

PDP11

T17-4K SYSTEM EXERCISER
MD-11-DZQKB-F

EP DZQKB-F-DL-A

OCT 1976

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FICHE 1 OF 1

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.NLIST SEQ
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IDENTIFICATION

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

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

DATE: 21-DECEMBER-1975

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: JOHN MITTELL

REVISED BY: W.F. KELICKER 25-FEB-74
AL LOSCHAK 21-DEC-75 :SUPPORT SOFTWARE SWITCH REGISTE

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1. ABSTRACT

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

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

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE

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

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES
4K OF MEMORY

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

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

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

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

4.1 CONTROL SWITCH SETTING

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

4.2 STARTING ADDRESS OR ADDRESSES

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

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

4.3 PROGRAM AND/OR OPERATOR ACTION

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

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

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

5.1.2 SWITCH SETTINGS ARE

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

5.1.3

5.2. SUBROUTINE ABSTRACTS

5.2.1 BEGIN SA 200

5.2.2 SCOPE

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

5.2.3 HLT

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

5.2.4 TRTRAP

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

5.2.5 TRAPCATCHER

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

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

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

5.2.6 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 TYOUT (TTY OUTPUT)

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

5.2.8 RFSTART (RF-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "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 LP1 (LINE PRINTER)

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

5.2.12 HSRINI (PC11 INPUT)

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

5.2.13 HPOUT (PC11 OUTPUT)

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

5.2.14 RKSTART (RK-11 DISK)

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

5.2.15 RCSTART (RC-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER IS 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 "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER IS TRANSFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN. (FOR THE RPO3 THE ISR MUST BE MOTIFIED TO TEST THE FULL SURFACE)

5.2.17 CORE EXPANSION (DET1)

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

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

5.3 PROGRAM AND/OR OPERATOR ACTION

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

6. ERRORS

6.1 ERROR PRINTOUT

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

6.2 ERROR RECOVERY

FOR TTY READER AND HSR, TAPE MUST BE REPOSITIONED TO LEADER BEFORE RESTARTING TEST. IF YOU DESIRE TO HAVE THE PROGRAM RESTART ON AN ERROR MAKE SWITCH REGISTER BIT8 AN ONE.

7. RESTRICTIONS

7.1 STARTING RESTRICTION

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

7.2 OPERATIONAL RESTRICTION

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

8. MISCELLANEOUS

TRACKING DOWN UNUSUAL FAILURES

FAILURES THAT MAY OCCUR BECAUSE OF A FALSE ENTRY INTO A SUBTEST, OR A FAILURE IN A CONTROL ROUTINE RATHER THAN A SUBTEST. DETECTION OF THESE MAY BE ACCOMPLISHED BY SEVERAL PROCEDURES. THERE IS A LOCATION CALLED "RETURN" THAT RECORDS THE LAST SUCCESSFUL SUBTEST COMPLETED. THERE IS ANOTHER LOCATION CALLED "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 %7,2#USER. THE SECOND WORD OF THAT INSTRUCTION IS AN ABSOLUTE ADDRESS THAT THE USER MAY CHANGE TO POINT TO HIS ROUTINE. THE USER SHOULD EXIT HIS PRIMING ROUTINE WITH A RTS %7 INSTRUCTION.

8.1 EXECUTION TIME

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

9. PROGRAM DESCRIPTION

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

THERE IS NO MONITOR IN THE CONVENTIONAL SENSE. EACH DEVICE THAT IS TO BE EXERCISED HAS IT'S OWN STAND ALONE ROUTINE THAT OPERATES IN THE INTERRUPT MODE. THESE ROUTINES NEED NO SUPERVISION OR MONITORING AFTER THEY ARE INITIATED. THERE IS A PRIMER AREA THAT CHECKS THE SWITCH REGISTER TO SEE WHAT DEVICES ARE TO BE INITIATED. THE PRIMER AREA SETS THE INTERRUPT ENABLE BIT IN THE DEVICE STATUS REGISTER, INITIALIZES THE DATA PATTERN AND INITIATES AN OPERATION TO RAISE DATA FLAGS ON DEVICES THAT CAN NOT INITIATE THEM THEMSELVES. THEN, THE PRIMER JUMPS TO THE PROCESSOR TEST WHERE THE INDIVIDUAL DEVICES ARE SERVICED AT THE INTERRUPT RATE.

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

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

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

THE CORE LAYOUT IS BROKEN INTO FIVE DISTINCT PARTS:

- (1) THE TRAP CATCHER,
- (2) THE SET UP AND I/O PRIMER AREA AND I/O TEST 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,KW11L,RK11,RC11,RP11 AND KE11
;TEST SIMULTANEOUS RUNNING OF I/O, WITH PROCESSOR INSTRUCTION TEST AND WITH
;WITH TRACE BIT ENABLED TO BE CONSIDER MAINLINE CODE

000240
104000
104400
177776

NOP=240 ;SYSTEM NULL OPERATION
HLT=EMT ;TRAP USED FOR ERROR PRINTOUT
SCOPE=TRAP ;TRAP USED SCOPE LOOP AND ITERATION OF SUB PROBLEMS
CC=177776

MO1

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| | | | | |
|-----|--------|--------|-------------------|---|
| | | 016062 | TUSR=TCSR | |
| | | 016762 | BUFF=FIN | |
| | | 000000 | R100=%0 | |
| | | 000001 | R101=%1 | |
| | | 000002 | RSR=%2 | |
| | | 176000 | RKWORDCT=-2000 | |
| | | 176000 | RPWORDCT=-2000 | |
| | | 176040 | RCWORDCT=-2000+40 | |
| | | 176040 | RFWORDCT=-2000+40 | |
| | | 000000 | XX=0 | |
| | | 000000 | .=0 | |
| | | | .REPT 100 | |
| | | | .+2 | |
| | | | HALT | ; TRAP ENTRANCE |
| | | | .ENDR | ; TRAPPED TO PREVIOUS LOCATION |
| 600 | | | .LIST SEQ,ME | |
| 601 | | 000014 | .=14 | |
| 602 | 000014 | 000016 | .+2 | |
| 603 | 000016 | 000000 | HALT | ; FALSE TRACE TRAP |
| 604 | | 000024 | .=24 | |
| 605 | 000024 | 016504 | PFAIL | |
| 606 | 000026 | 000340 | 340 | |
| 607 | | 000030 | .=30 | |
| 608 | 000030 | 015564 | PRINT | ; FOR HALT TRAPS |
| 609 | 000032 | 000340 | 340 | ; HIGHEST PRIORITY |
| 610 | | 000034 | .=34 | |
| 611 | 000034 | 016364 | SCOPEC | ; USER TRAP |
| 612 | 000036 | 000000 | 0 | |
| 613 | | 000046 | .=46 | |
| 614 | 000046 | 015534 | LOGICA | ; RETURN TO MONITOR ADDRESS |
| 615 | | 000052 | .=52 | |
| 616 | 000052 | 040000 | 040000 | ; EXECUTION TIME IS MEMORY SIZE DEPENDENT |
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;(R6) IS THE STACK POINTER
;((R6)) IS THE PC+2 OF LOCATION WHERE THE TRAP ORIGINATED
;FOR NORMAL OPERATION RUN WITH ALL SWITCHES DOWN
;SR 15=1 OR UP---HALT ON ERROR
;SR 14=1 OR UP---SCOPE LOOP
;SR 13=1 OR UP---INHIBIT PRINT OUT
;SR 12=1 OR UP---INHIBIT TRACE TRAPPING
;SR 11=1 OR UP---INHIBIT SUB-PROBLEM ITERATION
;SR 10=1 OR UP---INHIBIT PROCESSOR TEST
;SR 09=1 OR UP INHIBIT VARIABLE CORE EXPANSION
;SR 08=1 OR UP RESTART ON ERROR
;SPECIAL DELETE SWITCHES-SET RESPECTIVE SWITCH TO A 1 TO INHIBIT INITIATION OF DEVICE

;SW 0=1 INHIBIT TTY OUTPUT
;SW 1=1 INHIBIT TTY INPUT
;SW 2=1 INHIBIT HSP
;SW 3=1 INHIBIT HSR
;SW 4=1 INHIBIT LINE CLOCK
;SW 5=1 INHIBIT RC, RF, RK, RP DISKS
;SW 6=1 INHIBIT TC11 DECTAPE
;SW 7=1 INHIBIT LINE PRINTER --- IF LINE PRINTER IS USED, MUST RESTART AT 502
;IF EAE EXIST IT WILL BE AUTOMATICALLY SELECTED.

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641          :PDP11 SIMULTANEOUS I/O
642          .=60
643 000060 001522      TTYINR      ;TTY IN INTERRUPT VECTOR
644 000062 000200      200
645 000064 001576      TYOUTR      ;TTY OUT INTERRUPT VECTOR
646 000066 000200      200
647 000070 001624      HSRINR      ;HSR INTERRUPT VECTOR
648 000072 000200      200
649 000074 001716      HPOUTR      ;HSP INTERRUPT VECTOR
650 000076 000200      200
651          .=100
652 000100 002022      LK3        ;INTERRUPT VECTOR LINE CLOCK
653 000102 000300      300        ;LEVEL SIX PRIORITY
654          .=4
655 000004 017456      .PARSRV    ;MEMORY PARITY
656 000006 000340      340
657
658          .=174
659 000174 177570      SRPTR:    177570
660 000176 000000      SOFTSR: 000000
661          .=200
662 000200 000137      JMP        @#START
663          .=204
664 000204 002610      IRF        ;RF11 DISK
665 000206 000240      240        ;LEVEL 5
666 000210 002512      IRC        ;RC DISK
667 000212 000240      240
668
669          .=214
670 000214 002674      FENDZ
671 000216 000300      300        ;DEC TAPE
672          .=220
673 000220 002322      IRK        ;RK DISK
674 000222 000240      240
675
676          .=254
677 000254 002426      IRP        ;RP DISK
678 000256 000240      240
679
680          STATUS=177776
681 000260 177560      TRCSR:    177560
682 000262 177562      TRDR:    177562
683 000264 177564      TTCSR:    177564
684 000266 177566      TTDBR:    177566
685 000270 177550      HRCSR:    177550
686 000272 177552      HRDBR:    177552
687 000274 177554      HPCSR:    177554
688 000276 177556      HPDBR:    177556
689 000300 177546      LKCSR:    177546
690 000302 177514      LPCSR:    177514
691 000304 177516      LPDBR:    177516
692 000306 177470      RFDAR:    177470      ;DISK ADDRESS AND ERROR
693 000310 177466      RFDAR:    177466      ;DISK ADDRESS REGISTER
694 000312 177462      RFWC:    177462      ;WORD COUNT REGISTER
695 000314 177464      RFCAR:    177464      ;CURRENT ADDRESS REGISTER
696 000316 177460      RFCSR:    177460      ;STATUS REGISTER

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697 000323 177461
698 000322 177442
699 000324 177450
700 000326 177452
701 000330 177446
702 000332 177447
703 000334 177413
704 000336 177412
705 000340 177406
706 000342 177410
707 000344 177404
708 000346 177405
709 000350 177304
710 000352 177302
711 000354 177310
712 000356 177311
713 000360 177306
714 000362 177300
715 000364 177312
716 000366 177314
717 000370 177316
718
719
720 177340
721 000372 177342
722 000374 177340
723 000376 177350
724 000400 000440
725 000402 177344
726 000404 177346
727 000406 000214
728 000410 176722
729 000412 176725
730 000414 176724
731 000416 176710
732 000420 176724
733 000422 176716
734 000424 176720
735 000426 176714
736 000430 176715
737 000432 000000
738
739
740 000434 010146
741 000436 010346
742 000440 005003
743 000442 012701 003416
744 000446 062103
745 000450 062103
746 000452 001775
747 000454 020127 004416
748 000460 101001
749 000462 104000
750 000464 012603
751 000466 012601
752 000470 000207

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RFCSRH: 177461 :HIGH BYTE ADDRESS OR CSR
RCDAR: 177442 :DISK ADDRESS REGISTER
RCWC: 177450 :WORD COUNT REGISTER
RCBAR: 177452 :CURRENT ADDRESS REGISTER
RCCSR: 177446 :STATUS REGISTER
RCCSRH: 177447 :HIGH BYTE ADDRESS OR CSR
RKDAH: 177413 :HIGH BYTE OF DISK ADDRESS
RKDAE: 177412 :DISK ADDRESS REGISTER
RKWC: 177406 :WORD COUNT REGISTER
RKBAR: 177410 :CURRENT ADDRESS REGISTER
RKCSR: 177404 :STATUS REGISTER
RKCSRH: 177405 :HIGH BYTE ADDRESS OR CSR
MQ: 177304 :EAE LOCATIONS
AC: 177302
SC: 177310
SRE: 177311
MUL: 177306
DIV: 177300
NOR: 177312
LSH: 177314
ASH: 177316

```

:DECTAPE ADDRESSES

```

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

```

```

753 000472 012767 000240 014232 NOEAE: MOV #240,EAESRT ;BRANCH AROUND EAE ROUTINE
754 000500 000002 RTI ;JUMP OVER EAE SECTION
755
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000502 012767 016504 177314 START: MOV #PFAIL,24 ;SET POWER FAIL VECTOR
000510 012706 016762 MOV #BUFF,%6 ;SET UP STACK
000514 012767 000530 177262 MOV #15,4 ;SET UP TIME OUT VECTOR
000522 005777 177446 TST %SRPTR ;TRY TO REFERENCE THE
;HARDWARE SWITCH REGISTER
;BRANCH IF NO TIME OUT TRAP OCCURS
000526 000404 BR 25 ;CHANGE THE SWITCH REGISTER POINTER
000530 012767 000176 177436 1S: MOV #SOFTSR,SRPTR ;TO POINT TO A SOFTWARE SWITCH REGISTER
;RESTORE THE STACK
000536 022626 CMP (6)+,(6)+ ;RESTORE TIME OUT VECTOR
000540 012767 000006 177236 2S: MOV #6,4 ;RESTORE TIME OUT VECTOR
000546 017767 177422 000742 MOV %SRPTR,REG1 ;MOV SR TO REGISTER
000554 005737 016570 TST %SAVR6 ;SET ON POWER FAIL
000560 001403 BEQ ESTART
000562 005037 016570 CLR %SAVR6
000566 104000 HLT ;A POWER FAIL OCCURRED
000570 005067 015644 ESTART: CLR ICOUNT
000574 012706 016762 MOV #BUFF,%6 ;SET UP STACK
000600 012767 000642 015636 MOV #START2,RETURN
000606 005067 015630 CLR SCOPEF
000612 012767 000340 177156 MOV #340,STATUS ;LOCK OUT INTERRUPTS
000620 005067 014736 CLR PRFLAG ;PRINT ROUTINE BUSY
000624 016702 000666 MOV REG1,RSR ;SAVE SWITCHES
000630 012700 000100 MOV #100,R100 ;INTERRUPT ENABLE
000634 012701 000101 MOV #101,R101 ;INTERRUPT ENABLE AND GO
000640 104400 SCOPE
000642 050077 177412 START2: BIS R100,%TRCSR
000646 000005 RESET
000650 030077 177404 BIT R100,%TRCSR ;INTERRUPT ENABLE
000654 001401 BEQ .+4
000656 104000 HLT ;RESET DID NOT CLEAR INTERRUPT ENABLE
000660 104400 SCOPE
;DOES "RESET" ON THE BUS LAST TOO LONG
000662 012706 016762 MOV #BUFF,%6 ;SET UP STACK
000666 000005 RESET
000670 050077 177370 BIS R100,%TRCSR ;SET A BIT
000674 030077 177364 BIT R100,%TRCSR ;IS IT SET
000700 001001 BNE .+4
000702 104000 HLT ;RESET IS ON BUS TOO LONG
000704 005077 177354 CLR %TRCSR
000710 104400 SCOPE
000712 050077 177346 BIS R100,%TRCSR
000716 005077 177342 CLR %TRCSR ;IF BUS HANG, CHECK NO SACK TIMEOUT
000722 104400 SCOPE
000724 000005 RESET
000726 012767 004416 015510 MOV #BEGIN,RETURN
000734 012737 000472 000004 MOV #NOEAE,%4 ;TEST FOR EAE
000742 005777 177402 TST %M0 ;TRAP IF NONEXISTANT
000746 012767 001520 177030 MOV #RTIA,4 ;SET UP FOR NON-EXISTANT I/O
000754 012767 000340 177024 MOV #340,6 ;KEEP NEW PSW AT 340
000762 012767 000001 000604 MOV #1,DATA1 ;BASE DATA FOR TTY READER OR KEYBOARD

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| | | | | | | | |
|-----|--------|--------|--------|--------|------|--------------------|---|
| 809 | 000770 | 005067 | 000626 | | CLR | DATA2 | :BASE DATA FOR TTY PUNCH OR TELEPRINTER |
| 810 | 000774 | 012767 | 000001 | 000674 | MOV | #1,DATA3 | :BASE DATA FOR HSR |
| 811 | 001002 | 005067 | 000764 | | CLR | DATA4 | :BASE DATA FOR HSP |
| 812 | 001006 | 012706 | 016762 | | MOV | #BUFF,%6 | |
| 813 | 001012 | 005057 | 000760 | | CLR | DELAY | :FOR READER STALL - HSR - |
| 814 | 001016 | 012767 | 000340 | 176752 | MOV | #340,STATUS | :LOCK OUT INTERRUPTS |
| 815 | 001024 | 030227 | 000001 | | BIT | RSR,#1 | |
| 816 | 001030 | 001002 | | | BNE | ST1 | |
| 817 | 001032 | 050077 | 177226 | | BIS | R100,ATTCSR | :TTY OUT |
| 818 | 001036 | 030227 | 000002 | ST1: | BIT | RSR,#2 | |
| 819 | 001042 | 001002 | | | BNE | ST2 | |
| 820 | 001044 | 050177 | 177210 | | BIS | R101,ATRCR | :TTY IN |
| 821 | 001050 | 005777 | 177220 | ST2: | TST | ATPCSR | :TEST FOR OUT OF TAPE |
| 822 | 001054 | 100405 | | | BMI | ST3 | |
| 823 | 001056 | 030227 | 000004 | | BIT | RSR,#4 | |
| 824 | 001062 | 001002 | | | BNE | ST3 | |
| 825 | 001064 | 050077 | 177204 | | BIS | R100,ATPCSR | :HSP |
| 826 | 001070 | 005777 | 177174 | ST3: | TST | ATPCSR | :TEST FOR OUT OF TAPE |
| 827 | 001074 | 100412 | | | BMI | ST4 | |
| 828 | 001076 | 000402 | | | BR | ST3A | :RESERVED FOR OVERLAYS |
| 829 | 001100 | 017416 | | | DET3 | | :1020 GTP OVER LAY |
| 830 | 001102 | 017416 | | | DET3 | | :1022 GTP OVER LAY |
| 831 | 001104 | 030227 | 000010 | ST3A: | BIT | RSR,#10 | |
| 832 | 001110 | 001004 | | | BNE | ST4 | |
| 833 | 001112 | 010067 | 000660 | | MOV | R100,DELAY | :FOR STALL HSR |
| 834 | 001116 | 050177 | 177146 | | BIS | R101,ATPCSR | :HSR |
| 835 | 001122 | 030227 | 000020 | ST4: | BIT | RSR,#20 | |
| 836 | 001126 | 001004 | | | BNE | ST5 | |
| 837 | 001130 | 005067 | 000762 | | CLR | TIME | |
| 838 | 001134 | 050077 | 177140 | | BIS | R100,ALKCSR | :LINE CLOCK 50 OR 60 CYCLES |
| 839 | 001140 | 030227 | 000040 | ST5: | BIT | RSR,#40 | |
| 840 | 001144 | 001053 | | | BNE | ST6 | |
| 841 | 001146 | 012767 | 001210 | 176630 | MOV | #ST5A,4 | |
| 842 | 001154 | 105777 | 177246 | | TSTB | ATPCSR | :WAIT FOR CONTROLLER READY |
| 843 | 001160 | 100375 | | | BPL | .-4 | |
| 844 | 001162 | 012777 | 000015 | 177235 | MOV | #15,ATPCSR | :RESET DRIVE |
| 845 | 001170 | 105777 | 177232 | | TSTB | ATPCSR | :WAIT FOR CONTROLLER READY |
| 846 | 001174 | 100375 | | | BPL | .-4 | |
| 847 | 001176 | 005777 | 177214 | | TST | ATPCSR | :WAIT FOR ACCESS READY |
| 848 | 001202 | 100375 | | | BPL | .-4 | |
| 849 | 001204 | 005077 | 177206 | | CLR | ATPCSR | :CLR ATTENTION |
| 850 | 001210 | 012767 | 001520 | 176566 | MOV | #RTIA,4 | |
| 851 | 001216 | 012777 | 000037 | 177076 | MOV | #37,ATCDAR | |
| 852 | 001224 | 012767 | 043503 | 001426 | MOV | #43503, RFFUNCTION | :WRITE CHECK/WRITE RF |
| 853 | 001232 | 012767 | 043503 | 001310 | MOV | #43503, RCFUNCTION | |
| 854 | 001240 | 012767 | 043503 | 001116 | MOV | #43503, RKFUNCTION | |
| 855 | 001246 | 012767 | 043503 | 177156 | MOV | #43503, RPFUNCTION | |
| 856 | 001254 | 110077 | 177036 | | MOVB | R100,ATPCSR | :TELL DISK TO READ OR WRITE |
| 857 | 001260 | 110077 | 177060 | | MOVB | R100,ATKCSR | |
| 858 | 001264 | 110077 | 177040 | | MOVB | R100,ATCCSR | |
| 859 | 001270 | 110077 | 177132 | | MOVB | R100,ATPCSR | |
| 860 | 001274 | 030200 | | ST6: | BIT | RSR,R100 | :TEST FOR DECTAPE |
| 861 | 001276 | 001011 | | | BNE | ST7 | |
| 862 | 001300 | 012767 | 002664 | 001364 | MOV | #TCFIRST,TCXPE | :FIRST BLOCK SHOULD BE ZERO |
| 863 | 001306 | 012777 | 002674 | 177072 | MOV | #FENDZ,ATCIV | :GO TO END ZONE ON INTERRUPT |
| 864 | 001314 | 012777 | 004503 | 177050 | MOV | #R+TE+RB+DO,ATCCM | :MOVE REVERSE |

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865 001322 105702          ST7:  TSTB      RSR          ;LINE PRINTER
866 001324 100427          BMI      ST9          ;
867 001326 012767 001404 176450 MOV      #ST9,4      ;DON'T CHANGE 200
868 001334 012767 000137 000724 MOV      #137,SOLPAT ;RESET FOR START OF LINE PATTERN
869 001342 016767 000612 000720 MOV      LP6+4,CLINCT ;LINE COUNT
870 001350 012767 000040 000706 MOV      #40,CURPAT
871 001356 012777 000014 176720 MOV      #14,@LPDBR   ;LINE FEED TO POSITION BUFFER
872 001364 012737 002144 000200 MOV      @LPINTR,@#200 ;INTERRUPT VECTOR
873 001372 012737 000200 000202 MOV      #200,@#202  ;PROCESSOR LEVEL 4
874 001400 010077 176676 MOV      R100,@LPCSR ;INTERRUPT ENABLE
875 001404 005037 015550 ST8:   CLR      @#TRPB ;NO "T" BIT FIRST PASS
876          ;IF OPERATION WITH DIAGNOSTIC PACKAGE OR ACT11
877 001410 005767 176426 TST      42
878 001414 001415 BEQ      ST8A        ;BRANCH IF NO MONITOR
879 001416 012767 001520 176360 MOV      #RTIA,4
880 001424 005077 176652 CLR      @LPCSR      ;NO LINE PRINTER WITH MONITOR
881 001430 005077 176630 CLR      @TTCSR      ;NO CONSOLE TEST WITH MONITOR
882 001434 122767 000002 176377 CMPB     #2,41
883 001442 001002 BNE      ST8A
884 001444 005077 176674 CLR      @RKCSR      ;YES DON'T TEST RK DISK
885 001450 004737 016764 ST8A:  JSR      %7,@#USER ;FOR USER I/O PROGRAM
886 001454 004767 015306 JSR      %7,DET1     ;CHECK FOR CORE EXPANSION
887 001460 005067 176322 CLR      6           ;HALT FOR BUS ERROR
888 001464 012767 000006 176312 MOV      #6,4
889 001472 000067 176300 CLR      STATUS     ;FOR USER I/O PROGRAM
890 001476 000401 BR      .+4         ;ALLOW INTERRUPTS
891 001500 000001 MAINLINE: WAIT          ;WAIT HERE FOR INTERRUPTS
892 001502 037727 176466 002000 BIT      @SRPTR,#2000 ;INHIBIT PROCESSOR TEST
893 001510 001373 BNE
894 001512 000167 002700 JMP      BEGIN
895 001516 000000 REG1:  0           ;STATUS OF SELECTED DEVICES
896 001520 000002 RTIA:  RTI        ;AN RTI FOR NON EXISTANT I/O
897
898
899
900
901          ;TTY RECEIVER VALUES 0 TO 377
902
903 001522 105777 176532 TTYINR: TSTB     @TRCSR ;IS DONE SET
904 001526 100401 BMI      .+4
905 001530 104000 HLT
906 001532 105777 176524 TSTB     @TRDR
907 001536 001413 BEQ      TTYIN2     ;FALSE RETURN FROM MAINLINE
908 001540 127767 176516 000026 CMPB     @TRDR,DATA1 ;TEST DATA FOR LEADER
909 001546 001401 BEQ      TTYIN3     ;IF LEADER GO BACK
910 001550 104000 HLT          ;NOT LEADER TEST FOR DATA
911 001552 105267 000016 TTYIN3: INCB     DATA1 ;DATA COMPARISON ERROR
912 001556 001003 TTYIN4: BNE     TTYIN2 ;INCREMENT DATA
913 001560 012767 000001 000006 TTYIN1: MOV      #1,DATA1 ;BASE DATA
914 001566 005277 176466 TTYIN2: INC      @TRCSR ;START READER
915 001572 000002 RTI          ;RETURN TO MAINLINE
916
917 001574 000000 DATA1: XX          ;EXPECTED DATA
918
919          ;TTY TRANSMITTER PRINT VALUES 0 TO 377
920

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921 001576 105777 176462 TYOUTR: TSTB @TTCSR ;TEST FOR DONE
922 001602 100401 BMI .+4 ;BRANCH IF FLAG FOUND
923 001604 104000 HLT ;FALSE INTERRUPT RETURN
924 001606 105267 000010 INCB DATA2 ;INCREMENT DATA
925 001612 016777 000004 176446 TYOUT!: MOV DATA2,@TTDBR ;OUTPUT TO DEVICE
926 001620 000002 RTI ;RETURN TO MAINLINE
927
928 001622 000000 DATA2: XX ;TRANSMITTED DATA
929 ;HSR SECTION VALUES 0 TO 377
930
931 001624 105777 176440 HSRINR: TSTB @HRCR ;IS DONE SET
932 001630 100401 BMI .+4
933 001632 104000 HLT ;FALSE RETURN FROM MAINLINE
934 001634 105777 176432 TSTB @HRDBR ;TEST DATA FOR LEADER
935 001640 001413 BEQ HSRIN2 ;IF LEADER GO BACK
936 001642 127767 176424 000026 CMPB @HRDBR,DATA3 ;NOT LEADER TEST FOR DATA
937 001650 001401 BEQ .+4
938 001652 104000 HLT ;DATA COMPARISON ERROR
939 001654 105267 000016 INCB DATA3 ;INCREMENT DATA
940 001660 001003 BNE HSRIN2
941 001662 012767 000001 000006 HSRIN1: MOV #1,DATA3 ;BASE DATA
942 001670 005277 176374 HSRIN2: INC @HRCR ;START READER
943 001674 000002 RTI ;RETURN TO MAINLINE
944
945 001676 000000 DATA3: XX ;EXPECTED DATA
946
947 ;HS PUNCH SECTION, VALUES 0 TO 377
948 ;ENABLE READER ON FIX COUNT OF PUNCH ONLY (14 TIMES)
949 001700 012767 000000 000064 HPOUT: MOV #0,DATA4 ;INITIAL DATA
950 001706 016777 000060 176362 HPOUT1: MOV DATA4,@HPDBR ;OUTPUT TO DEVICE
951 001714 000002 RTI ;RETURN TO MAINLINE
952 001716 105777 176352 HPOUTR: TSTB @HPCSR ;TEST FOR DONE
953 001722 100401 BMI .+4 ;BRANCH IF FLAG FOUND
954 001724 104000 HLT ;FALSE INTERRUPT RETURN
955 001726 046777 000044 176334 BIC DELAY,@HRCR ;CLEAR HSR INTERRUPT ENABLE
956 001734 005267 000034 INC INTCNT ;COUNT INTERRUPTS
957 001740 026727 000030 000014 CMP INTCNT,#14 ;SAVE TO TURN READER ON?
958 001746 001005 BNE HPOUT2 ;NO-NEED MORE TIME
959 001750 005067 000020 CLR INTCNT ;YES RESET COUNTER
960 001754 056777 000016 176306 BIS DELAY,@HRCR ;SET READER INT ENABLE
961 001762 105267 000004 HPOUT2: INCB DATA4 ;INCREMENT DATA
962 001766 001744 BEQ HPOUT ;AT UPPER LIMIT START OVER
963 001770 000746 BR HPOUT1 ;FINISH REST OF DATA
964
965 001772 000000 DATA4: XX
966 001774 000000 INTCNT: 0
967 001776 000000 DELAY: 0 ;EQUAL 100 IF HSR RUNNING
968
969 ;TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
970 002000 005037 002116 LK1: CLR @TIME ;CLEAR LINE CLOCK TIMER
971 002004 052777 000100 176266 BIS #100,@LKCSR
972 002012 052737 000100 177776 BIS #100,@STATUS
973 002020 000002 LK2: RTI ;RETURN TO MAINLINE
974 002022 105777 176252 LK3: TSTB @LKCSR ;TEST FOR DONE
975 002026 100401 BMI .+4
976 002030 104000 HLT ;FALSE INTERRUPT

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977 002032 042777 000200 176240          BIC      #200, @LKCSR
978 002040 005237 002116          INC      @TIME
979 002044 022737 006344 002116      LK4:    CMP      #3300., @TIME
980 002052 103362          BHIS    LK2
981 002054 042777 000100 176216      BIC      #100, @LKCSR
982 002062 042737 000100 177776      BIC      #100, @STATUS
983 002070 022737 007020 002116      CMP      #3600., @TIME
984 002076 001740          BEQ     LK1
985 002100 105777 176174          TSTB   @LKCSR
986 002104 100375          BPL     -4
987 002106 042777 000200 176154      BIC      #200, @LKCSR
988 002114 000751          BR     LK4
989 002116 000000          TIME:  0
990
991          ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER
992          ;INTERRUPT VECTOR IS 200
993          LP80=LP6+4
994
995 002120 016767 000142 000136      LP1:    MOV     SOLPAT, CURPAT
996 002126 016777 000132 176150      LP2:    MOV     CURPAT, @LPD8R
997 002134 105777 176142          TSTB   @LPCSR
998 002140 100405          BMI     LP6
999 002142 000002          RTI
1000 002144 105777 176132          LPINTR: TSTB   @LPCSR
1001 002150 100401          BMI     +4
1002 002152 104000          HLT
1003 002154 026727 000110 000117      LP6:    CMP     CLINCT, #79.
1004
1005 002162 001415          BEQ     LP4
1006 002164 005267 000100          INC     CLINCT
1007 002170 026727 000070 000137      CMP     CURPAT, #137
1008 002176 001403          BEQ     LP3
1009 002200 005267 000060          INC     CURPAT
1010 002204 000750          BR     L?2
1011 002206 012767 000040 000050      LP3:    MOV     #40, CURPAT
1012 002214 000744          BR     LP2
1013 002216 005067 000046          LP4:    CLR     CLINCT
1014 002222 012777 000012 176054      MOV     #12, @LPD8R
1015 002230 105777 176046          TSTB   @LPCSR
1016 002234 100375          BPL     -4
1017 002236 026727 000024 000137      CMP     SOLFAT, #137
1018 002244 001403          BEQ     LP5
1019 002246 005267 000014          INC     SOLPAT
1020 002252 000722          BR     LP1
1021 002254 012767 000040 000004      LP5:    MOV     #40, SOLPAT
1022 002262 000716          BR     LP1
1023 002264 000000          CURPAT: 0
1024 002266 000000          SOLPAT: 0
1025 002270 000000          CLINCT: 0
1026
1027          ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
1028 002272 005077 176040      RKSTART: CLR     @RKDAE
1029 002276 016777 000360 176036      RK1:   MOV     LLIMIT, @RKBAR
1030 002304 012777 176000 176026      MOV     #RKWORDCT, @RKWC
1031 002312 113777 002364 176024      MOV     @#RKFUNCTION, @RKCSR
1032 002320 000002          RTI

```

; ON INTERRUPTS ENTER HERE
; A LAPS OF 55 SECONDS
; BRANCH IF TIME LESS THAN 55 SECONDS

; LOWER PRIORITY
; ONE MINUTE UP
; YES-RESET TIMER
; NO-SKIP ON FLAG TILL IT IS.

; CLEARS THE FLAG
; FOUND FLAG GO INCREMENT COUNTER

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

; START OF LINE TO CURRENT
; CURRENT PATTERN TO LINE PRINTER

; RETURN TO MAIN LINE
; TEST FOR FLAG

; FALSE RETURN FROM MAIN LINE
; TEST FOR END OF LINE
; CHANGE THIS VALUE FOR 132 COLUMN PRINTER

; GO GENERATE CR/LF
; INCREMENT LINE POSITION COUNT
; TEST FOR MAXIMUM PATTERN
; YES - GO TO LP3 AND RESET
; NO - INCREMENT TO NEXT PATTERN
; GO SEND IT TO LINE PRINTER
; RESET PATTERN AND SEND TO PRINTER
; SENT TO LINE PRINTER
; RESET LINE COUNT
; LINE FEED

; START OF LINE PATTERN
; INCREMENT START OF LINE

; RESET START OF LINE
; PRINT
; CURRENT CHARACTER BEING PRINTED
; START OF LINE CHARACTER
; POSITION OF LINE

; RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
; INITIALIZE DISK - DAR-DAE
; CORE BASE
; LENGTH OF TRANSFER
; WRITE OR WRITE CHECK TO DISK
; RETURN TO MAINLINE CODE

```

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

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

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

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| | | | | | | | |
|------|--------|--------|--------|--------|---------|----------------|--|
| 1192 | 003274 | 026777 | 177364 | 175074 | CMP | TCFIRST, @TCDT | ; DID WE DO ALL THE BLOCKS |
| 1193 | 003302 | 001666 | | | BEQ | XFENDZ | ; YES - GO TO END ZONE TO RESTART |
| 1194 | 003304 | 005367 | 177362 | | DEC | TCEXPE | ; NO - DECREMENT BLOCK NUMBER |
| 1195 | 003310 | 027767 | 175062 | 177354 | CMP | @TCDT, TCEXPE | ; TEST SEQUENTIAL BLOCK IN REVERSE |
| 1196 | 003316 | 001401 | | | BEQ | .+4 | |
| 1197 | 003320 | 104000 | | | HLT | | ; TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED |
| 1198 | 003322 | 000403 | | | BR | TCRBK | ; THIS ROUTINE READ A BLOCK |
| 1199 | 003324 | 105277 | 175042 | | TCR4: | INCB | ; SET DO |
| 1200 | 003330 | 000002 | | | RTI | @TCCM | ; LETS TRY A NEW BLOCK |
| 1201 | | | | | | | |
| 1202 | | | | | | | ; READ REVERSE ALL BLOCK EXCEPT BLOCK 1101 |
| 1203 | 003332 | 012777 | 003370 | 175046 | TCRBK: | MOV | #TCRB1, @TCIV ; SET UP INTERRUPT VECTOR |
| 1204 | 003340 | 012777 | 177400 | 175034 | | MOV | #-400, @TCWC ; READ ONE BLOCK |
| 1205 | 003346 | 012777 | 003416 | 175030 | | MOV | #TCRBUF, @TCBA ; WHERE BUFFER IS |
| 1206 | 003354 | 112777 | 000505 | 175010 | | MOV | #IE+RD+00, @TCCM ; READ THE BLOCK |
| 1207 | 003362 | 004767 | 175046 | | | JSR | %7, TC1 ; CHECK DATA BUFFER |
| 1208 | 003366 | 000002 | | | | RTI | ; EXIT - RETURN WHEN BLOCK IS READ |
| 1209 | 003370 | 005777 | 174776 | | TCRB1: | TST | @TCCM ; AND ERRORS |
| 1210 | 003374 | 100001 | | | | BPL | .+4 |
| 1211 | 003376 | 104000 | | | | HLT | ; DECTAPE ERROR |
| 1212 | 003400 | 012777 | 003262 | 175000 | | MOV | #TCR3, @TCIV ; NEW VECTOR FOR BLOCK SEARCH |
| 1213 | 003406 | 112777 | 000502 | 174756 | | MOV | #IE+RB, @TCCM ; READ BLOCK FUNCTION |
| 1214 | 003414 | 000743 | | | | BR | TCR4 ; RETURN TO BLOCK SEARCH |
| 1215 | | | | | | | |
| 1216 | | | | | | | ; THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE |
| 1217 | 003416 | | | | TCWBUF: | | |
| 1218 | 003416 | | | | TCRBUF: | | |
| 1219 | | 000001 | | | | N=1 | |
| 1220 | | | | | | .REPT | 100 |
| 1221 | | | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1222 | | | | | | -N | |
| 1223 | | | | | | N=N+1 | |
| 1224 | | | | | | .ENDR | |
| 1225 | 003416 | 000001 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1226 | 003420 | 177777 | | | | -N | |
| 1227 | | 000002 | | | | N=N+1 | |
| 1228 | 003422 | 000002 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1229 | 003424 | 177776 | | | | -N | |
| 1230 | | 000003 | | | | N=N+1 | |
| 1231 | 003426 | 000003 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1232 | 003430 | 177775 | | | | -N | |
| 1233 | | 000004 | | | | N=N+1 | |
| 1234 | 003432 | 000004 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1235 | 003434 | 177774 | | | | -N | |
| 1236 | | 000005 | | | | N=N+1 | |
| 1237 | 003436 | 000005 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1238 | 003440 | 177773 | | | | -N | |
| 1239 | | 000006 | | | | N=N+1 | |
| 1240 | 003442 | 000006 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1241 | 003444 | 177772 | | | | -N | |
| 1242 | | 000007 | | | | N=N+1 | |
| 1243 | 003446 | 000007 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1244 | 003450 | 177771 | | | | -N | |
| 1245 | | 000010 | | | | N=N+1 | |
| 1246 | 003452 | 000010 | | | | N | ; DECTAPE READ/WRITE BUFFER |
| 1247 | 003454 | 177770 | | | | -N | |

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

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

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

| | | | |
|------|---------------|-------|-----------------------------|
| 1416 | 000101 | N=N+1 | |
| 1417 | | .REPT | 100 |
| 1418 | | N=N-1 | |
| 1419 | | -N | |
| 1420 | | N | :DEC TAPE READ/WRITE BUFFER |
| 1421 | | .ENDR | |
| 1422 | 000100 | N=N-1 | |
| 1423 | 004016 177700 | -N | |
| 1424 | 004020 000100 | N | :DEC TAPE READ/WRITE BUFFER |
| 1425 | | N=N-1 | |
| 1426 | 004022 177701 | -N | |
| 1427 | 004024 000077 | N | :DEC TAPE READ/WRITE BUFFER |
| 1428 | | N=N-1 | |
| 1429 | 004026 000076 | -N | |
| 1430 | 004030 177702 | N | :DEC TAPE READ/WRITE BUFFER |
| 1431 | | N=N-1 | |
| 1432 | 004032 000075 | -N | |
| 1433 | 004034 177703 | N | :DEC TAPE READ/WRITE BUFFER |
| 1434 | | N=N-1 | |
| 1435 | 004036 000074 | -N | |
| 1436 | 004040 177704 | N | :DEC TAPE READ/WRITE BUFFER |
| 1437 | | N=N-1 | |
| 1438 | 004042 000073 | -N | |
| 1439 | 004044 177705 | N | :DEC TAPE READ/WRITE BUFFER |
| 1440 | | N=N-1 | |
| 1441 | 004046 000073 | -N | |
| 1442 | 004050 000072 | N | :DEC TAPE READ/WRITE BUFFER |
| 1443 | | N=N-1 | |
| 1444 | 004052 177707 | -N | |
| 1445 | 004054 000071 | N | :DEC TAPE READ/WRITE BUFFER |
| 1446 | | N=N-1 | |
| 1447 | 004056 177710 | -N | |
| 1448 | 004060 000070 | N | :DEC TAPE READ/WRITE BUFFER |
| 1449 | | N=N-1 | |
| 1450 | 004062 000067 | -N | |
| 1451 | 004064 177711 | N | :DEC TAPE READ/WRITE BUFFER |
| 1452 | | N=N-1 | |
| 1453 | 004066 000066 | -N | |
| 1454 | 004070 177712 | N | :DEC TAPE READ/WRITE BUFFER |
| 1455 | | N=N-1 | |
| 1456 | 004072 000065 | -N | |
| 1457 | 004074 177713 | N | :DEC TAPE READ/WRITE BUFFER |
| 1458 | | N=N-1 | |
| 1459 | 004076 000064 | -N | |
| 1460 | 004100 177714 | N | :DEC TAPE READ/WRITE BUFFER |
| 1461 | | N=N-1 | |
| 1462 | 004102 000063 | -N | |
| 1463 | 004104 177715 | N | :DEC TAPE READ/WRITE BUFFER |
| 1464 | | N=N-1 | |
| 1465 | 004106 000062 | -N | |
| 1466 | 004110 177716 | N | :DEC TAPE READ/WRITE BUFFER |
| 1467 | | N=N-1 | |
| 1468 | 004112 000061 | -N | |
| 1469 | 004114 177717 | N | :DEC TAPE READ/WRITE BUFFER |
| 1470 | | N=N-1 | |
| 1471 | 004116 000060 | -N | |
| | | N | :DEC TAPE READ/WRITE BUFFER |
| | | N=N-1 | |
| | | -N | |

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|-----|--------|--------|-------|-----------------------------|
| 147 | 004120 | 000060 | N | :DEC TAPE READ/WRITE BUFFER |
| 148 | | 000057 | N=N-1 | |
| 149 | 004122 | 177721 | -N | |
| 150 | 004124 | 000057 | N | :DEC TAPE READ/WRITE BUFFER |
| 151 | | 000056 | N=N-1 | |
| 152 | 004126 | 177722 | -N | |
| 153 | 004130 | 000056 | N | :DEC TAPE READ/WRITE BUFFER |
| 154 | | 000055 | N=N-1 | |
| 155 | 004132 | 177723 | -N | |
| 156 | 004134 | 000055 | N | :DEC TAPE READ/WRITE BUFFER |
| 157 | | 000054 | N=N-1 | |
| 158 | 004136 | 177724 | -N | |
| 159 | 004140 | 000054 | N | :DEC TAPE READ/WRITE BUFFER |
| 160 | | 000053 | N=N-1 | |
| 161 | 004142 | 177725 | -N | |
| 162 | 004144 | 000053 | N | :DEC TAPE READ/WRITE BUFFER |
| 163 | | 000052 | N=N-1 | |
| 164 | 004146 | 177726 | -N | |
| 165 | 004150 | 000052 | N | :DEC TAPE READ/WRITE BUFFER |
| 166 | | 000051 | N=N-1 | |
| 167 | 004152 | 177727 | -N | |
| 168 | 004154 | 000051 | N | :DEC TAPE READ/WRITE BUFFER |
| 169 | | 000050 | N=N-1 | |
| 170 | 004156 | 177730 | -N | |
| 171 | 004160 | 000050 | N | :DEC TAPE READ/WRITE BUFFER |
| 172 | | 000047 | N=N-1 | |
| 173 | 004162 | 177731 | -N | |
| 174 | 004164 | 000047 | N | :DEC TAPE READ/WRITE BUFFER |
| 175 | | 000046 | N=N-1 | |
| 176 | 004166 | 177732 | -N | |
| 177 | 004170 | 000046 | N | :DEC TAPE READ/WRITE BUFFER |
| 178 | | 000045 | N=N-1 | |
| 179 | 004172 | 177733 | -N | |
| 180 | 004174 | 000045 | N | :DEC TAPE READ/WRITE BUFFER |
| 181 | | 000044 | N=N-1 | |
| 182 | 004176 | 177734 | -N | |
| 183 | 004200 | 000044 | N | :DEC TAPE READ/WRITE BUFFER |
| 184 | | 000043 | N=N-1 | |
| 185 | 004202 | 177735 | -N | |
| 186 | 004204 | 000043 | N | :DEC TAPE READ/WRITE BUFFER |
| 187 | | 000042 | N=N-1 | |
| 188 | 004206 | 177736 | -N | |
| 189 | 004210 | 000042 | N | :DEC TAPE READ/WRITE BUFFER |
| 190 | | 000041 | N=N-1 | |
| 191 | 004212 | 177737 | -N | |
| 192 | 004214 | 000041 | N | :DEC TAPE READ/WRITE BUFFER |
| 193 | | 000040 | N=N-1 | |
| 194 | 004216 | 177740 | -N | |
| 195 | 004220 | 000040 | N | :DEC TAPE READ/WRITE BUFFER |
| 196 | | 000037 | N=N-1 | |
| 197 | 004222 | 177741 | -N | |
| 198 | 004224 | 000037 | N | :DEC TAPE READ/WRITE BUFFER |
| 199 | | 000036 | N=N-1 | |
| 200 | 004226 | 177742 | -N | |
| 201 | 004230 | 000036 | N | :DEC TAPE READ/WRITE BUFFER |
| 202 | | 000035 | N=N-1 | |

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

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

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

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1696                                     ;REGISTER 1 CONTAINS 000010
1697 004764 026160 016666 016666      CMP      A(1),A(0)
1698 004772 001401                    BEQ      .+4
1699 004774 104000                    HLT
1700 004776 104400                    SCOPE      ;COMPARE FAILED
1701                                     ;TEST MOVE ODD BYTE TO REGISTER
1702                                     ;PROBLEM 1150237-7-MAR-72
1703 005000 116700 011677              MOV      C+3,%0
1704 005004 022700 000035              CMP      #35,%0
1705 005010 001401                    BEQ      .+4
1706 005012 104000                    HLT
1707 005014 104400                    SCOPE
1708                                     ;TEST MOVE INSTRUCTION FOR INDEX
1709
1710 005016 012700 177770              MOV      #-10,%0
1711 005022 016067 016666 011660      MOV      A(0),TEMP
1712 005030 026727 011654 125252      CMP      TEMP,#125252
1713 005036 001401                    BEQ      .+4
1714 005040 104000                    HLT
1715 005042 104400                    SCOPE      ;COMPARE FAILED
1716
1717 005044 012700 000010              MOV      #+10,%0
1718 005050 016067 016666 011632      MOV      A(0),TEMP
1719 005056 026727 011626 052525      CMP      TEMP,#052525
1720 005064 001401                    BEQ      .+4
1721 005066 104000                    HLT
1722 005070 104400                    SCOPE      ;MOV FAILED
1723
1724 005072 012700 177770              MOV      #-10,%0
1725 005076 012760 125252 016710      MOV      #125252,TEMP(0)
1726 005104 023727 016700 125252      CMP      @#C,#125252
1727 005112 001401                    BEQ      .+4
1728 005114 104000                    HLT
1729 005116 104400                    SCOPE      ;MOV FAILED
1730
1731 005120 012700 000010              MOV      #+10,%0
1732 005124 012760 052525 016710      MOV      #052525,TEMP(0)
1733 005132 023727 016720 052525      CMP      @#TEMP+10,#052525
1734 005140 001401                    BEQ      .+4
1735 005142 104000                    HLT
1736 005144 104400                    SCOPE      ;MOV FAILED
1737
1738                                     ;TEST BIC INSTRUCTION FOR INDEXING
1739 005146 012767 177777 011534      MOV      #-1,TEMP
1740 005154 012700 177770              MOV      #-10,%0
1741 005160 046067 016666 011522      BIC      A(0),TEMP
1742 005166 026727 011516 052525      CMP      TEMP,#052525
1743 005174 001401                    BEQ      .+4
1744 005176 104000                    HLT
1745 005200 104400                    SCOPE      ;BIC FAILED
1746
1747 005202 012767 177777 011500      MOV      #-1,TEMP
1748 005210 012700 000010              MOV      #10,%0
1749 005214 046067 016666 011466      BIC      A(0),TEMP
1750 005222 026727 011462 125252      CMP      TEMP,#125252
1751 005230 001401                    BEQ      .+4

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| | | | | | | | |
|------|--------|--------|--------|--------|-------|-----------|-------------|
| 1808 | 005506 | 012737 | 177777 | 016710 | MOV | #-1,@TEMP | |
| 1909 | 005514 | 012700 | 000010 | | MOV | #+10,%0 | |
| 1810 | 005520 | 005060 | 016700 | | CLR | C(0) | |
| 1811 | 005524 | 005737 | 016710 | | TST | @TEMP | |
| 1812 | 005530 | 001401 | | | BEQ | +.4 | |
| 1813 | 005532 | 104000 | | | HLT | | ;CLR FAILED |
| 1814 | 005534 | 104400 | | | SCOPE | | |
| 1815 | | | | | | | |
| 1816 | 005536 | 012737 | 177777 | 016710 | MOV | #-1,@TEMP | |
| 1817 | 005544 | 012700 | 177770 | | MOV | #-10,%0 | |
| 1818 | 005550 | 005160 | 016720 | | COM | D(0) | |
| 1819 | 005554 | 005737 | 016710 | | TST | @TEMP | |
| 1820 | 005560 | 001401 | | | BEQ | +.4 | |
| 1821 | 005562 | 104000 | | | HLT | | ;COM FAILED |
| 1822 | 005564 | 104400 | | | SCOPE | | |
| 1823 | | | | | | | |
| 1824 | 005566 | 012737 | 177777 | 016710 | MOV | #-1,@TEMP | |
| 1825 | 005574 | 012700 | 000010 | | MOV | #10,%0 | |
| 1826 | 005600 | 005160 | 016700 | | COM | C(0) | |
| 1827 | 005604 | 005737 | 016710 | | TST | @TEMP | |
| 1828 | 005610 | 001401 | | | BEQ | +.4 | |
| 1829 | 005612 | 104000 | | | HLT | | ;COM FAILED |
| 1830 | 005614 | 104400 | | | SCOPE | | |
| 1831 | 005616 | 012737 | 177777 | 016710 | MOV | #-1,@TEMP | |
| 1832 | 005624 | 012700 | 177770 | | MOV | #-10,%0 | |
| 1833 | 005630 | 005260 | 016720 | | INC | D(0) | |
| 1834 | 005634 | 005737 | 016710 | | TST | @TEMP | |
| 1835 | 005640 | 001401 | | | BEQ | +.4 | |
| 1836 | 005642 | 104000 | | | HLT | | ;INC FAILED |
| 1837 | 005644 | 104400 | | | SCOPE | | |
| 1838 | | | | | | | |
| 1839 | 005646 | 012737 | 177777 | 016710 | MOV | #-1,@TEMP | |
| 1840 | 005654 | 012700 | 000010 | | MOV | #+10,%0 | |
| 1841 | 005660 | 005260 | 016700 | | INC | C(0) | |
| 1842 | 005664 | 005737 | 016710 | | TST | @TEMP | |
| 1843 | 005670 | 001401 | | | BEQ | +.4 | |
| 1844 | 005672 | 104000 | | | HLT | | ;INC FAILED |
| 1845 | 005674 | 104400 | | | SCOPE | | |
| 1846 | | | | | | | |
| 1847 | 005676 | 012737 | 000001 | 016710 | MOV | #1,@TEMP | |
| 1848 | 005704 | 012700 | 177770 | | MOV | #-10,%0 | |
| 1849 | 005710 | 005360 | 016720 | | DEC | D(0) | |
| 1850 | 005714 | 005737 | 016710 | | TST | @TEMP | |
| 1851 | 005720 | 001401 | | | BEQ | +.4 | |
| 1852 | 005722 | 104000 | | | HLT | | ;DEC FAILED |
| 1853 | 005724 | 104400 | | | SCOPE | | |
| 1854 | | | | | | | |
| 1855 | 005726 | 012737 | 000001 | 016710 | MOV | #1,@TEMP | |
| 1856 | 005734 | 012700 | 000010 | | MOV | #10,%0 | |
| 1857 | 005740 | 005360 | 016700 | | DEC | C(0) | |
| 1858 | 005744 | 005737 | 016710 | | TST | @TEMP | |
| 1859 | 005750 | 001401 | | | BEQ | +.4 | |
| 1860 | 005752 | 104000 | | | HLT | | ;DEC FAILED |
| 1861 | 005754 | 104400 | | | SCOPE | | |
| 1862 | | | | | | | |
| 1863 | 005756 | 012737 | 000001 | 016710 | MOV | #1,@TEMP | |

| | | | | | | | |
|------|--------|--------|--------|--------|-------|-----------|-------------|
| 1864 | 005764 | 012700 | 177770 | | MOV | #-10,%0 | |
| 1865 | 005770 | 005460 | 016720 | | NEG | D(0) | |
| 1866 | 005774 | 022737 | 177777 | 016710 | CMP | #-1,%TEMP | |
| 1867 | 006002 | 001401 | | | BEQ | .+4 | |
| 1868 | 006004 | 104000 | | | HLT | | ;NEG FAILED |
| 1869 | 006006 | 104400 | | | SCOPE | | |
| 1870 | | | | | | | |
| 1871 | 006010 | 012737 | 000001 | 016710 | MOV | #1,%TEMP | |
| 1872 | 006016 | 012700 | 000010 | | MOV | #+10,%0 | |
| 1873 | 006022 | 005460 | 016700 | | NEG | C(0) | |
| 1874 | 006026 | 022737 | 177777 | 016710 | CMP | #-1,%TEMP | |
| 1875 | 006034 | 001401 | | | BEQ | .+4 | |
| 1876 | 006036 | 104000 | | | HLT | | ;NEG FAILED |
| 1877 | 006040 | 104400 | | | SCOPE | | |
| 1878 | | | | | | | |
| 1879 | 006042 | 012737 | 177777 | 016710 | MOV | #-1,%TEMP | |
| 1880 | 006050 | 012700 | 177770 | | MOV | #-10,%0 | |
| 1881 | 006054 | 000261 | | | SEC | | |
| 1882 | 006056 | 005560 | 016720 | | ADC | D(0) | |
| 1883 | 006062 | 005737 | 016710 | | TST | %TEMP | |
| 1884 | 006066 | 001401 | | | BEQ | .+4 | |
| 1885 | 006070 | 104000 | | | HLT | | ;ADC FAILED |
| 1886 | 006072 | 104400 | | | SCOPE | | |
| 1887 | | | | | | | |
| 1888 | 006074 | 012737 | 177777 | 016710 | MOV | #-1,%TEMP | |
| 1889 | 006102 | 012700 | 000010 | | MOV | #+10,%0 | |
| 1890 | 006106 | 000261 | | | SEC | | |
| 1891 | 006110 | 005560 | 016700 | | ADC | C(0) | |
| 1892 | 006114 | 005737 | 016710 | | TST | %TEMP | |
| 1893 | 006120 | 001401 | | | BEQ | .+4 | |
| 1894 | 006122 | 104000 | | | HLT | | ;ADC FAILED |
| 1895 | 006124 | 104400 | | | SCOPE | | |
| 1896 | | | | | | | |
| 1897 | 006126 | 012737 | 000001 | 016710 | MOV | #1,%TEMP | |
| 1898 | 006134 | 012700 | 177770 | | MOV | #-10,%0 | |
| 1899 | 006140 | 000261 | | | SEC | | |
| 1900 | 006142 | 005560 | 016720 | | SBC | D(0) | |
| 1901 | 006146 | 005737 | 016710 | | TST | %TEMP | |
| 1902 | 006152 | 001401 | | | BEQ | .+4 | |
| 1903 | 006154 | 104000 | | | HLT | | ;SBC FAILED |
| 1904 | 006156 | 104400 | | | SCOPE | | |
| 1905 | | | | | | | |
| 1906 | 006160 | 012737 | 000001 | 016710 | MOV | #1,%TEMP | |
| 1907 | 006166 | 012700 | 000010 | | MOV | #+10,%0 | |
| 1908 | 006172 | 000261 | | | SEC | | |
| 1909 | 006174 | 005560 | 016700 | | SBC | C(0) | |
| 1910 | 006200 | 005737 | 016710 | | TST | %TEMP | |
| 1911 | 006204 | 001401 | | | BEQ | .+4 | |
| 1912 | 006206 | 104000 | | | HLT | | ;SBC FAILED |
| 1913 | 006210 | 104400 | | | SCOPE | | |
| 1914 | | | | | | | |
| 1915 | | | | | | | |
| 1916 | 006212 | 010700 | | | | | |
| 1917 | 006214 | 062700 | 000010 | | MOV | %7,%0 | |
| 1918 | 006220 | 000110 | | | ADD | #10,%0 | |
| 1919 | 006222 | 104000 | | | JMP | %0 | |
| | | | | | HLT | | ;JMP FAILED |

;TEST JMP INDIRECT

| | | | | | | | |
|------|--------|--------|--------|--------|---------------------------|-------------|----------------------|
| 1920 | 006224 | 000240 | | | NOP | | |
| 1921 | 006226 | 104400 | | | SCOPE | | |
| 1922 | | | | | | | |
| 1923 | 006230 | 010600 | | | MOV | %6,%0 | |
| 1924 | 006232 | 010001 | | | MOV | %0,%1 | |
| 1925 | 006234 | 010102 | | | MOV | %1,%2 | |
| 1926 | 006236 | 010203 | | | MOV | %2,%3 | |
| 1927 | 006240 | 010304 | | | MOV | %3,%4 | |
| 1928 | 006242 | 010405 | | | MOV | %4,%5 | |
| 1929 | 006244 | 020605 | | | CMP | %6,%5 | |
| 1930 | 006246 | 001401 | | | BEQ | +.4 | |
| 1931 | 006250 | 104000 | | | HLT | | ;MOV REGISTOR FAILED |
| 1932 | 006252 | 104400 | | | SCOPE | | |
| 1933 | | | | | | | |
| 1934 | | | | | ;TEST INDIRECT ADDRESSING | | |
| 1935 | 006254 | 023727 | 016655 | 125252 | ;TEST COMPARE INSTRUCTION | | |
| 1936 | 006262 | 001401 | | | CMP | 2*B,#125252 | |
| 1937 | 006264 | 104000 | | | BEQ | +.4 | |
| 1938 | 006266 | 104400 | | | HLT | | ;CMP FAILED |
| 1939 | | | | | SCOPE | | |
| 1940 | 006270 | 022737 | 125252 | 016656 | CMP | #125252,2*B | |
| 1941 | 006276 | 001401 | | | BEQ | +.4 | |
| 1942 | 006300 | 104000 | | | HLT | | ;CMP FAILED |
| 1943 | 006302 | 104400 | | | SCOPE | | |
| 1944 | | | | | | | |
| 1945 | 006304 | 023737 | 016656 | 016656 | CMP | 2*B,2*B | |
| 1946 | 006312 | 001401 | | | BEQ | +.4 | |
| 1947 | 006314 | 104000 | | | HLT | | ;CMP FAILED |
| 1948 | 006316 | 104400 | | | SCOPE | | |
| 1949 | | | | | | | |
| 1950 | | | | | ;TEST MOVE INSTRUCTIONS | | |
| 1951 | 006320 | 013700 | 016656 | | MOV | 2*B,%0 | |
| 1952 | 006324 | 022700 | 125252 | | CMP | #125252,%0 | |

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

;TEST BIC INSTRUCTION INDIRECT

;TEST SUBTRACT INSTRUCTION

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

| | | | | | | | |
|------|--------|--------|--------|--------|-------|------------------|---|
| 2177 | 007530 | 001401 | | | BEQ | .+4 | |
| 2178 | 007532 | 104000 | | | HLT | | :NEG FAILED |
| 2179 | 007534 | 104400 | | | SCOPE | | |
| 2180 | | | | | | | |
| 2181 | 007536 | 012737 | 177777 | 016710 | MOV | #-1,2#TEMP | |
| 2182 | 007544 | 000261 | | | SEC | | |
| 2183 | 007546 | 005577 | 007140 | | ADC | 2TEMP+2 | |
| 2184 | 007552 | 005737 | 016710 | | TST | 2#TEMP | |
| 2185 | 007556 | 001401 | | | BEQ | .+4 | |
| 2186 | 007560 | 104000 | | | HLT | | :ADC FAILED |
| 2187 | 007562 | 104400 | | | SCOPE | | |
| 2188 | | | | | | | |
| 2189 | 007564 | 012737 | 000001 | 016710 | MOV | #1,2#TEMP | |
| 2190 | 007572 | 000261 | | | SEC | | |
| 2191 | 007574 | 005677 | 007112 | | SBC | 2TEMP+2 | |
| 2192 | 007600 | 005737 | 016710 | | TST | 2#TEMP | |
| 2193 | 007604 | 001401 | | | BEQ | .+4 | |
| 2194 | 007606 | 104000 | | | HLT | | :SBC FAILED |
| 2195 | 007610 | 104400 | | | SCOPE | | |
| 2196 | | | | | | | |
| 2197 | | | | | | | |
| 2198 | | | | | | | :TEST OF COMBINED INDEXING AND INDIRECT |
| 2199 | 007612 | 012700 | 177772 | | MOV | #-6,%0 | |
| 2200 | 007616 | 027027 | 016666 | 125252 | CMP | 2A(0),#125252 | |
| 2201 | 007624 | 001401 | | | BEQ | .+4 | |
| 2202 | 007626 | 104000 | | | HLT | | :CMP FAILED |
| 2203 | 007630 | 104400 | | | SCOPE | | |
| 2204 | | | | | | | |
| 2205 | 007632 | 012700 | 177772 | | MOV | #-6,%0 | |
| 2206 | 007636 | 022770 | 125252 | 016666 | CMP | #125252,2A(0) | |
| 2207 | 007644 | 001401 | | | BEQ | .+4 | |
| 2208 | 007646 | 104000 | | | HLT | | :CMP FAILED |
| 2209 | 007650 | 104400 | | | SCOPE | | |
| 2210 | | | | | | | |
| 2211 | 007652 | 012700 | 177772 | | MOV | #-6,%0 | |
| 2212 | 007656 | 012701 | 000002 | | MOV | #+2,%1 | |
| 2213 | 007662 | 027071 | 016666 | 016666 | CMP | 2A(0),2A(1) | |
| 2214 | 007670 | 001401 | | | BEQ | .+4 | |
| 2215 | 007672 | 104000 | | | HLT | | :CMP FAILED |
| 2216 | 007674 | 104400 | | | SCOPE | | |
| 2217 | | | | | | | :TEST BIC INSTRUCTION |
| 2218 | 007676 | 012700 | 000006 | | MOV | #+6,%0 | |
| 2219 | 007702 | 012767 | 177777 | 007000 | MOV | #-1,TEMP | |
| 2220 | 007710 | 047067 | 016666 | 006772 | BIC | 2A(0),TEMP | |
| 2221 | 007716 | 022767 | 125252 | 006764 | CMP | #125252,TEMP | |
| 2222 | 007724 | 001401 | | | BEQ | .+4 | |
| 2223 | 007726 | 104000 | | | HLT | | :BIC FAILED |
| 2224 | 007730 | 104400 | | | SCOPE | | |
| 2225 | | | | | | | |
| 2226 | 007732 | 012700 | 177772 | | MOV | #-3,%0 | |
| 2227 | 007736 | 012737 | 177777 | 016700 | MOV | #-2,2#C | |
| 2228 | 007744 | 042770 | 125252 | 016710 | BIC | #125252,2TEMP(0) | |
| 2229 | 007752 | 023727 | 016700 | 052525 | CMP | 2#C,#052525 | |
| 2230 | 007760 | 001401 | | | BEQ | .+4 | |
| 2231 | 007762 | 104000 | | | HLT | | :BIC FAILED |
| 2232 | 007764 | 104400 | | | SCOPE | | |

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

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|------|--------|--------|--------|--------|-------|-------------------|------------------------------------|
| 2299 | 010226 | 126160 | 016666 | 016666 | CMPB | A(1),A(0) | |
| 2300 | 010234 | 001401 | | | BEQ | +.4 | |
| 2301 | 010236 | 104000 | | | HLT | | ;CMPB FAILED |
| 2302 | 010240 | 104400 | | | SCOPE | | |
| 2303 | 010242 | 012700 | 177774 | | MOV | #-4,%0 | |
| 2304 | 010246 | 012701 | 000010 | | MOV | #+10,%1 | |
| 2305 | 010252 | 126061 | 016666 | 016666 | CMPB | A(0),A(1) | |
| 2306 | 010260 | 001401 | | | BEQ | +.4 | |
| 2307 | 010262 | 104000 | | | HLT | | ;C FAILED |
| 2308 | 010264 | 104400 | | | SCOPE | | |
| 2309 | 010266 | 012700 | 177774 | | MOV | #-4,%0 | |
| 2310 | 010272 | 012701 | 000010 | | MOV | #10,%1 | |
| 2311 | 010276 | 126160 | 016666 | 016666 | CMPB | A(1),A(0) | |
| 2312 | 010304 | 001401 | | | BEQ | +.4 | |
| 2313 | 010306 | 104000 | | | HLT | | ;CMPB FAILED |
| 2314 | 010310 | 104400 | | | SCOPE | | |
| 2315 | | | | | | | ;TEST MOVE INSTRUCTION FOR INDEX |
| 2316 | 010312 | 012700 | 177770 | | MOV | #-10,%0 | |
| 2317 | 010316 | 116067 | 016666 | 006364 | MOV | A(0),TEMP | |
| 2318 | 010324 | 126727 | 006360 | 000252 | CMPB | TEMP,#000252 | |
| 2319 | 010332 | 001401 | | | BEQ | +.4 | |
| 2320 | 010334 | 104000 | | | HLT | | ;MOV B FAILED |
| 2321 | 010336 | 104400 | | | SCOPE | | |
| 2322 | 010340 | 012700 | 000010 | | MOV | #+10,%0 | |
| 2323 | 010344 | 116067 | 016666 | 006336 | MOV | A(0),TEMP | |
| 2324 | 010352 | 126727 | 006332 | 000125 | CMPB | TEMP,#000125 | |
| 2325 | 010360 | 001401 | | | BEQ | +.4 | |
| 2326 | 010362 | 104000 | | | HLT | | ;MOV B FAILED |
| 2327 | 010364 | 104400 | | | SCOPE | | |
| 2328 | 010366 | 012700 | 177770 | | MOV | #-10,%0 | |
| 2329 | 010372 | 112760 | 125252 | 016710 | MOV | #125252,TEMP(0) | |
| 2330 | 010400 | 123727 | 016700 | 125252 | CMPB | 3#C,#125252 | |
| 2331 | 010406 | 001401 | | | BEQ | +.4 | |
| 2332 | 010410 | 104000 | | | HLT | | ;MOV B FAILED |
| 2333 | 010412 | 104400 | | | SCOPE | | |
| 2334 | 010414 | 012700 | 000010 | | MOV | #+10,%0 | |
| 2335 | 010420 | 112760 | 052525 | 016710 | MOV | #052525,TEMP(0) | |
| 2336 | 010426 | 123727 | 016720 | 052525 | CMPB | 2#TEMP+10,#052525 | |
| 2337 | 010434 | 001401 | | | BEQ | +.4 | |
| 2338 | 010436 | 104000 | | | HLT | | ;MOV B FAILED |
| 2339 | 010440 | 104400 | | | SCOPE | | |
| 2340 | | | | | | | ;TEST BIC INSTRUCTION FOR INDEXING |
| 2341 | 010442 | 012767 | 177777 | 006240 | MOV | #-1,TEMP | |
| 2342 | 010450 | 012700 | 177770 | | MOV | #-10,%0 | |
| 2343 | 010454 | 146067 | 016666 | 006226 | BICB | A(0),TEMP | |
| 2344 | 010462 | 126727 | 006222 | 177525 | CMPB | TEMP,#177525 | |
| 2345 | 010470 | 001401 | | | BEQ | +.4 | |
| 2346 | 010472 | 104000 | | | HLT | | ;BICB FAILED |

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|------|--------|--------|--------|--------|----------------------|-----------------|
| 2345 | 010474 | 104400 | | | SCOPE | |
| 2346 | | | | | | |
| 2347 | 010476 | 012767 | 177777 | 006204 | MOV | #-1,TEMP |
| 2348 | 010504 | 012700 | 000010 | | MOV | #10,%0 |
| 2349 | 010510 | 146067 | 016666 | 006172 | BICB | A(0),TEMP |
| 2350 | 010516 | 126727 | 006166 | 007652 | CMPB | TEMP,#007652 |
| 2351 | 010524 | 001401 | | | BEQ | +.4 |
| 2352 | 010526 | 104000 | | | HLT | :BICB FAILED |
| 2353 | 010530 | 104400 | | | SCOPE | |
| 2354 | | | | | | |
| 2355 | 010532 | 012737 | 177777 | 016720 | MOV | #-1,2#TEMP+10 |
| 2356 | 010540 | 012700 | 000010 | | MOV | #10,%0 |
| 2357 | 010544 | 142760 | 125252 | 016710 | BICB | #125252,TEMP(0) |
| 2358 | 010552 | 123727 | 016720 | 002525 | CMPB | 2#TEMP+10,#2525 |
| 2359 | 010560 | 001401 | | | BEQ | +.4 |
| 2360 | 010562 | 104000 | | | HLT | :BICB FAILED |
| 2361 | 010564 | 104400 | | | SCOPE | |
| 2362 | | | | | | |
| 2363 | 010566 | 012700 | 177770 | | MOV | #-10,%0 |
| 2364 | 010572 | 012767 | 177777 | 006100 | MOV | #-1,TEMP-10 |
| 2365 | 010600 | 142767 | 052525 | 006072 | BICB | #052525,TEMP-10 |
| 2366 | 010606 | 126727 | 006066 | 125252 | CMPB | TEMP-10,#125252 |
| 2367 | 010614 | 001401 | | | BEQ | +.4 |
| 2368 | 010616 | 104000 | | | HLT | :BICB FAILED |
| 2369 | 010620 | 104400 | | | SCOPE | |
| 2370 | | | | | | |
| 2371 | | | | | :TEST UNARYS INDEXED | |
| 2372 | 010622 | 012737 | 177777 | 016710 | MOV | #-1,2#TEMP |
| 2373 | 010630 | 012700 | 177770 | | MOV | #-10,%0 |
| 2374 | 010634 | 105060 | 016720 | | CLRB | D(0) |
| 2375 | 010640 | 105737 | 016710 | | TSTB | 2#TEMP |
| 2376 | 010644 | 001401 | | | BEQ | +.4 |
| 2377 | 010646 | 104000 | | | HLT | :CLRB FAILED |
| 2378 | 010650 | 104400 | | | SCOPE | |
| 2379 | | | | | | |
| 2380 | 010652 | 012737 | 177777 | 016710 | MOV | #-1,2#TEMP |
| 2381 | 010660 | 012700 | 177770 | | MOV | #-10,%0 |
| 2382 | 010664 | 105060 | 016720 | | CLRB | D(0) |
| 2383 | 010670 | 023727 | 016710 | 177400 | CMP | 2#TEMP,#177400 |
| 2384 | 010676 | 001401 | | | BEQ | +.4 |
| 2385 | 010700 | 104000 | | | HLT | :CLRB FAILED |
| 2386 | 010702 | 104400 | | | SCOPE | |
| 2387 | | | | | | |
| 2388 | 010704 | 012737 | 177777 | 016710 | MOV | #-1,2#TEMP |
| 2389 | 010712 | 012700 | 177771 | | MOV | #-7,%0 |
| 2390 | 010716 | 105060 | 016720 | | CLRB | D(0) |
| 2391 | 010722 | 023727 | 016710 | 000377 | CMP | 2#TEMP,#000377 |
| 2392 | 010730 | 001401 | | | BEQ | +.4 |
| 2393 | 010732 | 104000 | | | HLT | :CLRB FAILED |
| 2394 | 010734 | 104400 | | | SCOPE | |
| 2395 | | | | | | |
| 2396 | 010736 | 012737 | 177777 | 016710 | MOV | #-1,2#TEMP |
| 2397 | 010744 | 012700 | 000010 | | MOV | #+10,%0 |
| 2398 | 010750 | 105060 | 016700 | | CLRB | C(0) |
| 2399 | 010754 | 105737 | 016710 | | TSTB | 2#TEMP |
| 2400 | 010760 | 001401 | | | BEQ | +.4 |

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

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|------|--------|--------|--------|--------|--|-----------------|--------------|
| 2457 | 011236 | 023727 | 016710 | 000377 | CMP | 2#TEMP, #377 | |
| 2458 | 011244 | 001401 | | | BEQ | .+4 | |
| 2459 | 011246 | 104000 | | | HLT | | ;NEGB FAILED |
| 2460 | 011250 | 104400 | | | SCOPE | | |
| 2461 | | | | | | | |
| 2462 | 011252 | 012737 | 000001 | 016710 | MOV | #1, 2#TEMP | |
| 2463 | 011260 | 012700 | 000010 | | MOV | #+10, %0 | |
| 2464 | 011264 | 105460 | 016700 | | NEGB | C(0) | |
| 2465 | 011270 | 023727 | 016710 | 000377 | CMP | 2#TEMP, #377 | |
| 2466 | 011276 | 001401 | | | BEQ | .+4 | |
| 2467 | 011300 | 104000 | | | HLT | | ;NEGB FAILED |
| 2468 | 011302 | 104400 | | | SCOPE | | |
| 2469 | | | | | | | |
| 2470 | 011304 | 012737 | 177777 | 016710 | MOV | #-1, 2#TEMP | |
| 2471 | 011312 | 012700 | 177770 | | MOV | #-10, %0 | |
| 2472 | 011316 | 000261 | | | SEC | | |
| 2473 | 011320 | 105560 | 016720 | | ADCB | D(0) | |
| 2474 | 011324 | 023727 | 016710 | 177400 | CMP | 2#TEMP, #177400 | |
| 2475 | 011332 | 001401 | | | BEQ | .+4 | |
| 2476 | 011334 | 104000 | | | HLT | | ;ADCB FAILED |
| 2477 | 011336 | 104400 | | | SCOPE | | |
| 2478 | | | | | | | |
| 2479 | 011340 | 012737 | 177777 | 016710 | MOV | #-1, 2#TEMP | |
| 2480 | 011346 | 012700 | 000010 | | MOV | #+10, %0 | |
| 2481 | 011352 | 000261 | | | SEC | | |
| 2482 | 011354 | 105550 | 016700 | | ADCB | C(0) | |
| 2483 | 011360 | 023727 | 016710 | 177400 | CMP | 2#TEMP, #177400 | |
| 2484 | 011366 | 001401 | | | BEQ | .+4 | |
| 2485 | 011370 | 104000 | | | HLT | | ;ADCB FAILED |
| 2486 | 011372 | 104400 | | | SCOPE | | |
| 2487 | | | | | | | |
| 2488 | 011374 | 012737 | 000401 | 016710 | MOV | #401, 2#TEMP | |
| 2489 | 011402 | 012700 | 177771 | | MOV | #-7, %0 | |
| 2490 | 011406 | 000261 | | | SEC | | |
| 2491 | 011410 | 105660 | 016720 | | SBCB | D(0) | |
| 2492 | 011414 | 022737 | 000001 | 016710 | CMP | #1, 2#TEMP | |
| 2493 | 011422 | 001401 | | | BEQ | .+4 | |
| 2494 | 011424 | 104000 | | | HLT | | ;SBCB FAILED |
| 2495 | 011426 | 104400 | | | SCOPE | | |
| 2496 | | | | | | | |
| 2497 | 011430 | 012737 | 000001 | 016710 | MOV | #1, 2#TEMP | |
| 2498 | 011436 | 012700 | 000010 | | MOV | #+10, %0 | |
| 2499 | 011442 | 000261 | | | SEC | | |
| 2500 | 011444 | 105660 | 016700 | | SBCB | C(0) | |
| 2501 | 011450 | 005737 | 016710 | | TST | 2#TEMP | |
| 2502 | 011454 | 001401 | | | BEQ | .+4 | |
| 2503 | 011456 | 104000 | | | HLT | | ;SBCB FAILED |
| 2504 | 011460 | 104400 | | | SCOPE | | |
| 2505 | | | | | | | |
| 2506 | | | | | | | |
| 2507 | | | | | | | |
| 2508 | 011462 | 123727 | 016656 | 000252 | ;TEST INDIRECT ADDRESSING ;TEST COMPARE INSTRUCTION | | |
| 2509 | 011470 | 001401 | | | CMPB | 2#B, #000252 | |
| 2510 | 011472 | 104000 | | | BEQ | .+4 | |
| 2511 | 011474 | 104400 | | | HLT | | ;CMPB FAILED |
| 2512 | | | | | SCOPE | | |

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

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

; TEST INDIRECT ADDRESSING WITH INDEXING

; TEST COMPARE INSTRUCTION

; TEST MOVE INSTRUCTIONS

| | | | | | | | | | |
|------|--------|--------|--------|--------|--|--|--|--|--|
| 2625 | | | | | | | | | |
| 2626 | | | | | | | | | |
| 2627 | 012156 | 012700 | 177777 | | | | | | |
| 2628 | 012162 | 147700 | 004472 | | | | | | |
| 2629 | 012166 | 120027 | 052525 | | | | | | |
| 2630 | 012172 | 001401 | | | | | | | |
| 2631 | 012174 | 104000 | | | | | | | |
| 2632 | 012176 | 104400 | | | | | | | |
| 2633 | | | | | | | | | |
| 2634 | 012200 | 012737 | 177777 | 016710 | | | | | |
| 2635 | 012206 | 142777 | 125252 | 004476 | | | | | |
| 2636 | 012214 | 122737 | 052525 | 016710 | | | | | |
| 2637 | 012222 | 001401 | | | | | | | |
| 2638 | 012224 | 104000 | | | | | | | |
| 2639 | 012226 | 104400 | | | | | | | |
| 2640 | | | | | | | | | |
| 2641 | 012230 | 012737 | 177777 | 016700 | | | | | |
| 2642 | 012236 | 147777 | 004416 | 004436 | | | | | |
| 2643 | 012244 | 126737 | 004426 | 016700 | | | | | |
| 2644 | 012252 | 001401 | | | | | | | |
| 2645 | 012254 | 104000 | | | | | | | |
| 2646 | 012256 | 104400 | | | | | | | |
| 2647 | | | | | | | | | |
| 2648 | 012260 | 012737 | 177777 | 016710 | | | | | |
| 2649 | 012266 | 105077 | 004420 | | | | | | |
| 2650 | 012272 | 105737 | 016710 | | | | | | |
| 2651 | 012274 | 001401 | | | | | | | |
| 2652 | 012300 | 104000 | | | | | | | |
| 2653 | 012302 | 104400 | | | | | | | |
| 2654 | | | | | | | | | |
| 2655 | 012304 | 012737 | 125252 | 016710 | | | | | |
| 2656 | 012312 | 105177 | 004374 | | | | | | |
| 2657 | 012316 | 122737 | 052525 | 016710 | | | | | |
| 2658 | 012324 | 001401 | | | | | | | |
| 2659 | 012326 | 104000 | | | | | | | |
| 2660 | 012330 | 104400 | | | | | | | |
| 2661 | | | | | | | | | |
| 2662 | 012332 | 005037 | 016710 | | | | | | |
| 2663 | 012336 | 105277 | 004350 | | | | | | |
| 2664 | 012342 | 122737 | 000001 | 016710 | | | | | |
| 2665 | 012350 | 001401 | | | | | | | |
| 2666 | 012352 | 104000 | | | | | | | |
| 2667 | 012354 | 104400 | | | | | | | |
| 2668 | | | | | | | | | |
| 2669 | 012356 | 005037 | 016710 | | | | | | |
| 2670 | 012362 | 105377 | 004324 | | | | | | |
| 2671 | 012366 | 123727 | 016710 | 177777 | | | | | |
| 2672 | 012374 | 001401 | | | | | | | |
| 2673 | 012376 | 104000 | | | | | | | |
| 2674 | 012400 | 104400 | | | | | | | |
| 2675 | | | | | | | | | |
| 2676 | 012402 | 012737 | 000001 | 016710 | | | | | |
| 2677 | 012410 | 105477 | 004276 | | | | | | |
| 2678 | 012414 | 122737 | 177777 | 016710 | | | | | |
| 2679 | 012422 | 001401 | | | | | | | |
| 2680 | 012424 | 104000 | | | | | | | |

;TEST BIC INSTRUCTION INDIRECT WITH INDEXING

MOV #-1,%0
BICB @B+2,%0
CMPB %0,#52525
BEQ .+4

;BICB FAILED

HLT
SCOPEMOV #-1,@#TEMP
BICB #125252,@TEMP+2
CMPB #52525,@#TEMP
BEQ .+4

;BICB FAILED

HLT
SCOPEMOV #-1,@#C
BICB @B+2,@C+2
CMPB A+10,@#C
BEQ .+4

;BICB FAILED

HLT
SCOPE

;TEST UNARYS INDIRECT WITH INDEXING

MOV #-1,@#TEMP
CLRB @TEMP+2
TSTB @#TEMP
BEQ .+4

;CLRB FAILED

HLT
SCOPEMOV #125252,@#TEMP
COMB @TEMP+2
CMPB #052525,@#TEMP
BEQ .+4

;COMB FAILED

HLT
SCOPECLR @#TEMP
INCB @TEMP+2
CMPB #1,@#TEMP
BEQ .+4

;INCB FAILED

HLT
SCOPECLR @#TEMP
DECB @TEMP+2
CMPB @#TEMP,#-1
BEQ .+4

;DECB FAILED

HLT
SCOPEMOV #1,@#TEMP
NEGB @TEMP+2
CMPB #-1,@#TEMP
BEQ .+4

;NEGB FAILED

HLT

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

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

| | | | | | | | |
|------|--------|--------|--------|--------|-----------------------|---------------|---------------------|
| 2793 | 013104 | 004767 | 003366 | | JSR | %7, SUBR6 | |
| 2794 | 013110 | 100401 | | | BMI | .+4 | |
| 2795 | 013112 | 104000 | | | HLT | | ;JSR OR RTS FAILED |
| 2796 | 013114 | 001401 | | | BEQ | .+4 | |
| 2797 | 013116 | 104000 | | | HLT | | ;JSR OR RTS FAILED |
| 2798 | 013120 | 102401 | | | BVS | .+4 | |
| 2799 | 013122 | 104000 | | | HLT | | ;JSR OR RTS FAILED |
| 2800 | 013124 | 103401 | | | BCS | .+4 | |
| 2801 | 013126 | 104000 | | | HLT | | ;JSR OR RTS FAILED |
| 2802 | 013130 | 104400 | | | SCOPE | | |
| 2803 | | | | | :TEST ROTATE ODD BYTE | | |
| 2804 | 013132 | 104400 | | | SCOPE | | |
| 2805 | 013134 | 000257 | | | CCC | | ;CLEAR "C" |
| 2806 | 013136 | 012767 | 123456 | 003544 | MOV | #123456, TEMP | |
| 2807 | 013144 | 106067 | 003541 | | RORB | TEMP+1 | ;ROTATE ODD BYTE |
| 2808 | 013150 | 103401 | | | BCS | .+4 | |
| 2809 | 013152 | 104000 | | | HLT | | ;C NOT SET |
| 2810 | 013154 | 102401 | | | BVS | .+4 | |
| 2811 | 013156 | 104000 | | | HLT | | ;V NOT SET |
| 2812 | 013160 | 022767 | 051456 | 003522 | CMP | #051456, TEMP | |
| 2813 | 013166 | 001401 | | | BEQ | .+4 | |
| 2814 | 013170 | 104000 | | | HLT | | ;ROTATE FAILED |
| 2815 | 013172 | 104400 | | | SCOPE | | |
| 2816 | 013174 | 000277 | | | SCC | | ;SET C |
| 2817 | 013176 | 012767 | 123456 | 003504 | MOV | #123456, TEMP | |
| 2818 | 013204 | 106067 | 003501 | | RORB | TEMP+1 | |
| 2819 | 013210 | 103401 | | | BCS | .+4 | |
| 2820 | 013212 | 104000 | | | HLT | | ;C NOT SET |
| 2821 | 013214 | 102001 | | | BVC | .+4 | |
| 2822 | 013216 | 104000 | | | HLT | | ;V NOT CLEARED |
| 2823 | 013220 | 022767 | 151456 | 003462 | CMP | #151456, TEMP | |
| 2824 | 013226 | 001401 | | | BEQ | .+4 | |
| 2825 | 013230 | 104000 | | | HLT | | ;ROTATE FAILED |
| 2826 | 013232 | 104400 | | | SCOPE | | |
| 2827 | | | | | | | |
| 2828 | 013234 | 000257 | | | CCC | | |
| 2829 | 013236 | 012767 | 123456 | 003444 | MOV | #123456, TEMP | |
| 2830 | 013244 | 106167 | 003441 | | ROLB | TEMP+1 | |
| 2831 | 013250 | 103401 | | | BCS | .+4 | |
| 2832 | 013252 | 104000 | | | HLT | | ;C NOT SET |
| 2833 | 013254 | 102401 | | | BVS | .+4 | |
| 2834 | 013256 | 104000 | | | HLT | | ;V NOT SET |
| 2835 | 013260 | 022767 | 047056 | 003422 | CMP | #047056, TEMP | |
| 2836 | 013266 | 001401 | | | BEQ | .+4 | |
| 2837 | 013270 | 104000 | | | HLT | | ;ROTATE BYTE FAILED |
| 2838 | 013272 | 104400 | | | SCOPE | | |
| 2839 | | | | | | | |
| 2840 | 013274 | 000277 | | | SCC | | ;SET C |
| 2841 | 013276 | 012767 | 123456 | 003404 | MOV | #123456, TEMP | |
| 2842 | 013304 | 106167 | 003401 | | ROLB | TEMP+1 | |
| 2843 | 013310 | 103 1 | | | BCS | .+4 | |
| 2844 | 013312 | 104000 | | | HLT | | ;C NOT SET |
| 2845 | 013314 | 102401 | | | BVS | .+4 | |
| 2846 | 013316 | 104000 | | | HLT | | ;V NOT SET |
| 2847 | 013320 | 022767 | 047456 | 003362 | CMP | #047456, TEMP | |
| 2848 | 013326 | 001401 | | | BEQ | .+4 | |

```

013330 104000 HLT ;ROTATE ODD BYTE FAILED
013332 104400 SCOPE
013334 000257 CCC ;CLEAR C
013336 012767 177777 003344 MOV #-1,TEMP
013344 106267 003341 ASRB TEMP+1
013350 103401 SCS .+4
013352 104000 HLT ;C NOT SET
013354 102001 BVC .+4
013356 104000 HLT ;V NOT CLEARED
013360 026727 003324 177777 CMP TEMP,#-1
013366 001401 BEQ .+4
013370 104000 HLT ;SHIFT FAILED
013372 104400 SCOPE
013374 000277 SCC
013376 012767 177777 003304 MOV #-1,TEMP
013404 106367 003301 ASLB TEMP+1
013410 103401 BCS .+4
013412 104000 HLT ;C NOT SET
013414 102001 BVC .+4
013416 104000 HLT ;V NOT CLEARED
013420 026727 003264 177377 CMP TEMP,#177377
013426 001401 BEQ .+4
013430 104000 HLT ;SHIFT BYTE FAILED
013432 104400 SCOPE
;TEST COMBINATION OF N, C AND V
.MACR TNCV
BPL .+12 ;Z=1
BCC .+20 ;Z=1, C=1
BVC .+30 ;Z=C, BUT V=1
HLT
BR .+24
BCC .+16 ;Z=0
BVS .+20 ;Z=0, C=1
HLT ;Z NOT EQUAL C, V=1
BR .+14
BVS .+12 ;Z=1, C=0
HLT ;Z NOT EQUAL C, V=1
BR .+6
BVC .+4 ;Z=0, C=0
HLT ;Z=C, BUT V=1
SCOPE
.ENDM
013434 005037 016740 CLR @ICOUNT ;NO ITERATION
;TEST ROTATING NUMBERS
SCOPE
013440 104400
013442 012767 177777 000142 MOV #-1,REFF ;INITIALIZE BASE NUMBER
013450 005267 000136 TSROT: INC REFF ;INCREMENT NUMBER
013454 004767 000012 JSR %7,ROTALL ;GO TO COMPARE ROUTINE
013460 026727 000126 100077 CMP REFF,#100077 ;TEST ALL VALUES
013466 001370 BNE TSROT ;NO TEST THEM ALL
013470 000452 BR TSROT2A ;WE ARE DONE
013472 016767 000114 000114 ROTALL: MOV REFF,TEST

```

```

013500 006167 000110
013504 006067 000104
013510 006067 000100
013514 006067 000074
013520 006067 000070
013524 006167 000064
013530 006167 000060
013534 006167 000054
013540 100004
013542 103007
013544 102013
013546 104000
013550 000411
013552 103006
013554 102407
013556 104000
013560 000405
013562 102404
013564 104000
013566 000402
013570 102001
013572 104000
013574 104400
013576 026767 000012 000006
013604 001401
013606 104000
013610 000207
013612 000000
013614 000000
013616 012767 177777 177766
013624 005267 177762
013630 004767 000016
013634 004767 000122
013640 022767 177777 177744
013646 001366
013650 000505
013652 015767 177734 177734
013654 106067 177730
013664 106067 177724
013670 106067 177720
013674 106167 177714
013700 106167 177710
013704 106167 177704
013710 100004
013712 103007
013714 102013
013716 104000
013720 000411
013722 103006
013724 102407
013726 104000
013730 000405

```

```

ROR TEST
ROR TEST
ROR TEST
ROR TEST
ROR TEST
ROL TEST
ROL TEST
ROL TEST
TNCV
BPL .+12
BCC .+20
BVC .+30
HLT
BR .+24
BCC .+16
BVS .+20
HLT
BR .+14
BVS .+12
HLT
BR .+6
BVC .+4
HLT
SCOPE
CMP TEST, REFF
BEQ .+4
HLT
RTS %7
REF: 0
TEST: 0
REF=REFF
:TEST ROTATING BYTE EVEN, ODD, ALL NUMBERS
TSRT2A: MOV #-1, REFF
TSROT2: INC REFF
JSR %7, ROTBE
JSR %7, ROTBO
CMP #-1, REFF
BNE TSROT2
BR ROTENI
ROTBE: MOV REFF, TEST
RORB TEST
RORB TEST
RORB TEST
ROLB TEST
RCLB TEST
ROLB TEST
TNCV
BPL .+12
BCC .+20
BVC .+30
HLT
BR .+24
BCC .+16
BVS .+20
HLT
BR .+14

```

```

: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
:INITIAL NOT EQUAL TO FINAL
:ROTATE WORD FAILED
:GOOD DATA
:BAD DATA

```

:ROTATE BYTE EVEN

```

:Z=1
:Z=1, C=1
:Z=C, BUT V=1

```

```

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

```

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

| | | | |
|------|--------|--------|---------------|
| 2997 | 014064 | 104400 | |
| 2998 | | | |
| 2999 | 014066 | 005227 | 177776 |
| 3000 | 014072 | 100002 | |
| 3001 | 014074 | 000167 | 000632 |
| 3002 | | | |
| 3003 | | | |
| 3004 | 014100 | 011667 | 000072 |
| 3005 | 014104 | 012767 | 000001 177500 |
| 3006 | 014112 | 005267 | 177474 |

```

RCTEN1: 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
†STARI: MOV    @%5, NUMA
      MOV     #1, REF
ARITST: INC    REF

```

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

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3063 014356 105167 002327 TCOM3: COMB TEMP+1 ;ODD BYTE
3064 014362 005367 002326 DEC TEMP+4
3065 014366 126767 002317 002320 CMPB TEMP+1,TEMP+4
3066 014374 001401 BEQ .+4
3067 014376 104000 HLT ;COMPLIMENT BYTE FAILED
3068 014400 105167 002305 COMB TEMP+1
3069 014404 105267 002301 INCB TEMP+1
3070 014410 001362 BNE TCOM3
3071 014412 104400 SCOPE
3072
3073 ;TEST COMPARE ALL VALUE EVEN BYTE WITH JDD
3074 014414 005067 002270 CLR TEMP ;BASE VALUE
3075 014420 126767 002264 002263 TSCOMB: CMPB TEMP,TEMP+1 ;COMPARE
3076 014426 001401 BEQ .+4
3077 014430 104000 HLT ;COMPARE FAILED
3078 014432 002001 BGE .+4
3079 014434 104000 HLT ;V IS NOT = TO N
3080 014436 003401 BLE .+4
3081 014440 104000 HLT ;V IS SET
3082 014442 062767 000401 002240 ADD #401,TEMP
3083 014450 022767 177777 002232 CMP #-1,TEMP
3084 014456 001360 BNE TSCOMB
3085 014460 104400 SCOPE
3086 014462 012737 004000 016440 MOV #4000,2#ICOUNT
3087 014470 104400 WAIT3: SCOPE
3088 014472 WAIT5:
3089 014472 012737 000010 016440 MOV #10,2#ICOUNT
3090
3091 ;TEST TO SEE IF I/O DEVICES WERE SELECTED
3092 014500 122737 000377 001516 CMPB #377,2#REG1 ;SELECTED DEVICES STORED IN REG1
3093 014506 001404 BEQ WAIT4 ;BRANCH IF NO DEVICES SELECTED
3094 014510 000001 WAIT ;INTERRUPTS WILL OCCUR
3095 014512 000001 WAIT ;IF DEVICES ARE SELECTED
3096 014514 000001 WAIT
3097 014516 000001 WAIT
3098 014520 104400 WAIT4: SCOPE
3099 014522 012737 004000 016440 MOV #4000,2#ICOUNT
3100
3101 ;TEST SWAB
3102 014530 012767 000200 177056 MOV #0200,TEST
3103 014536 000367 177052 SWAB TEST
3104 014542 100001 BPL .+4
3105 014544 104000 HLT
3106 014546 001401 BEQ .+4
3107 014550 104000 HLT
3108 014552 000367 177036 SWAB TEST
3109 014556 100401 BMI .+4
3110 014560 104000 HLT
3111 014562 001001 BNE .+4
3112 014564 104000 HLT
3113 014566 104400 SCOPE
3114 014570 005037 016440 CLR 2#ICOUNT
3115
3116 ;TEST ALL COMBINATIONS OF SWAB
3117 014574 005067 177014 CLR TEST ;NUMBER UNDER TEST
3118 014600 005067 177006 CLR REF ;REFERENCE NUMBER

```


H05

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| | | | | | | | |
|------|--------|--------|--------|--------|-------------|-----------------|-----------------------------------|
| 3119 | 014604 | 000367 | 177004 | | SWABA: SWAB | TEST | : OPERATION UNDER TEST |
| 3120 | 014610 | 026767 | 177000 | 176774 | CMP | TEST, REF | : TEST SWAB INSTRUCTION |
| 3121 | 014616 | 001401 | | | BEQ | .+4 | |
| 3122 | 014620 | 104000 | | | HLT | | : SWAB FAILED |
| 3123 | 014622 | 000367 | 176766 | | SWAB | TEST | |
| 3124 | 014626 | 005267 | 176760 | | INC | REF | : INCREMENT REFERENCE NUMBER |
| 3125 | 014632 | 105267 | 176757 | | INCB | TEST+1 | : INC TEST NUMBER |
| 3126 | 014636 | 001362 | | | BNE | SWABA | : LOOP TILL DONE |
| 3127 | 014640 | 104400 | | | SCOPE | | |
| 3128 | 014642 | 012737 | 004000 | 016440 | MOV | #4000, @#ICOUNT | |
| 3129 | | 000240 | | | | | |
| 3130 | | 177776 | | | | | |
| 3131 | | | | | | | |
| 3132 | 014650 | 012767 | 177777 | 002032 | MOV | #-1, TEMP | |
| 3133 | 014656 | 000261 | | | SEC | | |
| 3134 | 014660 | 105567 | 002025 | | ADCB | TEMP+1 | |
| 3135 | 014664 | 103401 | | | BCS | .+4 | |
| 3136 | 014666 | 104000 | | | HLT | | : ADCB FAILED |
| 3137 | 014670 | 022767 | 000377 | 002012 | CMP | #377, TEMP | |
| 3138 | 014676 | 001401 | | | BEQ | .+4 | |
| 3139 | 014700 | 104000 | | | HLT | | : ADCB FAILED |
| 3140 | 014702 | 104400 | | | SCOPE | | |
| 3141 | | | | | | | |
| 3142 | 014704 | 012703 | 000100 | | | | : PROBLEM 115 0300 17 AUG 1972 |
| 3143 | 014710 | 012705 | 016710 | | MOV | #100, %3 | |
| 3144 | 014714 | 012737 | 177777 | 016710 | MOV | #TEMP, %5 | |
| 3145 | 014722 | 030315 | | | MOV | #-1, @#TEMP | |
| 3146 | 014724 | 001001 | | | BIT | %3, @%5 | |
| 3147 | 014726 | 104000 | | | BNE | .+4 | |
| 3148 | 014730 | 104400 | | | HLT | | : BIT FAILED |
| 3149 | 014732 | 000402 | | | SCOPE | | |
| 3150 | 014734 | 000167 | 000362 | | EAESRT: BR | +6 | : NOP IF NO EAE |
| 3151 | | | | | JMP | ENDEAE | |
| 3152 | 014740 | 104400 | | | | | : TEST LEFT SHIFT |
| 3153 | 014742 | 005077 | 163402 | | SCOPE | | : TEST OF LOGICAL SHIFT |
| 3154 | 014746 | 012777 | 125252 | 163376 | CLR | @MQ | : LOAD MQ WITH 0 |
| 3155 | 014754 | 012777 | 177760 | 163404 | MOV | #125252, @AC | : LOAD AC WITH 125252 |
| 3156 | 014762 | 005777 | 163364 | | MOV | #-16., @LSH | : LOAD SHIFT COUNT (LSH) WITH -16 |
| 3157 | 014766 | 001401 | | | TST | @AC | : COMPARE AC WITH 0 |
| 3158 | 014770 | 104000 | | | BEQ | .+4 | : GO TO HLT IF BAD |
| 3159 | 014772 | 022777 | 125252 | 163350 | HLT | | |
| 3160 | 015000 | 001401 | | | CMP | #125252, @MQ | : COMPARE MQ WITH 125252 |
| 3161 | 015002 | 104000 | | | BEQ | .+4 | : GO TO HLT IF BAD |
| 3162 | 015004 | 122777 | 000020 | 163344 | HLT | | |
| 3163 | 015012 | 001401 | | | CMPB | #20, @SRE | : COMPARE SR WITH 2 |
| 3164 | 015014 | 104000 | | | BEQ | .+4 | : SKIP HLT IF GOOD |
| 3165 | | | | | HLT | | : HALT ON ERROR (LEFT SHIFT) |
| 3166 | | | | | | | |
| 3167 | 015016 | 104400 | | | | | : TEST RIGHT SHIFT |
| 3168 | 015020 | 005077 | 163324 | | SCOPE | | : TEST OF ARITHMETIC SHIFT |
| 3169 | 015024 | 012777 | 177777 | 163320 | CLR | @MQ | : LOAD MQ WITH 0 |
| 3170 | 015032 | 012777 | 000020 | 163330 | MOV | #-1, @AC | : LOAD AC WITH -1 |
| 3171 | 015040 | 005777 | 163306 | | MOV | #16., @ASH | : LOAD SHIFT COUNT (ASH) WITH 16. |
| 3172 | 015044 | 100401 | | | TST | @AC | : COMPARE AC WITH 100000 |
| 3173 | 015046 | 104000 | | | BMI | .+4 | : SKIP HLT IF GOOD |
| 3174 | 015050 | 005777 | 163274 | | HLT | | : HALT ON ERROR |
| | | | | | TST | @MQ | : COMPARE MQ WITH 0 |

| | | | | | | | | |
|------|--------|--------|--------|--------|---------------|--------------|--|-------------------------------|
| 3175 | 015054 | 001401 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3176 | 015056 | 104000 | | | HLT | | | ;HALT ON ERROR |
| 3177 | 015060 | 122777 | 000110 | 163270 | CMPB | #110,SR | | ;COMPARE SR WITH 10 |
| 3178 | 015066 | 001401 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3179 | 015070 | 104000 | | | HLT | | | ;HALT ON ERROR (RIGHT SHIFT) |
| 3180 | | | | | | | | |
| 3181 | | | | | | | | |
| 3182 | 015072 | 104400 | | | | | | ;TEST NORMALIZE |
| 3183 | 015074 | 012777 | 125252 | 163246 | SCOPE | | | ;TEST OF NORMALIZE |
| 3184 | 015102 | 012777 | 170000 | 163242 | MOV | #125252,AMQ | | ;LOAD MQ WITH 125252 |
| 3185 | 015110 | 005077 | 163250 | | MOV | #170000,AC | | ;LOAD AC WITH 170000 |
| 3186 | 015114 | 022777 | 100005 | 163230 | CLR | ANOR | | ;START NORMALIZE |
| 3187 | 015122 | 001401 | | | CMP | #100005,AC | | ;COMPARE AC WITH 100005 |
| 3188 | 015124 | 104000 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3189 | 015126 | 022777 | 052520 | 163214 | HLT | | | ;HALT ON ERROR |
| 3190 | 015134 | 001401 | | | CMP | #52520,AMQ | | ;COMPARE MQ WITH 52520 |
| 3191 | 015136 | 104000 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3192 | 015140 | 122777 | 000003 | 163206 | HLT | | | ;HALT ON ERROR |
| 3193 | 015146 | 001401 | | | CMPB | #3,SC | | ;COMPARE SC WITH 3 |
| 3194 | 015150 | 104000 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3195 | | | | | HLT | | | ;HALT ON ERROR (NORMALIZE) |
| 3196 | | | | | | | | |
| 3197 | 015152 | 104400 | | | | | | ;TEST MULTIPLY |
| 3198 | 015154 | 012777 | 125252 | 163166 | SCOPE | | | ;TEST OF MULTIPLY |
| 3199 | 015162 | 012777 | 040000 | 163170 | MOV | #125252,AMQ | | ;LOAD MQ WITH 125252 |
| 3200 | 015170 | 022777 | 165252 | 163154 | MOV | #40000,MUL | | ;LOAD MUL WITH 40000 |
| 3201 | 015176 | 001401 | | | CMP | #165252,AC | | ;COMPARE AC WITH 1652 |
| 3202 | 015200 | 104000 | | | BEQ | +.4 | | ;SKIP IF GOOD |
| 3203 | 015202 | 005777 | 163142 | | HLT | | | ;HALT ON ERROR |
| 3204 | 015206 | 100401 | | | TST | AMQ | | ;COMPARE MQ WITH 10000 |
| 3205 | 015210 | 104000 | | | BMI | +.4 | | ;SKIP HLT IF GOOD |
| 3206 | 015212 | 122777 | 000300 | 163136 | HLT | | | ;HALT ON ERROR |
| 3207 | 015220 | 001401 | | | CMPB | #300,SR | | ;COMPARE SR WITH 300 |
| 3208 | 015222 | 104000 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3209 | | | | | HLT | | | ;HALT ON ERROR (MULTIPLY) |
| 3210 | | | | | | | | |
| 3211 | 015224 | 104400 | | | | | | ;TEST DIVIDE |
| 3212 | 015226 | 012777 | 125252 | 163114 | SCOPE | | | ;TEST OF DIVIDE |
| 3213 | 015234 | 012777 | 177777 | 163110 | MOV | #125252,AMQ | | ;LOAD MQ WITH 125252 |
| 3214 | 015242 | 012777 | 000002 | 163112 | MOV | #-1,AC | | ;LOAD AC WITH -1 |
| 3215 | 015250 | 005777 | 163076 | | MOV | #2,DIV | | ;LOAD DIV WITH 2 AND DIVIDE |
| 3216 | 015254 | 001401 | | | TST | AC | | ;COMPARE AC WITH 0 (QUOTIENT) |
| 3217 | 015256 | 104000 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3218 | 015260 | 022777 | 152525 | 163062 | HLT | | | ;HALT ON ERROR |
| 3219 | 015266 | 001401 | | | CMP | #152525,AMQ | | ;COMPARE MQ WITH 152525 |
| 3220 | 015270 | 104000 | | | BEQ | +.4 | | ;SKIP HLT IF GOOD |
| 3221 | 015272 | 104400 | | | HLT | | | ;DIVIDE ERROR |
| 3222 | 015274 | 012767 | 177777 | 001406 | SCOPE | | | |
| 3223 | 015302 | 000261 | | | MOV | #-1,TEMP | | |
| 3224 | 015304 | 105667 | 001401 | | SEC | TEMP+1 | | |
| 3225 | 015310 | 022767 | 177377 | 001372 | SBCB | #177377,TEMP | | |
| 3226 | 015316 | 001401 | | | CMP | +.4 | | |
| 3227 | 015320 | 104000 | | | BEQ | +.4 | | |
| 3228 | 015322 | 104400 | | | HLT | | | |
| 3229 | 015324 | 022700 | 052525 | | ENDEAE: SCOPE | | | |
| 3230 | 015330 | 001401 | | | CMP | #52525,%0 | | |
| 3231 | 015332 | 104000 | | | BEQ | +.4 | | |
| 3232 | | | | | HLT | | | ;SOME OPERATION DESTROYED %0 |

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3231 015334 012737 016504 000024      MOV      #PFAIL, @#24      ;POWER FAIL VECTOR
3232 015342 012737 000340 000026      MOV      #340, @#26      ;PROCESSOR PRIORITY
3233
3234 015350 000401          SKPBEL: BR      .+4      ;SKIP OVER BELL-NOP ON CORE EXPANSION
3235 015352 000501          BR      TRPA
3236 015354 032777 000100 162702      BIT      #100, @TTCSR
3237 015362 001006          BNE     SBELL          ;DON'T RING BELL IF TTY IS BUSY
3238
3239 015364 012777 000207 000466      ;BELL ON PASS COMPLETE
3240 015372 105777 000464      BELL:  MOV     #207, @TDBR
3241 015376 100375          TSTB   @TCSR
3242 015400 005227 000000          BPL     .-4
3243 015404 010700          SBELL: INC     #0      ;PASS COUNT LOCATION
3244 015406 042700 017777      MOV     %7, %0      ;SET UP RESERVED INSTRUCTION
3245 015412 062700 015436      BIC     #17777, %0   ;OFFSET
3246 015416 010037 000010      ADD     #BEG20, %0
3247 015422 006701          MOV     %0, @#10
3248 015424 000240          6701
3249 015426 012737 000006 015552      NOP
3250 015434 000403          MOV     #6, @#YESRT   ;NO TRAP, PROCESSOR IS NOT=20,15.05
3251 015436 012737 000002 015552      BR      BEGANY
3252 015444 012737 000012 000010      BEG20: MOV    #2, @#YESRT ;TRAP OCCURRED
3253          BEGANY: MOV   #12, @#10 ;RESTORE HALT FOR RESERVED INC
3254          ;ROUTINE TO CHECK FOR TRACE TRAP TO BE RUN WITH PROGRAM
3255          ;SAVE OLD CONTENTS, SET UP FOR TRACE TRAP
3256 015452 005046          YESTR: CLR    -(6)
3257 015454 032777 010000 162512      BIT     #10000, @SRPTR ;INHIBIT "T" TRAP IF SET
3258 015462 001013          BNE     ACT
3259 015464 012737 015552 000014      MOV     #YESRT, @#14   ;T TRAP VECTOR
3260 015472 005167 000052      COM     TRPB
3261 015476 001405          BEQ     ACT
3262 015500 012716 000020          MOV     #20, (6)      ;SET TRACE TRAP
3263 015504 012746 004416          YESTR1: MOV   #BEGIN, -(6) ;START OF TEST WITH TRACE ON
3264 015510 000002          YESTR2: RTI
3265 015512 013700 000042          ACT:  MOV     @#42, %0  ;ARE WE UNDER ACT?
3266 015516 001772          BEQ     YESTR1        ;NO
3267 015520 012737 015532 000014      MOV     #CLEAR, @#14  ;TO BANK ZERO
3268 015526 012707 015532          MOV     #CLEAR, %7
3269 015532 000005          CLEAR: RESET
3270 015534 004710          LOGICA: JSR    %7, @%0 ;CLER THE WORLD
3271 015536 000240          NOP
3272 015540 000240          NOP
3273 015542 000240          NOP
3274 015544 000137 000570          JMP     @#ESTART
3275 015550 000000          TRPB:  0
3276 015552 000002          YESRT: RTI          ;RETURN TO PROGRAM FROM TRAP - CAN BE AN RTT
3277 015554 000000          HALT
3278 015556 000137 004416          TRPA:  JMP     @#BEGIN ;BEGIN MODIFY BY EXPANSION
3279 015562 000000          PRFLAG: 0          ;PRINT ROUTINE BUSY IF NOT ZERO
3280
3281          ;ENTERED WITH SYSTEM TRAP CALL(HLT)
3282          ;PRINT OUT THE ERROR PC AND STATUS REGISTER
3283 015564 005767 177772      PRINT: TST    PRFLAG   ;IS ROUTINE BUSY
3284 015570 001401          BEQ     .+4
3285 015572 000002          RTI
3286 015574 005267 177762          INC     PRFLAG      ;YES EXIT
                          ;NO SET FLAG

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

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

;SCOPE LOOP ROUTINE ENTERED BY USER TRAP

;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 4000 TIMES

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| | | | | | | | | | |
|------|--------|--------|--------|--------|---------|-------|----------------|--|-------------------------------------|
| 3399 | 016364 | 032777 | 040000 | 161602 | SCOPEC: | BIT | #40000, @SRPTR | | ; TEST SR FOR SCOPE |
| 3400 | 016372 | 001012 | | | | BNE | SCOPEB | | ; YES SCOPE |
| 3401 | 016374 | 032777 | 004000 | 161572 | | BIT | #4000, @SRPTR | | ; NO - TEST FOR ITERATION |
| 3402 | 016402 | 001011 | | | | BNE | SCOPEG | | ; INHIBIT ITERATION |
| 3403 | 016404 | 026767 | 000032 | 000026 | | CMP | SCOPEF, ICOUNT | | |
| 3404 | 016412 | 001405 | | | | BEQ | SCOPEG | | ; EXIT - DONE |
| 3405 | 016414 | 005267 | 000022 | | | INC | SCOPEF | | ; INCREMENT COUNT |
| 3406 | 016420 | 016716 | 000020 | | SCOPEB: | MOV | RETURN, @%6 | | ; REPOSITION THE STACK |
| 3407 | 016424 | 000002 | | | | RTI | | | ; SCOPE RETURN |
| 3408 | 016426 | 005067 | 000010 | | SCOPEG: | CLR | SCOPEF | | ; CLEAR COUNT |
| 3409 | 016432 | 011667 | 000006 | | | MOV | @%6, RETURN | | ; SAVE SCOPE RETURN POINTER |
| 3410 | 016436 | 000002 | | | | RTI | | | ; RETURN INLINE-NEXT TEST |
| 3411 | 016440 | 004000 | | | ICOUNT: | 4000 | | | |
| 3412 | 016442 | 000000 | | | SCOPEF: | 0 | | | ; COUNT LOCATION FOR ITERATION LOOP |
| 3413 | 016444 | 004416 | | | RETURN: | BEGIN | | | ; ADDRESS OF LAST TEST |
| 3414 | | | | | | | | | |
| 3415 | | | | | | | | | |
| 3416 | 016446 | 000207 | | | | | | | |
| 3417 | 016450 | 000277 | | | | | | | |
| 3418 | 016452 | 000205 | | | | | | | |
| 3419 | 016454 | 004537 | 016450 | | | | | | |
| 3420 | 016460 | 000204 | | | | | | | |
| 3421 | 016462 | 004467 | 177766 | | | | | | |
| 3422 | 016466 | 000203 | | | | | | | |
| 3423 | 016470 | 004367 | 177766 | | | | | | |
| 3424 | 016474 | 000202 | | | | | | | |
| 3425 | 016476 | 004267 | 177766 | | | | | | |
| 3426 | 016502 | 000207 | | | | | | | |
| 3427 | | | | | | | | | |
| 3428 | | | | | | | | | |
| 3429 | 016504 | 010046 | | | | | | | |
| 3430 | 016506 | 010146 | | | | | | | |
| 3431 | 016510 | 010246 | | | | | | | |
| 3432 | 016512 | 010346 | | | | | | | |
| 3433 | 016514 | 010446 | | | | | | | |
| 3434 | 016516 | 010546 | | | | | | | |
| 3435 | 016520 | 016746 | 161300 | | | | | | |
| 3436 | 016524 | 012737 | 000002 | 000006 | | | | | |
| 3437 | 016532 | 012700 | 016572 | | | | | | |

; GROUP OF NESTED SUBROUTINES

SUBR1: RTS %7 ; ONE INSTRUCTION

SUBR2: SCC ; ONE DEEP

SUBR3: JSR %5, @#SUBR2 ; TWO DEEP

SUBR4: JSR %4, SUBR3 ; THREE DEEP

SUBR5: JSR %3, SUBR4 ; FOUR DEEP

SUBR6: JSR %2, SUBR5 ; FIVE DEEP

RTS %7

; ENTER HERE OR POWER FAIL

PFAIL: MOV %0, -(6) ; SAVE REGISTER OR STACK

MOV %1, -(6) ; WHEN POWERING DOWN

MOV %2, -(6)

MOV %3, -(6)

MOV %4, -(6)

MOV %5, -(6)

MOV %6, -(6)

MOV #RTI, @#6 ; IN CASE OF NO EAE

MOV #HAC, %0

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


```

0550 017260 004767 177660 JSR %7 MOVE
0551 017264 012701 040000 XFER12: MOV #40000,%1
0552 017270 004767 177650 JSR %7 MOVE
0553 017274 012701 020000 XFER8: MOV #20000,%1
0554 017280 004767 177640 JSR %7 MOVE
0555 017304 000207 RTS %7 ;RETURN FROM TRANSFERS
0556 017306 012767 144424 116244 MOD24: MOV #BEGIN+140006,TRPA+120002
0557 017314 012767 000240 116026 MOV #NOP,SKPBEL+120000
0558 017322 012767 124424 076230 MOD20: MOV #BEGIN+120006,TRPA+100002
0559 017330 012767 000240 076012 MOV #NOP,SKPBEL+100000
0560 017336 012767 104424 056214 MOD16: MOV #BEGIN+100006,TRPA+80002
0561 017344 012767 000240 055776 MOV #NOP,SKPBEL+80000
0562 017352 012767 064424 036200 MOD12: MOV #BEGIN+60006,TRPA+40002
0563 017360 012767 000240 035762 MOV #NOP,SKPBEL+40000
0564 017366 012767 044424 016164 MOD8: MOV #BEGIN+40006,TRPA+20002
0565 017374 012767 000240 015746 MOV #NOP,SKPBEL+20000
0566 017402 012767 024424 176150 MOD4: MOV #BEGIN+20006,TRPA+2
0567 017410 012767 000240 175732 MOV #NOP,SKPBEL
0568 017416 000207 DET3: RTS %7 ;RETURN FROM MODIFY
0569 :ROUTINE TO SET ACTION ENABLE ON MA/MF PARITY MEMORIES
0570 :CALL: JSR PC,.MAMF
0571 172100 PARCSR= 172100 ;ADDRESS OF FIRST MA/MF PA
0572 000114 PARVEC= 114 ;ADDRESS OF PARITY INTERRU
0573 000004 ERRVEC=4
0574 000000 RO=%0
0575 000006 SP=%6
0576 000002 R2=%2
0577 000007 PC=%7
0578
0579
0580 017420 012737 000006 000004 .MAMF: MOV #ERRVEC+2,@ERRVEC
0581 017426 012737 000002 000006 MOV #RTI,@ERRVEC+2
0582 017434 012700 172100 MOV #PARCSR,RO ;GET FIRST CSR ADDRESS
0583 017440 012702 000001 MOV #!,R2
0584
0585
0586 017444 012720 000001 IS: MOV #!(RO)+ ;SET TIME OUT INDICATOR
0587 ;SET ACTION ENABLE IF AVAI
0588 ;BRANCH IF CSR NOT AVAILAB
0589 ;SHIFT AVAILABILITY INDICA
0590 017450 006302 ASL R2
0591 017452 103374 BCC IS
0592 017454 000207 RTS PC
0593 017456 104000 .PARSRV:HLT ;PARITY ERROR
0594 017460 000137 000570 JMP @ESTART
0595 000001 .END

```


L06

.MAIN. MACY11 27(732) 14-SEP-76 10:54 PAGE 78
DZQKBF.P11 CROSS REFERENCE TABLE -- MACRO NAMES

TNCV 2876# 2913 2951 2977

| | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| ADC | 1892 | 1891 | 2183 | 3506 | 3507 | 3508 | 3509 | 3510 | 3511 | | | | | | |
| ADC8 | 2473 | 2482 | 2685 | 3134 | | | | | | | | | | | |
| ADD | 744 | 745 | 1079 | 1088 | 1632 | 1635 | 1638 | 1641 | 1644 | 1647 | 1650 | 1917 | 2126 | 2133 | 2139 |
| | 3013 | 3082 | 3245 | 3359 | 3363 | 3365 | 3371 | | | | | | | | |
| ASL | 3598 | | | | | | | | | | | | | | |
| ASLB | 2966 | | | | | | | | | | | | | | |
| ASRB | 2854 | | | | | | | | | | | | | | |
| BCC | 2915 | 2919 | 2953 | 2957 | 2979 | 2983 | 3589 | | | | | | | | |
| BCCS | 2800 | 2808 | 2819 | 2831 | 2843 | 2855 | 2867 | 3135 | | | | | | | |
| BEQ | 746 | 771 | 787 | 878 | 907 | 909 | 935 | 937 | 962 | 984 | 1005 | 1008 | 1018 | 1129 | 1140 |
| | 1143 | 1178 | 1193 | 1196 | 1621 | 1626 | 1655 | 1661 | 1667 | 1673 | 1680 | 1685 | 1692 | 1698 | 1705 |
| | 1713 | 1720 | 1727 | 1734 | 1743 | 1751 | 1759 | 1767 | 1774 | 1781 | 1788 | 1795 | 1804 | 1812 | 1820 |
| | 1828 | 1835 | 1843 | 1851 | 1859 | 1867 | 1875 | 1884 | 1893 | 1902 | 1911 | 1930 | 1936 | 1941 | 1946 |
| | 1953 | 1959 | 1965 | 1972 | 1979 | 1986 | 1994 | 2000 | 2007 | 2014 | 2021 | 2028 | 2035 | 2042 | 2049 |
| | 2054 | 2059 | 2066 | 2072 | 2078 | 2086 | 2093 | 2100 | 2107 | 2113 | 2120 | 2128 | 2135 | 2141 | 2149 |
| | 2156 | 2163 | 2170 | 2177 | 2185 | 2193 | 2200 | 2206 | 2213 | 2222 | 2230 | 2238 | 2249 | 2255 | 2261 |
| | 2267 | 2273 | 2279 | 2286 | 2291 | 2298 | 2305 | 2313 | 2320 | 2327 | 2334 | 2343 | 2351 | 2359 | 2367 |
| | 2376 | 2384 | 2392 | 2400 | 2408 | 2416 | 2423 | 2426 | 2434 | 2442 | 2450 | 2458 | 2466 | 2475 | 2484 |
| | 2493 | 2502 | 2509 | 2514 | 2520 | 2525 | 2532 | 2538 | 2544 | 2551 | 2558 | 2565 | 2572 | 2579 | 2587 |
| | 2594 | 2599 | 2604 | 2610 | 2616 | 2622 | 2630 | 2637 | 2644 | 2651 | 2658 | 2665 | 2672 | 2679 | 2687 |
| | 2690 | 2698 | 2705 | 2711 | 2716 | 2726 | 2734 | 2740 | 2746 | 2752 | 2760 | 2768 | 2778 | 2786 | 2796 |
| | 2813 | 2824 | 2836 | 2848 | 2860 | 2872 | 2930 | 2968 | 2994 | 3016 | 3027 | 3030 | 3041 | 3054 | 3066 |
| | 3076 | 3093 | 3106 | 3121 | 3138 | 3157 | 3160 | 3163 | 3175 | 3178 | 3187 | 3190 | 3193 | 3200 | 3206 |
| | 3215 | 3218 | 3225 | 3229 | 3261 | 3266 | 3284 | 3289 | 3329 | 3358 | 3369 | 3380 | 3404 | 3502 | 3516 |
| | 3518 | 3520 | 3522 | 3524 | | | | | | | | | | | |
| BGE | 1179 | 3078 | | | | | | | | | | | | | |
| BGT | 1034 | 1054 | 1068 | 1085 | 1124 | 1137 | 1175 | 1190 | | | | | | | |
| BHI | 748 | | | | | | | | | | | | | | |
| BHIS | 980 | | | | | | | | | | | | | | |
| BIC | 955 | 977 | 981 | 982 | 987 | 1119 | 1631 | 1634 | 1637 | 1640 | 1643 | 1646 | 1649 | 1741 | 1749 |
| | 1757 | 1765 | 1970 | 1977 | 1984 | 2084 | 2091 | 2098 | 2220 | 2228 | 2236 | 3244 | 3294 | 3357 | |
| BICB | 2341 | 2349 | 2357 | 2365 | 2628 | 2635 | 2642 | 2724 | 2732 | 2766 | | | | | |
| BIS | 784 | 793 | 799 | 817 | 820 | 825 | 834 | 838 | 960 | 971 | 972 | | | | |
| BIT | 786 | 794 | 815 | 818 | 823 | 831 | 835 | 839 | 860 | 892 | 1033 | 1037 | 1053 | 1067 | 1084 |
| | 1123 | 1136 | 1174 | 1189 | 3145 | 3236 | 3257 | 3298 | 3328 | 3399 | 3401 | 3501 | | | |
| BLE | 3080 | | | | | | | | | | | | | | |
| BLOS | 1092 | 3499 | | | | | | | | | | | | | |
| BLT | 1127 | 2243 | | | | | | | | | | | | | |
| BMI | 822 | 827 | 866 | 904 | 922 | 932 | 953 | 975 | 998 | 1001 | 1115 | 1154 | 2794 | 3109 | 3172 |
| | 3203 | 3350 | | | | | | | | | | | | | |
| BNE | 795 | 816 | 819 | 824 | 832 | 836 | 840 | 861 | 883 | 893 | 912 | 940 | 958 | 1038 | 1040 |
| | 1058 | 1073 | 1090 | 2901 | 2942 | 3009 | 3045 | 3058 | 3070 | 3084 | 3111 | 3126 | 3146 | 3237 | 3259 |
| | 3362 | 3373 | 3400 | 3402 | 3529 | | | | | | | | | | |
| BPL | 843 | 846 | 848 | 986 | 1016 | 1048 | 1168 | 1210 | 2914 | 2952 | 2978 | 3000 | 3104 | 3241 | 3296 |
| | 3299 | 3302 | 3310 | 3315 | 3323 | 3325 | 3348 | 3377 | 3383 | | | | | | |
| BR | 724 | 764 | 828 | 890 | 963 | 988 | 1010 | 1012 | 1020 | 1022 | 1036 | 1042 | 1056 | 1060 | 1070 |
| | 1075 | 1087 | 1094 | 1145 | 1148 | 1172 | 1181 | 1198 | 1214 | 2776 | 1036 | 1042 | 1056 | 1060 | 1070 |
| | 2956 | 2960 | 2963 | 2982 | 2986 | 2989 | 3010 | 3033 | 3149 | 3234 | 2902 | 2918 | 2922 | 2925 | 2943 |
| | 3381 | 3512 | 3525 | 3532 | 3534 | 3536 | 3538 | 3540 | 3542 | | 3235 | 3250 | 3290 | 3352 | 3374 |
| BVC | 2821 | 2857 | 2869 | 2916 | 2926 | 2954 | 2964 | 2980 | 2990 | | | | | | |
| BVS | 2798 | 2810 | 2833 | 2845 | 2920 | 2923 | 2958 | 2961 | 2984 | 2987 | | | | | |
| CCC | 2783 | 2792 | 2805 | 2828 | 2852 | | | | | | | | | | |
| CLR | 742 | 772 | 774 | 777 | 779 | 797 | 800 | 809 | 811 | 813 | 837 | 849 | 875 | 880 | 881 |
| | 884 | 887 | 889 | 959 | 970 | 1013 | 1028 | 1802 | 1810 | 2012 | 2025 | 2032 | 2125 | 2132 | 2147 |
| | 2160 | 2167 | 2569 | 2576 | 2583 | 2662 | 2669 | 2893 | 3024 | 3025 | 3036 | 3037 | 3049 | 3050 | 3061 |
| | 3062 | 3074 | 3114 | 3117 | 3118 | 3153 | 3168 | 3185 | 3256 | 3327 | 3341 | 3342 | 3366 | 3367 | 3408 |

| | | | | | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| CLRB | 3454 | 3462 | 3526 | | | | | | | | | | | | |
| CMP | 2374 | 2382 | 2390 | 2398 | 2549 | 2649 | 2758 | | | | | | | | |
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| | 1195 | 1620 | 1625 | 1654 | 1660 | 1666 | 1672 | 1679 | 1684 | 1691 | 1697 | 1704 | 1712 | 1719 | 1726 |
| | 1733 | 1742 | 1752 | 1758 | 1766 | 1866 | 1874 | 1929 | 1935 | 1940 | 1945 | 1952 | 1958 | 1964 | 1971 |
| | 1978 | 1985 | 1993 | 2020 | 2027 | 2034 | 2041 | 2048 | 2053 | 2058 | 2065 | 2071 | 2077 | 2085 | 2092 |
| | 2099 | 2106 | 2127 | 2134 | 2140 | 2155 | 2162 | 2169 | 2176 | 2199 | 2205 | 2212 | 2221 | 2229 | 2237 |
| | 2383 | 2391 | 2425 | 2457 | 2465 | 2474 | 2483 | 2492 | 2550 | 2557 | 2564 | 2571 | 2578 | 2586 | 2686 |
| | 2739 | 2745 | 2759 | 2767 | 2812 | 2823 | 2835 | 2847 | 2859 | 2871 | 2900 | 2929 | 2941 | 2967 | 2993 |
| | 3008 | 3015 | 3026 | 3029 | 3040 | 3083 | 3120 | 3137 | 3159 | 3186 | 3189 | 3199 | 3217 | 3224 | 3228 |
| CMFB | 3293 | 3361 | 3403 | 3498 | 3515 | 3517 | 3519 | 3521 | 3523 | 3528 | | | | | |
| | 882 | 908 | 936 | 1039 | 1057 | 1089 | 2242 | 2248 | 2251 | 2260 | 2266 | 2272 | 2278 | 2285 | 2290 |
| | 2297 | 2304 | 2312 | 2319 | 2326 | 2333 | 2342 | 2350 | 2358 | 2366 | 2508 | 2513 | 2519 | 2524 | 2531 |
| | 2537 | 2543 | 2593 | 2598 | 2603 | 2609 | 2615 | 2621 | 2629 | 2636 | 2643 | 2657 | 2664 | 2671 | 2678 |
| | 2704 | 2710 | 2717 | 2725 | 2733 | 2751 | 2777 | 2785 | 3053 | 3065 | 3075 | 3092 | 3162 | 3177 | 3192 |
| | 3205 | | | | | | | | | | | | | | |
| COM | 1818 | 1826 | 2019 | 2154 | 3038 | 3043 | 3260 | 3356 | | | | | | | |
| COMB | 2406 | 2414 | 2556 | 2563 | 2656 | 3051 | 3056 | 3063 | 3068 | | | | | | |
| DEC | 1194 | 1849 | 1857 | 2033 | 2168 | 3039 | 3052 | 3064 | 3368 | 3372 | 3379 | | | | |
| DECB | 2440 | 2448 | 2577 | 2670 | 2696 | | | | | | | | | | |
| EMT | 582 | | | | | | | | | | | | | | |
| HALT | 600 | 603 | 3277 | 3326 | 3444 | | | | | | | | | | |
| INC | 914 | 942 | 956 | 978 | 1006 | 1009 | 1019 | 1071 | 1141 | 1833 | 1841 | 2026 | 2161 | 2898 | 2938 |
| | 2999 | 3006 | 3031 | 3032 | 3044 | 3124 | 3242 | 3286 | 3287 | 3360 | 3405 | | | | |
| INCB | 911 | 924 | 939 | 961 | 1078 | 1116 | 1121 | 1132 | 1146 | 1155 | 1182 | 1185 | 1199 | 2421 | 2432 |
| | 2570 | 2663 | 3057 | 3069 | 3125 | | | | | | | | | | |
| JMP | 662 | 894 | 1918 | 3001 | 3150 | 3274 | 3278 | 3330 | 3592 | | | | | | |
| JSR | 885 | 886 | 1207 | 2775 | 2784 | 2793 | 2899 | 2939 | 2940 | 3007 | 3270 | 3307 | 3312 | 3317 | 3419 |
| | 3421 | 3423 | 3425 | 3497 | 3531 | 3533 | 3535 | 3537 | 3539 | 3541 | 3544 | 3546 | 3548 | 3550 | 3552 |
| MOV | 3554 | | | | | | | | | | | | | | |
| | 740 | 741 | 743 | 750 | 751 | 753 | 759 | 760 | 761 | 765 | 768 | 769 | 775 | 776 | 778 |
| | 780 | 781 | 782 | 791 | 803 | 804 | 806 | 807 | 808 | 810 | 812 | 814 | 833 | 841 | 844 |
| | 850 | 851 | 852 | 853 | 854 | 855 | 862 | 863 | 864 | 867 | 868 | 869 | 870 | 871 | 872 |
| | 873 | 874 | 879 | 888 | 913 | 925 | 941 | 949 | 950 | 995 | 996 | 1011 | 1014 | 1021 | 1029 |
| | 1030 | 1049 | 1050 | 1062 | 1063 | 1064 | 1080 | 1091 | 1113 | 1118 | 1120 | 1131 | 1151 | 1152 | 1157 |
| | 1158 | 1162 | 1163 | 1164 | 1170 | 1184 | 1203 | 1204 | 1205 | 1212 | 1615 | 1617 | 1619 | 1630 | 1633 |
| | 1636 | 1639 | 1642 | 1645 | 1648 | 1651 | 1653 | 1671 | 1678 | 1689 | 1690 | 1710 | 1711 | 1717 | 1718 |
| | 1724 | 1725 | 1731 | 1732 | 1739 | 1740 | 1747 | 1748 | 1755 | 1756 | 1763 | 1764 | 1771 | 1772 | 1778 |
| | 1779 | 1785 | 1786 | 1792 | 1793 | 1800 | 1801 | 1808 | 1809 | 1816 | 1817 | 1824 | 1825 | 1831 | 1832 |
| | 1839 | 1840 | 1847 | 1848 | 1855 | 1856 | 1863 | 1864 | 1871 | 1872 | 1879 | 1880 | 1888 | 1889 | 1897 |
| | 1898 | 1906 | 1907 | 1916 | 1923 | 1924 | 1925 | 1926 | 1927 | 1928 | 1951 | 1957 | 1963 | 1969 | 1976 |
| | 1983 | 1991 | 1998 | 2004 | 2011 | 2018 | 2039 | 2064 | 2070 | 2076 | 2083 | 2090 | 2097 | 2104 | 2111 |
| | 2117 | 2138 | 2146 | 2153 | 2174 | 2181 | 2189 | 2198 | 2204 | 2210 | 2211 | 2218 | 2219 | 2226 | 2227 |
| | 2233 | 2234 | 2235 | 2247 | 2253 | 2259 | 2265 | 2271 | 2277 | 2283 | 2284 | 2295 | 2296 | 2302 | 2303 |
| | 2310 | 2317 | 2324 | 2331 | 2339 | 2340 | 2347 | 2348 | 2355 | 2356 | 2363 | 2364 | 2372 | 2373 | 2380 |
| | 2381 | 2388 | 2389 | 2396 | 2397 | 2404 | 2405 | 2412 | 2413 | 2419 | 2420 | 2430 | 2431 | 2439 | 2439 |
| | 2446 | 2447 | 2454 | 2455 | 2462 | 2463 | 2470 | 2471 | 2479 | 2480 | 2498 | 2499 | 2497 | 2498 | 2548 |
| | 2555 | 2562 | 2627 | 2634 | 2641 | 2648 | 2655 | 2676 | 2683 | 2694 | 2703 | 2709 | 2715 | 2716 | 2722 |
| | 2723 | 2730 | 2731 | 2738 | 2744 | 2750 | 2756 | 2757 | 2763 | 2764 | 2765 | 2772 | 2806 | 2817 | 2825 |
| | 2841 | 2853 | 2865 | 2897 | 2904 | 2937 | 2944 | 3004 | 3005 | 3012 | 3086 | 3089 | 3099 | 3102 | 3128 |
| | 3132 | 3142 | 3143 | 3144 | 3154 | 3155 | 3169 | 3170 | 3183 | 3184 | 3197 | 3198 | 3211 | 3212 | 3213 |
| | 3221 | 3231 | 3232 | 3239 | 3243 | 3246 | 3249 | 3251 | 3252 | 3259 | 3262 | 3263 | 3265 | 3267 | 3268 |
| | 3291 | 3292 | 3297 | 3300 | 3303 | 3304 | 3305 | 3306 | 3308 | 3311 | 3313 | 3316 | 3318 | 3319 | 3320 |
| | 3321 | 3343 | 3344 | 3345 | 3346 | 3351 | 3353 | 3354 | 3355 | 3364 | 3370 | 3375 | 3378 | 3406 | 3409 |
| | 3429 | 3430 | 3431 | 3432 | 3433 | 3434 | 3435 | 3436 | 3437 | 3438 | 3439 | 3440 | 3441 | 3442 | 3443 |
| | 3449 | 3450 | 3451 | 3452 | 3453 | 3455 | 3456 | 3457 | 3458 | 3459 | 3460 | 3461 | 3495 | 3496 | 3504 |

