grid of frames. The first column on the left contains 12 frames of data. The second column contains 12 frames of diagrams, including a large cross-like diagram in the top frame and various smaller diagrams below. The third column contains 12 frames of data. The fourth column contains 12 frames of data. The fifth column contains 12 frames of data. The sixth column contains 12 frames of data. The seventh column contains 12 frames of data. The eighth column contains 12 frames of data. The ninth column contains 12 frames of data. The tenth column contains 12 frames of data. The eleventh column contains 12 frames of data. The twelfth column contains 12 frames of data. The thirteenth column contains 12 frames of data. The fourteenth column contains 12 frames of data. The fifteenth column contains 12 frames of data. The sixteenth column contains 12 frames of data. The seventeenth column contains 12 frames of data. The eighteenth column contains 12 frames of data. The nineteenth column contains 12 frames of data. The twentieth column contains 12 frames of data. The twenty-first column contains 12 frames of data. The twenty-second column contains 12 frames of data. The twenty-third column contains 12 frames of data. The twenty-fourth column contains 12 frames of data. The twenty-fifth column contains 12 frames of data. The twenty-sixth column contains 12 frames of data. The twenty-seventh column contains 12 frames of data. The twenty-eighth column contains 12 frames of data. The twenty-ninth column contains 12 frames of data. The thirtieth column contains 12 frames of data. The thirty-first column contains 12 frames of data. The thirty-second column contains 12 frames of data. The thirty-third column contains 12 frames of data. The thirty-fourth column contains 12 frames of data. The thirty-fifth column contains 12 frames of data. The thirty-sixth column contains 12 frames of data. The thirty-seventh column contains 12 frames of data. The thirty-eighth column contains 12 frames of data. The thirty-ninth column contains 12 frames of data. The fortieth column contains 12 frames of data. The forty-first column contains 12 frames of data. The forty-second column contains 12 frames of data. The forty-third column contains 12 frames of data. The forty-fourth column contains 12 frames of data. The forty-fifth column contains 12 frames of data. The forty-sixth column contains 12 frames of data. The forty-seventh column contains 12 frames of data. The forty-eighth column contains 12 frames of data. The forty-ninth column contains 12 frames of data. The fiftieth column contains 12 frames of data. The fifty-first column contains 12 frames of data. The fifty-second column contains 12 frames of data. The fifty-third column contains 12 frames of data. The fifty-fourth column contains 12 frames of data. The fifty-fifth column contains 12 frames of data. The fifty-sixth column contains 12 frames of data. The fifty-seventh column contains 12 frames of data. The fifty-eighth column contains 12 frames of data. The fifty-ninth column contains 12 frames of data. The sixtieth column contains 12 frames of data. The sixty-first column contains 12 frames of data. The sixty-second column contains 12 frames of data. The sixty-third column contains 12 frames of data. The sixty-fourth column contains 12 frames of data. The sixty-fifth column contains 12 frames of data. The sixty-sixth column contains 12 frames of data. The sixty-seventh column contains 12 frames of data. The sixty-eighth column contains 12 frames of data. The sixty-ninth column contains 12 frames of data. The seventieth column contains 12 frames of data. The seventy-first column contains 12 frames of data. The seventy-second column contains 12 frames of data. The seventy-third column contains 12 frames of data. The seventy-fourth column contains 12 frames of data. The seventy-fifth column contains 12 frames of data. The seventy-sixth column contains 12 frames of data. The seventy-seventh column contains 12 frames of data. The seventy-eighth column contains 12 frames of data. The seventy-ninth column contains 12 frames of data. The eightieth column contains 12 frames of data. The eighty-first column contains 12 frames of data. The eighty-second column contains 12 frames of data. The eighty-third column contains 12 frames of data. The eighty-fourth column contains 12 frames of data. The eighty-fifth column contains 12 frames of data. The eighty-sixth column contains 12 frames of data. The eighty-seventh column contains 12 frames of data. The eighty-eighth column contains 12 frames of data. The eighty-ninth column contains 12 frames of data. The ninetieth column contains 12 frames of data. The ninety-first column contains 12 frames of data. The ninety-second column contains 12 frames of data. The ninety-third column contains 12 frames of data. The ninety-fourth column contains 12 frames of data. The ninety-fifth column contains 12 frames of data. The ninety-sixth column contains 12 frames of data. The ninety-seventh column contains 12 frames of data. The ninety-eighth column contains 12 frames of data. The ninety-ninth column contains 12 frames of data. The hundredth column contains 12 frames of data.

.NLIS⁺ SEQ
.REP⁺ C

PRODUCT CODE: AC-9031H-MC

PRODUCT NAME: CZQKBHO T17-4K SYSTEM EXERCISER
THIS VERSION TEST DECTAPE UNIT 1 NOT UNIT 2

DATE: 01-FEBRUARY-1978

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: JOHN HITTELL

REVISED BY: W.F. KELLICKER 25-FEB-74
AL LOSCHAK 21-DEC-75
BARRY SUSSMAN 01-OCT-77
BILL SCHLITZKUS 01-FEB-78

THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE WITHOUT NOTICE AND SHOULD NOT BE CONSTRUED AS A COMMITMENT BY DIGITAL EQUIPMENT CORPORATION. DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR ANY ERRORS THAT MAY APPEAR IN THIS DOCUMENT.

DIGITAL EQUIPMENT CORPORATION ASSUMES NO RESPONSIBILITY FOR THE USE OR RELIABILITY OF ITS SOFTWARE ON EQUIPMENT THAT IS NOT SUPPLIED BY DIGITAL.

COPYRIGHT (C) 1972, 1978 BY DIGITAL EQUIPMENT CORPORATION
THE FOLLOWING ARE TRADEMARKS OF DIGITAL EQUIPMENT CORPORATION:

DIGITAL
DEC

PDP
DECUS

UNIBUS
DECTAPE

MASSBUS

1. ABSTRACT

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

IN THIS VERSION THE INTERRUPT SERVICE ROUTINE FOR THE DISKS, KWIIL, 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
KWIIL	LINE CLOCK
PC11	HIGH SPEED READER/PUNCH
BL11	ASR33 OR ASR35 TELEPRINTER-LC11.VTOS
LP11	LINE PRINTER
LS11	LINE PRINTER...SEE 5.2.11

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES 4K OF MEMORY

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

2

A CONSOLE PROCESSOR.

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

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

4.2

- ```
(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 RP11, 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 HALT

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

## 5.2.4 TRITRAP

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 TTYINI (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 COMPARISON ERROR IS FLAGGED. 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 "DATA" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER IS TRANSFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN.

#### 5.2.9 FENDZ (TC11 FORWARD END ZONE)

FENDZ IS THE FIRST ADDRESS IN THE DECTAPE INTERRUPT VECTOR (214). THIS ROUTINE WILL READ, IN REVERSE, BLOCK NUMBERS UNTIL THE REVERSE END ZONE IS FOUND. AT THIS POINT THE INTERRUPT VECTOR AND COMMAND REGISTER ARE MODIFIED TO READ ALL BLOCK NUMBERS IN THE FORWARD DIRECTION. EACH BLOCK NUMBER READ IS COMPARED WITH THE EXPECTED BLOCK NUMBER 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 LPSC FROM 117 TO 121.

## 5.2.12 HSRINI (PC11 INPL)

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 FLAGGED. 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 VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATA" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO 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 "DATA" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER IS TRANSFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN.

## 5.2.16 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 "DATA" 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 MODIFIED TO TEST THE FULL SURFACE



IF OPERATION UNDER MONITORS, THE CONSOLE DEVICE, LINE PRINTER, 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 "SCOPE" 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 SHOULD SET INTERRUPT ENABLE, INITIALIZE DATA AND RAISE A FLAG IF NECESSARY.
5. THE INTERRUPT VECTOR STATUS WORD SHOULD CONTAIN THE PRIORITY LEVEL OF THE DEVICE.
6. THE INTERRUPT VECTOR SHOULD POINT TO YOUR STAND ALONE ROUTINE.
7. THE STAND ALONE ROUTINE WHEN COMPLETING ALL HOUSE KEEPING OPERATION AND DATA COMPARISONS SHOULD THEN EXECUTE A "RTI" TO RETURN TO MAINLINE CODE.

## INSERTION OF USER I/O ROUTINES

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

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

2. IF THE USER HAS MORE THAN 4KW OF CORE, THE ROUTINE MAY BE PLACED IN ANY OF THE EXTRA BANKS AND CORE EXPANSION BE INHIBITED.
3. IN THE PRIMING CODE SEVERAL INSTRUCTIONS BEFORE THE TAG "MAINLINE" THERE IS AN INSTRUCTION JSR %7,00USER. 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 UNAR S. THOSE INSTRUCTIONS ARE TESTED IN THE INDEX MODE: SOURCE ONLY, DESTINATION ONLY, THEN BOTH SOURCE AND DESTINATION. THE SAME INSTRUCTIONS ARE THEN TESTED USING THE IMMEDIATE MODE INDIRECT. THESE MODES ARE TESTED AGAINST OTHER MODES: WHICH MAY USE A REGISTER OR MEMORY LOCATION. THESE WILL BE SWAPPED BETWEEN SOURCE AND DESTINATION.

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

THE CORE LAYOUT IS BROKEN INTO FIVE DISTINCT PARTS:

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

10. LISTING

11. FLOW CHART(S)  
.ENDR  
.ENABLE ABS

:PDP11 PRELIMINARY SYSTEM TEST --- TTY-PC11-LP11,RF11,TC11,KW11,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  
NOP=240 ;SYSTEM NULL OPERATION  
HLT=EMT ;TRAP USED FOR ERROR PRINTOUT  
SCOPE=TRAP ;TRAP USED SCOPE LOOP AND ITERATION OF SJB PROBLEMS  
CC=177776

000240  
104000  
104400  
177776

|        |                   |                                          |
|--------|-------------------|------------------------------------------|
| 016104 | TDSR=ICSR         |                                          |
| 017004 | BUFF=FIN          |                                          |
| 000000 | R100=%0           |                                          |
| 000001 | R101=%1           |                                          |
| 000002 | RSR=%2            |                                          |
| 176000 | RKHORDCT=-2000    |                                          |
| 176000 | RPLORDCT=-2000    |                                          |
| 176040 | RCHORDCT=-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      |                                          |
|        | .=14              |                                          |
|        | .+2               |                                          |
|        | HALT              | :FALSE TRACE TRAP                        |
|        | .=24              |                                          |
|        | PFAIL             |                                          |
|        | 340               |                                          |
|        | .=30              |                                          |
|        | PRINT             | :FOR HALT TRAPS                          |
|        | 340               | :HIGHEST PRIORITY                        |
|        | .=34              |                                          |
|        | SCOPEC            | :USER TRAP                               |
|        | 0                 |                                          |
|        | .=46              |                                          |
|        | LOGICA            | :RETURN TO MONITOR ADDRESS               |
|        | .=52              |                                          |
|        | 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.

```

```

642 :PDP11 SIMULTANEOUS I/O
643 :=60
644 000060 001544 ITYINR ;TTY IN INTERRUPT VECTOR
645 000062 000200 200
646 000064 001620 TYOUTR ;TTY OUT INTERRUPT VECTOR
647 000066 000200 200
648 000070 001646 HSRINR ;HSR INTERRUPT VECTOR
649 000072 000200 200
650 000074 001740 HPOUTR ;HSP INTERRUPT VECTOR
651 000076 000200 200
652 :=100
653 000100 002044 LK3
654 000102 000300 300 ;INTERRUPT VECTOR LINE CLOCk
655 :=4 ;LEVEL SIX PRIORITY
656 000004 017500 .PARSRV
657 000006 000340 340 ;MEMORY PARITY
658
659 :=174
660 000174 177570 SRPTR: 177570
661 000176 000000 SOFTSR: 000000
662 :=200
663 000200 000137 000502 JMP J#START
664 :=204
665 000204 002632 IRF
666 000206 000240 240 ;RF11 DISK
667 000210 002534 IRC
668 000212 000240 240 ;LEVEL 5
669 :=214
670 FENDZ
671 000214 002716 300 ;RC DISK
672 000216 000300 :=220
673 000220 002344 IRK
674 000222 000240 240 ;DEC TAPE
675 :=254
676 IRP
677 000254 000254 240 ;LEVEL 6
678 000256 000240 ;RK DISK
679
680 STATUS=177776
681 TRCSR: 177560
682 000260 177560 TRDR: 177562
683 000262 177562 TTCSR: 177564
684 000264 177564 TTDBR: 177566
685 000266 177566 HRCsr: 177550
686 000270 177550 HRDBR: 177552
687 000272 177552 HPCSR: 177554
688 000274 177554 HPDBR: 177556
689 000276 177556 LKCSR: 177546
690 000300 177546 LPCSR: 177514
691 000302 177514 LPDBR: 177516
692 000304 177516 RFDAR: 177470
693 000306 177470 RFDAR: 177466
694 000310 177466 RFWC: 177462
695 000312 177462 RFCAR: 177464
696 000314 177464 RFCSR: 177460
697 000316 177460

```

```

;DISK ADDRESS AND ERROR
;DISK ADDRESS REGISTER
;WORD COUNT REGISTER
;CURRENT ADDRESS REGISTER
;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                |                              |
| 726 | 000402 | 177344 | TCWC:                                           | TC+4                 | : DATA                       |
| 727 | 000404 | 177346 | TCBA:                                           | TC+6                 | : WORD COUNT                 |
| 728 | 000406 | 000214 | TCIV:                                           | 214                  | : BUS ADDRESS                |
| 729 | 000410 | 176722 | RPCA:                                           | 176722               | : DECTAPE INTERRUPT VECTOR   |
| 730 | 000412 | 176725 | RPDAH:                                          | 176725               | : CYLINDER ADDRESS RPII DISK |
| 731 | 000414 | 176724 | RPDAE:                                          | 176724               | : HIGH BYTE OF DISK ADDRESS  |
| 732 | 000416 | 176710 | RPDSR:                                          | 176710               | : DISK ADDRESS               |
| 733 | 000420 | 176724 | RPDAR:                                          | 176724               | : DRIVE STATUS REGISTER      |
| 734 | 000422 | 176716 | RPWC:                                           | 176716               | : DISK ADDRESS REGISTER      |
| 735 | 000424 | 176720 | RPBAR:                                          | 176720               | : WORD COUNT REGISTER        |
| 736 | 000426 | 176714 | RPCSR:                                          | 176714               | : CURRENT ADDRESS REGISTER   |
| 737 | 000430 | 176715 | RPCSRH:                                         | 176715               | : STATUS REGISTER            |
| 738 | 000432 | 000000 | RPFUNCTION:                                     | 0                    | : HIGH BYTE ADDRESS OR CSR   |
| 739 |        |        | : THIS ROUTINE CHECKS THE READ DATA BUFFER TC11 |                      | : DISK COMMAND               |
| 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               |                              |
| 744 | 000442 | 012701 |                                                 | MOV #TCRBUF, %1      | : SUM OF DATA                |
| 745 | 000446 | 062103 | TC2:                                            | ADD (1)+, %3         | : ADDRESS OF READ BUFFER     |
| 746 | 000450 | 062103 |                                                 | ADD (1)+, %3         | : EVEN ADD                   |
| 747 | 000452 | 001775 |                                                 | BEQ TC2              | : ODD ADD -2'S COMPLIMENT    |
| 748 | 000454 | 020127 |                                                 | 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                       |

```

754 000472 012767 000240 014254 NOEAE: MOV #240,EAE$RT ;BRANCH AROUND EAE ROUTINE
755 000500 000002 RTI ;JUMP OVER EAE SECTION
756
757
758
759
760 000502 012767 016526 177314 START: MOV #PF$IL,24 ;SET POWER FAIL VECTOR
761 000510 012706 017004 MOV #BUFF,%6 ;SET UP STACK
762 000514 012767 000546 177262 MOV #15,4 ;SET UP TIME OUT VECTOR
763 000522 023737 000042 000046 CMP 2#42, 2#46 ;UNDER ACT11 AUTO MODE?
764 000530 001403 BEQ 3$;YES-SKIP TITLE PRINT-OUT
765 000532 004767 016750 JSR %7, TYPE ;PRINT TITLE
766 000536 017546 MSG
767 000540 005777 177430 3$: TST 2$SRPTR ;TRY TO REFERENCE THE
768
769 000544 000404 BR 2$;HARDWARE SWITCH REGISTER
770 000546 012767 000176 177420 1$: MOV #SOFTSR,SRPTR ;BRANCH IF NO T11 - OUT TRAP OCCURS
771
772 000554 022626 CMP (6)+,(6)+ ;CHANGE THE SWITCH REGISTER POINTER
773 000556 012767 000006 177220 2$: MOV #6,4 ;TO POINT TO A SOFTWARE SWITCH REGISTER
774 000564 017767 177404 000746 MOV 2$SRPTR,REG1 ;RESTORE THE STACK
775 000572 005737 016612 TST 2$SAVR6 ;RESTORE TIME OUT VECTOR
776 000576 001403 BEQ ESTART ;MOV SR TO REGISTER
777 000600 005037 016612 CLR 2$SAVR6
778 000604 104000 HLT
779 000606 005067 015650 ESTART: CLR ICOUNT ;A POWER FAIL OCCURRED
780 000612 012706 017004 MOV #BUFF,%6 ;SET UP STACK
781 000616 012767 000660 015642 MOV #START2,RETJRN
782 000624 005067 015634 CLR SCOPE$
783 000630 012767 000340 177140 MOV #340,STATUS ;LOCK OUT INTERRUPTS
784 000636 005067 014742 CLR PRFLAG ;PRINT ROUTINE BUSY
785 000642 016702 000672 MOV REG1,RSR ;SAVE SWITCHES
786 000646 012700 000100 MOV #100,R100 ;INTERRUPT ENABLE
787 000652 012701 000101 MOV #101,R101 ;INTERRUPT ENABLE AND GO
788 000656 104400 SCOPE
789 000660 050077 177374 START2: BIS R100,2$TRCSR
790 000664 000005 RESET
791 000666 030077 177366 BIT R100,2$TRCSR ;INTERRUPT ENABLE
792 000672 001401 BEQ .+4
793 000674 104000 HLT ;RESET DID NOT CLEAR INTERRUPT ENABLE
794 000676 104400 SCOPE
795
796 000700 012706 017004 ;DOES "RESET" ON THE BUS LAST TOO LONG
797 000704 000005 MOV #BUFF,%6 ;SET UP STACK
798 000706 050077 177352 RESET
799 000712 030077 177346 BIS R100,2$TTCSR ;SET A BIT
800 000716 001001 BIT R100,2$TTCSR ;IS IT SET
801 000720 104000 BNE .+4
802 000722 005077 177336 HLT ;RESET IS ON BUS TOO LONG
803 000726 104400 CLR 2$TTCSR
804 000730 050077 177330 SCOPE
805 000734 005077 177324 BIS R100,2$TTCSR
806 000740 104400 CLR 2$TTCSR ;IF BUS HANG, CHECK NO SACK TIMEOUT
807 000742 000005 SCOPE
808 000744 012767 004440 015514 RESET
809 000752 012737 000472 000004 MOV #BEGIN,RETURN
 MOV #NOEAE,2#4 ;TEST FOR EAE

```

MAIN. MACY11 306(1052) 20-JAN-78 11 05 PM JE .6  
 C20KBN.P11 20-JAN-78 11:05

|     |        |        |        |        |      |                   |  |                                        |
|-----|--------|--------|--------|--------|------|-------------------|--|----------------------------------------|
| 810 | 000760 | 005777 | 177364 |        | TST  | 2M0               |  |                                        |
| 811 | 000764 | 012767 | 001542 | 177012 | MOV  | RTIA, 4           |  | TRAP IF NONEXISTANT                    |
| 812 | 000772 | 012767 | 000340 |        | MOV  | 340, 6            |  | SET UP FOR NON-EXISTANT I/O            |
| 813 | 001000 | 012767 | 000001 | 000618 | MOV  | 1, DATA1          |  | KEEP NEW PSW AT 340                    |
| 814 | 001006 | 005067 | 000632 |        | CLR  | DATA2             |  | BASE DATA FOR TTY READER OR KEYBOARD   |
| 815 | 001012 | 012767 | 000001 | 000700 | MOV  | 1, DATA3          |  | BASE DATA FOR TTY PUNCH OR TELEPRINTER |
| 816 | 001020 | 005067 | 000770 |        | CLR  | DATA4             |  | BASE DATA FOR HSR                      |
| 817 | 001024 | 012706 | 017004 |        | MOV  | 8, BUFF, %6       |  | BASE DATA FOR HSP                      |
| 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, JTTCSR      |  | TTY OUT                                |
| 823 | 001054 | 030227 | 000002 |        | BIT  | RSR, #2           |  |                                        |
| 824 | 001060 | 001002 |        |        | BNE  | ST2               |  |                                        |
| 825 | 001062 | 050177 | 177172 |        | BIS  | R101, JTRCSR      |  | TTY IN                                 |
| 826 | 001066 | 005777 | 177202 |        | TST  | JHPCSR            |  | 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, JHPCSR      |  | HSP                                    |
| 831 | 001106 | 005777 | 177156 |        | TST  | JHRCR             |  | 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 |        | BIT  | RSR, #10          |  |                                        |
| 837 | 001126 | 001004 |        |        | BNE  | ST4               |  |                                        |
| 838 | 001130 | 010067 | 000664 |        | MOV  | R100, DELAY       |  | FOR STALL HSR                          |
| 839 | 001134 | 050177 | 177130 |        | BIS  | R101, JHRCR       |  | HSR                                    |
| 840 | 001140 | 030227 | 000020 |        | BIT  | RSR, #20          |  |                                        |
| 841 | 001144 | 001004 |        |        | BNE  | ST5               |  |                                        |
| 842 | 001146 | 005067 | 000756 |        | CLR  | TIME              |  |                                        |
| 843 | 001152 | 050077 | 177122 |        | BIS  | R100, JLKCSR      |  | LINE CLOCK 50 OR 60 CYCLES             |
| 844 | 001156 | 030227 | 000040 |        | BIT  | RSR, #40          |  |                                        |
| 845 | 001162 | 001053 |        |        | BNE  | ST6               |  |                                        |
| 846 | 001164 | 012767 | 001226 | 176612 | MOV  | STSA, 4           |  |                                        |
| 847 | 001172 | 105777 | 177230 |        | TSTB | JRPCSR            |  | WAIT FOR CONTROLLER READY              |
| 848 | 001176 | 100375 |        |        | BPL  | -4                |  |                                        |
| 849 | 001200 | 012777 | 000015 | 177220 | MOV  | 15, JRPCSR        |  | RESET DRIVE                            |
| 850 | 001206 | 105777 | 177214 |        | TSTB | JRPCSR            |  | WAIT FOR CONTROLLER READY              |
| 851 | 001212 | 100375 |        |        | BPL  | -4                |  |                                        |
| 852 | 001214 | 005777 | 177176 |        | TST  | JRPDSR            |  | WAIT FOR ACCESS READY                  |
| 853 | 001220 | 100375 |        |        | BPL  | -4                |  |                                        |
| 854 | 001222 | 005077 | 177170 |        | CLR  | JRPDSR            |  | CLR ATTENTION                          |
| 855 | 001226 | 012767 | 001542 | 176550 | MOV  | RTIA, 4           |  |                                        |
| 856 | 001234 | 012777 | 000037 | 177060 | MOV  | 37, JACDAR        |  |                                        |
| 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, RKFUNCTON  |  |                                        |
| 860 | 001264 | 012767 | 043503 | 177140 | MOV  | 43503, RPFUNCTON  |  |                                        |
| 861 | 001272 | 110077 | 177020 |        | MOVB | R100, JAFCSR      |  | TELL DISK TO READ OR WRITE             |
| 862 | 001276 | 110077 | 177042 |        | MOVB | R100, JAKCSR      |  |                                        |
| 863 | 001302 | 110077 | 177022 |        | MOVB | R100, JACCSR      |  |                                        |
| 864 | 001306 | 110077 | 177114 |        | MOVB | R100, JRPCSR      |  |                                        |
| 865 | 001312 | 030200 |        |        | BIT  | RSR, R100         |  | TEST FOR DECTAPE                       |

304 1052 20-JAN-78 11:05 PAGE 17  
20-JAN-78 11:05

```

866 001314 001011 BNE ST7
867 001316 012767 002706 001370 MOV STCFIRST, *CEAPE ; FIRST BLOCK SHOULD BE ZER
868 001324 012777 002716 177054 MOV #FENDZ, STCIV ; GO TO END ZONE ON INTERRUPT
869 001332 012777 004503 177032 MOV #R+IE+AB+DO, STCOM ; MOVE REVERSE
970 001340 105702 ST7: TSTB RSR ; LINE PRINTER
971 001342 100427 BMI STB ; DON'T CHANGE ZOC
972 001344 012767 001422 176432 MOV #STB.4 ; RESET FOR START OF LINE PATTERN
973 001352 012767 000137 000730 MOV #137, SOLPAT ; LINE COUNT
974 001360 016767 000616 000724 MOV LP6+4, CLINCT
975 001366 012767 000040 000712 MOV #40, CURPAT ; LINE FEED TO POSITION BUFFER
976 001374 012777 000014 176702 MOV #14, ALPOBR ; INTERRUPT VECTOR
977 001402 012737 002166 000200 MOV #LPINTR, #200 ; PROCESSOR LEVEL 4
978 001410 012737 000200 000202 MOV #200, #202 ; INTERRUPT ENABLE
979 001416 010077 176660 STB: CLR R100, ALPCSR ; NO "T" BIT FIRST PASS
980 001422 005037 015577 ; IF OPERATION WITH DIAGNOSTIC PACKAGE OR ACT11
981 001426 005767 176410 TST 42
982 001432 001417 BEQ STBA ; BRANCH IF NO MONITOR
983 001434 012767 001542 176342 MOV #RTIA.4 ; NO LINE PRINTER WITH MONITOR
984 001442 005077 176634 CLR ALPCSR ; NO LSR WITH MONITOR
985 001446 005077 176606 CLR STCRSR ; NO CONSOLE TEST WITH MONITOR
986 001452 005077 176606 CLR STTCSR ; IS IT RKDP
987 001456 122767 000002 176355 CMPB #2 41
988 001464 001002 BNE STBA ; YES DON'T TEST RK DISK
989 001466 005077 176652 STBA: CLR #RKCSR ; FOR USER I/O PROGRAM
990 001472 004737 017006 JSR %7, #USER ; CHECK FOR CORE EXPANSION
991 001476 004767 015306 JSR %7, DET1 ; HALT FOR BUS ERROR
992 001502 005067 176300 CLR 6 ; FOR USER I/O PROGRAM
993 001506 012767 000006 176270 MOV #6.4 ; ALLOW INTERRUPTS
994 001514 005067 176256 CLR STATUS
995 001520 000401 BR .+4 ; WAIT HERE FOR INTERRUPTS
996 001522 000001 MAINLINE: WAIT ; INHIBIT PROCESSOR TEST
997 001524 037727 176444 002000 BIT #SRPTR, #2000
998 001532 001373 BNE MAINLINE
999 001534 000167 002700 JMP BEGIN
1000 001540 000000 REG1: 0 ; STATUS OF SELECTED DEVICES
1001 001542 000002 RTIA: RTI ; AN RTI FOR NON EXISTANT I/O

; TTY RECEIVER VALUES 0 TO 377
909 001544 05777 176510 TTYINR: TSTB STCRSR ; IS DONE SET
910 001550 100401 BMI .+4 ; FALSE RETURN FROM MAINLINE
911 001552 104000 HLT ; TEST DATA FOR LEADER
912 001554 105777 176502 TSTB STDR ; IF LEADER GO BACK
913 001560 001413 BEQ TTYIN2 ; NOT LEADER TEST FOR DATA
914 001562 127767 176474 000026 CMPB STDR, DATA1 ; DATA COMPARISON ERROR
915 001570 001401 BEQ TTYIN3 ; INCREMENT DATA
916 001572 104000 HLT
917 001574 105267 000016 TTYIN3: INCB DATA1
918 001600 001003 TTYIN4: BNE TTYIN2 ; BASE DATA
919 001602 012767 000001 000006 TTYIN1: MOV #1, DATA1 ; START READER
920 001610 005277 176444 TTYIN2: INC STCRSR ; RETURN TO MAINLINE
921 001614 000002 RTI

```

30A:1052 20-JAN-76 11:05 PAGE 18  
20-JAN-76 11:05

```

322 001616 000000 DATA1: XX ;EXPECTED DATA
323
324 ;TTY TRANSMITTER PRINT VALUES 0 TO 377
325
326 TYOUTR: TSTB @TTCSR ;TEST FOR DONE
327 BMI .+4 ;BRANCH IF FLAG FOUND
328 HLT ;FALSE INTERRUPT RETURN
329 001620 105777 176440 TYOUT1: INCB DATA2 ;INCREMENT DATA
330 001624 100401 ;OUTPUT TO DEVICE
331 001626 104000 ;RETURN TO MAINLINE
332 001630 105267 000010 DATA2, @TTDBR
333 001634 016777 000004 176444 RTI
334 001644 000000 DATA2: XX ;TRANSMITTED DATA
335 ;MSR SECTION VALUES 0 TO 377
336
337 HSRINR: TSTB @HRCR ;IS DONE SET
338 BMI .+4
339 HLT ;FALSE RETURN FROM MAINLINE
340 001652 105777 176410 TSTB @HRDBR ;TEST DATA FOR LEADER
341 001654 104000 BEQ HSRIN2 ;IF LEADER GO BACK
342 001656 105777 176402 000026 CMPB @HRDBR, DATA3 ;NOT LEADER TEST FOR DATA
343 001662 001413 BEQ .+4 ;DATA COMPARISON ERROR
344 001664 127767 176402 000026 HLT ;INCREMENT DATA
345 001672 001401 INCB DATA3
346 001674 104000 BNE HSRIN2
347 001676 105267 000016 HSRIN1: MOV #1, DATA3 ;BASE DATA
348 001702 001003 000006 HSRIN2: INC @HRCR ;START READER
349 001704 012767 176352 RTI ;RETURN TO MAINLINE
350 001712 005277 000002
351 001716 000002 DATA3: XX ;EXPECTED DATA
352
353 ;MS PUNCH SECTION, VALUES 0 TO 377
354 ;ENABLE READER ON FIX COUNT OF PUNCH ONLY (14 TIMES)
355 001722 012767 000000 000064 HPOUT: MOV #0, DATA4 ;INITIAL DATA
356 001730 016777 000060 176340 HPOUT1: MOV DATA4, @HPDBR ;OUTPUT TO DEVICE
357 001736 000002 RTI ;RETURN TO MAINLINE
358 001740 105777 176330 HPOUTR: TSTB @HPCSR ;TEST FOR DONE
359 001744 100401 BMI .+4 ;BRANCH IF FLAG FOUND
360 001746 104000 HLT ;FALSE INTERRUPT RETURN
361 001750 046777 000044 176312 BIC DELAY, @HRCR ;CLEAR MSR INTERRUPT ENABLE
362 001756 005267 000034 INC INTCNT ;COUNT INTERRUPTS
363 001762 026727 000030 000014 CMP INTCNT, #14 ;SAVE TO TURN READER ON?
364 001770 001005 BNE HPOUT2 ;NO-NEED MORE TIME
365 001772 005067 000020 CLR INTCNT ;YES RESET COUNTER
366 001776 056777 000016 176264 BIS DELAY, @HRCR ;SET READER INT ENABLE
367 002004 105267 000004 HPOUT2: INCB DATA4 ;INCREMENT DATA
368 002010 001744 BEQ HPOUT ;AT UPPER LIMIT START OVER
369 002012 000746 BR HPOUT1 ;FINISH REST OF DATA
370
371 002014 000000 DATA4: XX
372 002016 000000 INTCNT: 0
373 002020 000000 DELAY: 0 ;EQUAL 100 IF MSR RUNNING
374
375 ;TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS
376 002022 005037 002140 LK1: CLR @TIME ;CLEAR LINE CLOCK TIMER
377 002026 052777 000100 176244 BIS #100, @LKCSR

```

304 1052 20-JAN-78 11:05 PAGE 19  
20-JAN-78 11:05

```

378 002034 052737 000100 :77776 BIS #100,2*STATUS
379 002042 000002 L*2: RTI :RETURN TO MAINLINE
380 002044 105777 176230 L*3: TSTB 2LKCSR :TEST FOR DONE
381 002050 100401 BMI +4
382 002052 104000 HLT :FALSE INTERRUPT
383 002054 042777 000200 176216 BIC #200,2LKCSR
384 002062 005237 002140 LK4: INC 2*TIME :ON INTERRUPTS ENTER HERE
385 002066 027737 006344 002140 CMP #3300.,2*TIME :A LAPSE OF 55 SECONDS
386 002074 103362 LK2 :BRANCH IF TIME LESS THAN 55 SECONDS
387 002076 042777 000100 176174 BIC #100,2LKCSR
388 002104 042737 000100 177776 BIC #100,2*STATUS :LOWER PRIORITY
389 002112 022737 007020 002140 CMP #3600.,2*TIME :ONE MINUTE UP
390 002120 001740 BEQ LK1 :YES-RESET TIMER
391 002122 105777 176152 TSTB 2LKCSR :NO-SKIP ON FLAG TILL IT IS.
392 002126 100375 BPL -4
393 002130 042777 000200 176142 BIC #200,2LKCSR :CLEARS THE FLAG
394 002136 000751 BR LK4 :FOUND FLAG GO INCREMENT COUNTER
395 002140 000000 TIME: 0
396
397 ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER
398 ;INTERRUPT VECTOR IS 200
399 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,2LPDBR :CURRENT PATTERN TO LINE PRINTER
1003 002156 105777 176120 TSTB 2LPCSR
1004 002162 100405 BMI LP6
1005 002164 000002 RTI :RETURN TO MAIN LINE
1006 002166 105777 176110 LPINTR: TSTB 2LPCSR :TEST FOR FLAG
1007 002172 100401 BMI +4
1008 002174 104000 HLT
1009 002176 026727 000110 000117 LP6: CMP CLINCT,#79. :FALSE RETURN FROM MAIN LINE
1010 :TEST FOR END OF LINE
1011 002204 001415 BEQ LP4 :CHANGE THIS VALUE FOR 132 COLUMN PRINTER
1012 002206 005267 000100 INC CLINCT :GO GENERATE CR/LF
1013 002212 026727 000070 000137 CMP CURPAT,#137 :INCREMENT LINE POSITION COUNT
1014 002220 001403 BEQ LP3 :TEST FOR MAXIMUM PATTERN
1015 002222 005267 000060 INC CURPAT :YES - GO TO LP3 AND RESET
1016 002226 000750 BR LP2 :NO - INCREMENT TO NEXT PATTERN
1017 002230 012767 000040 000050 LP3: MOV #40,CURPAT :GO SEND IT TO LINE PRINTER
1018 002236 000744 BR LP2 :RESET PATTERN AND SEND TO PRINTER
1019 002240 005067 000046 LP4: CLR CLINCT :SENT TO LINE PRINTER
1020 002244 012777 000012 176032 MOV #12,2LPDBR :RESET LINE COUNT
1021 002252 105777 176024 TSTB 2LPCSR :LINE FEED
1022 002256 100375 BPL -4
1023 002260 026727 000024 000137 CMP SOLPAT,#137 :START OF LINE PATTERN
1024 002266 001403 BEQ LP5 :INCREMENT START OF LINE
1025 002270 005267 000014 INC SOLPAT
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 ;PK11 DISK TEST INTERRUPT LEVEL 5. 2000 WORD TRANSFERS

```

MIN 304.052 20-JAN-78 11:05  
 20-JAN-78 11:05

|     |        |        |        |        |                             |        |                     |                                                |
|-----|--------|--------|--------|--------|-----------------------------|--------|---------------------|------------------------------------------------|
| 034 | 002314 | 005077 | 176016 |        | RPSTART:                    | CLR    | 0RKDAE              | : INITIALIZE DISK - DAP-DAE                    |
| 035 | 002320 | 016777 | 002360 | 176014 | RP1:                        | LLIMIT | 0RKBAR              | : CORE BASE                                    |
| 036 | 002326 | 012777 | 176000 | 176004 |                             | MOV    | 0RKWORDCT, 0RKWC    | : LENGTH OF TRANSFER                           |
| 037 | 002334 | 113777 | 002406 | 176002 |                             | MOVB   | 0RKFUNCTION, 0RKCSR | : WRITE OR WRITE CHECK TO DISK                 |
| 038 | 002342 | 000002 |        |        |                             | RTI    |                     | : RETURN TO MAINLINE CODE                      |
| 039 | 002344 | 032777 | 100200 | 175772 | IRP:                        | BIT    | #100200, 0RKCSR     | : INTERRUPT VECTOR POINTS HERE                 |
| 040 | 002352 | 003002 |        |        |                             | BGT    | +.6                 |                                                |
| 041 | 002354 | 104000 |        |        |                             | HLT    |                     |                                                |
| 042 | 002356 | 000756 |        |        |                             | BR     | 0RKSTART            | : RP-11 ERROR FLAG UP OR READ ERROR            |
| 043 | 002360 | 032777 | 000037 | 175750 |                             | BIT    | #37, 0RKDAE         | : DISK AT UPPER LIMIT                          |
| 044 | 002366 | 001354 |        |        |                             | BNE    | 0RK1                |                                                |
| 045 | 002370 | 122777 | 000031 | 175736 |                             | CMPB   | #31, 0RKDAE         |                                                |
| 046 | 002376 | 001350 |        |        |                             | BNE    | 0RK1                | : NO                                           |
| 047 | 002400 | 000337 | 002406 |        |                             | SWAB   | 0RKFUNCTION         | : CHANGE COMMAND                               |
| 048 | 002404 | 000743 |        |        |                             | BR     | 0RKSTART            | : RESTART NEW TRANSFER OF DISK                 |
| 049 |        |        |        |        |                             |        |                     |                                                |
| 050 | 002406 | 000000 |        |        | 0RKFUNCTION:                | 0      |                     | : DISK COMMAND                                 |
| 051 |        |        |        |        | : RP11 DISK SERVICE ROUTINE |        |                     |                                                |
| 052 | 002410 | 112777 | 000001 | 176010 | RPSTART:                    | MOVB   | #1, 0RKCSR          | : INITIALIZE DISK - DAP-DAE                    |
| 053 | 002416 | 105777 | 176004 |        |                             | TSTB   | 0RKCSR              |                                                |
| 054 | 002422 | 100375 |        |        |                             | BPL    | -.4                 |                                                |
| 055 | 002424 | 016777 | 000254 | 175772 | RP1:                        | MOV    | LLIMIT, 0RKBAR      | : INITIAL CORE ADDRESS                         |
| 056 | 002432 | 012777 | 176000 | 175762 |                             | MOV    | 0RKWORDCT, 0RKWC    | : LENGTH OF TRANSFER                           |
| 057 | 002440 | 113777 | 000432 | 175760 |                             | MOVB   | 0RKFUNCTION, 0RKCSR | : WRITE OR WRITE CHECK TO DISK                 |
| 058 | 002446 | 000002 |        |        |                             | RTI    |                     | : RETURN TO MAINLINE CODE                      |
| 059 | 002450 | 032777 | 100200 | 175750 | IRP:                        | BIT    | #100200, 0RKCSR     | : INTERRUPT VECTOR POINTS HERE                 |
| 060 | 002456 | 003002 |        |        |                             | BGT    | +.6                 |                                                |
| 061 | 002460 | 104000 |        |        |                             | HLT    |                     |                                                |
| 062 | 002462 | 000752 |        |        |                             | BR     | 0RKSTART            | : RP11 READY NOT UP OR ERROR                   |
| 063 | 002464 | 122777 | 000312 | 175716 |                             | CMPB   | #312, 0RKCA         | : CYLINDER NO. 312, 624 FOR RPC3               |
| 064 | 002472 | 001354 |        |        |                             | BNE    | 0RK1                | : NO                                           |
| 065 | 002474 | 000337 | 000432 |        |                             | SWAB   | 0RKFUNCTION         | : CHANGE COMMAND                               |
| 066 | 002500 | 000743 |        |        |                             | BR     | 0RKSTART            | : RESTART NEW TRANSFER OF DISK                 |
| 067 |        |        |        |        | : RC11 DISK SERVICE ROUTINE |        |                     |                                                |
| 068 | 002502 | 012777 | 000040 | 175612 | RCSTART:                    | MOV    | #40, 0RKCDAR        | : INITIALIZE DISK - DAR-DAE                    |
| 069 | 002510 | 016777 | 000170 | 175610 | RC2:                        | MOV    | LLIMIT, 0RKCDAR     | : CORE BASE                                    |
| 070 | 002516 | 012777 | 176040 | 175600 |                             | MOV    | 0RKWORDCT, 0RKWC    | : LENGTH OF TRANSFER                           |
| 071 | 002524 | 113777 | 002572 | 175576 |                             | MOVB   | 0RKFUNCTION, 0RKCSR | : WRITE OR WRITE CHECK TO DISK                 |
| 072 | 002532 | 000002 |        |        |                             | RTI    |                     | : RETURN TO MAINLINE CODE                      |
| 073 | 002534 | 037727 | 175570 | 100200 | IRC:                        | BIT    | 0RKCSR, #100200     | : INTERRUPT VECTOR POINTS HERE                 |
| 074 | 002542 | 003002 |        |        |                             | BGT    | +.6                 |                                                |
| 075 | 002544 | 104000 |        |        |                             | HLT    |                     |                                                |
| 076 | 002546 | 000755 |        |        |                             | BR     | 0RKSTART            | : RC11 READY NOT UP OR ERROR IS UP             |
| 077 | 002550 | 005277 | 175546 |        |                             | INC    | 0RKCDAR             | : TO INCREASE XFER RATE                        |
| 078 | 002554 | 022777 | 002000 | 175540 |                             | CMP    | #2000, 0RKCDAR      | : DISK AT UPPER LIMIT, 4000=2, 6000=3, 10000=4 |
| 079 | 002562 | 001352 |        |        |                             | BNE    | 0RK2                | : NO                                           |
| 080 | 002564 | 000337 | 002572 |        |                             | SWAB   | 0RKFUNCTION         | : CHANGE COMMAND                               |
| 081 | 002570 | 000744 |        |        |                             | BR     | 0RKSTART            | : RESTART NEW TRANSFER OF DISK                 |
| 082 | 002572 | 000000 |        |        |                             |        | 0                   | : DISK COMMAND                                 |
| 083 |        |        |        |        | RCFUNCTION:                 |        |                     |                                                |
| 084 | 002574 | 105277 | 175520 |        | : RF11 DISK                 |        |                     |                                                |
| 085 | 002600 | 062777 | 000040 | 175502 | RFSTART:                    | INCB   | 0RKCSRH             | : INITIALIZE DISK - DAR-DAE                    |
| 086 | 002606 | 016777 | 000072 | 175500 | RF1:                        | ADD    | #40, 0RKCDAR        | : INCREASE DUTY CYCLE                          |
| 087 | 002614 | 012777 | 176040 | 175470 |                             | MOV    | LLIMIT, 0RKCDAR     | : CORE BASE                                    |
| 088 | 002622 | 113777 | 002702 | 175466 |                             | MOVB   | 0RKWORDCT, 0RKWC    | : LENGTH OF TRANSFER                           |
| 089 | 002630 | 000002 |        |        |                             | MOVB   | 0RKFUNCTION, 0RKCSR | : WRITE OR WRITE CHECK TO DISK                 |
|     |        |        |        |        |                             | RTI    |                     | : RETURN TO MAINLINE CODE                      |

334 1052 20 JAN-78 11 05 PAGE 21  
20 JAN-78 11 05

```

090 002632 037727 175460 100200 IFF: BIT 0RFDAR, #100200 ; INTERRUPT VECTOR POINTS HERE
091 002640 003002 BGT .+6 ;
092 002642 104000 HLT ; RF11 READY NOT UP OR ERROR UP
093 002644 000753 BR RFSTART ;
094 002646 062777 000040 175434 ADD #40, 0RFDAR ; INCREASE DUTY CYCLE
095 002654 122777 000003 175424 CMPB #3, 0RFDAR ; DISK AT UPPER LIMIT 7=2, 17=4, 37=8
096 002662 001351 BNE RF1 ; NO
097 002664 027727 175420 174000 CMP 0RFDAR, #174000 ; AS FAR ON DISK AS WE CAN GO
098 002672 101745 BLOS RF1 ; NO
099 002674 000337 002702 SWAB 0RFFUNCTION ; CHANGE COMMAND
100 002700 000735 BR PFSTART ; RESTART NEW TRANSFER OF DISK
101 002702 000000 ; DISK COMMAND
102 002704 004440 J ; FIRST CORE ADDRESS OF TRANSFER
103 ;
104 ;
105 ;
106 ;
107 ;
108 ;
109 ;
110 ;
111 ;
112 ;
113 ;
114 002706 000000 TCFIRST: 0 ; FIRST BLOCK TO BE SEARCHED FOR
115 002710 001101 TCLAST: 577. ; LAST BLOCK TO BE SEARCHED FOR
116 002712 000000 TCBLK: 0 ; CURRENT BLOCK FOUND
117 002714 000000 TCXPE: 0 ; THE BLOCK THAT IS EXPECTED
118 ;
119 ;
120 002716 012777 002716 175462 ; GO TO FORWARD END ZONE
121 002724 005777 175444 FENDZ: MOV #FENDZ, 0TCIV ; END ZONE VECTOR SETUP
122 002730 100403 TST 0TCST ; TEST FOR END ZONE
123 002732 105277 175434 BMI FEND1 ; AT END ZONE?
124 002736 000002 INCB 0TCCM ; SET DO - NO DELAY
125 002740 012777 002770 175440 RTI ; NO - WAIT SOME MORE
126 002746 042777 104000 175416 FEND1: MOV #TCF1, 0TCIV ; YES - NEW VECTOR
127 002754 016767 177726 177732 BIC #104000, 0TCCM ; SEARCH BLOCK FORWARD
128 002762 105277 175404 TCF1A: MOV TCFIRST, TCXPE ; COUNT WHEN THIS BLOCK IS FOUND
129 002766 000002 INCB 0TCCM ; SET DO
130 002770 032777 100200 175374 TCF1: RTI ; RETURN ON NEXT BLOCK
131 002776 003001 BIT #100200, 0TCCM ; ANY ERROR ON READ?
132 003000 104000 .+4 ;
133 003002 027767 175370 177704 HLT ; TC ERROR SET - FORWARD READ BLOCK
134 003010 002764 CMP 0TCDT, TCXPE ; IS THIS OUR BLOCK FOR SYNC
135 003012 001401 BLT TCF1A ; NO-READ SOME MORE BLOCKS
136 003014 104000 BEQ TCF2 ; YES
137 ; WE PASSED THE BLOCK
138 003016 012777 003032 175362 TCF2: MOV #TCF3, 0TCIV ; VECTOR FOR SEQUENTIAL READS
139 003024 105277 175342 INCB 0TCCM ; SET DO
140 003030 000002 RTI ; RETURN AND TEST SEQUENTIAL BLOCKS
141 ;
142 ;
143 003032 032777 100200 175332 ; FIND SEQUENTIAL BLOCK AT FORWARD DIRECTION
144 003040 003001 TCF3: BIT #100200, 0TCCM ; TEST ERROR AND READY
145 003042 104000 .+4 ;
146 003044 027767 175326 177636 HLT ; FALSE INTERRUPT ON TC-11
147 ; HAVE WE TESTED ALL BLOCKS

```

```

146 003052 001414 BEQ RENDE :YES DRIVE UNIT IN END ZONE * START LEP
147 003054 005267 177634 INC TCXPE :NO-INCREMENT EXPECTED COUNT
148 003060 027767 175312 177626 CMP ATCDT,TCXPE :IS CURRENT BLOCK CORRECT
149 003066 001401 BEQ .+4
150 003070 104000 HLT
151 003072 000427 BR TCWBK :FAILED IN FOWARD READ TO FIND NEXT BLOCK
152 003074 105277 175272 TCF4: INCB ATCCM :THIS ROUTINE WRITES A BLOCK
153 003100 000002 RTI :SET DO
154 003102 000705 XFENDZ: BR FENDZ :INDIRECT LINK
155
156 :MOVE TAPE TO REVERSE END ZONE
157 003104 012777 003104 175274 RENDE: MOV #RENDE,ATCIV :END ZONE VECTOR SETUP
158 003112 016767 177572 177574 MOV TCLAST,TCXPE :SET UP FOR REVERSE SEARCH
159 003120 005777 175250 TST ATCST :IN END ZONE
160 003124 100403 BMI RENDE :YES - START TO TURN UNIT AROUND
161 003126 105277 175240 INCB ATCCM :SET DO
162 003132 000002 RTI :NO - WAIT TILL WE ARE
163 003134 012777 004503 175230 RENDE: MOV #R+IE+RB+DO,ATCCM :FUNCTION = READ BLOCK, REVERSE AND GO
164 003142 012777 003232 175236 MOV #TCR1,ATCIV :SET UP NEW INTERRUPT VECTOR
165 003150 000002 RTI
166 ;WRITE FORWARD ALL BLOCKS EXCEPT 0
167
168 003152 012777 003204 175226 TCWBK: MOV #TCWB1,ATCIV :INTERRUPT VECTOR FOR WRITE
169 003160 012777 177400 175214 MOV #-400,ATCWC :ONE BLOCK
170 003166 012777 003440 175210 MOV #TCWBUF,ATCBA :THE WRITE BUFFER ADDRESS
171 003174 112777 000515 175170 MOV #IE+WD+DO,ATCCM :WRITE THE BLOCK
172 003202 000002 RTI :RETURN WHEN BLOCK IS WRITTEN
173 003204 005777 175162 TCWB1: TST ATCCM :ANY ERRORS
174 003210 100001 BPL .+4
175 003212 104000 HLT
176 003214 012777 003032 175164 MOV #TCF3,ATCIV :SEARCH BLOCK VECTOR
177 003222 112777 000502 175142 MOV #IE+RB,ATCCM :READ BLOCK
178 003230 000721 BR TCF4 :FIND THE NEXT BLOCK
179
180 003232 032777 100200 175132 TCR1: BIT #100200,ATCCM :TEST FOR ERROR AND READY
181 003240 003001 .+4
182 003242 104000 HLT
183 003244 027767 175126 177442 CMP ATCDT,TCXPE :DECTAPE ERROR ON READ BLOCK REVERSE
184 003252 001406 BEQ TCR2 :IS IT OUR FIRST BLOCK
185 003254 002002 BGE TCR1A :YES - GO TEST THE REST
186 003256 104000 HLT :NO - HAVE WE PASSED THE BLOCK
187 003260 000711 BR RENDE :WE PASS OUR BLOCK
188 003262 105277 175104 TCR1A: INCB ATCCM :GO TO END ZONE AND TRY AGAIN
189 003266 000002 RTI :SET DO
190 003270 012777 003304 175110 TCR2: MOV #TCR3,ATCIV :WE FOUND OUR FIRST BLOCK
191 003276 105277 175070 INCB ATCCM :SET UP INTERRUPT TO TEST ALL BLOCKS
192 003302 000002 RTI :SET DO
193 :WAIT FOR NEXT BLOCK TO INTERRUPT
194
:FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION

```

K02

MAIN. MACY11 30A.1052' 20-JAN-78 11:05 PAGE 23  
1208A.111 20-JAN-78 11:05

1195 003304 032777 100200 175060 TCR3: BIT  
1196 003312 003001 BGT

100200.2TCOM ;TEST FOR READ AND ERROR  
.4

FEJ 0720

L02

MAIN. MAC-11 3061052 20-JAN-78 11:05 PAGE 24

20-JAN-78 11:05

117 003314 104000

HLT

JEFF A FENCING, DEJUVENIA, 21, IN RELEASE

FEB 0024

```

1198 003316 026777 177364 175052 CMP TCFIRST, @TCDT :DID WE DO ALL THE BLOCKS
1199 003324 001666 177362 175012 BEQ XFEND2 :YES - GO TO END ZONE TO RESTART
1200 003326 005367 177362 175012 DEC TCXPE :NO - DECREMENT BLOCK NUMBER
1201 003332 027767 175040 177354 CMP @TCDT, TCXPE :TEST SEQUENTIAL BLOCK IN REVERSE
1202 003340 001401 175040 177354 BEQ .+4 :
1203 003342 104000 175040 177354 HLT :TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1204 003344 000403 175040 177354 BR TCR4 :THIS ROUTINE READ A BLOCK
1205 003346 105277 175020 177354 INCB TCR4 :SET DO
1206 003352 000002 175020 177354 RTI @TCCTM :LETS TRY A NEW BLOCK
1207
1208
1209 003354 012777 003412 175024 :READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1210 003362 012777 177400 175012 TCRBK: MOV @TCRB1, @TCIV :SET UP INTERRUPT VECTOR
1211 003370 012777 003440 175006 MOV #-400, @TCWC :READ ONE BLOCK
1212 003376 112777 000505 174766 MOV @TCRB1, @TCBA :WHERE BUFFER IS
1213 003404 004767 175024 174766 MOV @IE+@RD+@DO, @TCCTM :READ THE BLOCK
1214 003410 000002 175024 174766 JSR %7, TC1 :CHECK DATA BUFFER
1215 003412 005777 174754 174766 RTI @TCCTM :EXIT - RETURN WHEN BLOCK IS READ
1216 003416 100001 174754 174766 BPL .+4 :AND ERRORS
1217 003420 104000 174754 174766 HLT :
1218 003422 012777 003304 174756 MOV @TCR3, @TCIV :DECTAPE ERROR
1219 003430 112777 000502 174734 MOV @IE+@RB, @TCCTM :NEW VECTOR FOR BLOCK SEARCH
1220 003436 000743 174734 174734 BR TCR4 :READ BLOCK FUNCTION
1221
1222
1223 003440 000001 174734 174734 :THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1224 003440 000100 174734 174734 TCRBUF:
1225 000001 174734 174734 174734 TCRBUF:
1226 000100 174734 174734 174734 N=1
1227 174734 174734 174734 174734 .REPT 100
1228 174734 174734 174734 174734 N
1229 174734 174734 174734 174734 -N
1230 174734 174734 174734 174734 N=N+1
1231 003440 000001 174734 174734 .ENDR
1232 003442 177777 174734 174734 N
1233 000002 174734 174734 174734 -N
1234 003444 000002 174734 174734 N=N+1
1235 003446 177776 174734 174734 N
1236 000003 174734 174734 174734 -N
1237 003450 000003 174734 174734 N=N+1
1238 003452 177775 174734 174734 N
1239 000004 174734 174734 174734 -N
1240 003454 000004 174734 174734 N=N+1
1241 003456 177774 174734 174734 N
1242 000005 174734 174734 174734 -N
1243 003460 000005 174734 174734 N=N+1
1244 003462 177773 174734 174734 N
1245 000006 174734 174734 174734 -N
1246 003464 000006 174734 174734 N=N+1
1247 003466 177772 174734 174734 N
1248 000007 174734 174734 174734 -N
1249 003470 000007 174734 174734 N=N+1
1250 003472 177771 174734 174734 N
1251 000010 174734 174734 174734 -N
1252 003474 000010 174734 174734 N=N+1
1253 003476 177770 174734 174734 N
1254 174734 174734 174734 174734 -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 |                            |

MAIN. MACY.1 30A(1052) 20-JAN-78 11:05 PAGE 28  
 C2UKBH.F11 20-JAN-78 11:05

|      |        |        |       |                            |
|------|--------|--------|-------|----------------------------|
| 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 BUFFER |
| 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    |                            |

MAIN. MAC-11 3041052 20-JAN-76 11:05 PM JF 29  
 20481 20-JAN-76 11:05

CC23

|      |        |        |     |
|------|--------|--------|-----|
| 1420 | 000101 | N=N+1  |     |
| 1421 | 000100 | REP    | 100 |
| 1422 |        | N=N-1  |     |
| 1423 |        | -N     |     |
| 1424 |        | N      |     |
| 1425 |        | ENDP   |     |
| 1426 |        | N=N-1  |     |
| 1427 | 000100 |        |     |
| 1428 | 004040 | 177700 |     |
| 1429 | 004042 | 000100 |     |
| 1430 |        | 000077 |     |
| 1431 | 004044 | 177701 |     |
| 1432 | 004046 | 000077 |     |
| 1433 |        | 000076 |     |
| 1434 | 004050 | 177702 |     |
| 1435 | 004052 | 000076 |     |
| 1436 |        | 000075 |     |
| 1437 | 004054 | 177703 |     |
| 1438 | 004056 | 000075 |     |
| 1439 |        | 000074 |     |
| 1440 | 004060 | 177704 |     |
| 1441 | 004062 | 000074 |     |
| 1442 |        | 000073 |     |
| 1443 | 004064 | 177705 |     |
| 1444 | 004066 | 000073 |     |
| 1445 |        | 000072 |     |
| 1446 | 004070 | 177706 |     |
| 1447 | 004072 | 000072 |     |
| 1448 |        | 000071 |     |
| 1449 | 004074 | 177707 |     |
| 1450 | 004076 | 000071 |     |
| 1451 |        | 000070 |     |
| 1452 | 004100 | 177710 |     |
| 1453 | 004102 | 000070 |     |
| 1454 |        | 000067 |     |
| 1455 | 004104 | 177711 |     |
| 1456 | 004106 | 000067 |     |
| 1457 |        | 000066 |     |
| 1458 | 004110 | 177712 |     |
| 1459 | 004112 | 000066 |     |
| 1460 |        | 000065 |     |
| 1461 | 004114 | 177713 |     |
| 1462 | 004116 | 000065 |     |
| 1463 |        | 000064 |     |
| 1464 | 004120 | 177714 |     |
| 1465 | 004122 | 000064 |     |
| 1466 |        | 000063 |     |
| 1467 | 004124 | 177715 |     |
| 1468 | 004126 | 000063 |     |
| 1469 |        | 000062 |     |
| 1470 | 004130 | 177716 |     |
| 1471 | 004132 | 000062 |     |
| 1472 |        | 000061 |     |
| 1473 | 004134 | 177717 |     |
| 1474 | 004136 | 000061 |     |
| 1475 |        | 000060 |     |
| 1476 | 004140 | 177720 |     |
| 1477 |        | -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

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

34-052  
20-JAN-59

|        |        |  |                             |
|--------|--------|--|-----------------------------|
| 004254 | 177743 |  |                             |
| 004256 | 000035 |  |                             |
| 004260 | 000034 |  | :DEC TAPE READ WRITE BUFFER |
| 004262 | 177744 |  |                             |
| 004264 | 000034 |  | :DEC TAPE READ WRITE BUFFER |
| 004266 | 000033 |  |                             |
| 004270 | 177745 |  | :DEC TAPE READ WRITE BUFFER |
| 004272 | 000033 |  |                             |
| 004274 | 000032 |  | :DEC TAPE READ WRITE BUFFER |
| 004276 | 177746 |  |                             |
| 004300 | 000031 |  | :DEC TAPE READ WRITE BUFFER |
| 004302 | 177747 |  |                             |
| 004304 | 000031 |  | :DEC TAPE READ WRITE BUFFER |
| 004306 | 000030 |  |                             |
| 004310 | 177750 |  | :DEC TAPE READ WRITE BUFFER |
| 004312 | 000030 |  |                             |
| 004314 | 000027 |  | :DEC TAPE READ WRITE BUFFER |
| 004316 | 177751 |  |                             |
| 004320 | 000027 |  | :DEC TAPE READ/WRITE BUFFER |
| 004322 | 000026 |  |                             |
| 004324 | 177752 |  | :DEC TAPE READ WRITE BUFFER |
| 004326 | 000026 |  |                             |
| 004330 | 000025 |  | :DEC TAPE READ/WRITE BUFFER |
| 004332 | 177753 |  |                             |
| 004334 | 000025 |  | :DEC TAPE READ/WRITE BUFFER |
| 004336 | 000024 |  |                             |
| 004340 | 177754 |  | :DEC TAPE READ/WRITE BUFFER |
| 004342 | 000024 |  |                             |
| 004344 | 000023 |  | :DEC TAPE READ/WRITE BUFFER |
| 004346 | 177755 |  |                             |
| 004350 | 000023 |  | :DEC TAPE READ/WRITE BUFFER |
| 004352 | 000022 |  |                             |
| 004354 | 177756 |  | :DEC TAPE READ/WRITE BUFFER |
| 004356 | 000022 |  |                             |
| 004360 | 000021 |  | :DEC TAPE READ/WRITE BUFFER |
| 004362 | 177757 |  |                             |
| 004364 | 000021 |  | :DEC TAPE READ/WRITE BUFFER |
| 004366 | 000020 |  |                             |
|        | 177760 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 000020 |  |                             |
|        | 000017 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 177761 |  |                             |
|        | 000017 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 000016 |  |                             |
|        | 177762 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 000016 |  |                             |
|        | 000015 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 177763 |  |                             |
|        | 000015 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 000014 |  |                             |
|        | 177764 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 000014 |  |                             |
|        | 000013 |  | :DEC TAPE READ/WRITE BUFFER |
|        | 177765 |  |                             |
|        | 000013 |  | :DEC TAPE READ WRITE BUFFER |

MAIN PAGE 11 304 1052 20-JAN-78 11:05 PAGE 32  
 JOB BH.F11 20-JAN-78 11:05

SEG 0032

```

1590 000012 N=N-1
1591 004370 177766 -N
1592 004372 000012 N
1593 000011 N=N-1 :DEC TAPE READ WRITE BUFFER
1594 004374 177767 -N
1595 004376 000011 N
1596 000010 N=N-1 :DEC TAPE READ WRITE BUFFER
1597 004400 177770 -N
1598 004402 000010 N
1599 000007 N=N-1 :DEC TAPE READ WRITE BUFFER
1600 004404 177771 -N
1601 004406 000007 N
1602 000006 N=N-1 :DEC TAPE READ/WRITE BUFFER
1603 004410 177772 -N
1604 004412 000006 N
1605 000005 N=N-1 :DEC TAPE READ/WRITE BUFFER
1606 004414 177773 -N
1607 004416 000005 N
1608 000004 N=N-1 :DEC TAPE READ/WRITE BUFFER
1609 004420 177774 -N
1610 004422 000004 N
1611 000003 N=N-1 :DEC TAPE READ/WRITE BUFFER
1612 004424 177775 -N
1613 004426 000003 N
1614 000002 N=N-1 :DEC TAPE READ/WRITE BUFFER
1615 004430 177776 -N
1616 004432 000002 N
1617 000001 N=N-1 :DEC TAPE READ/WRITE BUFFER
1618 004434 177777 -N
1619 004436 000001 N
1620 :DEC TAPE READ/WRITE BUFFER
1621 004440 012767 004440 012020 BEGIN: MOV #BEGIN, RETURN :FOR SCOPING
1622 004446 104400 SCOPE
1623 004450 012737 004000 016462 MOV #4000, #ICOUNT :ITERATION COUNT
1624 :TEST COMPARE INSTRUCTION INDEXED
1625 004456 012700 177770 MOV #-10, %0 :MINUS 10 TO REG 0
1626 004462 026027 016710 125252 CMP A(0), #125252 :A INDEX BY MINUS 10 TO #125252
1627 004470 001401 BEQ .+4
1628 004472 104000 HLT
1629 004474 104400 :COMPARE WITH INDEX FAILED
1630 SCOPE
1631 004476 022760 125252 016710 CMP #125252, A 0 :A INDEXED
1632 004504 001401 BEQ .+4
1633 004506 104000 HLT
1634 004510 104400 :COMPARE FAILED DESTINATION INDEXED
1635 SCOPE
1636 SET "ISR" FOR DISKS AND KWILL TO CURRENT BANK
1637 004512 010700 MOV %7, %0 :CURRENT BANK
1638 004514 042700 007777 BIC #007777, %0 :LEAVE ONLY BANK BITS
1639 004520 062700 002044 ADD #LK3, %0 :ADD IN CLOCK ENTRANCE
1640 004524 010037 000100 MOV %0, #100 :LINE CLOCK, KWILL
1641 004530 042700 007777 BIC #007777, %0
1642 004534 062700 002632 ADD #IRF, %0
1643 004540 010037 000204 MOV %0, #204 :RFILE ISR
1644 004544 042700 007777 BIC #007777, %0
1645 004550 062700 002534 ADD #IRC, %0
1646 004554 010037 000210 MOV %0, #210 :RFILE ISR

```

20-JAN-78 11:05  
20-JAN-78 11:05

SE1 0033

|      |        |        |        |        |       |               |                                   |
|------|--------|--------|--------|--------|-------|---------------|-----------------------------------|
| 1646 | 004560 | 042700 | 007777 |        | MOV   | #007777, %0   |                                   |
| 1647 | 004564 | 062700 | 002344 |        | MOV   | #10, %0       |                                   |
| 1648 | 004570 | 010037 | 000220 |        | BIC   | #0, %0        | :R0: :SR                          |
| 1649 | 004574 | 042700 | 007777 |        | ADD   | #7777, %0     |                                   |
| 1650 | 004600 | 062700 | 002450 |        | MOV   | #0, %0        |                                   |
| 1651 | 004604 | 010037 | 000254 |        | BIC   | #0, %0        | :R0: :SR                          |
| 1652 | 004610 | 042700 | 007777 |        | ADD   | #007777, %0   |                                   |
| 1653 | 004614 | 063700 | 002704 |        | MOV   | #0, %0        |                                   |
| 1654 | 004620 | 010067 | 176060 |        | BIC   | #007777, %0   | :CHANGE DISK NPR BUFFER           |
| 1655 | 004624 | 042700 | 007777 |        | ADD   | #007777, %0   |                                   |
| 1656 | 004630 | 062700 | 017004 |        | MOV   | #0, %0        | :CHANGE STACK TO EXISTING BANK    |
| 1657 | 004634 | 010006 |        |        |       |               |                                   |
| 1658 |        |        |        |        |       |               |                                   |
| 1659 | 004636 | 012700 | 000010 |        | MOV   | #10, %0       | :INDEX                            |
| 1660 | 004642 | 026027 | 016710 | 052525 | CMP   | A(0), #052525 |                                   |
| 1661 | 004650 | 001401 |        |        | BEQ   | #+4           |                                   |
| 1662 | 004652 | 104000 |        |        | HLT   |               | :COMPARE FAILED                   |
| 1663 | 004654 | 104400 |        |        | SCOPE |               |                                   |
| 1664 |        |        |        |        |       |               |                                   |
| 1665 |        |        |        |        |       |               |                                   |
| 1666 | 004656 | 022760 | 052525 | 016710 | CMP   | #052525, A(0) | :REGISTER 0 CONTAINS 000010       |
| 1667 | 004664 | 001401 |        |        | BEQ   | #+4           |                                   |
| 1668 | 004666 | 104000 |        |        | HLT   |               | :COMPARE FAILED                   |
| 1669 | 004670 | 104400 |        |        | SCOPE |               |                                   |
| 1670 |        |        |        |        |       |               |                                   |
| 1671 |        |        |        |        |       |               |                                   |
| 1672 | 004672 | 026060 | 016710 | 016710 | CMP   | A(0), A(0)    | :REGISTER 0 CONTAINS 000010       |
| 1673 | 004700 | 001401 |        |        | BEQ   | #+4           |                                   |
| 1674 | 004702 | 104000 |        |        | HLT   |               | :COMPARE FAILED                   |
| 1675 | 004704 | 104400 |        |        | SCOPE |               |                                   |
| 1676 |        |        |        |        |       |               |                                   |
| 1677 | 004706 | 012700 | 177770 |        | MOV   | #-10, %0      |                                   |
| 1678 | 004712 | 026060 | 016710 | 016710 | CMP   | A(0), A(0)    |                                   |
| 1679 | 004720 | 001401 |        |        | BEQ   | #+4           |                                   |
| 1680 | 004722 | 104000 |        |        | HLT   |               | :COMPARE FAILED                   |
| 1681 | 004724 | 104400 |        |        | SCOPE |               |                                   |
| 1682 |        |        |        |        |       |               |                                   |
| 1683 |        |        |        |        |       |               |                                   |
| 1684 | 004726 | 012701 | 000004 |        | MOV   | #+4, %1       | :REGISTER 0 CONTAINS 177770 (-10) |
| 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)  |

304 105 20-JUN-78 11:05

```

1702 005006 026160 016710 016710 016710 016710 016710 016710 016710
1703 005014 001401 016710 016710 016710 016710 016710 016710 016710
1705 005016 104000 016710 016710 016710 016710 016710 016710 016710
1706 005020 104400 016710 016710 016710 016710 016710 016710 016710
1708 005022 116700 011677 011677 011677 011677 011677 011677 011677
1710 005026 022700 000035 000035 000035 000035 000035 000035 000035
1711 005032 001401 016710 016710 016710 016710 016710 016710 016710
1712 005034 104000 016710 016710 016710 016710 016710 016710 016710
1713 005036 104400 016710 016710 016710 016710 016710 016710 016710
1715 005040 012700 177770 177770 177770 177770 177770 177770 177770
1716 005044 016067 016710 016710 016710 016710 016710 016710 016710
1717 005052 026727 011654 011654 011654 011654 011654 011654 011654
1718 005060 001401 016710 016710 016710 016710 016710 016710 016710
1720 005062 104000 016710 016710 016710 016710 016710 016710 016710
1721 005064 104400 016710 016710 016710 016710 016710 016710 016710
1722 005066 012700 000010 000010 000010 000010 000010 000010 000010
1723 005072 016067 016710 016710 016710 016710 016710 016710 016710
1724 005100 026727 011626 011626 011626 011626 011626 011626 011626
1725 005106 001401 016710 016710 016710 016710 016710 016710 016710
1726 005110 104000 016710 016710 016710 016710 016710 016710 016710
1727 005112 104400 016710 016710 016710 016710 016710 016710 016710
1728 005114 012700 177770 177770 177770 177770 177770 177770 177770
1729 005120 012760 125252 016732 016732 016732 016732 016732 016732
1730 005126 023727 016722 125252 125252 125252 125252 125252 125252
1731 005134 001401 016710 016710 016710 016710 016710 016710 016710
1732 005136 104000 016710 016710 016710 016710 016710 016710 016710
1733 005140 104400 016710 016710 016710 016710 016710 016710 016710
1734 005142 012700 000010 000010 000010 000010 000010 000010 000010
1735 005146 012760 052525 016732 016732 016732 016732 016732 016732
1736 005154 023727 016742 052525 052525 052525 052525 052525 052525
1737 005162 001401 016710 016710 016710 016710 016710 016710 016710
1738 005164 104000 016710 016710 016710 016710 016710 016710 016710
1739 005166 104400 016710 016710 016710 016710 016710 016710 016710
1740 005170 012767 177777 011534 011534 011534 011534 011534 011534
1741 005176 012700 177770 011522 011522 011522 011522 011522 011522
1742 005202 046067 016710 011516 011516 011516 011516 011516 011516
1743 005210 026727 011516 052525 052525 052525 052525 052525 052525
1744 005216 001401 016710 016710 016710 016710 016710 016710 016710
1745 005220 104000 016710 016710 016710 016710 016710 016710 016710
1746 005222 104400 016710 016710 016710 016710 016710 016710 016710
1747 005224 012767 177777 011500 011500 011500 011500 011500 011500
1748 005232 012700 000010 011466 011466 011466 011466 011466 011466
1749 005236 046067 016710 125252 125252 125252 125252 125252 125252
1750 005244 026727 011462 125252 125252 125252 125252 125252 125252
1751 005252 001401 016710 125252 125252 125252 125252 125252 125252

```

; REGISTER 1 CONTAINS 000010

; COMPARE FAILED

; TEST MOVE ODD BYTE TO REGISTER  
; PROBLEM 1150237-7-1 AR-72

; COMPARE FAILED

; MOV FAILED

; MOV FAILED

; MOV FAILED

; TEST BIC INSTRUCTION FOR INDEXING

; BIC FAILED

|      |        |        |        |        |                                         |                   |  |             |  |
|------|--------|--------|--------|--------|-----------------------------------------|-------------------|--|-------------|--|
| 1758 | 005254 | 104000 |        |        | HLT                                     |                   |  |             |  |
| 1759 | 005256 | 104400 |        |        | SCOPE                                   |                   |  | :BIC FAILED |  |
| 1760 |        |        |        |        |                                         |                   |  |             |  |
| 1761 | 005260 | 012737 | 177777 | 016742 | MOV                                     | #-1, 2*TEMP+10    |  |             |  |
| 1762 | 005266 | 012700 | 000010 |        | MOV                                     | #10, %0           |  |             |  |
| 1763 | 005272 | 042760 | 125252 | 016732 | BIC                                     | #125252, TEMP(0)  |  |             |  |
| 1764 | 005300 | 023727 | 016742 | 052525 | CMP                                     | 2*TEMP+10, #52525 |  |             |  |
| 1765 | 005306 | 001401 |        |        | BEQ                                     | .+4               |  |             |  |
| 1766 | 005310 | 104000 |        |        | HLT                                     |                   |  |             |  |
| 1767 | 005312 | 104400 |        |        | SCOPE                                   |                   |  | :BIC FAILED |  |
| 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                                     |                   |  |             |  |
| 1775 | 005346 | 104400 |        |        | SCOPE                                   |                   |  | :BIC FAILED |  |
| 1776 |        |        |        |        |                                         |                   |  |             |  |
| 1777 | 005350 | 012767 | 125252 | 011354 | ;TEST SUBTRACT INSTRUCTION FOR INDEXING |                   |  |             |  |
| 1778 | 005356 | 012700 | 177770 |        | MOV                                     | #125252, TEMP     |  |             |  |
| 1779 | 005362 | 166067 | 016710 | 011342 | MOV                                     | #-10, %0          |  |             |  |
| 1780 | 005370 | 001401 |        |        | SUB                                     | A(0), TEMP        |  |             |  |
| 1781 | 005372 | 104000 |        |        | BEQ                                     | .+4               |  |             |  |
| 1782 | 005374 | 104400 |        |        | HLT                                     |                   |  |             |  |
| 1783 |        |        |        |        | SCOPE                                   |                   |  | :SUB FAILED |  |
| 1784 | 005376 | 012737 | 125252 | 016732 | MOV                                     | #125252, 2*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                                     |                   |  |             |  |
| 1789 | 005422 | 104400 |        |        | SCOPE                                   |                   |  | :SUB FAILED |  |
| 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                                     |                   |  |             |  |
| 1796 | 005450 | 104400 |        |        | SCOPE                                   |                   |  | :SUB FAILED |  |
| 1797 |        |        |        |        |                                         |                   |  |             |  |
| 1798 | 005452 | 012737 | 052525 | 016732 | MOV                                     | #052525, 2*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                                     |                   |  |             |  |
| 1803 | 005476 | 104400 |        |        | SCOPE                                   |                   |  | :SUB FAILED |  |
| 1804 |        |        |        |        |                                         |                   |  |             |  |
| 1805 |        |        |        |        |                                         |                   |  |             |  |
| 1806 | 005500 | 012737 | 177777 | 016732 | ;TEST UNARYS INDEXED                    |                   |  |             |  |
| 1807 | 005506 | 012700 | 177770 |        | MOV                                     | #-1, 2*TEMP       |  |             |  |
| 1808 | 005512 | 005060 | 016742 |        | MOV                                     | #-10, %0          |  |             |  |
| 1809 | 005516 | 005737 | 016732 |        | CLR                                     | D(0)              |  |             |  |
| 1810 | 005522 | 001401 |        |        | TST                                     | 2*TEMP            |  |             |  |
| 1811 | 005524 | 104000 |        |        | BEQ                                     | .+4               |  |             |  |
| 1812 | 005526 | 104400 |        |        | HLT                                     |                   |  |             |  |
| 1813 |        |        |        |        | SCOPE                                   |                   |  | :CLR FAILED |  |

|      |        |        |        |        |       |            |             |
|------|--------|--------|--------|--------|-------|------------|-------------|
| 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   |            |             |
| 1820 | 005556 | 104400 |        |        | SCOPE |            | :CLR FAILED |
| 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   |            |             |
| 1828 | 005606 | 104400 |        |        | SCOPE |            | :COM FAILED |
| 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   |            |             |
| 1836 | 005636 | 104400 |        |        | SCOPE |            | :COM FAILED |
| 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   |            |             |
| 1843 | 005666 | 104400 |        |        | SCOPE |            | :INC FAILED |
| 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   |            |             |
| 1851 | 005716 | 104400 |        |        | SCOPE |            | :INC FAILED |
| 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   |            |             |
| 1859 | 005746 | 104400 |        |        | SCOPE |            | :DEC FAILED |
| 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   |            |             |
| 1867 | 005776 | 104400 |        |        | SCOPE |            | :DEC FAILED |
| 1868 |        |        |        |        |       |            |             |
| 1869 | 006000 | 012737 | 000001 | 016732 | MOV   | #1, @TEMP  |             |

MIN MM JOM 1052 20-JAN-78 11:05 PAGE 37  
 SUBM F.1 20-JAN-78 11:05

EE2 CC37

|      |        |        |        |        |                    |           |             |
|------|--------|--------|--------|--------|--------------------|-----------|-------------|
| 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                |           |             |
| 1875 | 006030 | 104400 |        |        | SCOPE              |           | ;NEG FAILED |
| 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                |           |             |
| 1883 | 006062 | 104400 |        |        | SCOPE              |           | ;NEG FAILED |
| 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                |           |             |
| 1892 | 006114 | 104400 |        |        | SCOPE              |           | ;ADC FAILED |
| 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                |           |             |
| 1901 | 006146 | 104400 |        |        | SCOPE              |           | ;ADC FAILED |
| 1902 |        |        |        |        |                    |           |             |
| 1903 | 006150 | 012737 | 000001 | 016732 | MOV                | #1,%TEMP  |             |
| 1904 | 006156 | 012700 | 177770 |        | MOV                | #-10,%0   |             |
| 1905 | 006162 | 000261 |        |        | SEC                |           |             |
| 1906 | 006164 | 005560 | 016742 |        | SBC                | D(0)      |             |
| 1907 | 006170 | 005737 | 016732 |        | TST                | %TEMP     |             |
| 1908 | 006174 | 001401 |        |        | BEQ                | .+4       |             |
| 1909 | 006176 | 104000 |        |        | HLT                |           |             |
| 1910 | 006200 | 104400 |        |        | SCOPE              |           | ;SBC FAILED |
| 1911 |        |        |        |        |                    |           |             |
| 1912 | 006202 | 012737 | 000001 | 016732 | MOV                | #1,%TEMP  |             |
| 1913 | 006210 | 012700 | 000010 |        | MOV                | #+10,%0   |             |
| 1914 | 006214 | 000261 |        |        | SEC                |           |             |
| 1915 | 006216 | 005560 | 016722 |        | SBC                | C(0)      |             |
| 1916 | 006222 | 005737 | 016732 |        | TST                | %TEMP     |             |
| 1917 | 006226 | 001401 |        |        | BEQ                | .+4       |             |
| 1918 | 006230 | 104000 |        |        | HLT                |           |             |
| 1919 | 006232 | 104400 |        |        | SCOPE              |           | ;SBC FAILED |
| 1920 |        |        |        |        |                    |           |             |
| 1921 |        |        |        |        |                    |           |             |
| 1922 | 006234 | 010700 |        |        | ;TEST JMP INDIRECT |           |             |
| 1923 | 006236 | 062700 | 000010 |        | MOV                | %7,%0     |             |
| 1924 | 006242 | 000110 |        |        | ADD                | #10,%0    |             |
| 1925 | 006244 | 104000 |        |        | JMP                | %0        |             |
|      |        |        |        |        | HLT                |           | ;JMP FAILED |

|      |        |        |        |        |                           |         |                      |
|------|--------|--------|--------|--------|---------------------------|---------|----------------------|
| 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                       |         |                      |
| 1938 | 006274 | 104400 |        |        | SCOPE                     |         | ;MOV REGISTOR FAILED |
| 1939 |        |        |        |        |                           |         |                      |
| 1940 |        |        |        |        | :TEST INDIRECT ADDRESSING |         |                      |
| 1941 | 006276 | 023727 | 016700 | 125252 | :TEST COMPARE INSTRUCTION |         |                      |
| 1942 | 006304 | 001401 |        |        | CMP                       | 2#B,2#B |                      |
| 1943 | 006306 | 104000 |        |        | BEQ                       | .+4     |                      |
| 1944 | 006310 | 104400 |        |        | HLT                       |         | ;CMP FAILED          |
| 1945 |        |        |        |        | SCOPE                     |         |                      |
| 1946 | 006312 | 022737 | 125252 | 016700 | CMP                       | 2#B,2#B |                      |
| 1947 | 006320 | 001401 |        |        | BEQ                       | .+4     |                      |
| 1948 | 006322 | 104000 |        |        | HLT                       |         | ;CMP FAILED          |
| 1949 | 006324 | 104400 |        |        | SCOPE                     |         |                      |
| 1950 |        |        |        |        |                           |         |                      |
| 1951 | 006326 | 023737 | 016700 | 016700 | CMP                       | 2#B,2#B |                      |
| 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                       | 2#B,%0  |                      |
| 1958 | 006346 | 022700 | 125252 |        | CMP                       | 2#B,%0  |                      |

|      |        |        |        |        |                                |                |             |
|------|--------|--------|--------|--------|--------------------------------|----------------|-------------|
| 1959 | 006352 | 001401 |        |        | BEQ                            | .+4            |             |
| 1960 | 006354 | 104000 |        |        | HLT                            |                | ;MOV FAILED |
| 1961 | 006356 | 104400 |        |        | SCOPE                          |                |             |
| 1962 |        |        |        |        |                                |                |             |
| 1963 | 006360 | 012737 | 125252 | 016732 | MOV                            | #125252,2#TEMP |             |
| 1964 | 006366 | 023737 | 016700 | 016732 | CMP                            | 2#B,2#TEMP     |             |
| 1965 | 006374 | 001401 |        |        | BEQ                            | .+4            |             |
| 1966 | 006376 | 104000 |        |        | HLT                            |                | ;MOV FAILED |
| 1967 | 006400 | 104400 |        |        | SCOPE                          |                |             |
| 1968 |        |        |        |        |                                |                |             |
| 1969 | 006402 | 013737 | 016700 | 016722 | MOV                            | 2#B,2#C        |             |
| 1970 | 006410 | 023737 | 016700 | 016722 | CMP                            | 2#B,2#C        |             |
| 1971 | 006416 | 001401 |        |        | BEQ                            | .+4            |             |
| 1972 | 006420 | 104000 |        |        | HLT                            |                | ;MOV FAILED |
| 1973 | 006422 | 104400 |        |        | SCOPE                          |                |             |
| 1974 |        |        |        |        |                                |                |             |
| 1975 | 006424 | 012700 | 177777 |        | ;TEST BIC INSTRUCTION INDIRECT |                |             |
| 1976 | 006430 | 043700 | 016700 |        | MOV                            | #-1,%0         |             |
| 1977 | 006434 | 020027 | 052525 |        | BIC                            | 2#B,%0         |             |
| 1978 | 006440 | 001401 |        |        | CMP                            | %0,#052525     |             |
| 1979 | 006442 | 104000 |        |        | BEQ                            | .+4            |             |
| 1980 | 006444 | 104400 |        |        | HLT                            |                | ;BIC FAILED |
| 1981 |        |        |        |        | SCOPE                          |                |             |
| 1982 | 006446 | 012737 | 177777 | 016732 | MOV                            | #-1,2#TEMP     |             |
| 1983 | 006454 | 042737 | 125252 | 016732 | BIC                            | #125252,2#TEMP |             |
| 1984 | 006462 | 022737 | 052525 | 016732 | CMP                            | #052525,2#TEMP |             |
| 1985 | 006470 | 001401 |        |        | BEQ                            | .+4            |             |
| 1986 | 006472 | 104000 |        |        | HLT                            |                | ;BIC FAILED |
| 1987 | 006474 | 104400 |        |        | SCOPE                          |                |             |
| 1988 |        |        |        |        |                                |                |             |
| 1989 | 006476 | 012737 | 177777 | 016722 | MOV                            | #-1,2#C        |             |
| 1990 | 006504 | 043737 | 016700 | 016722 | BIC                            | 2#B,2#C        |             |
| 1991 | 006512 | 023727 | 016722 | 052525 | CMP                            | 2#C,#52525     |             |
| 1992 | 006520 | 001401 |        |        | BEQ                            | .+4            |             |
| 1993 | 006522 | 104000 |        |        | HLT                            |                | ;BIC FAILED |
| 1994 | 006524 | 104400 |        |        | SCOPE                          |                |             |
| 1995 |        |        |        |        |                                |                |             |
| 1996 |        |        |        |        |                                |                |             |
| 1997 | 006526 | 012700 | 125252 |        | ;TEST SUBTRACT INSTRUCTION     |                |             |
| 1998 | 006532 | 163700 | 016700 |        | MOV                            | #125252,%0     |             |
| 1999 | 006536 | 020027 | 000000 |        | SUB                            | 2#B,%0         |             |
| 2000 | 006542 | 001401 |        |        | CMP                            | %0,#0          |             |
| 2001 | 006544 | 104000 |        |        | BEQ                            | .+4            |             |
| 2002 | 006546 | 104400 |        |        | HLT                            |                | ;SUB FAILED |
| 2003 |        |        |        |        | SCOPE                          |                |             |
| 2004 | 006550 | 012737 | 125252 | 016732 | MOV                            | #125252,2#TEMP |             |
| 2005 | 006556 | 166737 | 010116 | 016732 | SUB                            | B,2#TEMP       |             |
| 2006 | 006564 | 001401 |        |        | BEQ                            | .+4            |             |
| 2007 | 006566 | 104000 |        |        | HLT                            |                | ;SUB FAILED |
| 2008 | 006570 | 104400 |        |        | SCOPE                          |                |             |
| 2009 |        |        |        |        |                                |                |             |
| 2010 | 006572 | 012767 | 125252 | 010132 | MOV                            | #125252,TEMP   |             |
| 2011 | 006600 | 163767 | 016700 | 010124 | SUB                            | 2#B,TEMP       |             |
| 2012 | 006606 | 005767 | 010120 |        | TST                            | TEMP           |             |
| 2013 | 006612 | 001401 |        |        | BEQ                            | .+4            |             |
| 2014 | 006614 | 104000 |        |        | HLT                            |                | ;SUB FAILED |

MAIN MACV11 30A1052 20 JAN 78 11.05 PAGE 40  
 2018H P11 20 JAN 78 11.05

|      |        |        |        |        |                                         |                |
|------|--------|--------|--------|--------|-----------------------------------------|----------------|
| 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                                     |                |
| 2022 | 006642 | 104400 |        |        | SCOPE                                   | :TST FAILED    |
| 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                                     |                |
| 2029 | 006670 | 104400 |        |        | SCOPE                                   | :COM FAILED    |
| 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                                     |                |
| 2036 | 006714 | 104400 |        |        | SCOPE                                   | :INC FAILED    |
| 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                                     |                |
| 2043 | 006740 | 104400 |        |        | SCOPE                                   | :DEC FAILED    |
| 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 | 007036 | 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       |

MAIN MACY11 3041052 20-JAN-78 11:05 PAGE 41  
 JOB BH P11 20-JAN-78 11:05

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

;TEST BIC INSTRUCTION INDIRECT WITH INDEXING

MAIN. MAC 111 304 1052 20-JAN-78 11:05 PAGE 42  
 120KBM F. 11 20-JAN-78 11:05

|      |        |        |        |       |                                     |  |  |  |             |
|------|--------|--------|--------|-------|-------------------------------------|--|--|--|-------------|
| 2127 | 007306 | 104000 |        | HLT   |                                     |  |  |  |             |
| 2128 | 007310 | 104400 |        | SCOPE |                                     |  |  |  | :SUB FAILED |
| 2129 |        |        |        |       |                                     |  |  |  |             |
| 2130 |        |        |        |       |                                     |  |  |  |             |
| 2131 | 007312 | 005000 |        |       | :TEST ADD INDIRECT WITH INDEXING    |  |  |  |             |
| 2132 | 007314 | 067700 | 007362 | CLR   | %0                                  |  |  |  |             |
| 2133 | 007320 | 022700 | 125252 | ADD   | 2B+2,%0                             |  |  |  |             |
| 2134 | 007324 | 001401 |        | CMP   | #125252,%0                          |  |  |  |             |
| 2135 | 007326 | 104000 |        | BEQ   | .+4                                 |  |  |  |             |
| 2136 | 007330 | 104400 |        | HLT   |                                     |  |  |  | :ADD FAILED |
| 2137 |        |        |        | SCOPE |                                     |  |  |  |             |
| 2138 | 007332 | 005037 | 016732 | CLR   | 2#TEMP                              |  |  |  |             |
| 2139 | 007336 | 062777 | 125252 | ADD   | #125252,2#TEMP+2                    |  |  |  |             |
| 2140 | 007344 | 022737 | 125252 | CMP   | #125252,2#TEMP                      |  |  |  |             |
| 2141 | 007352 | 001401 |        | BEQ   | .+4                                 |  |  |  |             |
| 2142 | 007354 | 104000 |        | HLT   |                                     |  |  |  | :ADD FAILED |
| 2143 | 007356 | 104400 |        | SCOPE |                                     |  |  |  |             |
| 2144 | 007360 | 012737 | 125252 | MOV   | #125252,2#TEMP                      |  |  |  |             |
| 2145 | 007366 | 067777 | 007324 | ADD   | 2A+6,2#TEMP+2                       |  |  |  |             |
| 2146 | 007374 | 023727 | 016732 | CMP   | 2#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 | MOV   | %-1,2#TEMP                          |  |  |  |             |
| 2153 | 007416 | 005077 | 007312 | CLR   | 2#TEMP+2                            |  |  |  |             |
| 2154 | 007422 | 005737 | 016732 | TST   | 2#TEMP                              |  |  |  |             |
| 2155 | 007426 | 001401 |        | BEQ   | .+4                                 |  |  |  |             |
| 2156 | 007430 | 104000 |        | HLT   |                                     |  |  |  | :TST FAILED |
| 2157 | 007432 | 104400 |        | SCOPE |                                     |  |  |  |             |
| 2158 |        |        |        |       |                                     |  |  |  |             |
| 2159 | 007434 | 012737 | 125252 | MOV   | #125252,2#TEMP                      |  |  |  |             |
| 2160 | 007442 | 005177 | 007266 | COM   | 2#TEMP+2                            |  |  |  |             |
| 2161 | 007446 | 022737 | 052525 | CMP   | #052525,2#TEMP                      |  |  |  |             |
| 2162 | 007454 | 001401 |        | BEQ   | .+4                                 |  |  |  |             |
| 2163 | 007456 | 104000 |        | HLT   |                                     |  |  |  | :COM FAILED |
| 2164 | 007460 | 104400 |        | SCOPE |                                     |  |  |  |             |
| 2165 |        |        |        |       |                                     |  |  |  |             |
| 2166 | 007462 | 005037 | 016732 | CLR   | 2#TEMP                              |  |  |  |             |
| 2167 | 007466 | 005277 | 007242 | INC   | 2#TEMP+2                            |  |  |  |             |
| 2168 | 007472 | 022737 | 000001 | CMP   | #1,2#TEMP                           |  |  |  |             |
| 2169 | 007500 | 001401 |        | BEQ   | .+4                                 |  |  |  |             |
| 2170 | 007502 | 104000 |        | HLT   |                                     |  |  |  | :INC FAILED |
| 2171 | 007504 | 104400 |        | SCOPE |                                     |  |  |  |             |
| 2172 |        |        |        |       |                                     |  |  |  |             |
| 2173 | 007506 | 005037 | 016732 | CLR   | 2#TEMP                              |  |  |  |             |
| 2174 | 007512 | 005377 | 007216 | DEC   | 2#TEMP+2                            |  |  |  |             |
| 2175 | 007516 | 023727 | 016732 | CMP   | 2#TEMP,%-1                          |  |  |  |             |
| 2176 | 007524 | 001401 |        | BEQ   | .+4                                 |  |  |  |             |
| 2177 | 007526 | 104000 |        | HLT   |                                     |  |  |  | :DEC FAILED |
| 2178 | 007530 | 104400 |        | SCOPE |                                     |  |  |  |             |
| 2179 |        |        |        |       |                                     |  |  |  |             |
| 2180 | 007532 | 012737 | 000001 | MOV   | #1,2#TEMP                           |  |  |  |             |
| 2181 | 007540 | 005477 | 007170 | NEG   | 2#TEMP+2                            |  |  |  |             |
| 2182 | 007544 | 022737 | 177777 | CMP   | %-1,2#TEMP                          |  |  |  |             |

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

MIN 11:30A 1052 20-JAN-78 11:05 PAGE 44  
 20-JAN-78 11:05

|      |        |        |        |        |               |                     |                                 |
|------|--------|--------|--------|--------|---------------|---------------------|---------------------------------|
| 2239 | 010010 | 012737 | 177777 | 016722 | MOV           | #-1,%0              |                                 |
| 2240 | 010016 | 012700 | 177772 |        | MOV           | #-6,%0              |                                 |
| 2241 | 010022 | 012701 | 177772 |        | MOV           | #-6,%1              |                                 |
| 2242 | 010026 | 047071 | 016710 | 016732 | BIC           | 0A(0),TEMP 1        |                                 |
| 2243 | 010034 | 022737 | 052525 | 016722 | CMP           | #052525,%0          |                                 |
| 2244 | 010042 | 001401 |        |        | BEQ           | .+4                 |                                 |
| 2245 | 010044 | 104000 |        |        | HLT           |                     |                                 |
| 2246 | 010046 | 104400 |        |        | SCOPE         |                     | :BIC FAILED                     |
| 2247 |        |        |        |        |               |                     |                                 |
| 2248 | 010050 | 122727 | 000000 | 000001 | CMPB          | #0,%1               | :T7 FIX                         |
| 2249 | 010056 | 002401 |        |        | BLT           | .+4                 |                                 |
| 2250 | 010060 | 104000 |        |        | HLT           |                     |                                 |
| 2251 | 010062 | 104400 |        |        | SCOPE         |                     | :CMPB FAILED                    |
| 2252 |        |        |        |        |               |                     |                                 |
| 2253 | 010064 | 012700 | 177770 |        | :TEST COMPARE | INSTRUCTION INDEXED |                                 |
| 2254 | 010070 | 126027 | 016710 | 000252 | MOV           | #-10,%0             | :MINUS 10 TO REG 0              |
| 2255 | 010076 | 001401 |        |        | CMPB          | A(0),#000252        | :A INDEX BY MINUS 10 TO #125252 |
| 2256 | 010100 | 104000 |        |        | BEQ           | .+4                 |                                 |
| 2257 | 010102 | 104400 |        |        | HLT           |                     | :COMPARE WITH INDEX FAILED      |
| 2258 |        |        |        |        | SCOPE         |                     |                                 |
| 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 |        |        |        |        |       |                 |                                    |
| 2315 |        |        |        |        |       |                 | :TEST MOVE INSTRUCTION FOR INDEX   |
| 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  | TEMP,#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                       |

[illegible]

| Address | Instruction | Op-Code | Address | Instruction | Op-Code       | Comments     |
|---------|-------------|---------|---------|-------------|---------------|--------------|
| 011004  | 104000      |         |         | HLT         |               |              |
| 011006  | 104400      |         |         | SCOPE       |               | :CLPB FAILED |
| 011010  | 012737      | 177777  | 016732  | MOV         | #-1,%TEMP     |              |
| 011016  | 012700      | 177770  |         | MOV         | #-10,%0       |              |
| 011022  | 105160      | 016742  |         | COMB        | D(0)          |              |
| 011026  | 105737      | 016732  |         | TSTB        | %TEMP         |              |
| 011032  | 001401      |         |         | BEQ         | .+4           |              |
| 011034  | 104000      |         |         | HLT         |               |              |
| 011036  | 104400      |         |         | SCOPE       |               | :COMB FAILED |
| 011040  | 012737      | 177777  | 016732  | MOV         | #-1,%TEMP     |              |
| 011046  | 012700      | 000010  |         | MOV         | #10,%0        |              |
| 011052  | 105160      | 016722  |         | COMB        | C(0)          |              |
| 011056  | 105737      | 016732  |         | TSTB        | %TEMP         |              |
| 011062  | 001401      |         |         | BEQ         | .+4           |              |
| 011064  | 104000      |         |         | HLT         |               |              |
| 011066  | 104400      |         |         | SCOPE       |               | :COMB FAILED |
| 011070  | 012737      | 177777  | 016732  | MOV         | #-1,%TEMP     |              |
| 011076  | 012700      | 177770  |         | MOV         | #-10,%0       |              |
| 011102  | 105260      | 016742  |         | INCB        | D(0)          |              |
| 011106  | 105737      | 016732  |         | TSTB        | %TEMP         |              |
| 011112  | 001401      |         |         | BEQ         | .+4           |              |
| 011114  | 104000      |         |         | HLT         |               |              |
| 011116  | 023727      | 016732  | 177400  | CMP         | %TEMP,%177400 | :INCB FAILED |
| 011124  | 001401      |         |         | BEQ         | .+4           |              |
| 011126  | 104000      |         |         | HLT         |               |              |
| 011130  | 104400      |         |         | SCOPE       |               | :INCB FAILED |
| 011132  | 012737      | 177777  | 016732  | MOV         | #-1,%TEMP     |              |
| 011140  | 012700      | 000010  |         | MOV         | #+10,%0       |              |
| 011144  | 105260      | 016722  |         | INCB        | C(0)          |              |
| 011150  | 105737      | 016732  |         | TSTB        | %TEMP         |              |
| 011154  | 001401      |         |         | BEQ         | .+4           |              |
| 011156  | 104000      |         |         | HLT         |               |              |
| 011160  | 104400      |         |         | SCOPE       |               | :INCB FAILED |
| 011162  | 012737      | 000001  | 016732  | MOV         | #1,%TEMP      |              |
| 011170  | 012700      | 177770  |         | MOV         | #-10,%0       |              |
| 011174  | 105360      | 016742  |         | DECB        | D(0)          |              |
| 011200  | 105737      | 016732  |         | TSTB        | %TEMP         |              |
| 011204  | 001401      |         |         | BEQ         | .+4           |              |
| 011206  | 104000      |         |         | HLT         |               |              |
| 011210  | 104400      |         |         | SCOPE       |               | :DECB FAILED |
| 011212  | 012737      | 000001  | 016732  | MOV         | #1,%TEMP      |              |
| 011220  | 012700      | 000010  |         | MOV         | #10,%0        |              |

MAC 304, 1052) 20-JAN-78 11:05 PAGE 48  
 20-JAN-78 11:05

|      |        |        |        |        |                           |                 |              |
|------|--------|--------|--------|--------|---------------------------|-----------------|--------------|
| 2463 | 011260 | 023727 | 016732 | 000377 | CMP                       | 28TEMP, #377    |              |
| 2464 | 011266 | 001401 |        |        | BEQ                       | .+4             |              |
| 2465 | 011270 | 104000 |        |        | HLT                       |                 | :NEGB FAILED |
| 2466 | 011272 | 104400 |        |        | SCOPE                     |                 |              |
| 2467 |        |        |        |        |                           |                 |              |
| 2468 | 011274 | 012737 | 000001 | 016732 | MOV                       | #1, 28TEMP      |              |
| 2469 | 011302 | 012700 | 000010 |        | MOV                       | #+10, %0        |              |
| 2470 | 011306 | 105460 | 016722 |        | NEGB                      | C(0)            |              |
| 2471 | 011312 | 023727 | 016732 | 000377 | CMP                       | 28TEMP, #377    |              |
| 2472 | 011320 | 001401 |        |        | BEQ                       | .+4             |              |
| 2473 | 011322 | 104000 |        |        | HLT                       |                 | :NEGB FAILED |
| 2474 | 011324 | 104400 |        |        | SCOPE                     |                 |              |
| 2475 |        |        |        |        |                           |                 |              |
| 2476 | 011326 | 012737 | 177777 | 016732 | MOV                       | #-1, 28TEMP     |              |
| 2477 | 011334 | 012700 | 177770 |        | MOV                       | #-10, %0        |              |
| 2478 | 011340 | 000261 |        |        | SEC                       |                 |              |
| 2479 | 011342 | 105560 | 016742 |        | ADCB                      | D(0)            |              |
| 2480 | 011346 | 023727 | 016732 | 177400 | CMP                       | 28TEMP, #177400 |              |
| 2481 | 011354 | 001401 |        |        | BEQ                       | .+4             |              |
| 2482 | 011356 | 104000 |        |        | HLT                       |                 | :ADCB FAILED |
| 2483 | 011360 | 104400 |        |        | SCOPE                     |                 |              |
| 2484 |        |        |        |        |                           |                 |              |
| 2485 | 011362 | 012737 | 177777 | 016732 | MOV                       | #-1, 28TEMP     |              |
| 2486 | 011370 | 012700 | 000010 |        | MOV                       | #+10, %0        |              |
| 2487 | 011374 | 000261 |        |        | SEC                       |                 |              |
| 2488 | 011376 | 105560 | 016722 |        | ADCB                      | C(0)            |              |
| 2489 | 011402 | 023727 | 016732 | 177400 | CMP                       | 28TEMP, #177400 |              |
| 2490 | 011410 | 001401 |        |        | BEQ                       | .+4             |              |
| 2491 | 011412 | 104000 |        |        | HLT                       |                 | :ADCB FAILED |
| 2492 | 011414 | 104400 |        |        | SCOPE                     |                 |              |
| 2493 |        |        |        |        |                           |                 |              |
| 2494 | 011416 | 012737 | 000401 | 016732 | MOV                       | #401, 28TEMP    |              |
| 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, 28TEMP      |              |
| 2499 | 011444 | 001401 |        |        | BEQ                       | .+4             |              |
| 2500 | 011446 | 104000 |        |        | HLT                       |                 | :SBCB FAILED |
| 2501 | 011450 | 104400 |        |        | SCOPE                     |                 |              |
| 2502 |        |        |        |        |                           |                 |              |
| 2503 | 011452 | 012737 | 000001 | 016732 | MOV                       | #1, 28TEMP      |              |
| 2504 | 011460 | 012700 | 000010 |        | MOV                       | #+10, %0        |              |
| 2505 | 011464 | 000261 |        |        | SEC                       |                 |              |
| 2506 | 011466 | 105660 | 016722 |        | SBCB                      | C(0)            |              |
| 2507 | 011472 | 005737 | 016732 |        | TST                       | 28TEMP          |              |
| 2508 | 011476 | 001401 |        |        | BEQ                       | .+4             |              |
| 2509 | 011500 | 104000 |        |        | HLT                       |                 | :SBCB FAILED |
| 2510 | 011502 | 104400 |        |        | SCOPE                     |                 |              |
| 2511 |        |        |        |        |                           |                 |              |
| 2512 |        |        |        |        |                           |                 |              |
| 2513 |        |        |        |        |                           |                 |              |
| 2514 | 011504 | 123727 | 016700 | 000252 | :TEST INDIRECT ADDRESSING |                 |              |
| 2515 | 011512 | 001401 |        |        | :TEST COMPARE INSTRUCTION |                 |              |
| 2516 | 011514 | 104000 |        |        | CMPB                      | 28B, #000252    |              |
| 2517 | 011516 | 104000 |        |        | BEQ                       | .+4             |              |
| 2518 |        |        |        |        | HLT                       |                 | :CMPB FAILED |
|      |        |        |        |        | SCOPE                     |                 |              |

|      |        |        |        |        |                         |                |              |
|------|--------|--------|--------|--------|-------------------------|----------------|--------------|
| 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 |        |        |        |        |                         |                |              |
| 2536 | 011564 | 113700 | 016700 |        | ;TEST MOVE INSTRUCTIONS |                |              |
| 2537 | 011570 | 122700 | 000252 |        | MOVB                    | #B, %0         |              |
| 2538 | 011574 | 001401 |        |        | CMPB                    | #C#0252, .0    |              |
| 2539 | 011576 | 104000 |        |        | BEQ                     | .+4            |              |
| 2540 | 011600 | 104400 |        |        | HLT                     |                | ;MOVB FAILED |
| 2541 |        |        |        |        | SCOPE                   |                |              |
| 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 |        |        |        |        |                         |                |              |
| 2554 | 011646 | 012737 | 177777 | 016732 | ;TEST UNARYS INDIRECT   |                |              |
| 2555 | 011654 | 105037 | 016732 |        | MOV                     | #-1, #TEMP     |              |
| 2556 | 011660 | 023727 | 016732 | 177400 | CLRB                    | #TEMP          |              |
| 2557 | 011666 | 001401 |        |        | CMP                     | #TEMP, #177400 |              |
| 2558 | 011670 | 104000 |        |        | BEQ                     | .+4            |              |
| 2559 | 011672 | 104400 |        |        | HLT                     |                | ;CLRB FAILED |
| 2560 |        |        |        |        | SCOPE                   |                |              |
| 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                   |                |              |
| 2574 |        |        |        |        |                         |                |              |

MAN. ... 304-1052 20-JAN-78 ... PAGE 50  
 20 JAN 78 11:05

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

|      |        |        |        |        |                                               |                 |
|------|--------|--------|--------|--------|-----------------------------------------------|-----------------|
| 2631 |        |        |        |        | : TEST BIC INSTRUCTION INDIRECT WITH INDEXING |                 |
| 2632 | 012200 | 012700 | 177777 |        | MOV                                           | #-1,%0          |
| 2633 | 012204 | 147700 | 004472 |        | BICB                                          | @B+2,%0         |
| 2634 | 012210 | 120027 | 052525 |        | CMPB                                          | %0,#52525       |
| 2635 | 012214 | 001401 |        |        | BEQ                                           | .+4             |
| 2636 | 012216 | 104000 |        |        | HLT                                           |                 |
| 2637 | 012220 | 104400 |        |        | SCOPE                                         | ;BICB FAILED    |
| 2638 |        |        |        |        |                                               |                 |
| 2639 | 012222 | 012737 | 177777 | 016732 | MOV                                           | #-1,@TEMP       |
| 2640 | 012230 | 142777 | 125252 | 004476 | BICB                                          | @125252,@TEMP+2 |
| 2641 | 012236 | 122737 | 052525 | 016732 | CMPB                                          | #52525,@TEMP    |
| 2642 | 012244 | 001401 |        |        | BEQ                                           | .+4             |
| 2643 | 012246 | 104000 |        |        | HLT                                           |                 |
| 2644 | 012250 | 104400 |        |        | SCOPE                                         | ;BICB FAILED    |
| 2645 |        |        |        |        |                                               |                 |
| 2646 | 012252 | 012737 | 177777 | 016722 | MOV                                           | #-1,@#C         |
| 2647 | 012260 | 147777 | 004416 | 004436 | BICB                                          | @B+2,@C+2       |
| 2648 | 012266 | 126737 | 004426 | 016722 | CMPB                                          | A+10,@#C        |
| 2649 | 012274 | 001401 |        |        | BEQ                                           | .+4             |
| 2650 | 012276 | 104000 |        |        | HLT                                           |                 |
| 2651 | 012300 | 104400 |        |        | SCOPE                                         | ;BICB FAILED    |
| 2652 |        |        |        |        |                                               |                 |
| 2653 | 012302 | 012737 | 177777 | 016732 | : TEST UNARYS INDIRECT WITH INDEXING          |                 |
| 2654 | 012310 | 105077 | 004420 |        | MOV                                           | #-1,@TEMP       |
| 2655 | 012314 | 105737 | 016732 |        | CLRB                                          | @TEMP+2         |
| 2656 | 012320 | 001401 |        |        | TSTB                                          | @TEMP           |
| 2657 | 012322 | 104000 |        |        | BEQ                                           | .+4             |
| 2658 | 012324 | 104400 |        |        | HLT                                           |                 |
| 2659 |        |        |        |        | SCOPE                                         | ;CLRB FAILED    |
| 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                                           |                 |
| 2666 | 012352 | 104400 |        |        | SCOPE                                         | ;COMB FAILED    |
| 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                                           |                 |
| 2673 | 012376 | 104400 |        |        | SCOPE                                         | ;INCB FAILED    |
| 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                                           |                 |
| 2680 | 012422 | 104400 |        |        | SCOPE                                         | ;DECB FAILED    |
| 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                                      |                   |
| 2695 | 012500 | 105737 | 016732 |        | TSTB                                     | @TEMP             |
| 2696 | 012504 | 001401 |        |        | BEQ                                      | .+4               |
| 2697 | 012506 | 104000 |        |        | HLT                                      |                   |
| 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                                      |                   |
| 2706 | 012536 | 104400 |        |        | SCOPE                                    |                   |
| 2707 |        |        |        |        |                                          |                   |
| 2708 |        |        |        |        |                                          |                   |
| 2709 | 012540 | 012700 | 177772 |        | ; TEST OF COMBINED INDEXING AND INDIRECT |                   |
| 2710 | 012544 | 127027 | 016710 | 125252 | MOV                                      | #-6, %0           |
| 2711 | 012552 | 001401 |        |        | CMPB                                     | @A(0), #125252    |
| 2712 | 012554 | 104000 |        |        | BEQ                                      | .+4               |
| 2713 | 012556 | 104400 |        |        | HLT                                      |                   |
| 2714 |        |        |        |        | SCOPE                                    |                   |
| 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                                      |                   |
| 2719 | 012576 | 104400 |        |        | SCOPE                                    |                   |
| 2720 |        |        |        |        |                                          |                   |
| 2721 | 012600 | 012700 | 177772 |        | MOV                                      | #-6, %0           |
| 2722 | 012604 | 012701 | 000002 |        | MOV                                      | #+2, %1           |
| 2723 | 012610 | 127071 | 016710 | 016710 | CMPB                                     | @A(0), @A(1)      |
| 2724 | 012616 | 001401 |        |        | BEQ                                      | .+4               |
| 2725 | 012620 | 104000 |        |        | HLT                                      |                   |
| 2726 | 012622 | 104400 |        |        | SCOPE                                    |                   |
| 2727 |        |        |        |        |                                          |                   |
| 2728 | 012624 | 012700 | 000006 |        | ; TEST BIC INSTRUCTION                   |                   |
| 2729 | 012630 | 012767 | 177777 | 004074 | MOV                                      | #+6, %0           |
| 2730 | 012636 | 147067 | 016710 | 004066 | MOV                                      | #-1, @TEMP        |
| 2731 | 012644 | 122767 | 125252 | 004060 | BICB                                     | @A(0), @TEMP      |
| 2732 | 012652 | 001401 |        |        | CMPB                                     | #125252, @TEMP    |
| 2733 | 012654 | 104000 |        |        | BEQ                                      | .+4               |
| 2734 | 012656 | 104400 |        |        | HLT                                      |                   |
| 2735 |        |        |        |        | SCOPE                                    |                   |
| 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                                      |                   |
| 2742 | 012712 | 104400 |        |        | SCOPE                                    |                   |

20-JAN-78 11:05 PAGE 5

|      |        |        |        |       |                |                                                   |
|------|--------|--------|--------|-------|----------------|---------------------------------------------------|
| 2743 | 012744 | 012700 | 016702 | MOV   | #B+2,%C        | ADDRESS OF ADDRESS F 2                            |
| 2745 | 012720 | 023067 | 003754 | CMP   | %C,%B          |                                                   |
| 2746 | 012724 | 001401 |        | BEQ   | +.4            |                                                   |
| 2747 | 012726 | 104000 |        | HLT   |                | :CMP FAILED                                       |
| 2748 | 012730 | 104400 |        | SCOPE |                |                                                   |
| 2750 | 012732 | 012700 | 016704 | MOV   | #B+4,%C        |                                                   |
| 2751 | 012736 | 025067 | 003736 | CMP   | %C,%B          |                                                   |
| 2752 | 012742 | 001401 |        | BEQ   | +.4            |                                                   |
| 2753 | 012744 | 104000 |        | HLT   |                | :CMP FAILED                                       |
| 2754 | 012746 | 104400 |        | SCOPE |                |                                                   |
| 2755 | 012750 | 012700 | 016704 | MOV   | #B+4,%C        |                                                   |
| 2757 | 012754 | 125067 | 003720 | CMPB  | %C,%B          |                                                   |
| 2758 | 012760 | 001401 |        | BEQ   | +.4            |                                                   |
| 2759 | 012762 | 104000 |        | HLT   |                | :CMPB FAILED                                      |
| 2760 | 012764 | 104400 |        | SCOPE |                |                                                   |
| 2761 |        |        |        |       |                |                                                   |
| 2762 | 012766 | 012700 | 016726 | MOV   | #C+4,%D        |                                                   |
| 2763 | 012772 | 012737 | 177777 | MOV   | #-1,%C         |                                                   |
| 2764 | 013000 | 105050 |        | CLRB  | %C             |                                                   |
| 2765 | 013002 | 023727 | 016722 | CMP   | %C,%177400     |                                                   |
| 2766 | 013010 | 001401 |        | BEQ   | +.4            |                                                   |
| 2767 | 013012 | 104000 |        | HLT   |                | :CLRB FAILED                                      |
| 2768 | 013014 | 104400 |        | SCOPE |                |                                                   |
| 2769 | 013016 | 012737 | 177777 | MOV   | #-1,%C         |                                                   |
| 2770 | 013024 | 012700 | 177772 | MOV   | #-6,%D         |                                                   |
| 2771 | 013030 | 012701 | 177772 | MOV   | #-6,%I         |                                                   |
| 2772 | 013034 | 147071 | 016710 | BICB  | %A(0),%TEMP(1) |                                                   |
| 2773 | 013042 | 022737 | 177525 | CMP   | %177525,%C     |                                                   |
| 2774 | 013050 | 001401 |        | BEQ   | +.4            |                                                   |
| 2775 | 013052 | 104000 |        | HLT   |                | :BICB FAILED                                      |
| 2776 | 013054 | 104400 |        | SCOPE |                |                                                   |
| 2777 |        |        |        |       |                |                                                   |
| 2778 | 013056 | 012700 | 052525 | MOV   | %52525,%D      | :TEST THAT RD IS NOT DESTROYED BY FALSE SELECTION |
| 2779 |        |        |        |       |                | :THIS IS CHECK LATER IN PROGRAM                   |
| 2780 |        |        |        |       |                |                                                   |
| 2781 | 013062 | 004767 | 000002 | JSR   | %7,%TJSR2      | :PLACE PC ON STACK                                |
| 2782 | 013066 | 000405 |        | BR    | %TJSR3         | :RETURN HERE ON RTS %7                            |
| 2783 | 013070 | 121627 | 013066 | CMPB  | %6,%TJSR1      | :CHECK FOR CORRECT PC ON STACK                    |
| 2784 | 013074 | 001401 |        | BEQ   | +.4            |                                                   |
| 2785 | 013076 | 104000 |        | HLT   |                | :INCORRECT PC ON STACK                            |
| 2786 | 013100 | 000207 |        | RTS   | %7             | :RETURN TO INST AFTER JSR                         |
| 2787 | 013102 | 104400 |        | SCOPE |                |                                                   |
| 2788 |        |        |        |       |                |                                                   |
| 2789 | 013104 | 000257 |        | CCC   |                |                                                   |
| 2790 | 013106 | 004717 |        | JSR   | %7,%TJSR3      | :INSTRUCTION UNDER TEST                           |
| 2791 | 013110 | 121627 | 013110 | CMPB  | %6,%TJSR3+6    | :TEST THE STACK                                   |
| 2792 | 013114 | 001401 |        | BEQ   | +.4            |                                                   |
| 2793 | 013116 | 104000 |        | HLT   |                | :PC OF JSR DID NOT GO TO STACK                    |
| 2794 | 013120 | 005726 |        | TST   | (6)+           | :REPOSITION THE STACK                             |
| 2795 | 013122 | 104400 |        | SCOPE |                |                                                   |
| 2796 |        |        |        |       |                |                                                   |
| 2797 |        |        |        |       |                |                                                   |
| 2798 | 013124 | 000257 |        | CCC   |                | :TEST NESTED SUBROUTINES                          |
| 2799 |        |        |        |       |                |                                                   |
| 2800 |        |        |        |       |                | :CLEAR CONDITION CODES                            |

MMIN MM ... 30M 1052 20-JAN-78 .. OF PAGE 54  
 23:00 P. 1 20-JAN-78 11:05

SEG 0054

|      |        |        |               |                       |               |                     |
|------|--------|--------|---------------|-----------------------|---------------|---------------------|
| 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 |               | BVS                   | .+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
2856 013354 104400 SCOPE
2857
2858 013356 000257 CCC
2859 013360 012767 177777 003344 MOV #1 TEMP
2860 013366 106267 003341 ASRB TEMP+1
2861 013372 103401 BCS .+4
2862 013374 104000 HLT
2863 013376 102001 BVC .+4
2864 013400 104000 HLT
2865 013402 026727 003324 177777 CMP TEMP, #1
2866 013410 001401 BEQ .+4
2867 013412 104000 HLT
2868 013414 104400 SCOPE
2869
2870 013416 000277 SCC
2871 013420 012767 177777 003304 MOV #1 TEMP
2872 013426 106367 003301 ASLB TEMP+1
2873 013432 103401 BCS .+4
2874 013434 104000 HLT
2875 013436 102001 BVC .+4
2876 013440 104000 HLT
2877 013442 026727 003264 177377 CMP TEMP, #177377
2878 013450 001401 BEQ .+4
2879 013452 104000 HLT
2880 013454 104400 SCOPE
2881
2882 ;TEST COMBINATION OF N, C AND V
2883 .MACR TNCV
2884 BPL .+12
2885 BCC .+20
2886 BVC .+30
2887 HLT
2888 BR .+24
2889 BCC .+16
2890 BVS .+20
2891 HLT
2892 BR .+14
2893 BVS .+12
2894 HLT
2895 BR .+6
2896 BVC .+4
2897 HLT
2898 SCOPE
2899 .ENDM
2900 CLR @#ICOUNT
2901
2902 ;TEST ROTATING NUMBERS
2903 SCOPE
2904 013462 104400 MOV #1 REFF
2905 013464 012767 177777 000142 TSROT: INC REFF
2906 013472 005267 000136 JSR %7, ROTALL
2907 013476 004767 000012 REFF, #100077
2908 013502 026727 000126 100077 CMP REFF, #100077
2909 013510 001370 BNE TSROT
2910 013512 000452 BR TSRT2A
2911 013514 016767 000114 000114 ROTALL: MOV REFF, TEST

```

;ROTATE ODD BYTE FAILED

;CLEAR C

;C NOT SET

;V NOT CLEARED

;SHIFT FAILED

;C NOT SET

;V NOT CLEARED

;SHIFT BYTE FAILED

 ;Z=1  
 ;Z=1, C=1  
 ;Z=C, BUT V=1

 ;Z=0  
 ;Z=0, C=1  
 ;Z NOT EQUAL C, V=1

 ;Z=1, C=0  
 ;Z NOT EQUAL C, V=1

 ;Z=0, C=0  
 ;Z=C, BUT V=1

;NO ITERATION

 ;INITIALIZE BASE NUMBER  
 ;INCREMENT NUMBER  
 ;GO TO COMPARE ROUTINE  
 ;TEST ALL VALUES  
 ;NO TEST THEM ALL  
 ;WE ARE DONE

20 JAN 1952 11:05 PAGE 56

|      |        |        |               |                                          |            |                              |
|------|--------|--------|---------------|------------------------------------------|------------|------------------------------|
| 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                                      |            |                              |
| 2938 | 013632 | 000207 |               | RTS                                      | %7         | : INITIAL NOT EQUAL TO FINAL |
| 2939 | 013634 | 000000 |               |                                          |            | : ROTATE WORD FAILED         |
| 2940 | 013636 | 000000 |               |                                          |            | : GOOD DATA                  |
| 2941 |        | 013634 |               |                                          |            | : BAD DATA                   |
| 2942 |        |        |               | REF=REFF                                 |            |                              |
| 2943 | 013640 | 012767 | 177777 177766 | TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS |            |                              |
| 2944 | 013646 | 005267 | 177762        | TSROT2A: 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 | ROTBE: ROTEN1                            | REFF, TEST |                              |
| 2951 | 013702 | 106067 | 177730        | RORB                                     | TEST       | : ROTATE BYTE EVEN           |
| 2952 | 013706 | 106067 | 177724        | RORB                                     | TEST       |                              |
| 2953 | 013712 | 106067 | 177720        | RORB                                     | TEST       |                              |
| 2954 | 013716 | 106167 | 177714        | ROLB                                     | TEST       |                              |
| 2955 | 013722 | 106167 | 177710        | ROLB                                     | TEST       |                              |
| 2956 | 013726 | 106167 | 177704        | ROLB                                     | TEST       |                              |
| 2957 | 013732 |        |               | TNCV                                     |            |                              |
| 2958 | 013732 | 100004 |               | BPL                                      | .+12       |                              |
| 2959 | 013734 | 103007 |               | BCC                                      | .+20       | :Z=1                         |
| 2960 | 013736 | 102013 |               | BVC                                      | .+30       | :Z=1, C=1                    |
| 2961 | 013740 | 104000 |               | HLT                                      |            | :Z=C, BUT V=1                |
| 2962 | 013742 | 000411 |               | BR                                       | .+24       |                              |
| 2963 | 013744 | 103006 |               | BCC                                      | .+16       | :Z=0                         |
| 2964 | 013746 | 102407 |               | BVS                                      | .+20       | :Z=0, C=1                    |
| 2965 | 013750 | 104000 |               | HLT                                      |            | :Z NOT EQUAL C, V=1          |
| 2966 | 013752 | 000405 |               | BR                                       | .+14       |                              |

|      |        |        |       |            |                     |
|------|--------|--------|-------|------------|---------------------|
| 2967 | 013754 | 102404 | BVS   | .+12       | :Z=1, C=0           |
| 2968 | 013756 | 104000 | HLT   |            | :Z NOT EQUAL C, V=1 |
| 2969 | 013750 | 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 | CMP   | TEST, REFF |                     |
| 2974 | 013776 | 001401 | BEQ   | .+4        |                     |
| 2975 | 014000 | 104000 | HLT   |            |                     |
| 2976 | 014002 | 000207 | RTS   | %7         |                     |
| 2977 | 014004 | 106067 | RORB  | TEST+1     | :ROTATE BYTE ODD    |
| 2978 | 014010 | 106067 | RORB  | TEST+1     |                     |
| 2979 | 014014 | 106067 | RORB  | TEST+1     |                     |
| 2980 | 014020 | 106167 | ROLB  | TEST+1     |                     |
| 2981 | 014024 | 106167 | ROLB  | TEST+1     |                     |
| 2982 | 014030 | 106167 | 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 | CMP   | TEST, REFF |                     |
| 3000 | 014100 | 001401 | BEQ   | .+4        |                     |
| 3001 | 014102 | 104000 | HLT   |            |                     |
| 3002 | 014104 | 000207 | RTS   | %7         |                     |

177642 177636

POTBO:

177540 177534

MM: 3041052 20-JAN-76 11:05 PAGE 58  
 2048H 20-JAN-76 11:05

5. 0000

|      |        |        |        |        |  |
|------|--------|--------|--------|--------|--|
| 3003 | 014106 | 104400 |        |        |  |
| 3004 |        |        |        |        |  |
| 3005 | 014110 | 005227 | 177776 |        |  |
| 3006 | 014114 | 100002 |        |        |  |
| 3007 | 014116 | 000167 | 000632 |        |  |
| 3008 |        |        |        |        |  |
| 3009 |        |        |        |        |  |
| 3010 | 014122 | 011667 | 000072 |        |  |
| 3011 | 014126 | 012767 | 000001 | 177500 |  |
| 3012 | 014134 | 005267 | 177404 |        |  |

ROTEN1: SCOPE  
 :WILL ALLOW TWO FAST PASSES  
 INC #177776  
 BPL .+6  
 JMP EAESRT  
 :ADD AND SUBTRACT ALL NUMBERS AGAINST FIXED NUMBERS  
 :A+B=C, C-A=B, BF SHOULD EQUAL BI  
 \*START: MOV 2%6, NUMA  
 MOV #1, REF  
 \*RTST: INC REF

[illegible]

20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 360 370 380 390 400 410 420 430 440 450 460 470 480 490 500 510 520 530 540 550 560 570 580 590 600 610 620 630 640 650 660 670 680 690 700 710 720 730 740 750 760 770 780 790 800 810 820 830 840 850 860 870 880 890 900 910 920 930 940 950 960 970 980 990 1000

```

3069 014400 105167 002327 * J3: 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 *SCOMB: 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 #4000,2#ICOUNT
3093 014512 104400 WAIT3: SCOPE
3094 014514 WAIT5:
3095 014514 012737 000010 016462 MOV #10,2#ICOUNT
3096
3097 : TEST TO SEE IF I/O DEVICES WERE SELECTED
3098 014522 122737 000377 001540 CMPB #377,2#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 #4000,2#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 2#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 | .76774 | CMP                            | TEST, REF     | : TEST SWAB INSTRUCTION          |
| 3127 | 014640 | 001401 |        |        | BEG                            | .+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, @COUNT |                                  |
| 3135 |        | 000240 |        |        |                                |               |                                  |
| 3136 |        | 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 |        |        |        |        |                                |               |                                  |
| 3148 | 014726 | 012703 | 000100 |        | : PROBLEM 115 0300 17 AUG 1972 |               |                                  |
| 3149 | 014732 | 012705 | 016732 |        | MOV                            | #100, %3      |                                  |
| 3150 | 014736 | 012737 | 177777 | 016732 | MOV                            | #TEMP, %5     |                                  |
| 3151 | 014744 | 030315 |        |        | MOV                            | #-1, @TEMP    |                                  |
| 3152 | 014746 | 001001 |        |        | BIT                            | %3, %5        |                                  |
| 3153 | 014750 | 104000 |        |        | BNE                            | .+4           |                                  |
| 3154 | 014752 | 104400 |        |        | HLT                            |               | : BIT FAILED                     |
| 3155 | 014754 | 000402 |        |        | SCOPE                          |               |                                  |
| 3156 | 014756 | 000167 | 000362 |        | EAESRT: BR                     | .+6           | : NOP IF NO EAE                  |
| 3157 |        |        |        |        | JMP                            | ENDEAE        |                                  |
| 3158 | 014762 | 104400 |        |        | : TEST LEFT SHIFT              |               |                                  |
| 3159 | 014764 | 005077 | 163360 |        | SCOPE                          |               | : TEST OF LOGICAL SHIFT          |
| 3160 | 014770 | 012777 | 125252 | 163354 | CLR                            | @MQ           | : LOAD MQ WITH 0                 |
| 3161 | 014776 | 012777 | 177760 | 163362 | MOV                            | #125252, @AC  | : LOAD AC WITH 125252            |
| 3162 | 015004 | 005777 | 163342 |        | MOV                            | #-16, @LSH    | : LOAD SHIFT COUNT (LSH) WITH 16 |
| 3163 | 015010 | 001401 |        |        | TST                            | @AC           | : COMPARE AC WITH 0              |
| 3164 | 015012 | 104000 |        |        | BEQ                            | .+4           | : GO TO HLT IF BAD               |
| 3165 | 015014 | 022777 | 125252 | 163326 | HLT                            |               |                                  |
| 3166 | 015022 | 001401 |        |        | CMP                            | #125252, @MQ  | : COMPARE MQ WITH 125252         |
| 3167 | 015024 | 104000 |        |        | BEQ                            | .+4           | : GO TO HLT IF BAD               |
| 3168 | 015026 | 122777 | 000020 | 163322 | HLT                            |               |                                  |
| 3169 | 015034 | 001401 |        |        | CMPB                           | #20, @SRE     | : COMPARE SR WITH 2              |
| 3170 | 015036 | 104000 |        |        | BEQ                            | .+4           | : SKIP HLT IF GOOD               |
| 3171 |        |        |        |        | HLT                            |               | : HALT ON ERROR (LEFT SHIFT)     |
| 3172 |        |        |        |        |                                |               |                                  |
| 3173 | 015040 | 104400 |        |        | : TEST RIGHT SHIFT             |               |                                  |
| 3174 | 015042 | 005077 | 163302 |        | SCOPE                          |               | : TEST OF ARITHMETIC SHIFT       |
| 3175 | 015046 | 012777 | 177777 | 163276 | CLR                            | @MQ           | : LOAD MQ WITH 0                 |
| 3176 | 015054 | 012777 | 000020 | 163306 | MOV                            | #-1, @AC      | : LOAD AC WITH -1                |
| 3177 | 015062 | 005777 | 163264 |        | MOV                            | #16, @ASH     | : LOAD SHIFT COUNT (ASH) WITH 16 |
| 3178 | 015066 | 100401 |        |        | TST                            | @AC           | : COMPARE AC WITH 100000         |
| 3179 | 015070 | 104000 |        |        | BMI                            | .+4           | : SKIP HLT IF GOOD               |
| 3180 | 015072 | 005777 | 163252 |        | HLT                            |               | : HALT ON ERROR                  |
|      |        |        |        |        | TST                            | @MQ           | : COMPARE MQ WITH 0              |

|      |        |        |        |        |                 |              |                               |
|------|--------|--------|--------|--------|-----------------|--------------|-------------------------------|
| 3181 | 015076 | 001401 |        |        | BEG             | ..+4         | :SKIP HLT IF GOOD             |
| 3182 | 015100 | 104000 |        |        | HLT             |              | :HALT ON ERROR                |
| 3183 | 015102 | 122777 | 000110 | 163246 | CMPB            | #110,DSFE    | :COMPARE SR WITH 10           |
| 3184 | 015110 | 001401 |        |        | BEG             | ..+4         | :SKIP HLT IF GOOD             |
| 3185 | 015112 | 104000 |        |        | HLT             |              | :HALT ON ERROR (RIGHT SHIFT)  |
| 3186 |        |        |        |        |                 |              |                               |
| 3187 |        |        |        |        |                 |              |                               |
| 3188 | 015114 | 104400 |        |        | :TEST NORMALIZE |              |                               |
| 3189 | 015116 | 012777 | 125252 | 163224 | SCOPE           |              | :TEST OF NORMALIZE            |
| 3190 | 015124 | 012777 | 170000 | 163220 | MOV             | #125252,AMQ  | :LOAD MQ WITH 125252          |
| 3191 | 015132 | 005077 | 163226 |        | MOV             | #170000,AC   | :LOAD AC WITH 170000          |
| 3192 | 015136 | 022777 | 100005 | 163206 | CLR             | ANOR         | :START NORMALIZE              |
| 3193 | 015144 | 001401 |        |        | CMP             | #100005,AC   | :COMPARE AC WITH 100005       |
| 3194 | 015146 | 104000 |        |        | BEG             | ..+4         | :SKIP HLT IF GOOD             |
| 3195 | 015150 | 022777 | 052520 | 163172 | HLT             |              | :HALT ON ERROR                |
| 3196 | 015156 | 001401 |        |        | CMP             | #52520,AMQ   | :COMPARE MQ WITH 52520        |
| 3197 | 015160 | 104000 |        |        | BEG             | ..+4         | :SKIP HLT IF GOOD             |
| 3198 | 015162 | 122777 | 000003 | 163164 | HLT             |              | :HALT ON ERROR                |
| 3199 | 015170 | 001401 |        |        | CMPB            | #3,ASC       | :COMPARE SC WITH 3            |
| 3200 | 015172 | 104000 |        |        | BEG             | ..+4         | :SKIP HLT IF GOOD             |
| 3201 |        |        |        |        | HLT             |              | :HALT ON ERROR (NORMALIZE)    |
| 3202 | 015174 | 104400 |        |        | :TEST MULTIPLY  |              |                               |
| 3203 | 015176 | 012777 | 125252 | 163144 | SCOPE           |              | :TEST OF MULTIPLY             |
| 3204 | 015204 | 012777 | 040000 | 163146 | MOV             | #125252,AMQ  | :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 |        |        | BEG             | ..+4         | :SKIP IF GOOD                 |
| 3208 | 015224 | 005777 | 163120 |        | HLT             |              | :HALT ON ERROR                |
| 3209 | 015230 | 100401 |        |        | TST             | AMQ          | :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,ASRE    | :COMPARE SR WITH 300          |
| 3213 | 015244 | 104000 |        |        | BEG             | ..+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,AMQ  | :LOAD MQ WITH 125252          |
| 3219 | 015264 | 012777 | 000002 | 163070 | MOV             | #-1,AC       | :LOAD AC WITH -1              |
| 3220 | 015272 | 005777 | 163054 |        | MOV             | #2,ADIV      | :LOAD DIV WITH 2 AND DIVIDE   |
| 3221 | 015276 | 001401 |        |        | TST             | AC           | :COMPARE AC WITH 0 (QUOTIENT) |
| 3222 | 015300 | 104000 |        |        | BEG             | ..+4         | :SKIP HLT IF GOOD             |
| 3223 | 015302 | 022777 | 152525 | 163040 | HLT             |              | :HALT ON ERROR                |
| 3224 | 015310 | 001401 |        |        | CMP             | #152525,AMQ  | :COMPARE MQ WITH 152525       |
| 3225 | 015312 | 104000 |        |        | BEG             | ..+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 |        |        | BEG             | ..+4         |                               |
| 3233 | 015344 | 104400 |        |        | HLT             |              |                               |
| 3234 | 015346 | 022700 | 052525 |        | ENDERE: SCOPE   |              |                               |
| 3235 | 015352 | 001401 |        |        | CMP             | #52525,%0    |                               |
| 3236 | 015354 | 104000 |        |        | BEG             | ..+4         |                               |
|      |        |        |        |        | HLT             |              | :SOME OPERATION DESTROYED .3  |

```

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

```

MAIN MAC111 304 1052 20-JAN 78 11:05 PAGE 5-  
 2048H P11 20-JAN 78 11:05

|      |        |        |        |        |              |               |  |  |                                 |
|------|--------|--------|--------|--------|--------------|---------------|--|--|---------------------------------|
| 3293 | 015622 | 005227 | 000000 |        | INC          | #C            |  |  |                                 |
| 3294 | 015628 | 037727 | 162342 | 020000 | BIT          | SRPTR, #20000 |  |  | : ERROR COUNT LOCATION          |
| 3295 | 015634 | 001401 |        |        | BEG          | .+4           |  |  | : TEST FOR INHIBIT PRINT OUT    |
| 3296 | 015636 | 000501 |        |        | BR           | PRINT1        |  |  | : BRANCH TO PRINT               |
| 3297 | 015640 | 012667 | 000242 |        | MOV          | (6)+, SAVPC   |  |  | : INHIBIT RETURN TO MAIN STREAM |
| 3298 | 015644 | 012667 | 000240 |        | MOV          | (6)+, SAVCC   |  |  | : PC OF FAILING ROUTINE         |
| 3299 | 015650 | 024646 |        |        | CMP          | -(6), -(6)    |  |  | : CC OF ERROR CONDITION         |
| 3300 | 015652 | 042767 | 000140 | 162116 | BIC          | #140, STATUS  |  |  | : REPOSITION THE STACK          |
| 3301 | 015660 | 105777 | 000220 |        | TSTB         | ATCSR         |  |  |                                 |
| 3302 | 015664 | 100375 |        |        | BPL          | .-4           |  |  | : WAIT FOR FLAG                 |
| 3303 | 015666 | 012777 | 000215 | 000206 | MOV          | #215, ATDBR   |  |  | : FILLER CHARACTER.             |
| 3304 | 015674 | 105777 | 000204 |        | TSTB         | ATCSR         |  |  |                                 |
| 3305 | 015700 | 100375 |        |        | BPL          | .-4           |  |  |                                 |
| 3306 | 015702 | 012777 | 000212 | 000172 | MOV          | #212, ATDBR   |  |  | : LINE FEED                     |
| 3307 | 015710 | 105777 | 000170 |        | TSTB         | ATCSR         |  |  |                                 |
| 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, ATDBR   |  |  |                                 |
| 3315 | 015750 | 105777 | 000130 |        | TSTB         | ATCSR         |  |  | : 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, ATDBR   |  |  |                                 |
| 3320 | 015774 | 105777 | 000104 |        | TSTB         | ATCSR         |  |  |                                 |
| 3321 | 016000 | 100375 |        |        | BPL          | .-4           |  |  |                                 |
| 3322 | 016002 | 016702 | 000460 |        | MOV          | RETURN, %2    |  |  | : WHERE CPU TEST IS AT          |
| 3323 | 016006 | 004767 | 000100 |        | JSR          | %7, PRTAB     |  |  | : RESTORE REGISTERS             |
| 3324 | 016012 | 016702 | 000056 |        | MOV          | SAVR2, %2     |  |  |                                 |
| 3325 | 016016 | 016703 | 000054 |        | MOV          | SAVR3, %3     |  |  |                                 |
| 3326 | 016022 | 016704 | 000052 |        | MOV          | SAVR4, %4     |  |  |                                 |
| 3327 | 016026 | 012777 | 000377 | 000046 | MOV          | #377, ATDBR   |  |  |                                 |
| 3328 | 016034 | 105777 | 000044 |        | TSTB         | ATCSR         |  |  |                                 |
| 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 |        |        | BEG          | EXPRINT       |  |  |                                 |
| 3336 | 016066 | 000167 | 162410 |        | JMP          | START         |  |  | : RESTART ON ERROR              |
| 3337 | 016072 | 000002 |        |        | EXPRINT: RTI |               |  |  | : RETURN TO MAIN STREAM         |
| 3338 | 016074 | 000000 |        |        | SAVR2:       | 0             |  |  |                                 |
| 3339 | 016076 | 000000 |        |        | SAVR3:       | 0             |  |  |                                 |
| 3340 | 016100 | 000000 |        |        | SAVR4:       | 0             |  |  |                                 |
| 3341 | 016102 | 177566 |        |        | TDBR:        | 177566        |  |  | : DATA                          |
| 3342 | 016104 | 177564 |        |        | TCSR:        | 177564        |  |  | : STATUS                        |
| 3343 | 016106 | 000000 |        |        | SAVPC:       | 0             |  |  |                                 |
| 3344 | 016110 | 000000 |        |        | SAVCC:       | 0             |  |  |                                 |
| 3345 |        | 017004 |        |        | BUFF=FIN     |               |  |  | : END OF PROGRAM-SP AREA.       |
| 3346 |        |        |        |        |              |               |  |  |                                 |
| 3347 | 016112 | 005067 | 000252 |        | PRTAB: CLR   | BINCT         |  |  |                                 |
| 3348 | 016116 | 005067 | 000244 |        | CLR          | WGTCT         |  |  |                                 |

```

3349 016122 012704 016374 MOV BLIST,4
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 107404 BMI MINUS
3357 016162 012777 000260 177712 MOV #260,@TDBR
3358 016170 000403 BR STAR
3359 016172 012777 000261 177702 MINUS: MOV #261,@TDBR
3360 016200 016703 000156 STAR: MOV SEVEN,%3
3361 016204 010267 000150 MOV %2,TOODLE
3362 016210 005167 000144 COM TOODLE
3363 016214 046703 000140 BIC TOODLE,%3
3364 016220 001410 BEQ WRTOC
3365 016222 066767 000136 000136 MKNUM: ADD DECML,WGTCT
3366 016230 005267 000134 INC BINCT
3367 016234 026703 000126 CMP WGTCT,%3
3368 016240 001370 BNE MKNUM
3369 016242 062767 000260 000120 WRTOC: ADD #260,BINCT
3370 016250 016724 000114 MOV BINCT,(4)+
3371 016254 066767 000102 000102 ADD SEVEN,DECML
3372 016262 005067 000100 CLR WGTCT
3373 016266 005067 000076 CLR BINCT
3374 016272 005367 000074 DEC ASCNT
3375 016276 001410 BEQ XLIST
3376 016300 012703 000003 MOV #3,%3
3377 016304 066767 000052 000050 MOADD: ADD SEVEN,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
3382 016326 105777 177552 WAIT2: TSTB @TCSR
3383 016332 100375 BPL WAIT2
3384 016334 014477 177542 MOV -(4),@TDBR
3385 016340 005367 000026 DEC ASCNT
3386 016344 001401 BEQ HDFHM
3387 016346 000767 BR WAIT2
3388 016350 105777 177530 HDFHM: TSTB @TCSR
3389 016354 100375 BPL -4
3390 016356 000207 RTS %7
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 ;SCOPE LOOP ROUTINE ENTERED BY USER TRAP
3403 ;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 4000 TIMES
3404

```

MAIN MAC-11 304 1052, 20-JAN-78 11:05 PAGE 66  
 20JAN 11:05 20-JAN-78 11:05

|      |        |        |        |        |                               |                 |                                     |
|------|--------|--------|--------|--------|-------------------------------|-----------------|-------------------------------------|
| 3405 | 016406 | 032777 | 040000 | 161560 | SCOPEC: BIT                   | #40000, JSR PTR | : TEST SR FOR SCOPE                 |
| 3406 | 016414 | 001012 |        |        | BNE                           | SCOPEB          | : YES SCOPE                         |
| 3407 | 016416 | 032777 | 004000 | 161550 | BIT                           | #4000, JSR PTR  | : NO - TEST FOR ITERATION           |
| 3408 | 016424 | 001011 |        |        | BNE                           | SCOPEB          | : INHIBIT ITERATION                 |
| 3409 | 016426 | 026767 | 000032 | 000026 | CMP                           | SCOPEF, ICOUNT  |                                     |
| 3410 | 016434 | 001405 |        |        | BEG                           | SCOPEB          | : EXIT - DONE                       |
| 3411 | 016436 | 005267 | 000022 |        | INC                           | SCOPEF          | : INCREMENT COUNT                   |
| 3412 | 016442 | 016716 | 000020 |        | SCOPEB: MOV                   | RETURN, 2%6     | : REPOSITION THE STACK              |
| 3413 | 016446 | 000002 |        |        | RTI                           |                 | : SCOPE RETURN                      |
| 3414 | 016450 | 005067 | 000010 |        | SCOPEB: CLR                   | SCOPEF          | : CLEAR COUNT                       |
| 3415 | 016454 | 011667 | 000006 |        | MOV                           | 2%6, RETURN     | : SAVE SCOPE RETURN POINTER         |
| 3416 | 016460 | 000002 |        |        | RTI                           |                 | : RETURN INLINE-NEXT TEST           |
| 3417 | 016462 | 004000 |        |        | ICOUNT: 4000                  |                 |                                     |
| 3418 | 016464 | 000000 |        |        | SCOPEF: 0                     |                 | : COUNT LOCATION FOR ITERATION LOOP |
| 3419 | 016466 | 004440 |        |        | RETURN: BEGIN                 |                 | : ADDRESS OF LAST TEST              |
| 3420 |        |        |        |        |                               |                 |                                     |
| 3421 |        |        |        |        | : GROUP OF NESTED SUBROUTINES |                 |                                     |
| 3422 | 016470 | 000207 |        |        | SUBR1: RTS                    | %7              | : ONE INSTRUCTION                   |
| 3423 | 016472 | 000277 |        |        | SUBR2: SCC                    |                 | : ONE DEEP                          |
| 3424 | 016474 | 000205 |        |        | RTS                           | %5              |                                     |
| 3425 | 016476 | 004537 | 016472 |        | SUBR3: JSR                    | %5, 2#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 |        |        |        |        | : ENTER HERE OR POWER FAIL    |                 |                                     |
| 3434 |        |        |        |        |                               |                 |                                     |
| 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, 2#6       | : IN CASE OF NO EAE                 |
| 3443 | 016554 | 012700 | 016614 |        | MOV                           | #HAC, %0        |                                     |

MAIN MAC11 30W1052, 20-JAN-78 11:05 PAGE 67  
 20-84 P11 20-JAN-78 11:05

SE 0067

|      |        |        |               |                                |               |                                         |
|------|--------|--------|---------------|--------------------------------|---------------|-----------------------------------------|
| 3444 | 016560 | 017720 | 161566        | MOV                            | 2AC, (%0)+    |                                         |
| 3445 | 016564 | 017720 | 161560        | MOV                            | 2MQ, (%0)+    |                                         |
| 3446 | 016570 | 017720 | 161560        | MOV                            | 2SC, (%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                            | 2RESTART, 24  |                                         |
| 3450 | 016610 | 000000 |               | HALT                           |               | ; HALT ON POWER DOWN NORMAL             |
| 3451 | 016612 | 000000 |               |                                |               | ; STACK IS SAVED HERE                   |
| 3452 | 016614 | 000000 |               | SAVR6:                         | 0             |                                         |
| 3453 | 016616 | 000000 |               | HAC:                           | 0             |                                         |
| 3454 | 016620 | 000000 |               | HMQ:                           | 0             |                                         |
| 3455 | 016622 | 016706 | 177764        | HSC:                           | 0             |                                         |
| 3456 | 016626 | 012600 |               | RESTART:                       | MOV SAVR6, 16 | ; RESTORE REGISTER OFF STACK            |
| 3457 | 016630 | 014077 | 161520        | MOV                            | (%6)+, %0     |                                         |
| 3458 | 016634 | 014077 | 161510        | MOV                            | -(%0), 2SC    |                                         |
| 3459 | 016640 | 014077 | 161506        | MOV                            | -(%0), 2MQ    | ; MQ MUST BE LOADED BEFORE AC           |
| 3460 | 016644 | 005037 | 000006        | MOV                            | -(%0), 2AC    |                                         |
| 3461 | 016650 | 012667 | 161150        | CLR                            | 2#6           | ; RESTORE TIME OUT                      |
| 3462 | 016654 | 012605 |               | MOV                            | (%6)+, 24     | ; WHEN POWERING UP                      |
| 3463 | 016656 | 012604 |               | MOV                            | (%6)+, %5     |                                         |
| 3464 | 016660 | 012603 |               | MOV                            | (%6)+, %4     |                                         |
| 3465 | 016662 | 012602 |               | MOV                            | (%6)+, %3     |                                         |
| 3466 | 016664 | 012601 |               | MOV                            | (%6)+, %2     |                                         |
| 3467 | 016666 | 012600 |               | MOV                            | (%6)+, %1     |                                         |
| 3468 | 016670 | 005037 | 016612        | MOV                            | (%6)+, %0     |                                         |
| 3469 | 016674 | 104000 |               | CLR                            | 2#SAVR6       |                                         |
| 3470 | 016676 | 000002 |               | HLT                            |               | ; POWER FAIL OCCURRED                   |
| 3471 | 016700 | 125252 |               | RTI                            |               | ; RETURN TO MAIN LINE                   |
| 3472 |        |        |               | B:                             | 125252        |                                         |
| 3473 | 016702 | 016700 |               | ; FIXED VALUES FOR USE IN TEST |               |                                         |
| 3474 | 016704 | 052525 |               | B                              | 052525        | ; ADDRESS OF B                          |
| 3475 |        |        |               |                                |               |                                         |
| 3476 |        | 016710 |               |                                |               |                                         |
| 3477 | 016710 | 177777 |               |                                |               |                                         |
| 3478 | 016712 | 016714 |               | A:                             | -1            |                                         |
| 3479 |        |        |               |                                | A+4           |                                         |
| 3480 |        | 016714 |               |                                |               |                                         |
| 3481 | 016714 | 125252 |               |                                |               |                                         |
| 3482 | 016716 | 016720 |               |                                |               |                                         |
| 3483 | 016720 | 052525 |               |                                |               |                                         |
| 3484 |        |        |               |                                |               |                                         |
| 3485 | 016722 | 000000 |               | ; FOR STORAGE                  |               |                                         |
| 3486 | 016724 | 016722 |               | C:                             | 0             |                                         |
| 3487 |        |        |               |                                | C             | ; ADDRESS OF C                          |
| 3488 |        | 016732 |               |                                |               |                                         |
| 3489 | 016732 | 000000 |               |                                |               |                                         |
| 3490 | 016734 | 016732 |               | TEMP:                          | 0             |                                         |
| 3491 |        |        |               |                                | TEMP          | ; ADDRESS OF TEMP                       |
| 3492 |        | 016740 |               |                                |               |                                         |
| 3493 | 016740 | 016742 |               |                                |               |                                         |
| 3494 | 016742 | 000000 |               |                                |               |                                         |
| 3495 |        | 017004 |               |                                |               |                                         |
| 3496 | 017004 | 000000 |               |                                |               |                                         |
| 3497 | 017006 | 000200 |               |                                |               |                                         |
| 3498 |        |        |               |                                |               |                                         |
| 3499 |        |        |               |                                |               |                                         |
| 3500 |        |        |               |                                |               |                                         |

D: 0  
 FIN: 0  
 USER: RTS %7  
 ; PDP-11 MEMORY DETERMINATION AND SETUP  
 ; USE WITH VARIABLE CORE QUANTITY SYSTEMS

; BUFFER FOR SP  
 ; OVERLAY USER ROUTINE HERE IF 4KW, USE 3AN+1 IF 5KW

```

3500 017010 017010 004440 176564 DET1: MOV #FIN + 4 :APPLICABLE TO SYSTEM TEST 2.
3501 017016 012767 000401 176346 MOV #BEGIN, TRPA+2
3502 017024 004767 000412 JSR #401, SKFBEL :BR .+4
3503 017030 023727 000042 017010 CMP #42, #DET1 :CHECK FOR DDP1
3504 017036 101401 BLOS .+4
3505 017040 000207 RTS %7 :NO CORE EXPANSION WITH DDP1
3506 017042 032777 001000 161124 BIT #1000, JSRPTR :CHECK VARIABLE CORE SWITCH
3507 017050 001401 BEQ DET4 :USE VARIABLE CORE ROUTINE
3508 017052 000207 RTS %7 :4K ONLY
3509 017054 012767 017122 160722 DET4: MOV #DET2, 4 :TRAP VECTOR SETUP
3510 017062 012767 000340 160716 MOV #340, 6 :TRAP STATUS SETUP
3511 017070 005537 037770 EIGHT: ADC #37770 :CHECK FOR 8K
3512 017074 005537 057770 TWELVE: ADC #57770 :CHECK FOR 12K
3513 017100 005537 077770 SXTEEN: ADC #077770 :CHECK FOR 16K
3514 017104 005537 117770 TWENTY: ADC #117770 :CHECK FOR 20K
3515 017110 005537 137770 TWOFOR: ADC #137770 :CHECK FOR 24K
3516 017114 005537 157770 TWOEIG: ADC #157770 :CHECK FOR 28K
3517 017120 000430 BR STRT28
3518 017122 012602 DET2: MOV (6)+, %2 :RETRIEVE TRAP PC
3519 017124 005726 TST (6)+ :DISCARD TRAP STATUS WORD
3520 017126 022702 017074 CMP #EIGHT+4, %2 :4K
3521 017132 001542 BEQ DET3 :8K
3522 017134 022702 017100 CMP #TWELVE+4, %2
3523 017140 001437 BEQ STRT8
3524 017142 022702 017104 CMP #SXTEEN+4, %2 :12K
3525 017146 001431 BEQ STRT12
3526 017150 022702 017110 CMP #TWENTY+4, %2 :16K
3527 017154 001423 BEQ STRT16
3528 017156 022702 017114 CMP #TWOFOR+4, %2 :20K
3529 017162 001415 BEQ STRT20 :24K
3530 017164 000411 BR STRT24 :SET UP MAIN CORE CURRENT
3531 017166 005000 MOVE: CLR %0 :MOVE WORD
3532 017170 012021 MOV (0)+, (1)+ :MOVE COMPLETE?
3533 017172 020027 017006 CMP %0, #FIN+2 :MOVE ANOTHER WORD
3534 017176 001374 BNE .-6 :MOVE COMPLETE
3535 017200 000207 RTS %7 :START 28K TRANSFER
3536 017202 004767 000040 STRT28: JSR %7, XFER28 :START 24K MODIFY
3537 017206 000450 BR MOD24 :START 24K TRANSFER
3538 017210 004767 000042 STRT24: JSR %7, XFER24 :START 20K MODIFY
3539 017214 000453 BR MOD20 :START 20K TRANSFER
3540 017216 004767 000044 STRT20: JSR %7, XFER20 :START 16K MODIFY
3541 017222 000456 BR MOD16 :START 16K TRANSFER
3542 017224 004767 000046 STRT16: JSR %7, XFER16 :START 12K MODIFY
3543 017230 000461 BR MOD12 :START 12K TRANSFER
3544 017232 004767 000050 STRT12: JSR %7, XFER12 :START 8K MODIFY
3545 017236 000464 BR MOD8 :START 8K TRANSFER
3546 017240 004767 000052 STRT8: JSR %7, XFER8 :START 4K MODIFY
3547 017244 000467 BR MOD4 :SET UP MOVE START LOCATION
3548 017246 012701 140000 XFER28: MOV #140000, %1 :GO TO MOVE SUBROUTINE
3549 017252 004767 177710 JSR %7, MOVE
3550 017256 012701 120000 XFER24: MOV #120000, %1
3551 017262 004767 177700 JSR %7, MOVE
3552 017266 012701 100000 XFER20: MOV #100000, %1
3553 017272 004767 177670 JSR %7, MOVE
3554 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
3562 017330 012767 144446 116244 MCD24: 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
3575 ;ROUTINE TO SET ACTION ENABLE ON MA/MF PARITY MEMORIES
3576 ;CALL: JSR PC, .MAMF
3577 PARCSR= 172100 ;ADDRESS OF FIRST MA/MF PA
3578 PARVEC= 114 ;ADDRESS OF PARITY INTERPL
3579 ERRVEC=4
3580 RD=%0
3581 SP=%6
3582 R2=%2
3583 PC=%7
3584
3586 017442 012737 000006 000004 .MAMF: MOV #ERRVEC+2, 2*ERRVEC
3587 017450 012737 000002 000006 MOV #RTI, 2*ERRVEC+2
3588 017456 012700 172100 MOV #PARCSR, RD
3589 017462 012702 000001 MOV #1, R2 ;GET FIRST CSR ADDRESS
3590
3592 017466 012720 000001 1$: MOV #1, (RD)+
3593 ;SET TIME OUT INDICATOR
3594 ;SET ACTION ENABLE IF AVAIL
3595 ;BRANCH IF CSR NOT AVAILAB
3596 ;SHIFT AVAILABILITY INDICA
3597 ASL R2
3598 BCC 1$
3599 RTS PC
3600 .PARSRV: HLT
3601 JMP 2*START
3602 ;ROUTINE TO OUTPUT TITLE
3603
3601 017506 011601
3602 017510 011101
3603 017512 062716 000002
3604 017516 112167 000022
3605 017522 001001
3606 017524 000207
3607 017526 105777 160532
3608 017532 100375
3609 017534 116777 000004 160524
3610 017542 000765
3611 017544 000000
3601 TYPE: MOV (%6), %1
3602 MOV (%1), %1
3603 ADD #2, (%6)
3604 LOOP: MOVB (%1)+, CHAR
3605 BNE 1$
3606 RTS %7
3607 1$: TSTB 2*TTCSR
3608 BPL 1$
3609 MOVB CHAR, 2*TTDBR
3610 BR LOOP
3611 CHAR: 0

```

F06

MAIN. MAC111 30A 1052 20-JAN-78 11:05 PAGE 70  
CZABH.F11 20-JAN-78 11:05

RE. 0070

|      |        |        |        |        |      |                                                   |
|------|--------|--------|--------|--------|------|---------------------------------------------------|
| 3612 | 017546 | 006412 | 055103 | 045521 | MSG: | .ASCI2 12 15 CZABH-H T17-W SYSTEM EXERCISEP 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 |        |        | .ENC |                                                   |

|  | 016710 | 1626  | 1631  | 1660  | 1666  | 1672  | 1678  | 1685  | 1690  | 1697  | 1703  | 1717  | 1724  | 1734  |
|--|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|  |        | 1755  | 1779  | 1793  | 1800  | 2105  | 2145  | 2205  | 2211  | 2218  | 2226  | 2242  | 2251  | 2254  |
|  |        | 2266  | 2272  | 2278  | 2284  | 2291  | 2296  | 2303  | 2310  | 2317  | 2324  | 2347  | 2355  | 2361  |
|  |        | 2710  | 2716  | 2723  | 2730  | 2772  | 3477* | 3478  | 3480  | 3482  |       |       | 3484  | 3485  |
|  |        | 711*  | 3160* | 3162  | 3175* | 3177  | 3190* | 3192  | 3205  | 3218* | 3220  | 3444  | 3459* |       |
|  |        | 3264  | 3267  | 3271* |       |       |       |       |       |       |       |       |       |       |
|  |        | 3013  | 3018* |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3016  | 3027* |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3012* | 3015  |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3350* | 3374* | 3381* | 3385* | 3396* |       |       |       |       |       |       |       |       |
|  |        | 718*  | 3176* |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 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  | 2131  |
|  |        | 2514  | 2519  | 2525  | 2530  | 2536  | 2543  | 2548  | 2549  | 2559  | 2604  | 2609  | 2614  | 2621  |
|  |        | 2626  | 2627  | 2634  | 2648  | 2744  | 2745  | 2750  | 2751  | 2756  | 2757  | 3471* | 3473  | 3474  |
|  |        | 3256  | 3258* |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 808   | 900   | 1102  | 1621* | 3269  | 3284  | 3419  | 3501  | 3562  | 3564  | 3566  | 3568  | 3570  |
|  |        | 3572  |       |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3251  | 3257* |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3245* |       |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3347* | 3366* | 3369* | 3370  | 3373* | 3395* |       |       |       |       |       |       |       |
|  |        | 1107  |       |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 587*  | 761   | 780   | 796   | 817   | 1656  | 3345* |       |       |       |       |       |       |
|  |        | 1709  | 1732  | 1800* | 1816* | 1832* | 1847* | 1863* | 1879* | 1897* | 1915* | 1963* | 1970  | 1977  |
|  |        | 1990* | 1991  | 2082* | 2083  | 2103* | 2104* | 2105  | 2233* | 2235  | 2239* | 2243  | 2332  | 2339* |
|  |        | 2420* | 2438* | 2454* | 2470* | 2488* | 2506* | 2548* | 2549  | 2626* | 2627  | 2647* | 2648* | 2649* |
|  |        | 2737* | 2739  | 2762  | 2763* | 2765  | 2769* | 2773* | 3485* | 3486  | 3488  |       |       |       |
|  |        | 585*  | 3136* |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3604* | 3609  | 3611* |       |       |       |       |       |       |       |       |       |       |
|  |        | 3273  | 3274  | 3275* |       |       |       |       |       |       |       |       |       |       |
|  |        | 874*  | 1009  | 1012* | 1019* | 1031* |       |       |       |       |       |       |       |       |
|  |        | 3032* | 3039  |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3036  | 3040* |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 3030* |       |       |       |       |       |       |       |       |       |       |       |       |
|  |        | 875*  | 1001* | 1002  | 1013  | 1015* | 1017* | 1029* |       |       |       |       |       |       |
|  |        | 1808* | 1824* | 1839* | 1855* | 1871* | 1888* | 1906* | 2380* | 2388* | 2396* | 2410* | 2427* | 2434* |
|  |        | 2462* | 2479* | 2497* | 3494* |       |       |       |       |       |       |       |       |       |
|  |        | 813*  | 914   | 917*  | 919*  | 923*  |       |       |       |       |       |       |       |       |
|  |        | 814*  | 930*  |       | 931   | 934*  |       |       |       |       |       |       |       |       |
|  |        | 815*  | 942   | 945*  | 947*  | 951*  |       |       |       |       |       |       |       |       |
|  |        | 816*  | 955*  | 956   | 967*  | 971*  |       |       |       |       |       |       |       |       |
|  |        | 3352* | 3365  | 33    |       |       |       |       |       |       |       |       |       |       |

|       |       |       |       |       |       |       |       |      |       |      |      |      |
|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|------|------|------|
| 671   | 868   | 1119# | 1154  |       |       |       |       |      |       |      |      |      |
| 1121  | 1124# |       |       |       |       |       |       |      |       |      |      |      |
| 587   | 3345  | 3496# | 3500  | 3534  |       |       |       |      |       |      |      |      |
| 3443  | 3452# |       |       |       |       |       |       |      |       |      |      |      |
| 3386  | 3388# |       |       |       |       |       |       |      |       |      |      |      |
| 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 | 1208 |
| 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  | 2883  | 2887  | 2890  | 2893  | 2897  | 2901 | 2905  | 2908 | 2911 | 2915 |
| 2987  | 2991  | 2994  | 2997  | 3001  | 3023  | 3033  | 3034  | 3037 | 3048  | 3061 | 3073 | 3075 |
| 3111  | 3113  | 3116  | 3118  | 3128  | 3142  | 3145  | 3153  | 3164 | 3167  | 3170 | 3179 | 3182 |
| 3185  | 3194  | 3197  | 3200  | 3207  | 3210  | 3213  | 3222  | 3225 | 3232  | 3236 | 3249 | 3257 |
| 3453# |       |       |       |       |       |       |       |      |       |      |      |      |
| 688#  | 826   | 830*  | 958   |       |       |       |       |      |       |      |      |      |
| 689#  | 956*  |       |       |       |       |       |       |      |       |      |      |      |
| 955#  | 968   |       |       |       |       |       |       |      |       |      |      |      |
| 650   | 958#  |       |       |       |       |       |       |      |       |      |      |      |
| 956#  | 969   |       |       |       |       |       |       |      |       |      |      |      |
| 964   | 967#  |       |       |       |       |       |       |      |       |      |      |      |
| 686#  | 831   | 839*  | 937   | 948*  | 961*  | 966*  |       |      |       |      |      |      |
| 687#  | 940   | 942   |       |       |       |       |       |      |       |      |      |      |
| 3454# |       |       |       |       |       |       |       |      |       |      |      |      |
| 648   | 937#  |       |       |       |       |       |       |      |       |      |      |      |
| 947#  |       |       |       |       |       |       |       |      |       |      |      |      |
| 941   | 946   | 948#  |       |       |       |       |       |      |       |      |      |      |
| 779*  | 1623* | 2899* | 3092* | 3095* | 3105* | 3120* | 3134* | 3409 | 3417# |      |      |      |
| 869   | 1109# | 1163  | 1171  | 1177  | 1212  | 1219  |       |      |       |      |      |      |
| 962*  | 963   | 965*  | 972#  |       |       |       |       |      |       |      |      |      |
| 667   | 1073# | 1644  |       |       |       |       |       |      |       |      |      |      |
| 665   | 1090# | 1641  |       |       |       |       |       |      |       |      |      |      |
| 674   | 1039# | 1647  |       |       |       |       |       |      |       |      |      |      |

|        |          |      |      |      |      |      |      |      |      |      |      |      |      |
|--------|----------|------|------|------|------|------|------|------|------|------|------|------|------|
| 000156 | 877      | 1006 |      |      |      |      |      |      |      |      |      |      |      |
| 002142 | 1001     | 1026 | 1028 |      |      |      |      |      |      |      |      |      |      |
| 002150 | 1002     | 1016 | 1019 |      |      |      |      |      |      |      |      |      |      |
| 002230 | 1014     | 1017 |      |      |      |      |      |      |      |      |      |      |      |
| 002240 | 1011     | 1013 |      |      |      |      |      |      |      |      |      |      |      |
| 002276 | 1024     | 1027 |      |      |      |      |      |      |      |      |      |      |      |
| 002176 | 874      | 999  | 1004 | 1009 |      |      |      |      |      |      |      |      |      |
| 002202 | 999      |      |      |      |      |      |      |      |      |      |      |      |      |
| 000366 | 717      | 3161 |      |      |      |      |      |      |      |      |      |      |      |
| 001522 | 897      | 899  |      |      |      |      |      |      |      |      |      |      |      |
| 016172 | 3356     | 3359 |      |      |      |      |      |      |      |      |      |      |      |
| 016222 | 3365     | 3368 |      |      |      |      |      |      |      |      |      |      |      |
| 016304 | 3377     | 3379 |      |      |      |      |      |      |      |      |      |      |      |
| 017374 | 3544     | 3568 |      |      |      |      |      |      |      |      |      |      |      |
| 017360 | 3542     | 3566 |      |      |      |      |      |      |      |      |      |      |      |
| 017344 | 3540     | 3564 |      |      |      |      |      |      |      |      |      |      |      |
| 017330 | 3538     | 3562 |      |      |      |      |      |      |      |      |      |      |      |
| 017424 | 3548     | 3572 |      |      |      |      |      |      |      |      |      |      |      |
| 017410 | 3546     | 3570 |      |      |      |      |      |      |      |      |      |      |      |
| 017166 | 3532     | 3550 | 3552 | 3554 | 3556 | 3558 | 3560 |      |      |      |      |      |      |
| 000350 | 710      | 810  | 3159 | 3165 | 3174 | 3180 | 3189 | 3195 | 3203 | 3208 | 3217 | 3223 | 3245 |
|        | 3458     |      |      |      |      |      |      |      |      |      |      |      |      |
| 017546 | 766      | 3612 |      |      |      |      |      |      |      |      |      |      |      |
| 000360 | 714      | 3204 |      |      |      |      |      |      |      |      |      |      |      |
| 000001 |          |      |      |      |      |      |      |      |      |      |      |      |      |
|        | 1225     | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 |
|        | 1243     | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 |
|        | 1256     | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 |
|        | 1269     | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 |
|        | 1282     | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 |
|        | 1295     | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 |
|        | 1308     | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 |
|        | 1321     | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 |
|        | 1334     | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 |
|        | 1347     | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 |
|        | 1360     | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 |
|        | 1373     | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 |
|        | 1386     | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 |
|        | 1399     | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 |
|        | 1412     | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 |
|        | 1430     | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 |
|        | 1443     | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 |
|        | 1456     | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 |
|        | 1469     | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 |
|        | 1482     | 1483 | 1484 | 1485 | 1486 | 1487 | 1488 | 1489 | 1490 | 1491 | 1492 | 1493 | 1494 |
|        | 1495     | 1496 | 1497 | 1498 | 1499 | 1500 | 1501 | 1502 | 1503 | 1504 | 1505 | 1506 | 1507 |
|        | 1508     | 1509 | 1510 | 1511 | 1512 | 1513 | 1514 | 1515 | 1516 | 1517 | 1518 | 1519 | 1520 |
|        | 1521     | 1522 | 1523 | 1524 | 1525 | 1526 | 1527 | 1528 | 1529 | 1530 | 1531 | 1532 | 1533 |
|        | 1534     | 1535 | 1536 | 1537 | 1538 | 1539 | 1540 | 1541 | 1542 | 1543 | 1544 | 1545 | 1546 |
|        | 1547     | 1548 | 1549 | 1550 | 1551 | 1552 | 1553 | 1554 | 1555 | 1556 | 1557 | 1558 | 1559 |
|        | 1560     | 1561 | 1562 | 1563 | 1564 | 1565 | 1566 | 1567 | 1568 | 1569 | 1570 | 1571 | 1572 |
|        | 1573     | 1574 | 1575 | 1576 | 1577 | 1578 | 1579 | 1580 | 1581 | 1582 | 1583 | 1584 | 1585 |
|        | 1586     | 1587 | 1588 | 1589 | 1590 | 1591 | 1592 | 1593 | 1594 | 1595 | 1596 | 1597 | 1598 |
|        | 1599     | 1600 | 1601 | 1602 | 1603 | 1604 | 1605 | 1606 | 1607 | 1608 | 1609 | 1610 | 1611 |
|        | 1612     | 1613 | 1614 | 1615 | 1616 | 1617 | 1618 | 1619 |      |      |      |      |      |
|        | 754      | 809  |      |      |      |      |      |      |      |      |      |      |      |
|        | 582      | 3135 | 3563 | 3565 | 3567 | 3569 | 3571 | 3573 |      |      |      |      |      |
| NOEAE  | 000472   |      |      |      |      |      |      |      |      |      |      |      |      |
| NOP    | = 000240 |      |      |      |      |      |      |      |      |      |      |      |      |

CROSS REFERENCE TABLE -- USER SYMBOLS

[illegible]



[illegible]

SEC 0077

[illegible]

|       |       |       |        |       |      |      |      |      |      |       |       |       |
|-------|-------|-------|--------|-------|------|------|------|------|------|-------|-------|-------|
| 3094# |       |       |        |       |      |      |      |      |      |       |       |       |
| 1105# | 1171  |       |        |       |      |      |      |      |      |       |       |       |
| 3348# | 3365# | 3367  | 3372#  | 3394# |      |      |      |      |      |       |       |       |
| 3364  | 3369# |       |        |       |      |      |      |      |      |       |       |       |
| 1154# | 1199  |       |        |       |      |      |      |      |      |       |       |       |
| 3545  | 3557# |       |        |       |      |      |      |      |      |       |       |       |
| 354J  | 3555# |       |        |       |      |      |      |      |      |       |       |       |
| 3541  | 3553# |       |        |       |      |      |      |      |      |       |       |       |
| 3539  | 3551# |       |        |       |      |      |      |      |      |       |       |       |
| 3537  | 3549# |       |        |       |      |      |      |      |      |       |       |       |
| 3547  | 3559# |       |        |       |      |      |      |      |      |       |       |       |
| 3375  | 3381# |       |        |       |      |      |      |      |      |       |       |       |
| 595#  | 923   | 934   | 951    | 971   |      |      |      |      |      |       |       |       |
| 3255# | 3257# | 3265  | 3282#  |       |      |      |      |      |      |       |       |       |
| 3262# |       |       |        |       |      |      |      |      |      |       |       |       |
| 3269# | 3272  |       |        |       |      |      |      |      |      |       |       |       |
| 3270# |       |       |        |       |      |      |      |      |      |       |       |       |
| 546#  | 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</ |       |      |      |      |      |      |       |       |       |

MAIN MACRO 304 1052 20-JAN-78 11:05 PAGE 8:  
CZOKBH.F11 20-JAN-78 11:05 CROSS REFERENCE TABLE -- MACRO NAMES

TE. CC79

TNOV 2882# 2919 2957 2983

ABS. 017612 000

ERRORS DETECTED: 0

CZOKBH.BIN,CZOKBH.LST/CRF/SOL/NL:TOC=CZOKBH.P11

RUN-TIME: 3 7 1 SECONDS

RUN-TIME RATIO: 91/12=7.3

CORE USED: 11K (21 PAGES)

