VT03

DISPLAY TEST

MD-11-DZVTB-D

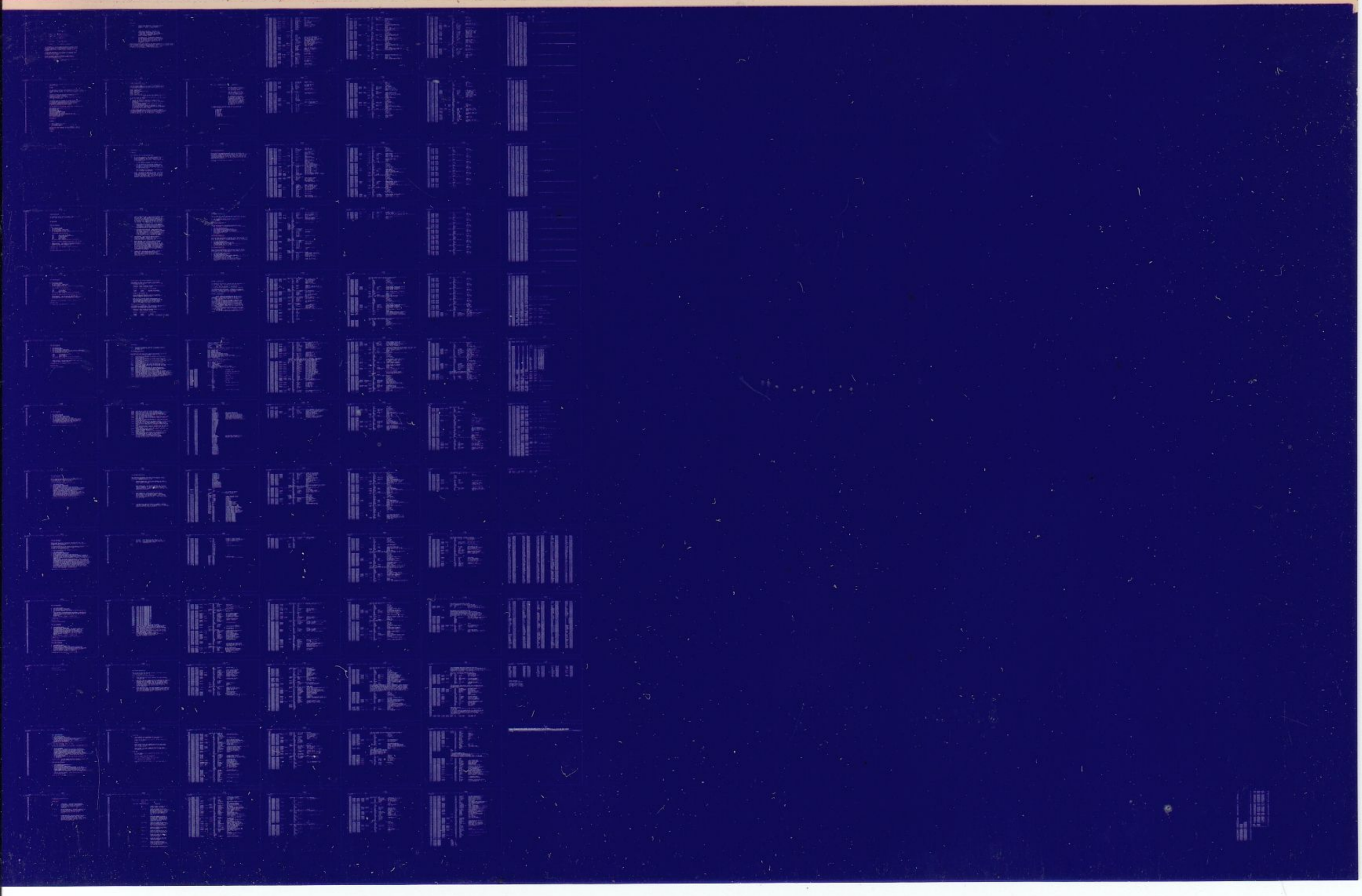
EP-DZVTB-D-DL-B

FICHE 1 OF 1

DEC 1976

digital

MADE IN USA



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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZVTB-D-D

PRODUCT NAME: VTDS DISPLAY TERMINAL TESTS

DATE: DECENMBER,1976

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: JIM CARRON/VIN KALINOWSKI

NOTE: THIS PROGRAM IS A MODIFIED VERSION OF THE TELETYPE DIAGNOSTIC
MAINDEC-11-D2AA

1. ABSTRACT

THE VTOS DISPLAY TERMINAL TESTS CONSISTS OF A PACKAGE OF TEST PROGRAMS DESIGNED TO TEST THE VTOS INPUT-OUTPUT LOGIC, THE VTOS DISPLAY, AND THE KEYBOARD. ALL TESTS ARE INCLUDED IN ONE OBJECT TAPE.

THIS TEST CAN TEST THE VTOS WHEN INTERFACED BY EITHER A SINGLE (KL) OR DOUBLE BUFFERED (DL) CONTROLLER COMMUNICATING SERIAL TO 2400 BAUD.
UNDER MONITOR LOAD IT WILL TEST THE CONSOLE DEVICE AND ALL CONTIGUOUS EXTRA DEVICES.

THE PROGRAM USES THE CONTENTS OF LOCATION 176 AS THE VALUE OF THE SWITCHES IF NO HARDWARE SWITCH REGISTER IS FOUND.
THE OPERATOR IS RESPONSIBLE FOR LOADING THE DESIRED VALUE BEFORE STARTING THE PROGRAM. LOCATION 174 WILL BE USED AS THE SOFTWARE DISPLAY REGISTER.

THE AVAILABLE TEST PROGRAMS ARE LISTED HERE IN NUMERICAL ORDER:

PRG0-COMBINED INPUT-OUTPUT LOGIC TESTS
PRG1-DISPLAY TEST
PRG2-KEYBOARD TEST
PRG3-PRINTER EXERCISER
PRG4-CLOCK ADJUSTMENT ROUTINE
PRG5-CLOCK ADJUSTMENT ROUTINE
PRG6-MAINTENANCE MODE SINGLE CHARACTER DATA TEST.
PRG7-MAINTENANCE MODE SPECIAL BINARY COUNT PATTERN TEST.
PRG10-ROLL-UP DISPLAY TEST
PRG11-CURSOR ADDRESS TEST

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP-11. SYSTEM. (4 K CORE).
B. VTOS DISPLAY TERMINAL
C. HIGH SPEED READER

THE VTOS MUST HAVE STANDARD TELETYPE ADDRESSES. REFER TO SECTION 7.3 IF THE VTOS DOES NOT HAVE STANDARD PERIPHERAL ADDRESSES.

2.2 STORAGE

D01


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                                  THIS PROGRAM USES LOCATION 00200 THROUGH 17434.
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3. LOADING PROCEDURE

THIS PROGRAM'S OBJECT TAPE IS PUNCHED IN ABSOLUTE FORMAT.
THE ABS LOADER IS USED TO LOAD THE PROGRAM.

4. USE PROCEDURE

4.1 PROG USE PROCEDURE

A. SET VTOS TO ON-LINE.
B. LOAD ADDRESS 000200
C. SET SR TO 000000. PRESS START
D. THE PROGRAM STOPS AT COMMON HALT.
E. SET ANY DESIRED SR OPTIONS. NORMAL RUN IS WITH SR = 000000.

THIS PROGRAM'S SR OPTIONS ARE:

SR15	HALT AT END OF ROUTINE
SR14	ENTER SCOPE MODE AFTER ERROR
SR11	INHIBIT ITERATION
SR10	LOOP PROGRAM
SR9	SELECT ROUTINE
SR6 THROUGH SR0	= NUMBER OF ROUTINE TO BE SELECTED.

SECTION 7.2 GIVES A COMPLETE EXPLANATION OF SR OPTIONS.

F. PRESS CONTINUE. THE PROGRAM IS EXECUTED AND STOPS AT PROGRAM END HALT WHEN COMPLETED, PROVIDED NO ERRORS OCCUR.
G. REFER TO SECTION 6. IF ERRORS OCCUR.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.1

EXECUTION TIME:

ONE NORMAL ERROR FREE PASS TAKES APPROXIMATELY 4 MINUTES.

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151
152
153                             4.2     PRG1 USE PROCEDURE
154                                     ------------------
155
156                                     A.  SET VT05 TO ON-LINE
157                                     B.  LOAD ADDRESS 000200.
158                                     C.  SET SR TO 000001.  PRESS START
159                                     D.  PROGRAM STOPS AT COMMON HALT.
160                                     E.  SET ANY DESIRED SR OPTIONS. NORMAL RUN IS WITH SR = 000000.
161
162                                         THIS PROGRAM'S SR OPTIONS ARE:
163
164                                         SR15        HALT AT END OF ROUTINE
165                                         SR10        LOOP PROGRAM
166                                         SR9         SELECT ROUTINE
167                                         SR6 THROUGH SR0 = NUMBER OF ROUTINE TO BE SELECTED.
168
169                                         SECTION 7.2 GIVES A COMPLETE EXPLANATION OF SR OPTIONS.
170
171                                     F.  PRESS CONTINUE.  THE VT05 WILL BE EXERCISED AND
172                                         THE PROGRAM WILL STOP AT PROGRAM END HALT WHEN COMPLETED.
173                                     G.  ERROR DETECTION IS BY VISUAL INSPECTION OF DISPLAY.
174
175
176                                     A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION  8.2
177
178                                     EXECUTION TIME:
179
180                                     ONE NORMAL PASS TAKES APPROXIMATELY 12 MINUTES.
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182
183                             4.3     PRG2 USE PROCEDURE
184                                     ------------------
185
186                                     A.  SET VTOS ON-LINE.
187                                     B.  LOAD ADDRESS 000200.
188                                     C.  SET SR TO 000002.  PRESS START
189                                     D.  THE PROGRAM TYPES "KEYBOARD TEST" AND STOPS AT COMMON HALT.
190                                     E.  SET  ANY DESIRED SR OPTIONS. NORMAL RUN IS WITH SR = 000000.
191                                         THIS PROGRAM'S SR OPTIONS ARE:
192
193                                         SR15        HALT AT END OF ROUTINE
194                                         SR10        LOOP PROGRAM
195                                         SR9         SELECT ROUTINE
196                                         SR6 THROUGH SR0 = NUMBER OF ROUTINE TO BE SELECTED.
197
198                                         SECTION 7.2 GIVES A COMPLETE EXPLANATION OF SR OPTIONS.
199
200                                     F.  PRESS CONTINUE.  FOLLOW TYPED INSTRUCTIONS.  WHEN DONE
201                                         PROGRAM STOPS AT PROGRAM END HALT.
202
203                                     A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.3
204
205                                     EXECUTION TIME:
206
207                                     PROGRAM IS USER DEPENDENT.
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4.4 PRG3 USE PROCEDURE

A. SET VTOS TO ON-LINE
B. LOAD ADDRESS 000200
C. SET SR TO 000003. PRESS START
D. THE PROGRAM TYPES "TYPE IN DATA"
E. KEY IN ANY FIVE CHARACTERS TO BE TYPED.
F. KEY IN EITHER A RUBOUT FOR FULL SPEED TYPING, OR ANY OTHER CHARACTER FOR RANDOM STALLS BETWEEN CHARACTERS.
G. THE PROGRAM TYPES CONTINUOUSLY LINES CONTAINING THE FIVE CHARACTERS SPECIFIED, UNTIL SR15 IS SET TO A 1. AT THAT POINT THE PROGRAM GOES TO STEP E.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.8

4.5 PRG4 USE PROCEDURE

PRG4 IS USED AS AN AID IN ADJUSTING THE TRANSMITTER CLOCK, AND IN OBSERVING THE DATA BITS AS THEY ARE SHIFTED OUT OF THE TRANSMITTER BUFFER. A SCOPE IS REQUIRED.

TO ADJUST THE PUNCH CLOCK PROCEED AS FOLLOWS:

A. LOAD ADDRESS 000200
B. SET SR TO 00004. PRESS START.
C. PROGRAM STOPS AT COMMON HALT.
D. SET ANY DESIRED ASCII CODE IN LEFT HALF OF SR.
E. SET NUMBER OF MILLISECONDS TO DELAY BETWEEN PUNCH COMMANDS IN RIGHT HALF OF SR. THE NUMBER OF MILLISECONDS SELECTED SHOULD BE LONG ENOUGH FOR THE ENTIRE PUNCH OPERATION TO COMPLETE. A SUGGESTED STARTING NUMBER IS 177.
F. PRESS CONTINUE. THE PROGRAM RUNS CONTINUOUSLY. FIRST IT LOADS THE PUNCH BUFFER WITH THE CHARACTER IN SR LEFT, AND THEN DELAYS FOR THE NUMBER OF MILLISECONDS SPECIFIED IN SR RIGHT BEFORE RELOADING THE PUNCH BUFFER AGAIN.
G. SET UP A SCOPE AND DISPLAY THE PUNCH CLOCK PULSES. ADJUST THE PUNCH CLOCK ACCORDING TO SPECIFICATIONS.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.4

4.6 PRGS USE PROCEDURE

PRGS IS USED AS AN AID IN ADJUSTING THE RECEIVER CLOCK, AND
IN OBSERVING THE DATA BITS AS THEY ARE SHIFTED INTO THE RECEIVER
BUFFER. A SCOPE IS REQUIRED.

THE PROGRAM MAKES USE OF THE TRANSMIT MAINTENANCE BIT FEATURE IN ORDER
TO CAUSE THE DATA OUTPUTTED TO THE TRANSMITTER BUFFER TO BE
SHIFTED INTO THE RECEIVER BUFFER.

TO ADJUST THE RECEIVER CLOCK PROCEED AS FOLLOWS:

A. LOAD ADDRESS 000200
B. SET SR TO 000005. PRESS START.
C. PROGRAM STOPS AT COMMON HALT.
D. SET ANY DESIRED ASCII CODE IN LEFT HALF OF SR.
E. SET NUMBER OF MILLISECONDS TO DELAY BETWEEN TRANSMIT COMMANDS IN
   RIGHT HALF OF SR. THE SELECTED NUMBER SHOULD BE LONG ENOUGH FOR
   THE ENTIRE TRANSMIT/RECEIVE OPERATION TO COMPLETE. A SUGGESTED STARTING
   NUMBER IS 177.
F. PRESS CONTINUE. THE PROGRAM RUNS CONTINUOUSLY. FIRST IT LOADS THE
   TRANSMITTER BUFFER WITH THE CHARACTER IN SR LEFT, AND THEN DELAYS
   THE NUMBER OF MILLISECONDS SPECIFIED IN SR RIGHT. AS THE DATA BITS
   ARE SHIFTED OUT OF THE TRANSMITTER BUFFER, THE RECEIVER CLOCK STARTS,
   AND THE DATA BITS ARE SHIFTED INTO THE RECEIVER BUFFER. AT THE END
   OF THE DELAY THE PROGRAM MOVES THE RECEIVER BUFFER CONTENTS TO REG 0,
   AND ISSUES 5 RESET INSTRUCTIONS IN ORDER TO MAKE THE RECEIVER
   BUFFER CONTENTS VISIBLE IN THE RIGHT HALF OF THE DATA LIGHTS.
G. SET UP A SCOPE AND DISPLAY THE RECEIVER CLOCK PULSES. ADJUST THE
   RECEIVER CLOCK ACCORDING TO SPECIFICATIONS.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.5

4.7 PRG6 USE PROCEDURE

A. LOAD ADRESS 000200.
B. SET SR TO 000006. PRESS START
C. THE PROGRAM STOPS AT COMMON HALT.
D. SET CODE FOR CHARACTER TO BE TESTED IN THE LEFT HALF OF THE SR.
E. PRESS CONTINUE. THE PROGRAM RUNS CONTINUOUSLY, OUTPUTING THE CHARACTER TO THE OUTPUT BUFFER AND CHECKING THAT THE RECEIVE BUFFER CONTAINS THE SAME CHARACTER WHEN THE RECEIVE DONE BIT BECOMES SET.
F. REFER TO SECTION 6. ERRORS, IF ERRORS OCCUR.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.6

EXECUTION TIME:

CONTINUOUS RUNNING PROGRAM.

4.8 PRG7 USE PROCEDURE

A. LOAD ADDRESS 000200.
B. SET SR TO 00007. PRESS START
C. THE PROGRAM RUNS CONTINUOUSLY. THE SPECIAL BINARY COUNT PATERN IS OUTPUTTED TO THE OUTPUT BUFFER. EACH TIME THE RECEIVE DONE BIT BECOMES SET THE CHARACTER IN THE RECEIVE BUFFER IS CHECKED TO SEE THAT IT MATCHES THE PREVIOUSLY OUTPUTTED CHARACTER. THE PROGRAM STALLS RANDOMLY BETWEEN CHARACTERS. TO RUN AT FULL SPEED, SET SR8 TO A 1.
D. REFER TO SECTION 6. ERRORS, IF ERRORS OCCUR.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.7

EXECUTION TIME:

CONTINUOUS RUNNING PROGRAM.

4.9 PRG10 USER PROCEDURE

A. LOAD ADDRESS 000200.
B. SET SR TO 000010. PRESS START
C. PROGRAM RUNS CONTINUOUSLY. THE SCREEN IS FILLED WITH ALTERNATE LINES OF A CHARACTER AND ITS COMPLEMENT AND A LINE OF THE COMPLEMENT OF THE CHATACTER FOLLOWED BY THE CHARACTER. THIS TEST VERIFIES THE ROLL-UP CAPABILITY OF THE VT05.
D. REFER TO SECTION 6. ERRORS, IF ERRORS OCCUR.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.10

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                                EXECUTION TIME:
                                CONTINUOUS RUNNING PROGRAM.
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351
352
353                             4.10    PRG11 USER PROCEDURE
354                                     --------------------
355                                     A.  LOAD ADDRESS 000200.
356                                     B.  SET SR TO 000011. PRESS START
357                                     C.  CURSOR ADDRESSING CODES WILL BE UTILIZED TO RANDOMLY COVER
358                                      THE FACE OF THE CRT WITH THE APPROPRIATE MESSAGE.
359                                         AT THIS POINT THE PROGRAM WILL HALT, A RERUN IS POSSIBLE BY
360                                         DEPRESSING THE CONTINUE KEY.
361                                     A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.11
362
363                             EXECUTION TIME: BAUD DEPENDANT, APPROX. 3-5 MIN.
364
365                             4.11    MONITOR LOAD USE PROCEDURE - ACT11 OR DDP1 - NON PAPER TAPE SYSTEM
366                                     ------------------------------------------------------------------
367
368                                     A.  SET SR TO 000000
369                                     B.  WHEN LOADED BY THE MONITOR THIS TEST WILL AUTOMATICALLY
370                                         EXECUTE PROG. 0 AND PROG 1 FOR THE CONSOLE DEVICE AND FOR
371                                         ALL CONTIGUOUSLY ASSIGNED EXTRA DEVICES.  IN ADDITION
372                                         PROGRAM 0 RUNS PROGRAM 7 AS A SUBROUTINE TO VERIFY THE
373                                         CORRECT TRANSFER OF DATA THROUGH THE INTERFACE AND PROGRAM 1
374                                         RUNS PROGRAM 11 AS A SUBROUTINE TO VERIFY THE CURSOR ADDRESSING FEATURES
375                                     C.  REFER TO SECTION 6, ERRORS.  ERRORS DETECED ARE LOGGED
376                                         ON THE CONSOLE DEVICE
377                                     D.  AT THE END OF A PASS OF ALL DEVICES CONTROL IS RETURNED
378                                         TO THE MONITOR
379
380                                     EXECUTION TIME:  BAUD AND NUMBER OF DEVICES DEPENDENT.  APPROXIMATELY
381                                                      20 MIN FOR ERROR FREE PASS PER DEVICE
382
383                             4.12    GROUP TEST USE PROCEDURE
384                                     ------------------------
385
386                                     A.  LOAD CONSTANTS AS DESCRIBED IN 7.4
387                                     B.  LOAD ADDRESS 000200
388                                     C.  SET SR TO 000000.  PRESS START
389                                     D.  THIS TEST WILL AUTOMATICALLY EXECUTE PROG. 0 AND PROG 1
390                                         FOR THE GROUP OF EXTRA DEVICES AS DEFINED IN 7.4 IN ADDITION
391                                         PROGRAM 0 RUNS PROGRAM 7 AS A SUBROUTINE TO VERIFY THE
392                                         CORRECT TRANSFER OF DATA THROUGH THE INTERFACE AND PROGRAM 1
393                                         RUNS PROGRAM 11 AS A SUBROUTINE TO VERIFY THE CURSOR ADDRESSING FEATURES
394
395                                     E.  REFER TO SECTION 6 ERRORS.  ERRORS DETECTED ARE LOGGED
396                                         ON THE CONSOLE DEVICE.
397
398                                     EXECUTION TIME: - PROGRAM RUNS CONTINUOUSLY.
```

5. PROGRAM AND/OR OPERATOR ACTION

5.1 NORMAL HALTS

LOC CHLTA — COMMON HALT. THIS HALT OCCURS WHENEVER THE PROGRAM IS AWAITING USER INTERVENTION. THE DATA LIGHTS CONTAIN THE ADDRESS OF INSTRUCTION THAT GENERATED THE CALL TO THE COMMON HALT.

LOC RHLTA — END OF ROUTINE HALT. THIS HALT OCCURS AT THE END OF A TEST ROUTINE IF SR15 IS SET TO A 1. TO PROCEED, PRESS CONTINUE. PROGRAMS PRG0, PRG1, AND PRG2 USE THE ROUTINE END OPTION.

LOC PRGEND. — PROGRAM END HALT. THIS HALT NORMALLY OCCURS AT THE END OF PROGRAMS PRG0, PRG1 AND UNLESS THE LOOP PROGRAM OPTION IS SET. (SR10). THIS HALT WILL NOT OCCUR AT THE END OF PROG 0 OR PROG 1 UNDER MONITOR CONTROL OR IF THE CONSTANTS PER 7.4 HAVE BEEN ALTERED.

6. ERRORS

6.1 ERROR HALTS

LOC ERRLT — UNCONDITIONAL ERROR HALT. DATA LIGHTS CONTAIN ADDRESS OF INSTRUCTION THAT GENERATED THE ERROR CALL. REFER TO PROGRAM LISTING.

LOC CERRH — CONDITIONAL ERROR HALT. THIS CALL WILL ALWAYS OCCUR, UNLESS SR14 IS SET TO A 1 (SCOPE MODE) AND THE ERROR HAS OCCURRED AT LEAST ONCE. DATA LIGHTS CONTAIN ADDRESS OF INSTRUCTION THAT GENERATED ERROR CALL. REFER TO PROGRAM LISTING.

LOC DERRH — DATA ERROR HALT. OCCURS WHEN A PROGRAM OR ROUTINE CHECKING DATA FINDS THAT THE EXPECTED AND THE RECEIVED DATA DO NOT AGREE. THE LEFT HALF OF THE DATA LIGHTS CONTAIN THE EXPECTED 8 BIT DATA. THE RIGHT HALF CONTAINS THE RECEIVED 8 BIT DATA.

UNDER MONITOR LOAD AND WHEN CONSTANTS HAVE BEEN ALTERED PER 7.4 FOR GROUP TESTIN
AN ERROR MESSAGE IS TYPED ON THE CONSOLE DEVICE INDICATING TYPE OF ERROR, ADDRES
(CSR) OF DEVICE IN ERROR AND PROGRAM ADDRESS OF TEST. NO HALT OCCURS AND THE TE
ADVANCES TO THE NEXT DEVICE. IMPROPER SR SETTING (NON ZERO)
FOR MONITOR LOAD WILL GENERATE A TEST ABORTED MESSAGE

6.2 NON RECOVERABLE ERROR HALTS

A NON-RECOVERABLE ERROR HALT WILL OCCUR AT THE ADDRESSES LISTED BELOW IF THROUGH HARDWARE OR SOFTWARE FAILURE, PROGRAM CONTROL IS TRANSFERRED TO AN UNEXPECTED AREA BETWEEN 000000 AND 000176.

000002 RESERVED AREA
000006 ERROR TRAP
000012 RESERVED INSTRUCTION TRAP
000016 DEBUG TRAP
000022 IOT TRAP
000026 POWER FAIL TRAP
000044 THROUGH 000776 SYSTEM SOFTWARE AND INTERRUPT VECTOR AREA, EXCEPT FOR KL11 INTERRUPT VECTORS.

TO FIND OUT WHERE THE PROGRAM WAS AT THE TIME THE FAILURE OCCURRED, PERFORM THE FOLLOWING STEPS:

A. EXAMINE THE CONTENTS OF REGISTER 6 (ADDRESS 177706).
B. TRANSFER THE CONTENTS OF REGISTER 6 TO THE SR, LOAD ADDRESS, AND EXAMINE.
C. THE DATA SHOWN IN THE DATA LIGHTS IS THE VALUE OF THE PC WHEN THE FAILURE OCCURRED.
D. LOCATE IN THE PROGRAM LISTING THE DISPLAYED PC VALUE.
E. THE INSTRUCTION THAT IMMEDIATELY PRECEDES THE ONE REFERENCED BY THE DISPLAYED PC VALUE IS THE INSTRUCTION THAT WAS BEING EXECUTED WHEN THE FAILURE OCCURRED.

A NON-RECOVERABLE ERROR HALT FAILURE IS AN ABNORMAL CONDITION INDICATING A HARDWARE FAILURE, OR MOST UNLIKELY, A PROGRAM FAILURE. THIS PROGRAM ASSUMES THAT THE PROCESSOR IS IN OPERATING CONDITION IN ORDER TO TEST THE VTOS. ANY FURTHER STEPS TO DIAGNOSE A NON-RECOVERABLE ERROR ARE NOT WITHIN THE SCOPE OF THIS PROGRAM.

7. MISCELLANEOUS

7.1 SR OPTIONS

THE STANDARD SR OPTIONS ARE DESCRIBED HERE.

SR15 - HALT AT END OF ROUTINE. FOR THESE PROGRAMS CONSISTING OF A SET OF SEPARATE TEST ROUTINES, SR15 SET TO A 1 CAUSES THE PROGRAM TO HALT UPON COMPLETION OF THE ROUTINE CURRENTLY BEING EXECUTED. THREE POSSIBLE USES OF THIS OPTION ARE:

A. TO STEP THROUGH A PROGRAM ONE ROUTINE AT A TIME.

B. WHEN AN UNPREDICTED FAILURE HAS OCCURRED (BLOW UP, HANG UP), TO ADVANCE THROUGH THE PROGRAM ONE ROUTINE AT A TIME UNTIL THE FAILURE OCCURS. THE ROUTINE FOLLOWING THE LAST IDENTIFIED ROUTINE WOULD BE THE FAILING ROUTINE.

C. WHEN A PROGRAM IS IN EXECUTION, TO DETERMINE HOW FAR THE PROGRAM HAS PROGRESSED.

SR14 - SCOPE. THIS OPTION IS USED ONLY BY PRGO. THE OPTION CAUSES THE PROGRAM TO BYPASS ERROR HALTS, AND TO STAY IN THE FAILING ROUTINE. THIS OPTION WILL NOT BECOME ACTIVE UNTIL AN ERROR OCCURS. SR14 MUST BE ON BEFORE THE ERROR OCCURS, OR AT LEAST IT MUST BE SET BEFORE PRESSING CONTINUE AFTER AN ERROR HALT.

(7.2 CONT'D)

SR11 - INHIBIT ITERATION COUNT. THIS OPTION IS USED BY PRGO, PRG1, AND PRG3. THESE PROGRAMS CONSIST OF A SET OF ROUTINES EACH OF WHICH SPECIFIES THE NUMBER OF TIMES A TEST IS TO BE PERFORMED BY MEANS OF AN ITERATION COUNT. SETTING SR11 TO A 1 CAUSES THE PROGRAM TO DISREGARD THE ITERATION COUNT AND PERFORM THE TEST ONLY ONCE FOR EACH ROUTINE. TWO POSSIBLE USES OF THIS OPTION ARE:

A. QUICK PASS. THE USER MAY ELECT TO RUN THROUGH A PROGRAM QUICKLY TO FIND OUT IF ANY FAILURES SHOW IMMEDIATELY. A SUCCESSFUL QUICK PASS HOWEVER, DOES NOT GUARANTEE THAT THE SAME PROGRAM WILL RUN ERROR-FREE WHEN PERFORMING A NORMAL ITERATION PASS.

B. SKIP OVER FAILING ROUTINE. WHEN A ROUTINE HAS DETECTED A SOLID FAILURE, THE ERROR WILL BE REPORTED MANY TIMES. TO GO ON TO THE NEXT ROUTINE, THE USER CAN INHIBIT ITERATION. IT WILL BE NECESSARY TO CAUSE THE PROGRAM TO STOP AT THE END OF THE ROUTINE BY SETTING SR15 TO A 1. OTHERWISE THE PROGRAM WOULD QUICKLY RUN THROUGH THE NEXT ROUTINE(S) ALSO.

SR10 - LOOP PROGRAM. THIS OPTION IS USED BY PROGRAMS PRGO,PRG1, AND PRG4. SETTING SR10 TO A 1 CAUSES THE PROGRAM TO REPEAT ITSELF UPON COMPLETION. INSTEAD OF STOPPING AT PROGRAM END HALT.

SR9 - SELECT ROUTINE. THIS OPTION IS USED BY PROGRAMS PRGO, PRG1 AND PRG4. THE USER MAY ELECT TO RUN ONLY ONE SPECIFIC ROUTINE BY SETTING SR9 TO A 1, AND SR6 THROUGH SR0 TO THE NUMBER OF THE DESIRED ROUTINE. REFER TO THE INDIVIDUAL PROGRAM DESCRIPTION IN SECTION 8 TO OBTAIN THE ROUTINE NUMBER. THE ROUTINE NUMBER SELECTED MUST BE A VALID NUMBER, OR AN ERROR HALT WILL OCCUR. THE SELECT ROUTINE OPTION WILL BE HONORED BY THE PROGRAM UPON COMPLETION OF THE CURRENT ROUTINE, OR UPON STARTING THE PROGRAM.

SR8 - DISABLE STALL MODE AND RUN FULL SPEED. USED BY PROGRAM PRG10. THIS PROGRAM OPERATES NORMALLY IN STALL MODE (TESTS OR EXERCISES ARE NOT FULL SPEED, BUT RANDOM DURATION DELAYS ARE INTRODUCED.. SETTING SR8 TO A 1 CAUSE THE PROGRAM TO PERFORM THEIR TESTS AT FULL SPEED.

7.3 TESTING VTDS AT NON-STANDARD ADDRESSES AND/OR VECTORS

THIS PROGRAM CAN TEST A KL11 ASSIGNED TO NON-STANDARD ADDRESSES AND VECTORS PROVIDED THESE ADDRESSES ARE PROVIDED TO THE PROGRAM AS FOLLOWS:

A. IMMEDIATELY AFTER LOADING THE PROGRAM CHANGE THE FOLLOWING LOCATIONS. REFER TO PROGRAM LISTING.

LOCATION	FROM STANDARD	TO NON-STANDARD
CONADD	177560	RECEIVER CSR ADDRESS
CONVEC	000060	RECEIVER VECTOR ADDRESS

B. PROCEED TO USE PROGRAM, OR

C. USING STANDARD DUMP ROUTINES, DUMP OUT THE ENTIRE PROGRAM IN ABSOLUTE FORMAT, TO HAVE AN UPDATED OBJECT TAPE THAT REFLECTS YOUR SYSTEM, OR

D. DUMP OUT ONLY LOCATIONS 000204 THROUGH 000222, AND SPLICE THE TAPE TO THE END OF THE STANDARD OBJECT TAPE. THIS PROCEDURE WOULD REQUIRE THAT THE SHORT LENGTH OF TAPE BE LOADED IMMEDIATELY AFTER THE MAIN PROGRAM, IN ORDER TO OVERLAY LOCATIONS 000204 THROUGH 000222.

7.4 TESTING A CONTIGUOUS GROUP OF VTDS'S

THIS PROGRAM WILL AUTOMATICALLY AND CONTINUOUSLY TEST THE CONSOLE DEVICE AND A CONTIGUOUS GROUP OF VTDS'S PROVIDED CERTAIN CONSTANTS OF THE PROGRAM ARE CHANGED AS FOLLOWS:

A. IMMEDIATELY AFTER LOADING THE PROGRAM CHANGE THE FOLLOWING LOCATIONS. REFER TO PROGRAM LISTINGS.

LOCATION	FROM STANDARD	TO NON-STANDARD
000042	000000	000200
LOWADD	176500	FIRST ADDNL. VTDS RECEIVER CSR ADDRESS
LSTADD	000000	LAST + 10 VTDS RECEIVER CSR ADDRESS

8. DESCRIPTION

NOTE: THIS TEXT WAS ORIGINALLY WRITTEN TO DESCRIBE A TELETYPE. THEREFORE, INTERPRET READER/KYBD AS RECEIVER AND PUNCH AS TRANSMITTER.

8.1 PRGO PROGRAM DESCRIPTION

PRGO TESTS THE INPUT AND OUTPUT LOGIC IN ONE PROGRAM. THE PROGRAM CONSISTS OF 35 TEST ROUTINES NUMBERED FROM 00 TO 42(8).

RTN0	TESTS ABILITY TO REFERENCE THE READER/KYBD STATUS WORD (TKS) WITHOUT TRAPPING.
RTN1	TESTS ABILITY TO REFERENCE THE READER/KYBD BUFFER (TKB) WITHOUT TRAPPING.
RTN2	TESTS ABILITY TO REFERENCE THE PRINTER/PUNCH STATUS WORD (TPS) WITHOUT TRAPPING.
RTN3	TESTS ABILITY TO REFERENCE THE PRINTER/PUNCH BUFFER (TPB) WITHOUT TRAPPING.
RTN4	TESTS ABILITY TO SET AND CLEAR THE READER/KYBD ID BIT.
RTN5	CHECKS THAT READER /KYBD ID BIT CAN BE CLEARED WITH RESET INSTRUCTION.
RTN11	CHECKS THAT READER DONE BIT SETS NO LATER THAN 200 MSECS AFTER READER ENABLE.
RTN12	TESTS THAT READER/KYBD DONE BIT CAN BE READ RELIABLY.
RTN13	CHECKS THAT RESET INSTRUCTION CLEARS THE READER DONE BIT.
RTN14	CHECKS THAT REFERENCING READER BUFFER CLEARS DONE BIT.
RTN17	TESTS THAT READ BUFFER CAN BE READ RELIABLY.
RTN20	CHECKS THAT READER DONE BIT IS ABLE TO CAUSE AN INTERRUPT. IF THE INTERRUPT IS SERVICED, IT WILL HAVE OCCURRED AT CORRECT VECTOR.
RTN21	TESTS THAT READER DONE DOES NOT CAUSE AN INTERRUPT WHEN THE PROCESSOR IS AT THE SAME PRIORITY AS THE READER'S INTERRUPT REQUEST LEVEL.
RTN22	TESTS THAT READER DONE CAUSES INTERRUPT WHEN THE PROCESSOR IS AT A PRIORITY ONE LEVEL LOWER THAN THE READER'S INTERRUPT REQUEST LEVEL.
RTN23	CHECKS THAT READER DONE DOES NOT REINTERRUPT AFTER RTI INSTRUCTION WHEN DONE BIT IS LEFT SET.

(8.1 CONT'D)

RTN24 TESTS ABILITY TO SET AND CLEAR THE PUNCH ID BIT.
RTN25 CHECKS THAT PUNCH ID BIT CAN BE CLEARED WITH RESET INSTRUCTION.
RTN26 TESTS ABILITY TO SET AND CLEAR PUNCH MAINTENANCE BIT.
RTN27 CHECKS THAT RESET INSTRUCTION CLEARS THE MAINTENANCE BIT.
RTN30 TESTS THAT RESET SETS THE PUNCH READY BIT, AND THAT THE READY BIT CAN BE READ RELIABLY.
RTN31 TESTS THAT PUNCH READY IS CLEARED BY LOADING THE PUNCH BUFFER.
RTN32 TESTS THAT BYTE LOADING PUNCH BUFFER+1 DOES NOT CLEAR THE PUNCH READY BIT.
RTN33 CHECKS THAT THE PUNCH BECOMES READY NO LATER THAN 200 MSECS AFTER BUFFER LOAD.
RTN34 CHECKS THAT PUNCH READY BIT CAN CAUSE INTERRUPT. IF THE INTERRUPT IS SERVICED, IT WILL HAVE OCCURRED AT THE CORRECT VECTOR
RTN35 TESTS THAT PUNCH READY DOES NOT CAUSE AN INTERRUPT WHEN THE PROCESSOR IS AT A PRIORITY AS THE READER'S INTERRUPT REQUEST LEVEL.
RTN36 TESTS THAT PUNCH READY CAUSES AN INTERRUPT WHEN THE PROCESSOR IS AT PRIORITY ONE LEVEL LOWER THAN THE PUNCH INTERRUPT REQUEST LEVEL.
RTN40 CHECKS THAT PUNCH READY CAUSES AN INTERRUPT IMMEDIATELY UPON LOWERING PROCESSOR PRIORITY TO 0.
RTN41 CHECKS FOR CORRECT OPERATION OF WAIT INSTRUCTION. (REFER TO PROGRAM LISTING).
RTN42 TESTS THAT LOADING PUNCH BUFFER WITH MAINTENANCE BIT SET CAUSES READER DONE BIT TO SET NO LATER THAN 290 MSECS.
RTN43 IF MONITOR ADDRESS IN NONZERO (LOADED BY THE MONITOR OR GROUP TESTING DESIRED) THIS ROUTINE WILL LINK TO PROG. 7 WHICH VERIFIES THAT PROPER TRANSFERS CAN BE EXECUTED TO AND FROM THE BUFFERS

```


8.2     PRG1 PROGRAM DESCRIPTION
        ------------------------

        PRG1 EXERCISES THE DISPLAY FUNCTIONS. VERIFICATION OF DISPLAY
        OPERATION IS PERFORMED VISUALLY BY USER. THE PROGRAM CONTAINS
        29 ROUTINES NUMBERED FROM 00 TO 34(8).

        RTN0    CARRIAGE RETURN TEST. CHECKS THAT CARRIAGE CAN CORRECTLY
                RETURN TO PRINT POSITION 0 FROM EVERY OTHER PRINT POSITION.
                VISUAL DISPLAY IS A WEDGE.


        RTN1    RIGHT MARGIN TEST. THIS ROUTINE VERIFIES THAT THE RIGHT
                MARGIN IS CORRECTLY SET FOR 72 PRINT POSITIONS. THE TEST
                TYPES 73 CHARACTERS. IF THE RIGHT MARGIN IS CORRECTLY SET,
                CHARACTER 73 SHOULD OVERPRINT CHARACTER 72. THE TYPED LINE
                SHOULD LOOK AS FOLLOWS:

----I----I----I----I----I----I----I----I----I----I----I----I----I----I--

        RTN2    RIGHT CURSOR TEST. CHECKS ABILITY OF THE VT05 TO
                SPACE CORRECTLY WITH THE "RIGHT CURSOR" CHARACTER
                THE TEST FIRST PRINTS REVERSE SLASHES (\) IN ALTERNATE
                PRINT POSITIONS, AND THEN FROM PRINT POSITION 0 TO EACH
                PRINT POSITION AND PRINTS A SLASH (/). THE TYPEOUT SHOULD
                LOOK AS FOLLOWS:

\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/




        RTN3    LINE FEED TEST. TESTS FOR ABILITY TO CORRECTLY PERFORM A
                LINE FEED. A RANDOM STALL OCCURS BETWEEN EACH LINE FEED. A
                CORRECTLY PERFORMED TEST WILL APPEAR AS DIAGONAL LINE BETWEEN
                PRINT POSITION 0 AND PRINT POSITION 72.
```

```
                        RTN4    TAB TEST.  CHECKS ABILITY OF THE DISPLAY TO TAB
                                POSITIONS 1 TO 9.  THE FIRST LINE TYPED MARKS THE TAB
                                POSITIONS.  SUBSEQUENT LINES INCREMENT BY ONE SPACE
                                EACH.  THE TYPEOUT LOOKS AS FOLLOWS:

                                /       /       /       /       /       /       /       /       /

                                /       /       /       /       /       /       /       / /

                                /       /       /       /       /       /       /       / /

                                /       /       /       /       /       /       /       /  /

                                /       /       /       /       /       /       /       /   /

                                /       /       /       /       /       /       /       /     /

                                /       /       /       /       /       /       /       /       /

                                /       /       /       /       /       /       /       /       /
```

```
                        (8.2 CONT'D)

RTN5    TYPES LINE OF CHARACTERS ABC
RTN6    TYPES LINE OF CHARACTERS DEF
RTN7    TYPES LINE OF CHARACTERS GHI
RTN10   TYPES LINE OF CHARACTERS JKL
RTN11   TYPES LINE OF CHARACTERS MNO
RTN12   TYPES LINE OF CHARACTERS PQR
RTN13   TYPES LINE OF CHARACTERS STU
RTN14   TYPES LINE OF CHARACTERS VWX
RTN15   TYPES LINE OF CHARACTERS YZ0
RTN16   TYPES LINE OF CHARACTERS 123
RTN17   TYPES LINE OF CHARACTERS 456
RTN20   TYPES LINE OF CHARACTERS 789
RTN21   TYPES LINE OF CHARACTERS !"#
RTN22   TYPES LINE OF CHARACTERS $%&
RTN23   TYPES LINE OF CHARACTERS '()
RTN24   TYPES LINE OF CHARACTERS *+,
RTN25   TYPES LINE OF CHARACTERS -./
RTN26   TYPES LINE OF CHARACTERS :;<
RTN27   TYPES LINE OF CHARACTERS =>?
RTN30   TYPES LINE OF CHARACTERS @[\
RTN31   TYPES LINE OF CHARACTERS ]↑ AND LEFT ARROW
RTN32   TYPES 2 LINES OF ALL CHARACTERS. FIRST LINE IS TYPED AT
        FULL SPEED, SECOND LINE IS TYPED WITH RANDOM STALLS.
RTN33   TYPES 12 LINES OF ASR33 (001224=10) WORST CASE PATTERN.
        EVERY OTHER LINE IS TYPED WITH RANDOM STALLS. THE ASR33
        WORST CASE PATTERN IS '←W/W←
RTN34   TYPES 12 LINES OF ASR35 (001224=11) WORST CASE PATTERN.
        EVERY OTHER LINE IS TYPED WITH RANDOM STALLS. THE ASR35
        WORST CASE PATTERN IS '[?C?[
RTN35   IF MONITOR ADDRESS IS NONZERO (LOADED BY
        THE MONITOR OR GROUP TESTING DESIRED) THIS ROUTINE
        WILL LINK TO PROGRAM 11 WHICH EXERCISES
        THE CURSOR ADDRESSING FEATURES.
```

8.3 PRG2 PROGRAM DESCRIPTION

PRG2 IS USED TO TEST THE TELETYPE KEYBOARD. THE PROGRAM CONTAINS 3 ROUTINES NUMBERED FROM 00 TO 02.

DEFAULT PROGRAM FOR SWITCHLESS PROCESSOR

RTN0 TESTS THAT TELETYPE CONTROL RESPONDS WHEN USER DEPRESSES A KEYBOARD KEY.

RTN1 ECHO TEST. THE TEST ECHOES ONTO THE TELEPRINTER THE CHARACTER RECEIVED FROM THE KEYBOARD. WHEN THE TEST SENSES A RUBOUT CHARACTER THE TEST IS ENDED. THE TEST ENABLES THE USER TO DETERMINE IF ALL PRINTABLE CODES CAN BE SUCCESSFULLY SENT TO THE VT05 CONTROL. THE FOLLOWING SECTIONS (8.3.1, 8.3.2) DESCRIBE HOW THIS ROUTINE SHOULD BE USED TO TEST THE SPECIAL CHARACTERS.

RTN2 OCTAL EQUIVALENT TEST. THE OCTAL EQUIVALENT OF ANY CHARACTER RECEIVED BY THE CONTROL IS TYPED. SENSING A RUBOUT ENDS THE TEST. THIS TEST ENABLES THE USER TO DETERMINE THAT ALL CODES INCLUDING NON-PRINTABLE CONTROL CODES ARE BEING CORRECTLY SENT TO THE TELETYPE CONTROL.

8.3.1 CURSOR TEST

A. USING "SPACES" AND "LINE FEEDS" PUT THE LETTER "A" AT A KNOWN POSITION (5 "SPACES" AND 5 "LINE FEEDS")

B. PLACE A "B" AT ANOTHER KNOWN POSITION (10 MORE "SPACES" AND 5 MORE "LINE FEEDS")

C. HOME UP

D. USING "CURSOR RIGHT" AND CURSOR DOWN" POSITION THE CURSOR OVER THE "B". IT SHOULD REQUIRE EXACTLY 15 "CURSOR RIGHT"S AND 10 "CURSOR DOWN"S.

E. USING "CURSOR LEFT" AND "CURSOR UP" POSITION THE CURSOR OVER THE "A". IT SHOULD REQUIRE EXACTLY 5 "CURSOR-UP"S AND 10 "CURSOR LEFT"S.

8.3.2 ERASE TEST

A. FILL THE SCREEN WITH ANY CHARACTER AND RETURN CURSOR TO LEFT SIDE OF SCREEN.

B. TYPE EOL (ERASE LINE) AND "CURSOR UP".

C. REPEAT B 25 TIMES AND SCREEN SHOULD BE CLEAR.

D. FILL SCREEN WITH ANY CHARACTER.

E. "HOME UP" AND TYPE "EOF" (ERASE FIELD) AND SCREEN SHOULD BE CLEAR.

DESCRIPTION OF CURSOR CONTROL CODES AND SPECIAL FUNCTION CODES

TABLE 8-3

OCTAL CODE	CORRESPONDING KEY	DESCRIPTION
07	BELL	CAUSES A "BEEP" TO SOUND IN THE SPEAKER INSIDE THE DISPLAY.
12	LINE FEED	CAUSES THE CURSOR TO MOVE DOWN ONE LINE POSITION UNTIL THE CURSOR REACHES THE BOTTOM LINE. WHEN THE CURSOR IS ON THE BOTTOM LINE, THE CODE WILL CAUSE THE TEXT TO ROLL UP ONE LINE (TOP LINE IS LOST).
15	RETURN	CAUSES THE CURSOR TO RETURN TO THE FIRST CHARACTER POSITION ON THE SAME LINE. CARRIAGE RETURN/ LINE FEED WILL NOT AUTOMATICALLY OCCUR AFTER THE SEVENTY-SECOND CHARACTER IS WRITTEN.
10	BACK SPACE	CAUSES THE CURSOR TO MOVE BACK-WARD ONE CHARACTER SPACE. IF THE CURSOR IS AT CHARACTER POSITION ONE, THIS CODE HAS NO EFFECT.
37	ERASE EOF	CAUSES THE SCREEN TO BE ERASED FROM THE CURSOR POSITION TO THE END OF THE SCREEN.
36	ERASE EOL	CAUSES THE PORTION OF THE LINE FROM THE CURSOR POSITION TO THE END OF THAT LINE TO BE ERASED.
35	HOME UP	PLACES THE CURSOR IN THE FIRST CHARACTER POSITION OF THE FIRST LINE ON THE SCREEN.
34	HOME DOWN	PLACES THE CURSOR IN THE FIRST CHARACTER POSITION OF THE LAST LINE ON THE SCREEN.
32	CURSOR UP	MOVES THE CURSOR VERTICALLY UPWARD TO THE NEXT HIGHER LINE. IF THE CURSOR IS ON THE TOP LINE, THIS CODE HAS NO EFFECT.
13	CURSOR DOWN	MOVES THE CURSOR VERTICALLY DOWN-WARD ONE LINE. IF THE CURSOR

```
919                                                               IS ON THE BOTTOM LINE, THIS HAS
920                                                               NO EFFECT.
```

OCTAL CODE	CORRESPONDING KEY	DESCRIPTION
31	CURSOR LEFT	MOVES THE CURSOR HORIZONTALLY LEFT ONE POSITION. IF THE CURSOR IS AT CHARACTER POSITION ONE, THIS CODE HAS NO EFFECT.
30	CURSOR RIGHT	MOVES THE CURSOR HORIZONTALLY RIGHT ONE POSITION. IF THE CURSOR IS AT CHARACTER POSITION 72, THIS CODE HAS NO EFFECT.
40	SPACE	THE CHARACTER AT THE CURSOR POSITION WHEN THE SPACE COMMAND IS ISSUED WILL BE ERASED THE CURSOR MOVES HORIZONTALLY ONE CHARACTER POSITION TO THE RIGHT IF THE CURSOR IS IN CHARACTER POSITION 72, THAT CHARACTER AT THE 72ND POSITION IS ERASED, BIUT THE CURSOR WILL REMAIN AT THE 72ND POSITION.

THE CURSOR SWITCH AT THE REAR OF THE UNIT WILL CAUSE THE VTDS
TO IGNORE (NO RESPONSE ON THE SCREEN) THE FOLLOWING CODES

10 BACK SPACE
37 ERASE EOF
36 ERASE EOL
35 HOME UP
34 HOME DOWN
32 CURSOR UP
13 CORSOR DOWN
31 CURSOR LEFT
30 CURSOR RIGHT WHEN IN THE "OFF" POSITION.

8.8 PRG3 PROGRAM DESCRIPTION

PRG3 IS A PRINTER EXERCISER DESIGNED AS AN AID IN MAKING VTOS ADJUSTMENTS. THE PROGRAM PERMITS THE USER TO TYPE IN FIVE TEST CHARACTERS AND ONE FINAL CHARACTER THAT SIGNIFIES WHETHER FULL SPEED OR STALL OPERATION IS DESIRED. THE PROGRAM THEN TYPES LINES CONTAINING THE FIVE SELECTED CHARACTERS. WHEN THE USER WISHES TO CHANGE THE TEST CHARACTERS SR15 IS SET TO A 1. THE PROGRAM TERMINATES TYPING THE LINE BEFORE ACCEPTING NEW DATA.

THIS TEST CAN ALSO BE USED FOR ALIGNMENT BY FILLING THE SCREEN WITH E'S.

8.4 PRG4 PROGRAM DESCRIPTION

PRG11 IS USED AS AN AID IN ADJUSTING THE TRANSMITTER CLOCK WITH THE AID OF A SCOPE. THE PROGRAM PERFORMS THE FOLLOWING SEQUENCE:

A. LOAD TRANSMITTER BUFFER WITH ASCII CODE IN SR LEFT.
B. DELAY NUMBER OF MILLISECONDS SET IN SR RIGHT.
C. GO TO STEP A.

8.5 PRG5 PROGRAM DESCRIPTION

PRG5 IS USED AS AN AID IN ADJUSTING THE RECEIVER CLOCK. A SCOPE IS REQUIRED. THE PROGRAM PERFORMS THE FOLLOWING SEQUENCE:

A. SET PUNCH MAINTENANCE BIT.
B. LOAD PUNCH BUFFER WITH CODE IN SR LEFT.
C. DELAY NUMBER OF MILLISECONDS SET IN SR RIGHT.
D. MOVE CONTENTS OF READ BUFFER TO REGISTER 0.
E. ISSUE 5 RESET INSTRUCTIONS TO "FIX" READ BUFFER CONTENTS IN RIGHT HALF OF DATA LIGHTS.
F. GO TO STEP A.

8.6 PRG6 PROGRAM DESCRIPTION

USING THE PUNCH MAINTENANCE BIT FEATURE, PRG13 TAKES THE ASCII CODE SET IN SR LEFT AND USES IT TO CHECK THE ABILITY OF THE CONTROL TO OUTPUT AND RECEIVE DATA. THE PROGRAM PERFORMS THE FOLLOWING SEQUENCE:

A. SET PUNCH MAINTENANCE BIT.
B. LOAD PUNCH BUFFER WITH CODE IN SR LEFT.
C. WHEN READER DONE BIT SETS, COMPARE CODE IN SR LEFT WITH DATA IN READER BUFFER. HALT IF NOT SAME.
D. WAIT FOR PUNCH DONE BIT TO SET AND GO TO STEP B.

8.7 PRG7 PROGRAM DESCRIPTION

USING THE PUNCH MAINTENANCE BIT FEATURE PRG14 USES THE SPECIAL BINARY COUNT PATTERN TO CHECK ABILITY OF THE CONTROL TO OUTPUT AND RECEIVE DATA. THE PROGRAM PERFORMS THE FOLLOWING STEPS:

A. INITIALIZE BINARY COUNT PATTERN.
B. SET PUNCH MAINTENANCE BIT.
C. LOAD PUNCH BUFFER WITH BINARY COUNT CHARACTER.
D. WHEN READER DONE BIT SETS, COMPARE BINARY CHARACTER WITH DATA IN READ BUFFER. HALT IF NOT SAME.
E. WAIT FOR PUNCH DONE BIT TO SET AND GO TO STEP C.
F. THIS PROGRAM IS EXECUTED AS A SUBROUTINE OF PROGRAM 0 UNDER MONITOR LOAD OR WHEN AUTOMATIC GROUP TESTING IS USED.

```
1037
1038
1039
1040
1041                    8.10    PROGRAM 10 DESCRIPTION
1042                            ----------------------
1043
1044                    THE PURPOSE OF THIS TEST IS TO VERIFY THAT THE VT05 MEMORY HAS
1045                    ROLL-UP CAPABILITIES.  THE TEST FUNCTIONS AS FOLLOWS:
1046
1047                    A.  A LINE !, AND ITS COMPLEMENT   , IS DISPLAYED
1048                    B.  THIS LINE IS FOLLOWED BY A LINE OF ITS EXACT COMPLEMENT
1049
1050                    THIS PROCEDURE RUNS CONTINUOUSLY.  IF SWITCH 15 IS HELD UP
1051                    MOMENTARILY THE ASCII CODE FOR THE CHARACTER IS INCREMENTED
1052                    BY ONE.  BY UTILIZING SWITCH 15 IN THIS MANNER, PROGRAM 10 CAN
1053                    TEST THE ROLL-UP CAPABILITY OF ALL CHARACTERS.
1054
1055                    8.11    PROGRAM 11 DESCRIPTION
1056                            ----------------------
1057
1058                            RANDOM NUMBERS ARE GENERATED AND USED AS X AND Y
1059                    COORDINATES. A 1440 CHARACTER MESSAGE IS USED AS THE VIS-
1060                    UAL DISPLAY, ONE PARTICULAR CHARACTER IS AVAILABLE FOR
1061                    EACH CURSOR POSITION.
1062                            THE FIRST LOCATION OF THE STORED CHARACTERS (MIN-
1063                    IMUM COORDINATES) IS USED AS A CONSTANT. A RANDOM Y COOR-
1064                    DINATE (40 TO 63) IS GENERATED AND CONVERTED TO 0 TO 23.
1065                    THIS LATER NUMBER IS THEN MULTIPLIED BY 110 WHICH PLACES
1066                    US AT THE BEGINNING OF LINES 0 TO 19. AN X COORDINATE (40
1067                    TO 147) IS NOW GENERATED AND CONVERTED TO 0 TO 107 AND ADD-
1068                    ED TO THE Y COORDINATE, ADDRESS, AND THIS CONTROLS THE TYPE
1069                    OF CHARACTER OUTPUT.
1070                            AFTER 1440 CHARACTERS ARE PRINTED A HALT WILL OCCUR
1071                    TO ALLOW VISUAL INSPECTION. A RERUN IS POSSIBLE BY DEPRESS-
1072                    ING THE CONTINUE KEY.
1073                            THIS PROGRAM IS EXECUTED AS A SUBROUTINE OF PROGRAM
1074                    0 UNDER MONITOR LOAD OR WHEN AUTOMATIC GROUP TESTING IS
1075                    USED.
1076            .ENDR
1077
1078
```

```
                                        .TITLE KL11 TESTS FOR VTO5 DISPLAY TERMINAL
                                        ;MAINDEC 11-DZVTB-D
                                        ;KL11  TESTS FOR VTO5 DISPLAY TERMINAL
                                        ;AUTHOR:        JIM CARRON
                                        ;DATE:          JUNE, 1972
                                        ;REVISED:       MARCH, 1973
                                        ;COPYRIGHT 1971,1972,1973 DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
                                        ;
                                        ;PRG0- COMBINED INPUT-OUTPUT LOGIC TESTS.
                                        ;PRG1- DISPLAY TEST.
                                        ;PRG2- KEYBOARD TEST.
                                        ;PRG3- PRINTER EXERCISER.
                                        ;PRG4- PUNCH CLOCK ADJUSTMENT ROUTINE.
                                        ;PRG5- READER CLOCK ADJUSTMENT ROUTINE.
                                        ;PRG6- MAINTENANCE MODE SINGLE CHARACTER DATA TEST.
                                        ;PRG7- MAINTENANCE MODE SPECIAL BINARY COUNT PATTERN DATA TEST.
                                        ;PRG10- ROLE-UP TEST
                                        ;PRG11-  CURSOR ADDRESS TEST

                                        ;STANDARD SR SWITCH OPTIONS (SWITCH SET TO A 1 )
                                        ;
                                        ;SR 15 - HALT AT END OF ROUTINE.
                                        ;SR 14 - SCOPE.
                                        ;SR 11 - INHIBIT ITERATION.
                                        ;SR 10 - LOOP PROGRAM.
                                        ;SR  9 - SELECT ROUTINE.
                                        ;SR 8 - DISABLE STALL MODE AND RUN FULL SPEED.
                                        ;SR 6 THROUGH SR 0 - NUMBER OF ROUTINE TO BE SELECTED.
                                                .ENABL  ABS
                                                .=0
000000  000002                                  .+2                     ;UNASSIGNED TRAP
000002  000000                                  HALT
000004  000006                          MACHER: .+2                     ;SP OVERFLOW, BUS ERROR TRAP
000006  000000                                  HALT
000010  000012                                  .+2                     ;RESERVED INSTRUCTION TRAP
000012  000000                                  HALT
000014  000016                                  .+2                     ;TRACE TRAP
000016  000000                                  HALT
000020  000022                                  .+2                     ;TRAP TO CALL IOX
000022  000000                                  HALT
000024  000026                                  .+2                     ;POWER FAIL TRAP
000026  000340                                  PRTY7
000030  002776                                  EMTINT                  ;EMT TRAP
000032  000340                                  PRTY7
000034  003042                                  TRPINT                  ;TRAP TRAP. SIMILAR TO EMT
000036  000340                                  PRTY7
000040  000042                                  .+2
000042  000000                          MONITR: HALT                    ;TRAPPED FOR MONITOR LOAD
000046                                          .=46
000046  002614                                  $ENDAD
                                                .REPT   176
                                                .+2
                                                HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                                .ENDR
```

```
1133
1134                                    ;EQUATE STATEMENTS
1135            177776                          CC=177776
1136            177776                          PSW=177776
1137            000240                          NOP=240
1138            000000                          OPEN=0
1139            100000                          HLTSW=BIT15             ;HALT SWITCH DEFINITION
1140            040000                          SCOPSW=BIT14            ;SCOPE SWITCH DEFINITION
1141            020000                          NPRTSW=BIT13            ;INHIBIT PRINT SWITCH DEFINITION
1142            010000                          NTRCSW=BIT12            ;INHIBIT TRACE SWITCH DEFINITION
1143            004000                          NITRSW=BIT11            ;INHIBIT ITERATION SWITCH DEFINITION
1144            002000                          LPRGSW=BIT10            ;LOOP PROGRAM SWITCH DEFINITION
1145            001000                          SRTSW=BIT9              ;SELECT ROUTINE SWITCH DEFINITION
1146            000400                          BYPMAN=BIT8             ;BYPASS MANUAL INTERVENTION DEFINITION.
1147            100000                          MANUAL=BIT15
1148            100000                          BIT15=100000
1149            040000                          BIT14=40000
1150            020000                          BIT13=20000
1151            010000                          BIT12=10000
1152            004000                          BIT11=4000
1153            002000                          BIT10=2000
1154            001000                          BIT9=1000
1155            000400                          BIT8=400
1156            000200                          BIT7=200
1157            000100                          BIT6=100
1158            000040                          BIT5=40
1159            000020                          BIT4=20
1160            000010                          BIT3=10
1161            000004                          BIT2=4
1162            000002                          BIT1=2
1163            000000                          BIT0=0
1164            005726                          POPSP=5726              ;POP THE STACK. SAME AS TST (6)+
1165            022626                          POPSP2=022626           ;POP STACK TWICE. SAME AS CMP (6)+,(6)+
1166            000340                          PRTY7=340               ;PRIORITY LEVEL DEFINITIONS
1167            000300                          PRTY6=300
1168            000240                          PRTY5=240
1169            000200                          PRTY4=200
1170            000140                          PRTY3=140
1171            000100                          PRTY2=100
1172            000040                          PRTY1=40
1173            000000                          PRTY0=0
1174            104000                          TYPE=EMT+0
1175            104001                          TYPES=EMT+1
1176            104002                          STALL=EMT+2
1177            104003                          ERROR=EMT+3
1178            104004                          DATCHK=EMT+4
1179            104005                          CHALT=EMT+5
1180            104006                          STRDRV=EMT+6
1181            104007                          STPCHV=EMT+7
1182            104010                          EHALT=EMT+10
1183            104011                          SRESET=EMT+11
1184            104012                          CHAIN=EMT+12
1185            104013                          CK33=EMT+13
```

```
                 104014                       CK35=EMT+14
                 104016                       TYPLN3=EMT+16
                 104017                       DATHLT=EMT+17
                 104020                       SAVREG=EMT+20
                 104021                       RSTREG=EMT+21
                 104022                       CHKASR=EMT+22
                 104400                       DELAY=TRAP+0
                 000007                       BELL=007
                 017621                       BLOCKA=DEND
                 017623                       BLOCK1=BLOCKA+2
                 017733                       BLOCKB=BLOCKA+112
                 017744                       BLKBB=BLOCKA+123
                 017735                       BLOCK2=BLOCKA+114
                 017746                       BLK2=BLOCKA+125
                 020045                       BLOCKC=BLOCKA+224
                 020056                       BLKCC=BLOCKA+235
                 000174                       .=174
        000174   000000               DISPREG:  0
        000176   000000               SWREG:    0
                 000200                       .=200
        000200   000167   001534              JMP       START           ;GO TO START OF PROGRAM.
                 001104               .=.+700                ;GET CODE OUT OF VECTOR AREA
        001104   000000               SPBOT:    0                       ;BOTTOM OF STACK
        001106   177570               SR:       177570
        001110   177570               DISPLAY:177570
        001112   177560               CONADD: 177560                    ;CONSOLE LSR CSR POINTER
        001114   000060               CONVEC: 60                        ;CONSLE INTERRUPT VECTOR
        001116   177560               TKS:      177560                  ;LSR CSR
        001120   177562               TKB:      177562                  ;LSR BUFFER
        001122   177564               TPS:      177564                  ;LSP CSR
        001124   177566               TPB:      177566                  ;LSP BUFFER
        001126   000060               TKVTR:    60                      ;LSR INTERRUPT VECTOR
        001130   000200               TKLVL:    PRTY4                   ;LSR PRIORITY LEVEL
        001132   000064               TPVTR:    64                      ;LSP INTERRUPT VECTOR
        001134   000200               TPLVL:    PRTY4                   ;LSP PRIORITY LEVEL
        001136   000001               TTYTYP: 01                        ;TTY = KSR35
        001140   000000               PRGNUM: OPEN                      ;CONTAINS CURRENT PROGRAM#
        001142   000000               KSTART: OPEN                      ;CURRENT PROGRAM START ADDRESS.
        001144   000000               CURTST: OPEN                      ;CONTAINS ADDR OF CURRENT TEST.
        001146   000000               RTNNO:    OPEN                    ;CONTAINS CURRENT TEST #.
        001150   000000               NXTST:    OPEN                    ;CONTAINS ADDR OF NEXT TEST.
        001152   000000               ICTR:     OPEN                    ;CONTAINS CURRENT ITERATION COUNT
        001154   000000               SCOPTR: OPEN                      ;CONTAINS CURRENT SCOPE POINTER.
        001156   000000               PRGID:    OPEN                    ;CONTAINS PROGRAM INDICATORS
        001160   005712               PRGTAB: PRG0                      ;PRG0 START ADDRESS
        001162   010260                         PRG1                    ;PRG1 START ADDRESS
        001164   011704                         PRG2                    ;PRG2 START ADDRESS
        001166   012204                         PRG3                    ;PRG3 START ADDRESS
        001170   012370                         PRG4                    ;PRG4 START ADDRESS
        001172   012400                         PRG5                    ;PRG5 START ADDRESS
        001174   012470                         PRG6                    ;PRG6 START ADDRESS
        001176   012542                         PRG7                    ;PRG7 START ADDRESS
        001200   012654                         PRG10                   ;PRG10 START ADDRESS
        001202   013014                         PRG11                   ;PRG11 START ADDRESS
```

```
 1242
 1243  001204  004136  EMTTAB: TYP                     ;POINTER TO TYPEOUT ROUTINE
 1244  001206  004462          TYPS                    ;POINTER TO CHAINED MESSAGES ROUTINE
 1245  001210  004560          STAL                    ;POINTER TO RANDOM STALL ROUTINE
 1246  001212  001536          ERR                     ;POINTER TO ERROR ROUTINE
 1247  001214  001436          DTCHK
 1248  001216  001300          CHLT                    ;COMMON HALT
 1249  001220  003766          STLSPV
 1250  001222  004016          STLSPV
 1251  001224  001322          EHLT                    ;POINTER TO ERROR HALT ROUTINE.
 1252  001226  004046          SRSETT
 1253  001230  002430          CHAINN
 1254  001232  003206          CHK33
 1255  001234  003222          CHK35
 1256  001236  003220          CHK33C
 1257  001240  005430          TYPL3
 1258  001242  001526          DTHLT
 1259  001244  003562          SAVRG
 1260  001246  003622          RSTRG
 1261  001250  003240          CKASR
 1262  001252  004514  TPTMB:  DLY
 1263  001254  000003  RCNT:   OPEN                    ;CHARACTER COUNT
 1264  001256  000003  CRBUF:  OPEN                    ;HOLDS ONE CHARACTER FROM READER.
 1265  001260  000000  CHR1:   OPEN
 1266  001262  000000  CHR2:   OPEN
 1267  001264  000000  CHR3:   OPEN
 1268  001266  000000  ERCTR:  OPEN
 1269  001270  000000  CTRA:   OPEN
 1270  001272  000000  CTRB:   OPEN
 1271  001274  000000  CTRC:   OPEN
 1272  001276  000000  CTRD:   OPEN
```

```
1273
1274                                        ;COMMON HALT ROUTINE
1275  001300  022767  000000  176534  CHLT: CMP     #0,MONITR       ;MONITOR LOAD?
1276  001306  001004                      BNE     CHLTR           ;YES - EXIT
1277  001310  011600                      MOV     @%6,%0          ;DEVELOP ADDRESS OF CALLER
1278  001312  162700  000002              SUB     #2,%0
1279  001316  000000                      HALT                    ;HALT, ADDRESS OF CALL INSTRUCTION
1280  001320  000002              CHLTR:  RTI                     ;IN DATA LIGHTS
1281                                      ;UNCONDITIONAL ERROR HALT ROUTINE
1282  001322  022767  000000  176512  EHLT: CMP     #0,MONITR       ;MONITOR LOAD?
1283  001330  001435                      BEQ     EHLTA           ;NO - HLT.
1284  001332  104011                      SRESET
1285  001334  004767  001724          EHLTB: JSR     %7,CONIT        ;SET UP CONSOLE POINTERS
1286  001340  016700  002206              MOV     CURADD,%0       ;SET UP DEVICE NUMBER
1287  001344  162700  000010              SUB     #10,%0          ;OF DISPLAY IN ERROR.
1288  001350  012767  016424  003514      MOV     #ERRORA,A1ST    ;SET ERROR DEVICE ADDRESS
1289  001356  004767  000332              JSR     %7,ACNVE        ;CONVERT OCTAL TO ASCII
1290  001362  112777  000067  003502      MOVB    #67,@A1ST
1291  001370  011600                      MOV     @%6,%0          ;TRANSFER PROGRAM ERROR
1292  001372  162700  000002              SUB     #2,%0           ;ADDRESS TO MESSAGE
1293  001376  012767  016453  003466      MOV     #ERRORB,A1ST
1294  001404  004767  000304              JSR     %7,ACNVE
1295  001410  104000                      TYPE                    ;TYPE ERROR MESSAGE
1296  001412  016362                      ERRORM
1297  001414  004767  001722              JSR     %7,RSTART
1298  001420  000167  000566              JMP     NSTART
1299  001424  011600          EHLTA:  MOV     @%6,%0          ;DEVELOP ADDRESS OF CALLER
1300  001426  162700  000002              SUB     #2,%0
1301  001432  000000          ERRH:   HALT                    ;HALT ADDRESS OF ERROR CALL
1302  001434  000002                      RTI                     ;IN DATA LIGHTS.
1303                                      ;DATA CHECK ROUTINE.
1304  001436  126767  177614  177613  DTCHK: CMPB    CRBUF,CRBUF+1   ;COMPARE EXPECTED AND RECEIVED
1305  001444  001433                      BEQ     DTCHKA          ;CHARS. BRANCH IF SAME.
1306  001446  022767  000000  176366      CMP     #0,MONITR       ;MONITOR LOAD?
1307  001454  001424                      BEQ     DTHLT           ;NO GO TO NORMAL HALT
1308  001456  004767  001602              JSR     %7,CONIT        ;SET UP CONSOLE POINTERS
1309  001462  016700  002064              MOV     CURADD,%0       ;SET UP DEVICE NUMBER OF
1310  001466  162700  000010              SUB     #10,%0          ;DISPLAY IN ERROR
1311  001472  012767  016566  003372      MOV     #DERRA,A1ST     ;SET ERROR MESSAGE ADDRESS
1312  001500  004767  000210              JSR     %7,ACNVE        ;CONVERT OCTAL TO ASCII
1313  001504  112777  000067  003360      MOVB    #67,@A1ST       ;MOST SIG.DIGIT = 7
1314  001512  104000                      TYPE                    ;TYPE ERROR MESSAGE
1315  001514  016541                      DERR
1316  001516  004767  001620              JSR     %7,RSTART
1317  001522  000167  000464              JMP     NSTART
1318  001526  016700  177524          DTHLT: MOV     CRBUF,%0        ;MOVE S/B AND WAS CHARS TO R0.
1319  001532  000000          DERRH:  HALT                    ;DATA ERROR HALT. GOOD CHAR IN
1320                                                          ;DATA LIGHTS LEFT. BAD CHAR IN DATA
1321  001534  000002          DTCHKA: RTI                     ;LIGHTS RIGHT. EXIT.
1322                                      ;CONDITIONAL ERROR HALT.
1323  001536  032777  040000  177342  ERR:  BIT     #SCOPSW,@SR     ;CHECK SCOPE SWITCH.
1324  001544  001404                      BEQ     ERRA            ;BRANCH IF NO SCOPE DESIRED.
1325  001546  005767  177404              TST     PRGID           ;SCOPING WANTED. FIRST ERROR?
1326  001552  100001                      BPL     ERRA            ;NO SCOPE IF FIRST ERROR.
1327  001554  000002                      RTI                     ;SCOPE EXIT.
1328  001556  052767  100000  177372  ERRA: BIS     #BIT15,PRGID    ;SET ERROR INDICATOR.
```

```
 1329  001564  022767  000000  176250          CMP     #0,MONITR       ;MONITOR LOAD?
 1330  001572  001434                          BEQ     ERRB            ;NO - GO TO NORMAL HALT
 1331  001574  104011                          SRESET
 1332  001576  004767  001462                  JSR     %7,CONIT        ;SET UP CONSOLE POINTERS
 1333  001602  016700  001744                  MOV     CURADD,%0       ;SET UP DEVICE NUMBER
 1334  001606  162700  000010                  SUB     #10,%0          ;OF DISPLAY IN ERROR
 1335  001612  012767  016503  003252          MOV     #CERRA,A1ST     ;SET ERROR MESSAGE ADDRESS
 1336  001620  004767  000070                  JSR     %7,ACNVE        ;CONVERT OCTAL TO ASCII
 1337  001624  112777  000067  003240          MOVB    #'7,@A1ST       ;MOST SIG DIGIT = 7
 1338  001632  012767  016532  003232          MOV     #CERRB,A1ST     ;TRANSFER PROGRAM ERROR
 1339  001640  011600                          MOV     @%6,%0          ;ADDRESS TO MESSAGE
 1340  001642  162700  000002                  SUB     #2,%0
 1341  001646  004767  000042                  JSR     %7,ACNVE        ;CONVERT OCTAL TO ASCII
 1342  001652  104000                          TYPE                    ;TYPE ERROR MESSAGE
 1343  001654  016463                          CERR
 1344  001656  004767  001460                  JSR     %7,RSTART
 1345  001662  000553                          BR      NSTART
 1346  001664  011600                ERRB:     MOV     @%6,%0          ;DEVELOP ADDRESS OF
 1347  001666  162700  000002                  SUB     #2,%0           ;CALLER
 1348  001672  000000                CERRH:    HALT                    ;ERROR HALT
 1349  001674  000002                          RTI                     ;EXIT
 1350                                  ;ROUTINE END HALT SUBROUTINE.
 1351  001676  005777  177204        SHALT:    TST     @SR             ;CHECK HALT SWITCH.
 1352  001702  100003                          BPL     SHLTA           ;BRANCH IF NO HALT DESIRED.
 1353  001704  116700  177236                  MOVB    RTNNO,%0        ;CURRENT TEST # TO R0.
 1354  001710  000000                RHLTA:    HALT                    ;ROUTINE END HALT.
 1355  001712  000207                SHLTA:    RTS     %7              ;EXIT.
 1356  001714  016701  003152        ACNVE:    MOV     A1ST,%1         ;TRANSFER ADDRESS TO R1
 1357  001720  062701  000006                  ADD     #6,%1           ;ADD 6 TO REF LSD
 1358  001724  012702  000006                  MOV     #6,%2           ;SET ROUTINE CTR TO 6
 1359  001730  010067  003144                  MOV     %0,ACNVX        ;TRANSFER NUMBER TO CONVERT ROUTINE REG
 1360  001734  000167  003156                  JMP     ACNVM           ;GO TO CONVERT ROUTINE
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1361
1362                                            ;ROUTINE FOR MONITOR LOAD
1363  001740  012706  001104          START:    MOV     #SPBOT,%6       ;SET BOTTOM OF STACK
1364  001744  012767  003066  176052            MOV     #PFAIL,24       ;SET POWER FAIL POINTER
1365  001752  012767  177570  177126            MOV     #177570,SR
1366  001760  012767  177570  177122            MOV     #177570,DISPLAY
1367  001766  013746  000006                    MOV     @#6,-(%6)       ;SAVE ERROR VECTOR
1368  001772  013746  000004                    MOV     @#4,-(%6)
1369  001776  012767  002012  176000            MOV     #1$,4           ;SET UP TIME OUT VECTOR
1370  002004  005777  177076                    TST     @SR             ;TRY TO REFERENCE HARDWARE SWR
1371  002010  000407                            BR      2$              ;BRANCH IF NO TIME OUT TRAP OCCURS
1372  002012  012767  000176  177066  1$:       MOV     #SWREG,SR       ;POINT TO SOFTWARE SWR
1373  002020  012767  000174  177062            MOV     #DISPREG,DISPLAY ;POINT TO SOFTWARE DISPLAY REG
1374  002026  022626                            CMP     (%6)+,(%6)+     ;RESTORE STACK
1375  002030  012637  000004          2$:       MOV     (%6)+,@#4       ;RESTORE ERROR VECTOR
1376  002034  012637  000006                    MOV     (%6)+,@#6
1377  002040  016767  001510  001504            MOV     LOWADD,CURADD   ;INITIALIZE POINTER FOR START OF MULTIPLES
1378  002046  012767  002104  175730            MOV     #END,4          ;INITIALIZE TIME OUT TRAP
1379  002054  012767  000300  001476            MOV     #300,CURVEC     ;INITIALIZE VECTOR POINTER
1380  002062  012700  174000                    MOV     #174000,%0      ;ADDRESS OF FIRST DC11 TO R0
1381  002066  005710                  B:        TST     @%0             ;IS THIS DEVICE EQUPPED?
1382  002070  062767  000010  001462            ADD     #10,CURVEC      ;NO ADD #10 TO VECTOR AND
1383  002076  062700  000010                    ADD     #10,%0          ;ADDRESS
1384  002102  000771                            BR      B
1385  002104  022626                  END:      POPSP2
1386  002106  016702  001442                    MOV     LOWADD,%2
1387  002112  162702  176500                    SUB     #176500,%2      ;SUBTRACT GROUP OFFSET
1388  002116  060267  001436                    ADD     %2,CURVEC       ;ADD GROUP BIAS TO VECTOR POINTER.
1389  002122  004767  001136                    JSR     %7,CONIT        ;RESTORE POINTERS & VECTORS TO CONSOLE
1390  002126  005767  175710                    TST     MONITR
1391  002132  001007                            BNE     1$              ;IF SOFTWARE SWR
1392  002134  022767  000176  176744            CMP     #176,SR         ;PRESENT AND NOT IN
1393  002142  001003                            BNE     1$              ;MONITOR MODE DEFAULT
1394  002144  052777  000002  176734            BIS     #2,@SR          ;TO PROGRAM #2
1395  002152  012767  000000  001370  1$:       MOV     #0,STNUM        ;RESET PROGRAM LOADER
1396  002160  022767  000000  175654            CMP     #0,MONITR       ;IS THIS A MONITOR LOAD?
1397  002166  001427                            BEQ     STARTO          ;NO - GO TO REGULAR START
1398  002170  022777  000000  176710            CMP     #0,@SR          ;ANY PANEL SW SET?
1399  002176  001405                            BEQ     NSTART          ;NO - GO TO NEW START
1400  002200  104000                            TYPE                    ;TYPE ABORT MESSAGE
1401  002202  016575                            ABORT
1402  002204  000005                            RESET
1403  002206  000167  011254                    JMP     LOGICAL         ;RETURN TO MONITOR.
1404  002212  012706  001104          NSTART:   MOV     #SPBOT,%6       ;SET BOTTOM OF SP STACK
1405  002216  005067  175554                    CLR     PSW
1406  002222  012767  000006  175554            MOV     #6,MACHER
1407  002230  005067  176712                    CLR     RTNNO
1408  002234  016700  001310                    MOV     STNUM,%0        ;TRANSFER PROGRAM NUMBER TO R0
1409  002240  005267  001304                    INC     STNUM
1410  002244  000422                            BR      CRTA
1411  002246  012706  001104          STARTO:   MOV     #SPBOT,%6       ;SET BOTTOM OF SP STACK.
1412  002252  005067  175520                    CLR     PSW
1413  002256  012767  000006  175520            MOV     #6,MACHER
1414  002264  005067  176656                    CLR     RTNNO
1415  002270  017700  176612                    MOV     @SR,%0          ;(SR) TO R0
1416  002274  042700  177760                    BIC     #177760,%0      ;LIMIT (SR) TO BITS 3-0
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 1417  002300  020027  000014                    CMP     %0,#14          ;COMPARE (SR) TO PROGRAM LIMIT
 1418  002304  101402                            BLOS    CRTA            ;VALID PROGRAM NUMBER?
 1419  002306  104010                  INCPRG:   EHALT                   ;NO. INCORRECT PRG NUMBER
 1420  002310  000613                            BR      START           ;START OVER.
 1421  002312  005067  176640          CRTA:     CLR     PRGID
 1422  002316  010067  176616                    MOV     %0,PRGNUM       ;SAVE PROGRAM NUMBER AT PRGNUM
 1423  002322  006100                            ROL     %0              ;ROX2
 1424  002324  000170  001160                    JMP     @PRGTAB(0)      ;GO TO SELECTED PROGRAM.
 1425  002330  104005                  SRSET:    CHALT                   ;SET SR OPTIONS DESIRED
 1426  002332  016767  176604  176610  GETRDY:   MOV     KSTART,NXTST    ;ADDR OF 1ST ROUTINE TO NXTST
 1427  002340  000167  000372                    JMP     CLEAN           ;GO CLEAN UP.
 1428  002344  004767  000262          GTRDYA:   JSR     %7,FORWD        ;ROLL FORWARD TO "NEXT" ROUTINE.
 1429  002350  032777  001000  176530  GTRDYB:   BIT     #SRTSW,@SR      ;CHECK FOR SELECT ROUTINE SWITCH
 1430  002356  001003                            BNE     GTRDYC          ;BRANCH IF SELECT ROUTINE SWITCH IS SET.
 1431  002360  004767  000324                    JSR     %7,GOTST        ;GO RUN CURRENT ROUTINE.
 1432  002364  000460                            BR      CHNB            ;NO GO. MANUAL RTN BYPASSED.
 1433  002366  017700  176514          GTRDYC:   MOV     @SR,%0          ;(SR) TO R0
 1434  002372  042700  177600                    BIC     #177600,%0      ;MASK UNDESIRED BITS
 1435  002376  126700  176544                    CMPB    RTNNO,%0        ;COMPARE RTNNO TO (R0)
 1436  002402  001004                            BNE     GTRDYD          ;BRANCH IF ROUTINE NOT FOUND YET.
 1437  002404  004767  000300                    JSR     %7,GOTST        ;GO RUN ROUTINE.
 1438  002410  104010                            EHALT                   ;NO GO. MANUAL RTN SELECTED BYPASSED.
 1439  002412  000747                            BR      GETRDY
 1440  002414  022767  177777  176526  GTRDYD:   CMP     #-1,NXTST       ;NO. CHECK FOR LAST ROUTINE.
 1441  002422  001350                            BNE     GTRDYA          ;LAST ROUTINE?
 1442  002424  104010                  INCRTN:   EHALT                   ;YES. INCORRECT ROUTINE SELECTED.
 1443  002426  000741                            BR      GETRDY          ;START OVER.
 1444  002430  005767  176522          CHAINN:   TST     PRGID           ;TEST ERROR BIT IN PRGID.
 1445  002434  100013                            BPL     CHNA            ;BRANCH IF ERROR BIT NOT SET.
 1446  002436  032777  040000  176442            BIT     #SCOPSW,@SR     ;ERROR BIT SET. CHECK FOR SCOPE OPTION.
 1447  002444  001407                            BEQ     CHNA            ;SCOPE SWITCH SET IN SR?
 1448  002446  022767  177777  176500            CMP     #-1,SCOPTR      ;YES. CHECK SCOPE ENTRY POINTER
 1449  002454  001403                            BEQ     CHNA            ;BRANCH IF SCOPE ENTRY IS -1.
 1450  002456  017716  176472                    MOV     @SCOPTR,@%6     ;SET UP TO GO SCOPING
 1451  002462  000002                            RTI                     ;GO TO SCOPE ENTRY.
 1452  002464  042767  100000  176464  CHNA:     BIC     #BIT15,PRGID    ;CLEAR ERROR BIT IN PRGID.
 1453  002472  032777  004000  176406            BIT     #NITRSW,@SR     ;TEST INHIBIT ITERATION SWITCH
 1454  002500  001004                            BNE     CHNAA           ;INHIBIT ITERATION?
 1455  002502  005367  176444                    DEC     ICTR            ;NO
 1456  002506  001401                            BEQ     CHNAA           ;COUNT 0?
 1457  002510  000002                            RTI                     ;NO. RETURN TO TEST ROUTINE
 1458  002512  022626                  CHNAA:    POPSP2                  ;POP STACK TWICE
 1459  002514  104011                            SRESET
 1460  002516  004767  001140                    JSR     %7,RETPVT       ;RESTORE VECTOR TABLES
 1461  002522  004767  177150                    JSR     %7,SHALT        ;GO HALT IF HALT SWITCH IS SET
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1462
1463  002526  032777  001000  176352  CHNB:   BIT     #SRTSW,@SR      ;CHECK SELECT ROUTINE SWITCH
1464  002534  001276                          BNE     GETRDY          ;SELECT ROUTINE SWITCH SET?
1465  002536  022767  177777  176404          CMP     #-1,NXTST       ;NO.
1466  002544  001275                          BNE     GTRDYA-4        ;LAST TEST?
1467  002546  032777  002000  176332          BIT     #LPRGSW,@SR     ;YES. TEST LOOP PROGRAM SWITCH.
1468  002554  001266                          BNE     GETRDY          ;LOOP PROGRAM?
1469  002556  022767  000000  175256          CMP     #0,MONITR       ;MONITOR LOAD?
1470  002564  001417                          BEQ     PRGEND          ;YES - GO TO HALT
1471  002566  026727  000756  000001          CMP     STNUM,#1        ;PROGRAM #1 COMPLETED?
1472  002574  003606                          BLE     NSTART          ;YES GO TO NEW START
1473  002576  004767  000540                  JSR     %7,RSTART       ;GO TO RESTART
1474  002602  000603                          BR      NSTART
1475  002604  013700  000042                  MOV     @#42,%0
1476  002610  001405                          BEQ     PRGEND
1477  002612  000005                          RESET
1478  002614  004710                  SENDAD: JSR     %7,(%0)
1479  002616  000240                          NOP
1480  002620  000240                          NOP
1481  002622  000240                          NOP
1482  002624  000167  177532          PRGEND: JMP     GETRDY
1483  002630  000736                          BR      CHNB
1484  002632  016705  176312          FORWD:  MOV     NXTST,%5        ;ADDR OF NEXT ROUTINE TO R5.
1485  002636  012567  176304                  MOV     (5)+,RTNNO      ;GET NEXT ROUTINE NUMBER.
1486  002642  012567  176302                  MOV     (5)+,NXTST      ;GET ADDR OF NEXT "NEXT" ROUTINE.
1487  002646  105767  176304                  TSTB    PRGID           ;CHECK IF PROGRAM SCOPE AND I COUNT
1488  002652  100407                          BMI     FORWDB          ;PARAMETERS. BRANCH IF NOT.
1489  002654  012567  176272                  MOV     (5)+,ICTR       ;GET ITERATION COUNT.
1490  002660  012567  176270                  MOV     (5)+,SCOPTR     ;GET SCOPE LOOP ENTRY POINTER.
1491  002664  010567  176254          FORWDA: MOV     %5,CURTST       ;ADDR OF NOW CURRENT TEST TO CURTST.
1492  002670  000207                          RTS     %7              ;EXIT FORWD SUBROUTINE.
1493  002672  012767  177777  176254  FORWDB: MOV     #-1,SCOPTR      ;FORCE "NO SCOPE"
1494  002700  012767  000001  176244          MOV     #1,ICTR         ;FORCE I COUNT OF 1
1495  002706  000766                          BR      FORWDA
1496  002710  005767  176232          GOTST:  TST     RTNNO           ;CHECK FOR MANUAL RTN.
1497  002714  100005                          BPL     GOTSTA          ;BRANCH IF NOT MANUAL RTN.
1498  002716  032777  000400  176162          BIT     #BYPMAN,@SR     ;MANUAL RTN. BYPASS IT?
1499  002724  001401                          BEQ     GOTSTA          ;NO. RUN IT.
1500  002726  000207                          RTS     %7              ;BYPASS MANUAL ROUTINE.
1501  002730  005726                  GOTSTA: POPSP
1502  002732  000177  176206                  JMP     @CURTST         ;GO RUN TEST.
1503  002736  012767  001233  001166  CLEAN:  MOV     #1233,RP1       ;RESET RANDOM NOS.
1504  002744  012767  005622  001162          MOV     #5622,RP2
1505  002752  104011                          SRESET
1506  002754  012767  000006  175022          MOV     #6,MACHER       ;RESET MACHER TRAP.
1507  002762  005067  175010                  CLR     PSW
1508  002766  012706  001104                  MOV     #SPBOT,%6       ;SET UP BOTTOM OF STACK.
1509  002772  000167  177346                  JMP     GTRDYA
1510  002776  011646                  EMTINT: MOV     @%6,-(6)        ;GET SAVED PC.
1511  003000  162716  000002                  SUB     #2,@%6          ;DECREMENT PC BY 2.
1512  003004  017616  000000                  MOV     @(6),@%6
1513  003010  121627  000022                  CMPB    @%6,#22         ;CHECK THAT CALL IS
1514  003014  101402                          BLOS    EMTA            ;WITHIN LIMITS.
1515  003016  000000                          HALT                    ;CALL NOT WITHIN LIMITS.
1516  003020  000776                          BR      .-2
1517  003022  006116                  EMTA:   ROL     @%6             ;EMT ARG X 2.
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 1518  003024  042716  177001                 BIC     #177001,@#6     ;REMOVE 7 MSB.
 1519  003030  062716  001204                 ADD     #EMTTAB,@#6     ;FORM EMT RTN ADDR.
 1520  003034  017616  000000                 MOV     @(6),@#6
 1521  003040  000136                         JMP     @(6)+           ;GO TO EMT ROUTINE.
 1522  003042  011646                 TRPINT: MOV     @#6,-(6)        ;GET SAVED PC.
 1523  003044  162716  000002                 SUB     #2,@#6          ;DECREMENT PC BY 2.
 1524  003050  017616  000000                 MOV     @(6),@#6
 1525  003054  121627  000000                 CMPB    @#6,#0          ;CHECK THAT EMT
 1526  003060  101442                         BLOS    TRPA            ;IS WITHIN LIMITS.
 1527  003062  000000                         HALT                    ;TRAP CALL NOT IN LIMIT.
 1528  003064  000776                         BR      .-2
 1529                                 ;ENTER HERE FOR POWER FAIL
 1530  003066  010046                 PFAIL:  MOV     %0,-(6)         ;SAVE REGISTER OR STACK
 1531  003070  010146                         MOV     %1,-(6)         ;WHEN POWERING DOWN
 1532  003072  010246                         MOV     %2,-(6)
 1533  003074  010346                         MOV     %3,-(6)
 1534  003076  010446                         MOV     %4,-(6)
 1535  003100  010546                         MOV     %5,-(6)
 1536  003102  016746  174716                 MOV     24,-(6)
 1537  003106  017746  175774                 MOV     @SR,-(6)
 1538  003112  010667  000010                 MOV     %6,SAVR6        ;STORE STACK POSITION
 1539  003116  012767  003130  174700         MOV     #RESTART,24
 1540  003124  000000                         HALT                    ;HALT ON POWER DOWN NORMAL
 1541  003126  000000                 SAVR6:  0                       ;STACK IS SAVED HERE
 1542  003130  016706  177772         RESTART:        MOV     SAVR6,%6        ;RESTORE REGISTER OFF STACK
 1543  003134  012677  175746                 MOV     (6)+,@SR
 1544  003140  012667  174660                 MOV     (6)+,24         ;WHEN POWERING UP
 1545  003144  012605                         MOV     (6)+,%5
 1546  003146  012604                         MOV     (6)+,%4
 1547  003150  012603                         MOV     (6)+,%3
 1548  003152  012602                         MOV     (6)+,%2
 1549  003154  012601                         MOV     (6)+,%1
 1550  003156  012600                         MOV     (6)+,%0
 1551  003160  000167  176554                 JMP     START
 1552  003164  000002                         RTI                     ;RETURN TO MAIN LINE
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:553
1554  003166  006116                  TRPA:   ROL     @%6             ;TRAP ARG X 2.
1555  003170  042716  177001                  BIC     #177001,@%6     ;REMOVE 7 MSB.
1556  003174  062716  001252                  ADD     #TRPTAB,@%6     ;FORM TRAP RTN ADDR.
1557  003200  017616  000000                  MOV     @(6),@%6
1558  003204  000136                          JMP     @(6)+           ;GO TO TRAP ROUTINE.
1559  003206  005767  175724          CHK33:  TST     TTYTYP          ;CHECK FOR 33.
1560  003212  001002                          BNE     .+6             ;BRANCH IF NOT 33.
1561  003214  062716  000002                  ADD     #2,@%6          ;+2 TO EXIT POINTER
1562  003220  000002                  CHK330: RTI                     ;EXIT
1563  003222  022767  000001  175706  CHK35:  CMP     #1,TTYTYP       ;CHECK FOR 35.
1564  003230  001002                          BNE     .+6             ;BRANCH IF NOT 35.
1565  003232  062716  000002                  ADD     #2,@%6          ;+2 TO EXIT POINTER
1566  003236  000002                          RTI                     ;EXIT
1567  003240  032767  000010  175670  CKASR:  BIT     #BIT3,TTYTYP    ;CHECK FOR ASR TTY.
1568  003246  001001                          BNE     .+4             ;BRANCH IF NOT ASR.
1569  003250  000002                          RTI                     ;ASR. EXIT.
1570  003252  022626                          POPSP2                  ;POP STACK TWICE.
1571  003254  012767  000001  175670          MOV     #1,ICTR         ;FORCE I COUNT TO A 1.
1572  003262  104012                          CHAIN                   ;CHAIN TO BYPASS ROUTINE.
1573                          ;SUBROUTINE TO RESTORE POINTERS AND VECTORS FOR CONSOLE OUTPUT.
1574  003264  016700  175622          CONIT:  MOV     CONADD,%0       ;CONSOLE ADDRESS TO R0
1575  003270  010067  175622                  MOV     %0,TKS          ;SET LSR CSR TO CONSOLE
1576  003274  005720                          TST     (0)+            ;ADD 2 TO R0
1577  003276  010067  175616                  MOV     %0,TKB          ;SET LSR BUFFER TO CONSOLE
1578  003302  005720                          TST     (0)+            ;ADD 2 TO R0
1579  003304  010067  175612                  MOV     %0,TPS          ;SET LSP CSR TO CONSOLE
1580  003310  005720                          TST     (0)+            ;ADD 2 TO R0
1581  003312  010067  175606                  MOV     %0,TPB          ;SET LSP BUFFER TO CONSOLE
1582  003316  016767  175572  175602          MOV     CONVEC,TKVTR    ;SET LSR INTERRUPT VECTOR TO CONSOLE
1583  003324  016767  175564  175600          MOV     CONVEC,TPVTR    ;SET LSP INTERRUPT VECTOR TO CONSOLE
1584  003332  062767  000004  175572          ADD     #4,TPVTR
1585  003340  000207                          RTS     %7
1586                          ;SUBROUTINE FOR ADVANCING TEST.
1587  003342  012767  000000  000200  RSTART: MOV     #0,STNUM        ;RESET PROGRAM LOADER
1588  003350  022777  000000  175530          CMP     #0,@SR          ;ANY PR SWITCH SET?
1589  003356  001407                          BEQ     RSTA            ;NO - CONTINUE
1590  003360  004767  177700                  JSR     %7,CONIT        ;RESTORE POINTER TO CONSOLE
1591  003364  104000                          TYPE                    ;TYPE ABORT MESSAGE
1592  003366  016575                          ABORT
1593  003370  000005                          RESET
1594  003372  000167  010070                  JMP     LOGICAL         ;EXIT TO MONITOR
1595  003376  004767  000260          RSTA:   JSR     %7,RETPVT       ;RESET INTERRUPT VECTORS
1596  003402  016700  000144                  MOV     CURADD,%0       ;NEXT DEVICE ADD TO R0
1597  003406  026767  000140  000142          CMP     CURADD,LSTADD   ;IS THIS LAST ADDRESS
1598  003414  001442                          BEQ     RSTB            ;YES - GO TO EXIT
1599  003416  062767  000010  000126          ADD     #10,CURADD      ;COMPUTE ADDRESS FOR NEXT TEST.
1600  003424  010067  175466                  MOV     %0,TKS          ;NEW LSR CSR
1601  003430  062700  000002                  ADD     #2,%0
1602  003434  010067  175460                  MOV     %0,TKB          ;NEW LSR BUFFER
1603  003440  062700  000002                  ADD     #2,%0
1604  003444  010067  175452                  MOV     %0,TPS          ;NEW LSP CSR
1605  003450  062700  000002                  ADD     #2,%0
1606  003454  010067  175444                  MOV     %0,TPB          ;NEW LSP BUFFER
1607  003460  016700  000074                  MOV     CURVEC,%0       ;NEXT VECTOR ADD TO R0
1608  003464  062767  000010  000066          ADD     #10,CURVEC      ;COMPUTE ADDRESS FOR NEXT VECTOR
```

```
 1609  003472  010067  175430                MOV     %0,TKVTR        ;NEW LSR INTERRUPT VECTOR
 1610  003476  062700  000004                ADD     #4,%0
 1611  003502  010067  175424                MOV     %0,TPVTR        ;NEW LSP INTERRUPT VECTOR
 1612  003506  012767  003522  174270        MOV     #RSTB,4         ;SETUP TRAP EXIT
 1613  003514  005777  175376                TST     @TKS            ;IS THIS DEVICE EQUIPPED?
 1614  003520  000412                        BR      RSTC            ;EXIT.
 1615  003522  016767  000024  000026  RSTB: MOV     CURADD,LSTADD   ;SETUP LAST ADDRESS
 1616  003530  004767  177530                JSR     %7,CONIT        ;RESTORE POINTER TO CONSOLE
 1617  003534  104000                        TYPE                    ;TYPE DONE MESSAGE
 1618  003536  016340                        DONE
 1619  003540  000005                        RESET
 1620  003542  000167  007720                JMP     LOGICAL         ;EXIT TO MONITOR
 1621  003546  000207                RSTC:   RTS     %7
 1622  003550  000000                STNUM:  OPEN
 1623  003552  000000                CURADD: OPEN
 1624  003554  176500                LOWADD: 176500
 1625  003556  000000                LSTADD: OPEN
 1626  003560  000000                CURVEC: OPEN
 1627                                ;SAVE REGS 0 TO 4 SUBROUTINE.
 1628  003562  012667  000030        SAVRG:  MOV     (6)+,SVRPC      ;SAVE PC AND PSW.
 1629  003566  012667  000026                MOV     (6)+,SVRPSW
 1630  003572  010446                        MOV     %4,-(6)         ;SAVE REGS 0 - 4
 1631  003574  010346                        MOV     %3,-(6)         ;IN STACK.
 1632  003576  010246                        MOV     %2,-(6)
 1633  003600  010146                        MOV     %1,-(6)
 1634  003602  010046                        MOV     %0,-(6)
 1635  003604  016746  000010                MOV     SVRPSW,-(6)     ;RESTORE PC AND PSW.
 1636  003610  016746  000002                MOV     SVRPC,-(6)
 1637  003614  000002                        RTI                     ;EXIT.
 1638  003616  000000                SVRPC:  OPEN
 1639  003620  000000                SVRPSW: OPEN
 1640                                ;RESTORE REGS 0 TO 4 SUBROUTINE.
 1641  003622  012667  000030        RSTRG:  MOV     (6)+,RSTPC      ;SAVE PC AND PSW.
 1642  003626  012667  000026                MOV     (6)+,RSTPSW
 1643  003632  012600                        MOV     (6)+,%0         ;RESTORE REGS 0 - 4
 1644  003634  012601                        MOV     (6)+,%1         ;FROM STACK.
 1645  003636  012602                        MOV     (6)+,%2
 1646  003640  012603                        MOV     (6)+,%3
 1647  003642  012604                        MOV     (6)+,%4
 1648  003644  016746  000010                MOV     RSTPSW,-(6)     ;RESTORE PC AND PSW.
 1649  003650  016746  000002                MOV     RSTPC,-(6)
 1650  003654  000002                        RTI                     ;EXIT
 1651  003656  000000                RSTPC:  OPEN
 1652  003660  000000                RSTPSW: OPEN
 1653                                ;SUBROUTINE TO RESET INTERRUPT VECTORS
 1654  003662  016701  175240        RETPVT: MOV     TKVTR,%1        ;PLACE CURRENT TRAP VECTOR
 1655  003666  010100                        MOV     %1,%0           ;ADDRESS IN R1, AND R1 TO R0.
 1656  003670  062700  000002                ADD     #2,%0           ;ADD #2 TO R0
 1657  003674  010021                        MOV     %0,(1)+         ;STORE .+2 AT TKVTR
 1658  003676  012721  000000                MOV     #0,(1)+         ;STORE HALT AT TKVTR+2
 1659  003702  062700  000004                ADD     #4,%0
 1660  003706  010021                        MOV     %0,(1)+         ;STORE .+2 AT TPVTR
 1661  003710  012711  000000                MOV     #0,@%1          ;STORE HALT AT TPVTR+2
 1662  003714  000207                        RTS     %7
```

```
 1663
 1664                                          ;ROUTINE TO FETCH A CHARACTER
 1665  003716  012767  000310  000040  AREAD:  MOV     #200.,BRCTR     ;SET UP DELAY COUNT.
 1666  003724  052777  000004  175170          BIS     #4,@TPS         ;SET MAINTENANCE BIT
 1667  003732  005077  175166                  CLR     @TPB            ;LOAD PUNCH BUFFER
 1668  003736  105777  175154          ARDA:   TSTB    @TKS            ;CHECK DONE BIT.
 1669  003742  100407                          BMI     ARDB            ;BRANCH IF DONE.
 1670  003744  104400                          DELAY                   ;DELAY 1 MILLISECOND.
 1671  003746  000001                          1
 1672  003750  005367  000010                  DEC     BRCTR           ;TIME UP?
 1673  003754  001370                          BNE     ARDA            ;BRANCH IF TIME NOT UP YET.
 1674  003756  104010                          EHALT                   ;ERROR. NO RESPONSE FROM READER.
 1675  003760  000756                          BR      AREAD           ;TRY AGAIN.
 1676  003762  000207          ARDB:   RTS     %7                      ;EXIT
 1677  003764  000000          BRCTR:  OPEN
 1678                                          ;ROUTINE TO SET LSR INTERRUPT VECTOR AND PRIORITY
 1679  003766  017667  000000  000012  STLSRV: MOV     @(6),STPRA+2    ;MOVE VECTOR ADDR TO STPRA+2
 1680  003774  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
 1681  004000  016701  175122                  MOV     TKVTR,%1
 1682  004004  012721  000000          STPRA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS
 1683  004010  016721  175114                  MOV     TKLVL,(1)+      ;SET PRIORITY
 1684  004014  000002                          RTI                     ;EXIT
 1685                                          ;ROUTINE TO SET LSP INTERRUPT VECTOR AND PRIORITY.
 1686  004016  017667  000000  000012  STLSPV: MOV     @(6),STPPA+2    ;MOVE VECTOR ADDR TO STPPA+2
 1687  004024  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
 1688  004030  016701  175076                  MOV     TPVTR,%1
 1689  004034  012721  000000          STPPA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS.
 1690  004040  016721  175070                  MOV     TPLVL,(1)+      ;SET PRIORITY
 1691  004044  000002                          RTI                     ;EXIT.
 1692                                          ;ROUTINE TO ISSUE RESET.
 1693  004046  012700  052525          SRSETT: MOV     #52525,%0               ;DATA TO R0.
 1694  004052  005100                          COM     %0              ;COMPLEMENT (R0).
 1695  004054  010067  177770                  MOV     %0,SRSETT+2     ;(R0) TO SRSETT+2.
 1696  004060  000005                          RESET                   ;ISSUE RESET. (R0) IS
 1697  004062  000002                          RTI                     ;DISPLAYED. EXIT.
 1698                                          ;RANDOM NUMBER GENERATOR. ROUTINE EXITS WITH NUMBER IN REGISTER 0.
 1699  004064  016700  000042          RNGEN:  MOV     RP1,%0
 1700  004070  006100                          ROL     %0
 1701  004072  006100                          ROL     %0
 1702  004074  066700  000034                  ADD     RP2,%0
 1703  004100  010067  000026                  MOV     %0,RP1
 1704  004104  006100                          ROL     %0
 1705  004106  006100                          ROL     %0
 1706  004110  066700  000020                  ADD     RP2,%0
 1707  004114  006100                          ROL     %0
 1708  004116  006100                          ROL     %0
 1709  004120  010067  000010                  MOV     %0,RP2
 1710  004124  016700  000002                  MOV     RP1,%0
 1711  004130  000207                          RTS     %7              ;EXIT. NUMBER IN R0
 1712  004132  001233          RP1:    1233
 1713  004134  005622          RP2:    5622
```

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 1714                                          ;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE PRINTER.
 1715  004136  011600                  TYP:    MOV     @%6,%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS.
 1716  004140  062716  000002                  ADD     #2,@%6          ;SET UP EXIT.
 1717  004144  011000                          MOV     @%0,%0          ;ADDRESS OF MESSAGE TO R0.
 1718  004146  112067  000306          TYPA:   MOVB    (0)+,TYPDAT     ;GET CHARACTER
 1719  004152  122767  000100  000300          CMPB    #100,TYPDAT     ;CHECK FOR"@"CHARACTER
 1720  004160  001013                          BNE     TYPC            ;BRANCH IF NOT"@".
 1721  004162  112767  000000  000270          MOVB    #0,TYPDAT       ;NULL TO CLEAR DOUBLE BUFFER
 1722  004170  004767  000046                  JSR     %7,OUTTYP
 1723  004174  112767  000000  000256          MOVB    #0,TYPDAT
 1724  004202  004767  000034                  JSR     %7,OUTTYP
 1725  004206  000002                          RTI                     ;TERMINATOR CHAR. DONE. EXIT.
 1726  004210  122767  000045  000242  TYPC:   CMPB    #45,TYPDAT      ;CHECK FOR"%".
 1727  004216  001505                          BEQ     TYPF            ;BRANCH IF"%"
 1728  004220  122767  000043  000232          CMPB    #43,TYPDAT      ;NOT"%".CHECK FOR"#".
 1729  004226  001506                          BEQ     TYPG            ;BRANCH IF "#"
 1730  004230  004767  000006                  JSR     %7,OUTTYP       ;TYPE CHAR IN TYPDAT
 1731  004234  000744                          BR      TYPA
 1732                                          ;SUBROUTINE TO INSERT NULLS AND PRINT CHARACTER.  USES REGISTER
 1733                                          ;LOCATION TYPDAT REFERENCED IN THE OUTPUT MESSAGE SUBROUTINE
 1734                                          ;AND LINKS TO TYPDAT REGISTER IN THE LSPCH SUBROUTINE.
 1735  004236  113067  000216          OUT:    MOVB    %0,TYPDAT       ;MOVE LSPCH CHAR TO TYPDAT.
 1736  004242  122767  000012  000210  OUTTYP: CMPB    #12,TYPDAT      ;CHECK FOR LINE FEED.
 1737  004250  001437                          BEQ     OUTNUL          ;GO TO NULL ROUTINE
 1738  004252  122767  000013  000200          CMPB    #13,TYPDAT      ;CHECK FOR CURSOR DWN
 1739  004260  001433                          BEQ     OUTNUL          ;GO TO NULL ROUTINE
 1740  004262  122767  000035  000170          CMPB    #35,TYPDAT      ;CHECK FOR CURSOR HOME
 1741  004270  001427                          BEQ     OUTNUL          ;GO TO NULL ROUTINE
 1742  004272  122767  000032  000160          CMPB    #32,TYPDAT      ;CHECK FOR CURSOR UP
 1743  004300  001423                          BEQ     OUTNUL          ;GO TO NULL ROUTINE
 1744  004302  122767  000037  000150          CMPB    #37,TYPDAT      ;CHECK FOR ERASE SCREEN
 1745  004310  001417                          BEQ     OUTNUL          ;GO TO NULL ROUTINE
 1746  004312  122767  000016  000140          CMPB    #16,TYPDAT      ;CHECK FOR CAD OPERATION
 1747  004320  001407                          BEQ     OUTNCT          ;GO TO CAD NULL ROUTINE
 1748  004322  026727  000102  000004          CMP     NULL,#4         ;NULL CTR 4 OR GREATER?
 1749  004330  003412                          BLE     OUTCAR          ;IF NOT GREATER GO TO OUTPUT
 1750  004332  005367  000072                  DEC     NULL            ;DEC NULL REGISTER
 1751  004336  000407                          BR      OUTCAR          ;GO TO OUTPUT.
 1752  004340  012767  000005  000062  OUTNCT: MOV     #5,NULL         ;SET NULL CTR TO 6
 1753  004346  000403                          BR      OUTCAR          ;GO TO OUTPUT
 1754  004350  012767  000004  000052  OUTNUL: MOV     #4,NULL         ;SET NULL CTR TO 4.
 1755  004356  116777  000076  174540  OUTCAR: MOVB    TYPDAT,@TPB     ;OUTPUT CHARACTER TO PRINTER
 1756  004364  105777  174532                  TSTB    @TPS            ;WAIT FOR DONE FLAG.
 1757  004370  100375                          BPL     .-4
 1758  004372  026727  000032  000004          CMP     NULL,#4         ;IS COUNTER> 4
 1759  004400  003012                          BGT     OUTEX           ;IF GREATER EXIT
 1760  004402  022767  000000  000020          CMP     #0,NULL         ;IS NULL CTR = 0
 1761  004410  001406                          BEQ     OUTEX           ;IF ZERO EXIT
 1762  004412  005367  000012                  DEC     NULL            ;DEC NULL CTR
 1763  004416  112767  000000  000034          MOVB    #0,TYPDAT       ;TRANSFER ZERO TO OUTPUT
 1764  004424  000754                          BR      OUTCAR
 1765  004426  000207                  OUTEX:  RTS     %7              ;EXIT
 1766  004430  000000                  NULL:   .OPEN
 1767  004432  112767  000015  000020  TYPF:   MOVB    #15,TYPDAT      ;MOVE CARRIAGE RETURN CODE TO TYPDAT
 1768  004440  004767  177576                  JSR     %7,OUTTYP       ;GO TYPE CHAR.
 1769  004444  112767  000012  000006  TYPG:   MOVB    #12,TYPDAT      ;MOVE LF CODE TO TYPDAT.
```

```
 1770  004452  004767  177564                JSR     %7,OUTTYP       ;GO TYPE CHAR.
 1771  004456  000633                        BR      TYPA
 1772  004460  000000              TYPDAT:   OPEN
 1773                              ;SUBROUTINE TO OUTPUT A SERIES OF ASCII MESSAGES ON TELETYPE PRINTER
 1774  004462  011600              TYPS:     MOV     @%6,%0          ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
 1775  004464  062716  000002              ADD     #2,@%6          ;UPDATE TO NEXT MESSAGE ADDRESS
 1776  004470  011067  000014              MOV     @%0,TYPSB       ;ADDRESS OF MESSAGE TO TYPSB
 1777  004474  022767  177777  000006      CMP     #-1,TYPSB       ;CHECK FOR TERMINATOR
 1778  004502  001001                      BNE     TYPSA           ;BRANCH IF NOT TERMINATOR.
 1779  004504  000002                      RTI                     ;TERMINATOR, EXIT
 1780  004506  104000              TYPSA:    TYPE                  ;CALL ON TYP SUB TO TYPE MESSAGE
 1781  004510  000000              TYPSB:    OPEN                  ;ADDRESS OF MESSAGE GOES HERE
 1782  004512  000763                        BR      TYPS            ;GO PROCESS NEXT MESSAGE
```

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1783
1784                                    ;SUBROUTINE TO DELAY A SPECIFIED NUMBER OF MILLISECONDS
1785  004514  011667  000036            DLY:    MOV     @%6,DLCNT       ;GET DELAY COUNT ADDRESS.
1786  004520  062716  000002                    ADD     #2,@%6          ;SET UP EXIT ADDRESS
1787  004524  017746  000026                    MOV     @DLCNT,-(6)     ;DELAY COUNT TO STACK
1788  004530  005067  173242                    CLR     PSW             ;SET PRIORITY 0
1789  004534  012746  002260            DLYA:   MOV     #2260,-(6)      ;1 MSEC COUNT TO STACK
1790  004540  005316                    DLYB:   DEC     @%6             ;DECREMENT 1 MSEC COUNT
1791  004542  001376                            BNE     DLYB            ;BRANCH IF NOT 0.
1792  004544  005726                            POPSP                   ;ZERO. UNCOVER MSECS. COUNT.
1793  004546  005316                            DEC     @%6             ;DECREMENT IT
1794  004550  001371                            BNE     DLYA            ;BR IF NOT DONE DELAYING
1795  004552  005726                            POPSP                   ;DONE
1796  004554  000002                            RTI                     ;EXIT.
1797  004556  000000            DLCNT:  OPEN                            ;CONTAINS MILLISECONDS COUNT ADDRESS.
1798                                    ;SUBROUTINE TO STALL A RANDOM NUMBER OF MILLISECONDS. MAXIMUM STALL
1799                                    ;DETERMINED BY CONTENTS OF LOC STLMSK.
1800  004560  032767  040000  174370    STAL:   BIT     #BIT14,PRGID    ;TEST FOR STALLS ALLOWED.
1801  004566  001001                            BNE     STALAA          ;ALLOWED.
1802  004570  000002                            RTI                     ;NOT ALLOWED.
1803  004572  004767  177266            STALAA: JSR     %7,RNGEN        ;GO GET RANDOM NUMBER.
1804  004576  046700  000014                    BIC     STLMSK,%0       ;# IN R0. APPLY STALL MASK.
1805  004602  001404                            BEQ     STALB           ;BRANCH IF RESULT IS 0.
1806  004604  010067  000002                    MOV     %0,STALA
1807  004610  104400                            DELAY                   ;DELAY
1808  004612  000000            STALA:  OPEN                            ;DELAY COUNT
1809  004614  000002            STALB:  RTI                             ;DONE. EXIT.
1810  004616  000000            STLMSK: OPEN                            ;STALL MASK.
1811                                    ;SUBROUTINE TO GENERATE RANDOM CHARACTER COUNT
1812  004620  004767  177240    GRCNT:  JSR     %7,RNGEN        ;GET RANDOM NUMBER
1813  004624  046700  000010            BIC     RCMSK,%0        ;APPLY MASK
1814  004630  001773                    BEQ     GRCNT           ;TRY AGAIN IF RESULT 0
1815  004632  010067  000004            MOV     %0,RNCNT        ;COUNT TO RNCNT
1816  004636  000207                    RTS     %7              ;EXIT.
1817  004640  000000            RCMSK:  OPEN                    ;RANDOM CHARACTER MASK.
1818  004642  000000            RNCNT:  OPEN                    ;RANDOM CHARACTER COUNT.
```

```
 1819                                           ;SUBROUTINE TO INITIALIZE BINARY COUNT PATTERNS
 1820  004644  012767  177777  000014  INBIN:   MOV     #-1,RIND        ;SET ALL VARIABLES
 1821  004652  004567  000300                   JSR     %5,BMOVE        ;TO MINUS 1.
 1822  004656  004666                           RIND
 1823  004660  004667                           RIND+1
 1824  004662  000013                           11.
 1825  004664  000207                           RTS     %7              ;EXIT
 1826  004666  000000                  RIND:    OPEN
 1827  004670  000000                  PTO:     OPEN
 1828  004672  000000                  PT1:     OPEN
 1829  004674  000000                  PIND:    OPEN
 1830  004676  000000                  PTOP:    OPEN
 1831  004700  000000                  PT1P:    OPEN
```

```
 1832
 1833                                          ;SPECIAL BINARY COUNT PATTERN SUBROUTINE. EXITS WITH BIN CHAR IN R0
 1834  004702  016767  177762  177762  GTBIN:  MOV     PT0,PT1         ;PREVIOUS BIN CHAR TO PT1
 1835  004710  005167  177756                  COM     PT1
 1836  004714  005167  177746                  COM     RIND
 1837  004720  001002                          BNE     .+6
 1838  004722  005267  177744                  INC     PT1
 1839  004726  042767  177400  177736          BIC     #177400,PT1     ;MASK TO 8 BITS
 1840  004734  016767  177732  177726          MOV     PT1,PT0         ;SAVE BIN CHAR IN PT0
 1841  004742  016700  177724                  MOV     PT1,%0          ;BIN CHAR TO R0.
 1842  004746  000207                          RTS     %7              ;EXIT.
 1843  004750  016767  177722  177722  GTBINP: MOV     PTOP,PT1P       ;PREVIOUS BIN CHAR TO PT1P
 1844  004756  005167  177716                  COM     PT1P
 1845  004762  005167  177706                  COM     PIND
 1846  004766  001002                          BNE     .+6
 1847  004770  005267  177704                  INC     PT1P
 1848  004774  042767  177400  177676          BIC     #177400,PT1P    ;MASK TO 8 BITS.
 1849  005002  016767  177672  177666          MOV     PT1P,PTOP       ;SAVE BIN CHAR IN PTOP.
 1850  005010  016701  177664                  MOV     PT1P,%1         ;BIN CHAR TO R1.
 1851  005014  000207                          RTS     %7              ;EXIT.
 1852                                          ;OCTAL TO ASCII CONVERT ROUTINES
 1853  005016  012500                  ACNV6:  MOV     (5)+,%0         ;CONVERT TO 6 ASCII. GET OCTAL ADDRESS
 1854  005020  012567  000012                  MOV     (5)+,ACNVB      ;GET ASCII ADDRESS
 1855  005024  004767  000052                  JSR     %7,ACNV         ;CONVERT TO ASCII
 1856  005030  004567  000122                  JSR     %5,BMOVE        ;MOVE 6 CHARS TO ASCII ADDRESS
 1857  005034  005072                          A1ST
 1858  005036  000000                  ACNVB:  OPEN
 1859  005040  000006                          6
 1860  005042  000205                          RTS     %5              ;EXIT
 1861  005044  012500                  ACNV4:  MOV     (5)+,%0         ;CONVERT TO 4 ASCII. GET OCTAL ADDRESS
 1862  005046  012567  000012                  MOV     (5)+,ACNVC      ;GET ASCII ADDRESS
 1863  005052  004767  000024                  JSR     %7,ACNV         ;CONVERT TO ASCII
 1864  005056  004567  000074                  JSR     %5,BMOVE        ;MOVE 4 CHARS TO ASCII ADDRESS.
 1865  005062  005074                          A1ST+2
 1866  005064  000000                  ACNVC:  OPEN
 1867  005066  000004                          4
 1868  005070  000205                          RTS     %5              ;EXIT
 1869  005072  000000                  A1ST:   OPEN
 1870  005074  000000                          OPEN
 1871  005076  000000                          OPEN
 1872  005100  000000                  ACNVX:  OPEN
 1873  005102  012701  005100          ACNV:   MOV     #A1ST+6,%1      ;ADDR TO STORE ASCII TO R1
 1874  005106  012702  000006                  MOV     #6,%2           ;6 TO R2
 1875  005112  011067  177762                  MOV     @%0,ACNVX       ;OCTAL WORD TO ACNVX
 1876  005116  016703  177756          ACNVM:  MOV     ACNVX,%3
 1877  005122  042703  177770                  BIC     #177770,%3      ;ISOLATE LEAST SIGNIFICANT OCTAL #
 1878  005126  062703  000060                  ADD     #60,%3          ;ADD 60 TO CONVERT TO ASCII
 1879  005132  110341                          MOVB    %3,-(1)         ;STORE ASCII BYTE
 1880  005134  006067  177740                  ROR     ACNVX           ;MOVE NEXT OCTAL DIGIT TO LEAST
 1881  005140  006067  177734                  ROR     ACNVX           ;SIGNIFICANT POSITION
 1882  005144  006067  177730                  ROR     ACNVX
 1883  005150  005302                          DEC     %2              ;DONE 6 TIMES?
 1884  005152  001361                          BNE     ACNVM           ;NO. REPEAT.
 1885  005154  000207                          RTS     %7              ;YES. EXIT.
```

```
1886
1887                                    ;SUBROUTINE TO MOVE A VARIABLE NUMBER OF BYTES.
1888  005156  104020                    BMOVE:  SAVREG                  ;SAVE REGS.
1889  005160  012501                            MOV     (5)+,%1         ;GET"FROM"ADDRESS
1890  005162  012502                            MOV     (5)+,%2         ;GET"TO"ADDRESS
1891  005164  012503                            MOV     (5)+,%3         ;GET COUNT
1892  005166  112122                    BMOVA:  MOVB    (1)+,(2)+       ;MOVE BYTE
1893  005170  005303                            DEC     %3              ;DECREMENT COUNT
1894  005172  001375                            BNE     BMOVA           ;BRANCH IF NOT DONE.
1895  005174  104021                            RSTREG                  ;RESTORE REGS.
1896  005176  000205                            RTS     %5              ;DONE EXIT
1897                                    ;SUBROUTINE TO CHECK FOR PUNCH READY.
1898  005200  105777  173716            CPRDY:  TSTB    @TPS            ;TEST FOR READY BIT.
1899  005204  100001                            BPL     CPRDYA          ;BRANCH IF READY NOT SET.
1900  005206  000207                            RTS     %7              ;OK. EXIT.
1901  005210  104010                    CPRDYA: EHALT                   ;NOT READY. HALT.
1902  005212  000772                            BR      CPRDY
1903                                    ;SUBROUTINE TO PUNCH ON LSP CHARACTER IN REG 0.
1904  005214  004767  177760            LSPCH:  JSR     %7,CPRDY        ;GO CHECK FOR PUNCH READY
1905  005220  004767  177012                    JSR     %7,OUT          ;GO TO OUTPUT ROUTINE.
1906  005224  005000                            CLR     %0
1907  005226  000207                            RTS     %7              ;DONE. EXIT.
1908                                    ;BINARY TO DECIMAL ASCII CONVERT SUBROUTINE.
1909  005230  012700  017614            BDCNV:  MOV     #DECVAL,%0      ;SET UP ADDR TO STORE DECIMAL ASCII IN R0
1910  005234  013501                            MOV     @(5)+,%1        ;BINARY VALUE TO R1.
1911  005236  012702  005336                    MOV     #ADTENP,%2      ;ADDR OF TEN POWER STRING TO R2.
1912  005242  012767  000005  000060            MOV     #5,CNVCTR       ;SET UP FOR 5 POWER CONVERSIONS.
1913  005250  012267  000060            BDCNVA: MOV     (2)+,TENPWR     ;MOVE POWER OF TEN VALUE TO TENPWR.
1914  005254  004767  000010                    JSR     %7,SUBTEN       ;PERFORM CONVERSION
1915  005260  005367  000044                    DEC     CNVCTR          ;DONE 5 CONVERSIONS?
1916  005264  001371                            BNE     BDCNVA          ;BRANCH IF NOT YET 5.
1917  005266  000205                            RTS     %5              ;YES, EXIT.
1918  005270  005067  000036            SUBTEN: CLR     DIGIT           ;CLEAR DIGIT
1919  005274  166701  000034            SUBTNA: SUB     TENPWR,%1       ;SUBTRACT TEN POWER FROM BINARY VALUE.
1920  005300  103403                            BCS     SUBTNB          ;BRANCH IF UNSUCCESSFUL SUBTRACTION.
1921  005302  005267  000024                    INC     DIGIT
1922  005306  000772                            BR      SUBTNA
1923  005310  066701  000020            SUBTNB: ADD     TENPWR,%1       ;RESTORE SUBTRACTED VALUE.
1924  005314  062767  000060  000010            ADD     #60,DIGIT       ;CONVERT (DIGIT) TO ASCII
1925  005322  116720  000004                    MOVB    DIGIT,(0)+      ;MOVE ASCII CHAR TO DECVAL FIELD.
1926  005326  000207                            RTS     %7              ;EXIT.
1927  005330  000000            CNVCTR: OPEN
1928  005332  000000            DIGIT:  OPEN
1929  005334  000000            TENPWR: OPEN
1930  005336  023420            ADTENP: 10000.
1931  005340  001750                    1000.
1932  005342  000144                    100.
1933  005344  000012                    10.
1934  005346  000001                    1
```

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1935
1936                                        ;SUBROUTINE TO TYPE A LINE OF CHARACTERS
1937  005350  012767  000112  000050  TYPLN:  MOV     #74.,TCTR       ;72 TO CHAR COUNT +CR,LF
1938  005356  012704  017621          TYPLA:  MOV     #BLOCKA,%4      ;SET LINE ADDRESS IN R4.
1939  005362  104002                  TYPLB:  STALL                   ;STALL IF ALLOWED.
1940  005364  112400                          MOVB    (4)+,%0         ;GET CHARACTER
1941  005366  004767  177622                  JSR     %7,LSPCH        ;GO OUTPUT CHARACTER.
1942  005372  005367  000030                  DEC     TCTR            ;DONE?
1943  005376  001371                          BNE     TYPLB           ;BRANCH IF NOT DONE.
1944  005400  112767  000000  177052  TYPCLR: MOVB    #0,TYPDAT
1945  005406  004767  176630                  JSR     %7,OUTTYP
1946  005412  112767  000000  177040          MOVB    #0,TYPDAT
1947  005420  004767  176616                  JSR     %7,OUTTYP
1948  005424  000207                          RTS     %7              ;DONE. EXIT
1949  005426  000000                  TCTR:   OPEN
1950                                        ;SUBROUTINE TO TYPE LINE OF 3 CHARACTERS
1951  005430  011667  000016          TYPL3:  MOV     @%6,TPL3A       ;DEVELOP AND SET ADDRESS OF
1952  005434  017767  000012  000010          MOV     @TPL3A,TPL3A    ;DATA IN TPL3A.
1953  005442  062716  000002                  ADD     #2,@%6          ;SET UP EXIT.
1954  005446  004567  000034                  JSR     %5,FBF3         ;FILL BUFFER WITH 3 CHARACTERS
1955  005452  000000                  TPL3A:  OPEN
1956  005454  042767  040000  173474          BIC     #BIT14,PRGID    ;DISABLE STALLS.
1957  005462  004767  177662                  JSR     %7,TYPLN        ;GO TYPE LINE OF CHARACTERS.
1958  005466  000002                          RTI                     ;EXIT.
1959  005470  112767  000015  012123  STBF:   MOVB    #15,BLOCKA      ;SUB TO SET UP BUFFER AREA.
1960  005476  112767  000012  012116          MOVB    #12,BLOCKA+1
1961  005504  000207                          RTS     %7              ;EXIT
1962                                        ;SUBROUTINE TO FILL CHARACTER BUFFER WITH 3 CHARACTERS.
1963  005506  012567  000004          FBF3:   MOV     (5)+,FBF3A
1964  005512  004567  177440                  JSR     %5,BMOVE        ;MOVE 3 CHARS TO BUFFER.
1965  005516  000000                  FBF3A:  OPEN
1966  005520  017623                          BLOCK1
1967  005522  000003                          3
1968  005524  004567  177426          FBF3B:  JSR     %5,BMOVE        ;FILL 72 CHARACTERS BUFFER
1969  005530  017623                          BLOCK1                  ;WITH 3 CHARACTERS
1970  005532  017626                          BLOCK1+3
1971  005534  000105                          69.
1972  005536  004567  177414                  JSR     %5,BMOVE
1973  005542  017623                          BLOCK1
1974  005544  017735                          BLOCK2
1975  005546  000110                          72.
1976  005550  000205                          RTS     %5              ;EXIT
```

```
 1977
 1978                                   ;SUBROUTINE TO FILL BUFFER WITH ALL CHARACTERS
 1979  005552  004567  177400  FBALL:   JSR     %5,BMOVE        ;FILL 72 CHAR BUFFER WITH
 1980  005556  016646                   A                       ;ALL CHARACTERS.
 1981  005560  017623                   BLOCK1
 1982  005562  000077                   63.
 1983  005564  004567  177366           JSR     %5,BMOVE
 1984  005570  016646                   A
 1985  005572  017722                   BLOCK1+63.
 1986  005574  000011                   9.
 1987  005576  004567  177354           JSR     %5,BMOVE
 1988  005602  017623                   BLOCK1
 1989  005604  017735                   BLOCK2
 1990  005606  000110                   72.
 1991  005610  000207                   RTS     %7              ;EXIT.
 1992                                   ;SUB TO FILL BUFFER WITH 33 WORST CASE PATTERN.
 1993  005612  004567  177340  FW336:   JSR     %5,BMOVE        ;6 CHARACTER PATTERN TO BUFFER
 1994  005616  016632                   A33WP6
 1995  005620  017623                   BLOCK1
 1996  005622  000006                   6
 1997  005624  004567  177226           JSR     %5,BMOVE        ;FILL BUFFER WITH PATTERN.
 1998  005630  017623                   BLOCK1
 1999  005632  017631                   BLOCK1+6
 2000  005634  000102                   66.
 2001  005636  004567  177314           JSR     %5.BMOVE
 2002  005642  017623                   BLOCK1
 2003  005644  017735                   BLOCK2
 2004  005646  000110                   72.
 2005  005650  000207                   RTS     %7              ;EXIT
 2006
 2007                                   ;SUB TO FILL BUFFER WITH 35 WORST CASE PATTERN.
 2008  005652  004567  177300  FW356:   JSR     %5,BMOVE        ;6 CHARACTER PATTERN TO BUFFER
 2009  005656  016640                   A35WP6
 2010  005660  017623                   BLOCK1
 2011  005662  000006                   6
 2012  005664  004567  177266           JSR     %5,BMOVE        ;FILL BUFFER WITH PATTERN.
 2013  005670  017623                   BLOCK1
 2014  005672  017631                   BLOCK1+6
 2015  005674  000102                   66.
 2016  005676  004567  177254           JSR     %5,BMOVE
 2017  005702  017623                   BLOCK1
 2018  005704  017735                   BLOCK2
 2019  005706  000110                   72.
 2020  005710  000207                   RTS     %7              ;EXIT.
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                                                ;PRGO - INPUT-OUTPUT LOGIC TESTS
005712  012767  005724  173222  PRGO:   MOV     #ATO,KSTART     ;ADDRESS OF 1ST ROUTINE TO KSTART.
005720  000167  174404          JMP     SRSE+           ;GO GET STARTED.
                                ;TEST ABILITY TO REFERENCE THE KEYBOARD/READER STATUS WORD (TKS)
005724  000000          ATO:    0                       ;TEST #.
005726  005756                  AT1                     ;NEXT TEST.
005730  001750                  1000.                   ;I COUNT.
005732  005742                  ATOA                    ;SCOPE ENTRY.
005734  012767  005752  172042        MOV     #ATOE,MACHER    ;SET UP MACHINE ERROR TRAP.
005742  005777  173150  ATOA:   TST     @TKS            ;REFERENCE CODER STATUS WORD.
005746  104012          ATOB:   CHAIN                   ;CHAIN
005750  000774                  BR      ATOA            ;REPEAT TEST.
005752  104003          ATOE:   ERROR                   ;ERROR. TRAPPED WHEN REFERENCING READER.
005754  000774                  BR      ATOB            ;STATUS WORD (TKS).
                                ;TEST ABILITY TO REFERENCE THE KEYBOARD/READER BUFFER (TKB).
005756  000001          AT1:    1                       ;TEST #.
005760  006010                  AT2                     ;NEXT TEST.
005762  001750                  1000.                   ;I COUNT.
005764  005774                  AT1A                    ;SCOPE ENTRY.
005766  012767  006004  172010        MOV     #AT1E,MACHER    ;SET UP MACHINE ERROR TRAP
005774  005777  173120  AT1A:   TST     @TKB            ;REFERENCE READER BUFFER.
006000  104012          AT1B:   CHAIN                   ;CHAIN
006002  000774                  BR      AT1A            ;REPEAT TEST.
006004  104003          AT1E:   ERROR                   ;ERROR. TRAPPED WHEN REFERENCING
006006  000774                  BR      AT1B            ;READER BUFFER. (TKB).
                                ;TEST ABILITY TO REFERENCE PUNCH/PRINTER STATUS WORD (TPS).
006010  000002          AT2:    2                       ;TEST #.
006012  006042                  AT3                     ;NEXT TEST
006014  001750                  1000.                   ;I COUNT.
006016  006026                  AT2A                    ;SCOPE ENTRY.
006020  012767  006036  171756        MOV     #AT2E,MACHER    ;SETUP MACHINE ERROR TRAP.
006026  005777  173070  AT2A:   TST     @TPS            ;REFERENCE PUNCH/PRINTER STATUS WORD.
006032  104012          AT2B:   CHAIN                   ;CHAIN
006034  000774                  BR      AT2A            ;REPEAT TEST.
006036  104003          AT2E:   ERROR                   ;ERROR. TRAPPED WHEN REFERENCING
006040  000774                  BR      AT2B            ;PUNCH/PRINTER STATUS WORD (TPS).
                                ;TEST ABILITY TO REFERENCE PUNCH/PRINTER BUFFER (TPB).
006042  000003          AT3:    3
006044  006074                  AT4
006046  001750                  1000.
006050  006060                  AT3A
006052  012767  006070  171724        MOV     #AT3E,MACHER    ;SETUP MACHINE ERROR TRAP.
006060  005777  173040  AT3A:   TST     @TPB            ;REFERENCE PUNCH/PRINTER BUFFER.
006064  104012          AT3B:   CHAIN                   ;CHAIN
006066  000774                  BR      AT3A            ;REPEAT TEST.
006070  104003          AT3E:   ERROR                   ;ERROR. TRAPPED WHEN REFERENCING
006072  000774                  BR      AT3B            ;PUNCH/PRINTER BUFFER. (TPB).
```

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 2069
 2070                                          ;TEST ABILITY TO SET AND CLEAR READER/KYBD ID BIT
 2071  006074  000004                AT4:     4                          ;TEST #
 2072  006076  006160                         AT5                        ;NEXT TEST
 2073  006100  001750                         1000.                      ;I COUNT
 2074  006102  006112                         AT4A                       ;SCOPE ENTRY
 2075  006104  012767  000340  171664         MOV      #PRTY7,PSW        ;SET PRIORITY 7.
 2076  006112  052777  000100  172776 AT4A:   BIS      #BIT6,@TKS        ;SET ID BIT IN TKS.
 2077  006120  032777  000100  172770         BIT      #BIT6,@TKS        ;CHECK ID BIT IN TKS
 2078  006126  001002                         BNE      AT4B              ;BRANCH IF ID BIT IS SET.
 2079  006130  104003                AT4E1:   ERROR                      ;ERROR 1 ID BIT NOT SET.
 2080  006132  000410                         BR       AT4C
 2081  006134  042777  000100  172754 AT4B:   BIC      #BIT6,@TKS        ;CLEAR ID BIT IN TKS
 2082  006142  032777  000100  172746         BIT      #BIT6,@TKS        ;CHECK ID BIT IN TKS.
 2083  006150  001401                         BEQ      AT4C              ;BRANCH IF ID BIT IS CLEARED.
 2084  006152  104003                AT4E2:   ERROR                      ;ERROR. ID BIT FAILED TO CLEAR.
 2085  006154  104012                AT4C:    CHAIN                      ;CHAIN
 2086  006156  000755                         BR       AT4A              ;REPEAT TEST.
 2087                                          ;TEST ABILITY TO CLEAR ID BIT WITH RESET INSTRUCTION.
 2088  006160  000005                AT5:     5                          ;TEST #
 2089  006162  007050                         AT24                       ;NEXT TEST
 2090  006164  000144                         100.                       ;I COUNT
 2091  006166  006176                         AT5A                       ;SCOPE ENTRY.
 2092  006170  012767  000340  171600         MOV      #PRTY7,PSW        ;SET PRIORITY 7.
 2093  006176  052777  000100  172712 AT5A:   BIS      #BIT6,@TKS        ;SET ID BIT IN TKS
 2094  006204  104011                         SRESET                     ;RESET
 2095  006206  032777  000100  172702         BIT      #BIT6,@TKS        ;TEST ID BIT.
 2096  006214  001401                         BEQ      AT5B              ;BRANCH IF ID BIT IS CLEAR.
 2097  006216  104003                AT5E:    ERROR                      ;ERROR. RESET FAILED TO CLEAR ID BIT.
 2098  006220  104012                AT5B:    CHAIN                      ;CHAIN
 2099  006222  000765                         BR       AT5A              ;REPEAT TEST.
 2100                                          ;TEST THAT READER DONE BIT SETS BY 200 MSECS AFTER READER ENABLE
 2101  006224  000011                AT11:    11                         ;TEST #
 2102  006226  006250                         AT12                       ;NEXT TEST
 2103  006230  000144                         100.                       ;ICOUNT
 2104  006232  006234                         AT11A                      ;SCOPE ENTRY
 2105  006234  104400                AT11A:   DELAY
 2106  006236  000226                         150.                       ;WAIT 150 MSECS
 2107  006240  004767  175452                 JSR      %7,AREAD          ;ENABLE READER
 2108  006244  104012                AT11B:   CHAIN                      ;CHAIN
 2109  006246  000772                         BR       AT11A             ;REPEAT TEST
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2110                                        ;TEST THAT DONE BIT READS RELIABLY.
2111  006250  000012                AT12:   12                  ;TEST #
2112  006252  006322                        AT13                ;NEXT TEST
2113  006254  000012                        10.                 ;I COUNT
2114  006256  006260                        AT12A               ;SCOPE ENTRY.
2115  006260  104400                AT12A:  DELAY               ;WAIT 150 MSECS.
2116  006262  000226                        150.
2117  006264  004767  175426        AT12B:  JSR     %7,AREAD    ;ENABLE READER. COME BACK WHEN DONE SET.
2118  006270  012767  001750  172772        MOV     #1000.,CTRA ;1000 TO CTRA
2119  006276  105777  172614        AT12C:  TSTB    @TKS        ;TEST FOR DONE
2120  006302  100402                        BMI     AT12D       ;BRANCH IF DONE FOUND SET.
2121  006304  104003                AT12E:  ERROR               ;ERROR. DONE BIT NOT FOUND SET.
2122  006306  000403                        BR      AT12F
2123  006310  005367  172754        AT12D:  DEC     CTRA        ;CHECKED 1000 TIMES?
2124  006314  001370                        BNE     AT12C       ;BRANCH IF NOT 1000 YET.
2125  006316  104012                AT12F:  CHAIN               ;CHAIN
2126  006320  000761                        BR      AT12B       ;REPEAT TEST.
2127                                        ;TEST THAT RESET CLEARS DONE BIT
2128  006322  000013                AT13:   13                  ;TEST #
2129  006324  006360                        AT14                ;NEXT TEST
2130  006326  000144                        100.                ;I COUNT
2131  006330  006332                        AT13A               ;SCOPE ENTRY
2132  006332  104400                AT13A:  DELAY               ;WAIT 150 MSECS.
2133  006334  000226                        150.
2134  006336  004767  175354        AT13B:  JSR     %7,AREAD    ;ENABLE READER. COME BACK WHEN DONE SET.
2135  006342  104011                        SRESET              ;ISSUE RESET.
2136  006344  105777  172546                TSTB    @TKS        ;TEST FOR DONE BIT
2137  006350  100001                        BPL     AT13C       ;BRANCH IF DONE BIT RESET.
2138  006352  104003                AT13E:  ERROR               ;ERROR. RESET FAILED TO CLEAR DONE.
2139  006354  104012                AT13C:  CHAIN               ;CHAIN
2140  006356  000767                        BR      AT13B       ;REPEAT TEST.
2141                                        ;TEST THAT REFERENCING READER DATA BUFFER CLEARS DONE
2142  006360  000014                AT14:   14                  ;TEST #
2143  006362  006420                        AT17                ;NEXT TEST
2144  006364  000144                        100.                ;I COUNT
2145  006366  006370                        AT14A               ;SCOPE ENTRY
2146  006370  104400                AT14A:  DELAY               ;WAIT 150 MSECS.
2147  006372  000226                        150.
2148  006374  004767  175316        AT14B:  JSR     %7,AREAD    ;ENABLE READER. RETURN WHEN DONE SET.
2149  006400  105777  172514                TSTB    @TKB        ;REFERENCE READ BUFFER.
2150  006404  105777  172506                TSTB    @TKS        ;TEST FOR DONE BIT
2151  006410  100001                        BPL     AT14C       ;BRANCH IF DONE NOT SET.
2152  006412  104003                AT14E:  ERROR               ;ERROR. REFERENCE TO BUFFER DID NOT RESET DONE.
2153  006414  104012                AT14C:  CHAIN               ;CHAIN
2154  006416  000766                        BR      AT14B       ;REPEAT TEST
2155                                        ;TEST THAT READ BUFFER CAN BE READ RELIABLY.
2156  006420  000017                AT17:   17                  ;TEST#
2157  006422  006514                        AT20                ;NEXT TEST
2158  006424  000144                        100.                ;I COUNT
2159  006426  006430                        AT17A               ;SCOPE ENTRY
2160  006430  104400                AT17A:  DELAY               ;WAIT 150 MSECS
2161  006432  000226                        150.
2162  006434  004767  175256        AT17B:  JSR     %7,AREAD    ;ENABLE READER. RETURN WHEN DONE SET.
2163  006440  117767  172454  172611        MOVB    @TKB,CRBUF+1 ;BUFFER CONTENTS TO CRBUF+1
2164  006446  012767  000144  172614        MOV     #100.,CTRA  ;100 TO CTRA
2165  006454  117767  172440  172574 AT17C:  MOVB    @TKB,CRBUF  ;BUFFER CONTENTS TO CRBUF
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 2166  006462  126767  172570  172567          CMPB    CRBUF,CRBUF+1   ;COMPARE CONTENTS OF CRBUF AND CRBUF+1
 2167  006470  001404                          BEQ     AT17D           ;BRANCH IF SAME.
 2168  006472  016700  172560                  MOV     CRBUF,%0        ;NOT SAME, ERROR, HALT WITH 1ST READ CHAR
 2169  006476  000000                  AT17E:  HALT                    ;IN DATA BYTES LEFT. SUBSEQUENT READ IN DATA BYTES RIGHT
 2170  006500  000403                          BR      AT17F
 2171  006502  005367  172562          AT17D:  DEC     CTRA            ;HERE IF SAME. CHECKED 100 TIMES?
 2172  006506  001362                          BNE     AT17C           ;BRANCH IF NOT.
 2173  006510  104012                  AT17F:  CHAIN                   ;CHAIN
 2174  006512  000750                          BR      AT17B           ;REPEAT TEST.
```

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2175
2176                                    ;TEST THAT READER DONE BIT IS ABLE TO CAUSE INTERRUPT. IF THE INTERRUPT IS
2177                                    ;SERVICED, IT WILL HAVE OCURRED AT CORRECT VECTOR.
2178  006514  000020                    AT20:   20                      ;TEST#
2179  006516  006572                            AT21                    ;NEXT TEST
2180  006520  001750                            1000.                   ;I COUNT
2181  006522  006540                            AT20B                   ;SCOPE ENTRY
2182  006524  104006                            STRDRV                  ;SET UP READER VECTOR TO AT20C
2183  006526  006564                            AT20C
2184  006530  104400                    AT20A:  DELAY                   ;WAIT 150 MSECS.
2185  006532  000226                            150.
2186  006534  004767  175156                    JSR     %7,AREAD        ;ENABLE READER. RETURN WHEN DONE SET.
2187  006540  005077  172352            AT20B:  CLR     @TKS            ;DISABLE READER INTERRUPTS
2188  006544  005067  171226                    CLR     PSW             ;ENABLE READER. RETURN WHEN DONE SET.
2189  006550  052777  000100  172340            BIS     #BIT6,@TKS      ;ENABLE READER INTERRUPT,
2190  006556  000240                            NOP
2191  006560  104003            AT20E:  ERROR                           ;ERROR. READER FAILED TO INTERRUPT.
2192  006562  000401                            BR      AT20D
2193  006564  022626            AT20C:  POPSP2                          ;HERE IF INTERRUPT OCCURS. POP STACK TWICE.
2194  006566  104012            AT20D:  CHAIN                           ;CHAIN
2195  006570  000763                            BR      AT20B           ;REPEAT TEST.
2196                                    ;TEST THAT DONE DOES NOT CAUSE INTERRUPT WITH PROCESSOR AT SAME
2197                                    ;PRIORITY LEVEL AS THE READERS INTERRUPT REQUEST LEVEL.
2198  006572  000021            AT21:   21                              ;TEST#
2199  006574  006656                    AT22                            ;NEXT TEST.
2200  006576  001750                    1000.                           ;I COUNT.
2201  006600  006616                    AT21B                           ;SCOPE ENTRY.
2202  006602  104006                    STRDRV                          ;SET READER VECTOR TO AT21E.
2203  006604  006650                    AT21E
2204  006606  104400            AT21A:  DELAY                           ;WAIT 150 MSECS.
2205  006610  000226                    150.
2206  006612  004767  175100            JSR     %7,AREAD                ;ENABLE READER. RETURN WHEN DONE SET.
2207  006616  005077  172274    AT21B:  CLR     @TKS                    ;DISABLE READER INTERRUPTS.
2208  006622  016767  172302  171146    MOV     TKLVL,PSW               ;SET PROCESSOR TO SAME PRIORITY AS READER'S.
2209  006630  052777  000100  172260    BIS     #BIT6,@TKS              ;ENABLE READER INTERRUPTS.
2210  006636  000240                    NOP                             ;NO OP.
2211  006640  005077  172252    AT21C:  CLR     @TKS                    ;OK IF NO INTERRUPT OCCURS.
2212  006644  104012                    CHAIN                           ;CHAIN
2213  006646  000763                    BR      AT21B                   ;REPEAT TEST.
2214  006650  022626            AT21E:  POPSP2                          ;ERROR. READER ERRONEOUSLY INTERRUPTED
2215                                                                    ;WITH PROCESSOR AT SAME PRIORITY
2216  006652  104003                    ERROR                           ;LEVEL AS THE READER, OR THE READER
2217  006654  000771                    BR      AT21C                   ;IS AT HIGHER PRIORITY THAN SPECIFIED
2218                                                                    ;AT TKLVL.
2219
2220
2221                                    ;TEST THAT DONE CAUSES INTERRUPT WITH PROCESSOR AT PRIORITY ONE LEVEL LOWER
2222                                    ;THAN THE READER'S INTERRUPT PRIORITY LEVEL.
2223  006656  000022            AT22:   22                              ;TEST#
2224  006660  006750                    AT23                            ;NEXT TEST
2225  006662  001750                    1000.                           ;I COUNT
2226  006664  006736                    AT22B                           ;SCOPE ENTRY
2227  006666  104006                    STRDRV                          ;SET READER INTERRUPT SERVICE TO
2228  006670  006736                    AT22B                           ;AT22B.
2229  006672  104400                    DELAY                           ;WAIT 150 MSECS.
2230  006674  000226                    150.
```

```
2231  006676  004767  175014                  JSR     %7,AREAD        ;ENABLE READER. RETURN WHEN DONE SET.
2232  006702  005077  172210          AT22A:  CLR     @TKS            ;DISABLE READER INTERRUPTS
2233  006706  016767  172216  171062          MOV     TKLVL,PSW       ;SET PROCESSOR PRIORITY ONE LEVEL LOWER
2234  006714  162767  000040  171054          SUB     #40,PSW         ;THAN READER.(SPECIFIED AT TKLVL).
2235  006722  052777  000100  172166          BIS     #BIT6,@TKS      ;ENABLE READER INTERRUPTS.
2236  006730  000240                          NOP
2237  006732  104003                  AT22E:  ERROR                   ;FAILED TO INTERRUPT WITH PC AT PRIORITY ONE LEVEL LOWER
2238  006734  000401                          BR      AT22C           ;THAN READER. THEREFORE, READER PRIORITY MUST BE LOWER
2239  006736  022626                  AT22B:  POPSP2                  ;HERE IF INTERRUPT OCCURS. OK. POP STACK TWICE
2240  006740  005077  172152          AT22C:  CLR     @TKS            ;DISABLE READER INTERRUPTS
2241  006744  104012                          CHAIN                   ;CHAIN
2242  006746  000755                          BR      AT22A           ;REPEAT TEST
2243                                  ;TEST THAT DONE DOES NOT REINTERRUPT AFTER RTI WHEN DONE IS NOT CLEARED.
2244  006750  000023                  AT23:   23                      ;TEST#
2245  006752  010220                          AT43                    ;NEXT TEST
2246  006754  001750                          1000.                   ;I COUNT
2247  006756  006770                          AT23A                   ;SCOPE ENTRY.
2248  006760  104400                          DELAY                   ;WAIT 150 MSECS
2249  006762  000226                          150.
2250  006764  004767  174726                  JSR     %7,AREAD        ;ENABLE READER. RETURN WHEN DONE SET.
2251  006770  104006          AT23A:  STRDRV                          ;SET READER INTERRUPT SERVICE
2252  006772  007022                          AT23C                   ;TO AT23C.
2253  006774  005077  172116                  CLR     @TKS            ;DISABLE READER INTERRUPTS.
2254  007000  052777  000100  172110          BIS     #BIT6,@TKS      ;ENABLE READER INTERRUPTS.
2255  007006  000240                          NOP
2256  007010  104003          AT23E1: ERROR                           ;ERROR1 FAILED TO INTERRUPT
2257  007012  005077  172100  AT23B:  CLR     @TKS                    ;DISABLE READER INTERRUPTS.
2258  007016  104012                          CHAIN                   ;CHAIN
2259  007020  000763                          BR      AT23A           ;REPEAT TEST
2260  007022  012777  007042  172076  AT23C:  MOV     #AT23E2,@TKVTR  ;CHANGE INTERRUPT VECTOR TO AT23E2
2261  007030  012716  007036                  MOV     #AT23D,@%6
2262  007034  000002                          RTI                     ;RETURN FROM INTERRUPT
2263  007036  000240          AT23D:  NOP
2264  007040  000764                          BR      AT23B           ;OK IF NO REINTERRUPT OCCURS.
2265  007042  022626          AT23E2: POPSP2                          ;ERROR2. DONE REINTERRUPTED AFTER
2266  007044  104003                  ERROR                           ;RTI WITH DONE BIT LEFT ON.
2267  007046  000761                          BR      AT23B
2268                                  ;TEST ABILITY TO SET AND CLEAR PUNCH ID BIT
2269  007050  000024                  AT24:   24                      ;TEST#
2270  007052  007134                          AT25                    ;NEXT TEST.
2271  007054  001750                          1000.                   ;I COUNT
2272  007056  007066                          AT24A                   ;SCOPE ENTRY.
2273  007060  012767  000340  170710          MOV     #PRTY7,PSW      ;SET PRIORITY 7.
2274  007066  052777  000100  172026  AT24A:  BIS     #BIT6,@TPS      ;SET PUNCH ID BIT.
2275  007074  032777  000100  172020          BIT     #BIT6,@TPS      ;CHECK PUNCH ID BIT.
2276  007102  001002                          BNE     AT24B           ;BRANCH IF PUNCH ID BIT IS SET.
2277  007104  104003          AT24E1: ERROR                           ;ERROR1. PUNCH ID BIT DID NOT SET.
2278  007106  000410                          BR      AT24C
2279  007110  042777  000100  172004  AT24B:  BIC     #BIT6,@TPS      ;CLEAR PUNCH ID BIT.
2280  007116  032777  000100  171776          BIT     #BIT6,@TPS      ;CHECK PUNCH ID BIT.
2281  007124  001401                          BEQ     AT24C           ;BRANCH IF PUNCH ID BIT IS CLEAR
2282  007126  104003          AT24E2: ERROR                           ;ERROR2. PUNCH ID BIT FAILED TO CLEAR.
2283  007130  104012          AT24C:  CHAIN                           ;CHAIN
2284  007132  000776                          BR      AT24C           ;REPEAT TEST
2285                                  ;TEST ABILITY TO CLEAR PUNCH ID BIT WITH RESET INSTRUCTION
2286  007134  000025          AT25:   25                              ;TEST#
```

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 2287  007136  007200                          AT26                    ;NEXT TEST.
 2288  007140  000144                          100.                    ;I COUNT.
 2289  007142  007152                          AT25A                   ;SCOPE ENTRY.
 2290  007144  012767  000340  170624          MOV     #PRTY7,PSW      ;SET PRIORITY 7.
 2291  007152  052777  000100  171742  AT25A:  BIS     #BIT6,@TPS      ;SET PUNCH ID BIT.
 2292  007160  104011                          SRESET                  ;RESET
 2293  007162  032777  000100  171732          BIT     #BIT6,@TPS      ;CHECK PUNCH ID BIT.
 2294  007170  001401                          BEQ     AT25B           ;BRANCH IF PUNCH ID BIT IS CLEAR.
 2295  007172  104003                  AT25E:  ERROR                   ;ERROR. RESET FAILED TO CLEAR PUNCH ID BIT.
 2296  007174  104012                  AT25B:  CHAIN                   ;CHAIN
 2297  007176  000765                          BR      AT25A           ;REPEAT TEST.
 2298                                  ;TEST ABILITY TO SET AND CLEAR THE PUNCH MAINTENANCE BIT
 2299  007200  000026                  AT26:   26                      ;TEST#
 2300  007202  007256                          AT27                    ;NEXT TEST
 2301  007204  001750                          1000.                   ;I COUNT
 2302  007206  007210                          AT26A                   ;SCOPE ENTRY
 2303  007210  052777  000004  171704  AT26A:  BIS     #BIT2,@TPS      ;SET MAINTANCE BIT.
 2304  007216  032777  000004  171676          BIT     #BIT2,@TPS      ;CHECK MAINTENANCE BIT
 2305  007224  001002                          BNE     AT26B           ;BRANCH IF MAINTENANCE BIT SET.
 2306  007226  104003                  AT26E1: ERROR                   ;ERROR1. MAINTENANCE BIT FAILED TO SET.
 2307  007230  000410                          BR      AT26C
 2308  007232  042777  000004  171662  AT26B:  BIC     #BIT2,@TPS      ;CLEAR MAINTENANCE BIT.
 2309  007240  032777  000004  171654          BIT     #BIT2,@TPS      ;CHECK MAINTENANCE BIT
 2310  007246  001401                          BEQ     AT26C           ;BRANCH IF MAINTENANCE BIT IS CLEAR.
 2311  007250  104003                  AT26E2: ERROR                   ;ERROR2. MAINTENANCE BIT FAILED TO CLEAR.
 2312  007252  104012                  AT26C:  CHAIN                   ;CHAIN
 2313  007254  000755                          BR      AT26A           ;REPEAT TEST
```

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2314
2315                                        ;TEST THAT RESET INSTRUCTION CLEARS THE MAINTENANCE BIT.
2316  007256  000027                AT27:   27                      ;TEST#
2317  007260  007314                        AT30                    ;NEXT TEST
2318  007262  000144                        100.                    ;I COUNT
2319  007264  007266                        AT27A                   ;SCOPE ENTRY
2320  007266  052777  000004  171626 AT27A: BIS     #BIT2,@TPS      ;SET MAINTENANCE BIT.
2321  007274  104011                        SRESET                  ;ISSUE RESET
2322  007276  032777  000004  171616        BIT     #BIT2,@TPS      ;CHECK MAINTENANCE BIT
2323  007304  001401                        BEQ     AT27B           ;BRANCH IF MAINTENANCE BIT CLEAR.
2324  007306  104003                AT27E:  ERROR                   ;ERROR. RESET FAILED TO CLEAR
2325  007310  104012                AT27B:  CHAIN                   ;THE MAINTENANCE BIT. CHAIN.
2326  007312  000765                        BR      AT27A           ;REPEAT TEST.
2327                                        ;TEST THAT RESET SETS THE PUNCH READY BIT, AND THAT READY CAN BE READ RELIABLY.
2328  007314  000030                AT30:   30                      ;TEST#
2329  007316  007340                        AT31                    ;NEXT TEST
2330  007320  001750                        1000.                   ;I COUNT
2331  007322  007324                        AT30A                   ;SCOPE ENTRY
2332  007324  105777  171572        AT30A:  TSTB    @TPS            ;CHECK PUNCH READY.
2333  007330  100401                        BMI     AT30B           ;BRANCH IF PUNCH READY IS SET.
2334  007332  104003                AT30E:  ERROR                   ;ERROR. RESET FAILED TO SET READY, OR FAILED TO READ  IT
2335  007334  104012                AT30B:  CHAIN                   ;CHAIN
2336  007336  000772                        BR      AT30A           ;REPEAT TEST.
2337                                        ;TEST THAT PUNCH READY RESETS BY LOADING PUNCH BUFFER.
2338  007340  000031                AT31:   31                      ;TEST#
2339  007342  007376                        AT32                    ;NEXT TEST
2340  007344  000024                        20.                     ;I COUNT
2341  007346  007350                        AT31A                   ;SCOPE ENTRY
2342  007350  104400                AT31A:  DELAY                   ;WAIT 150 MSECS
2343  007352  000226                        150.
2344  007354  104011                        SRESET                  ;RESET
2345  007356  005077  171542               CLR     @TPB            ;LOAD PUNCH BUFFER
2346  007362  105777  171534               TSTB    @TPS            ;CHECK PUNCH READY BIT.
2347  007366  100001                        BPL     AT31B           ;BRANCH IF PUNCH READY IS CLEAR.
2348  007370  104003                AT31E:  ERROR                   ;ERROR. BUFFER LOAD FAILED TO CLEAR READY.
2349  007372  104012                AT31B:  CHAIN                   ;CHAIN
2350  007374  000765                        BR      AT31A           ;REPEAT TEST.
2351                                        ;TEST THAT BYTE LOAD OF PUNCH BUFFER +1 DOES NOT RESET READY.
2352  007376  000032                AT32:   32                      ;TEST#
2353  007400  007440                        AT33                    ;NEXT TEST
2354  007402  000024                        20.                     ;I COUNT
2355  007404  007406                        AT32A                   ;SCOPE ENTRY
2356  007406  104400                AT32A:  DELAY                   ;WAIT 150 MSECS
2357  007410  000226                        150.
2358  007412  104011                        SRESET                  ;RESET
2359  007414  016700  171504               MOV     TPB,%0
2360  007420  005200                        INC     %0
2361  007422  105010                        CLRB    @%0             ;BYTE LOAD PUNCH BUFFER+1
2362  007424  105777  171472               TSTB    @TPS            ;CHECK PUNCH READY BIT
2363  007430  100401                        BMI     AT32B           ;BRANCH IF PUNCH READY STILL SET.
2364  007432  104003                AT32E:  ERROR                   ;ERROR. BYTE LOAD OF PUNCH BUFFER+1
2365  007434  104012                AT32B:  CHAIN                   ;CLEARED READY. CHAIN
2366  007436  000763                        BR      AT32A           ;REPEAT TEST.
```

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2367
2368                                    ;TEST THAT PUNCH BECOMES READY BY 200 MSECS AFTER BUFFER LOAD.
2369  007440  000033                    AT33:   33                      ;TEST #
2370  007442  007500                            AT34                    ;NEXT TEST
2371  007444  000024                            20.                     ;I COUNT
2372  007446  007450                            AT33A                   ;SCOPE ENTRY.
2373  007450  104400                    AT33A:  DELAY                   ;WAIT 150 MSECS.
2374  007452  000226                            150.
2375  007454  005077  171444                    CLR     @TPB            ;LOAD PUNCH BUFFER.
2376  007460  104400                            DELAY                   ;WAIT 200 MSECS.
2377  007462  000310                            200.
2378  007464  105777  171432                    TSTB    @TPS            ;CHECK PUNCH READY BIT.
2379  007470  100401                            BMI     AT33B           ;BRANCH IF PUNCH READY IS SET.
2380  007472  104003                    AT33E:  ERROR                   ;ERROR. READY NOT SET 200 MSECS AFTER BUFFER LOAD.
2381  007474  104012                    AT33B:  CHAIN                   ;CHAIN
2382  007476  000764                            BR      AT33A           ;REPEAT TEST.
2383                                    ;TEST THAT PUNCH READY BIT CAN CAUSE AN INTERRUPT. IF THE INTERRUPT
2384                                    ;IS SERVICED, IT WILL HAVE OCCURRED AT THE CORRECT VECTOR.
2385  007500  000034                    AT34:   34                      ;TEST #
2386  007502  007546                            AT35                    ;NEXT TEST
2387  007504  001750                            1000.                   ;I COUNT
2388  007506  007514                            AT34A                   ;SCOPE ENTRY
2389  007510  104007                            STPCHV                  ;SET PUNCH INTERRUPT SERVICE
2390  007512  007542                            AT34C                   ;TO AT34C
2391  007514  005077  171402            AT34A:  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
2392  007520  005067  170252                    CLR     PSW             ;SET PRIORITY 0.
2393  007524  052777  000100  171370            BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS.
2394  007532  000240                            NOP
2395  007534  104003                    AT34E:  ERROR                   ;PUNCH READY FAILED TO CAUSE
2396  007536  104012                    AT34B:  CHAIN                   ;INTERRUPT. CHAIN
2397  007540  000765                            BR      AT34A           ;REPEAT TEST.
2398  007542  022626                    AT34C:  POPSP2                  ;HERE IF INTERRUPT OCCURS. POP THE
2399  007544  000774                            BR      AT34B           ;STOCK TWICE.
2400                                    ;TEST THAT PUNCH READY DOES NOT CAUSE AN INTERRUPT WITH PROCESSOR
2401                                    ;AT SAME PRIORITY LEVEL AS THE PUNCH INTERRUPT REQUEST LEVEL.
2402  007546  000035                    AT35:   35                      ;TEST #
2403  007550  007622                            AT36                    ;NEXT TEST
2404  007552  001750                            1000.                   ;I COUNT
2405  007554  007562                            AT35A                   ;SCOPE ENTRY
2406  007556  104007                            STPCHV                  ;SET PUNCH INTERRUPT SERVICE
2407  007560  007614                            AT35E                   ;TO AT35E.
2408  007562  016767  171346  170206    AT35A:  MOV     TPLVL,PSW       ;SET PROCESSOR TO SAME PRIORITY AS PUNCH.
2409  007570  005077  171326                    CLR     @TPS            ;DISABLE PUNCH INTERRUPTS.
2410  007574  052777  000100  171320            BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS.
2411  007602  000240                            NOP
2412  007604  005077  171312            AT35B:  CLR     @TPS            ;OK IF NO INTERRUPT OCCURS.
2413  007610  104012                            CHAIN                   ;CHAIN
2414  007612  000763                            BR      AT35A           ;REPEAT TEST.
2415  007614  022626                    AT35E:  POPSP2                  ;ERROR. PUNCH INTERRUPTED WITH PROCESSOR
2416  007616  104003                            ERROR                   ;SET TO SAVE PRIORITY AS THE PUNCH.
2417  007620  000771                            BR      AT35B
```

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2418
2419                                    ;TEST THAT THE PUNCH INTERRUPTS WITH PROCESSOR AT PRIORITY ONE LEVEL LOWER
2420                                    ;THAN THE PUNCH PRIORITY.
2421  007622  000036                    AT36:   36                      ;TEST #
2422  007624  007704                            AT37                    ;NEXT TEST
2423  007626  001750                            1000.                   ;I COUNT
2424  007630  007636                            AT36A                   ;SCOPE ENTRY
2425  007632  104007                            STPCHV                  ;SET PUNCH INTERRUPT SERVICE
2426  007634  007672                            AT36B                   ;TO AT36B.
2427  007636  005077  171260           AT36A:  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
2428  007642  016767  171266  170126           MOV     TPLVL,PSW       ;SET PROCESSOR PRIORITY ONE LEVEL
2429  007650  162767  000040  170120           SUB     #40,PSW         ;LOWER THAN PUNCH PRIORITY
2430  007656  052777  000100  171236           BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS
2431  007664  000240                            NOP
2432  007666  104003                            ERROR                   ;ERROR. PUNCH FAILED TO INTERRUPT.
2433  007670  000401                            BR      AT36C
2434  007672  022626                    AT36B:  POPSP2                  ;HERE IF INTERRUPT OCCURS. POP
2435  007674  005077  171222           AT36C:  CLR     @TPS            ;THE STOCK TWICE. DISABLE PUNCH INTERRUPT
2436  007700  104012                            CHAIN                   ;CHAIN
2437  007702  000755                            BR      AT36A           ;REPEAT TEST.
2438                                    ;TEST THAT PUNCH READY DOES NOT REINTERRUPT AFTER RTI WHEN READY
2439                                    ;BIT HAS NOT BEEN RESET.
2440  007704  000037                    AT37:   37                      ;TEST #
2441  007706  010000                            AT40                    ;NEXT TEST
2442  007710  001750                            1000.                   ;I COUNT
2443  007712  007714                            AT37A                   ;SCOPE ENTRY
2444  007714  104007                    AT37A:  STPCHV                  ;SET PUNCH INTERRUPT SERVICE TO
2445  007716  007752                            AT37C                   ;AT37C
2446  007720  005077  171176                    CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
2447  007724  005067  170046                    CLR     PSW             ;SET PROCESSOR PRIORITY TO 0
2448  007730  052777  000100  171164           BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS
2449  007736  000240                            NOP
2450  007740  104003                    AT37E1: ERROR                   ;ERROR 1. PUNCH FAILED TO INTERRUPT.
2451  007742  005077  171154           AT37B:  CLR     @TPS            ;DISABLE PUNCH INTERRUPT.
2452  007746  104012                            CHAIN                   ;CHAIN
2453  007750  000761                            BR      AT37A           ;REPEAT TEST.
2454  007752  012777  007772  171152   AT37C:  MOV     #AT37E2,@TPVTR  ;HERE IF INTERRUPT OCCURS. CHANGE
2455  007760  012716  007766                    MOV     #AT37D,@(6      ;PUNCH VECTOR TO AT37E2 AND EXIT
2456  007764  000002                            RTI                     ;INTERRUPT
2457  007766  000240                    AT37D:  NOP                     ;OK IF NO REINTERRUPT OCCURS
2458  007770  000764                            BR      AT37B
2459  007772  022626                    AT37E2: POPSP2                  ;ERROR 2.  PUNCH REINTERRUPTED AFTER
2460  007774  104003                            ERROR                   ;RTI WITH READY BIT LEFT ON
2461  007776  000761                            BR      AT37B
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                                        ;TEST THAT THE PUNCH INTERRUPTS IMMEDIATELY UPON LOWERING
                                        ;PROCESSOR PRIORITY TO 0.
010000  000040                  AT40:   40                      ;TEST #
010002  010064                          AT41                    ;NEXT TEST
010004  001750                          1000.                   ;I COUNT
010006  010014                          AT40A                   ;SCOPE ENTRY
010010  104007                          STPCHV                  ;SET PUNCH INTERRUPT
010012  010052                          AT40B                   ;SERVICE TO AT40B
010014  012767  000340  167754  AT40A:  MOV     #PRTY7,PSW      ;SET PROCESSOR PRIORITY TO 7.
010022  005077  171074                  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
010026  052777  000100  171066          BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS
010034  005067  167736                  CLR     PSW             ;LOWER PROCESSOR PRIORITY TO 0.
010040  012767  000340  167730          MOV     #PRTY7,PSW      ;RAISE PRIORITY TO 7.
010046  104003                          ERROR                   ;ERROR. PUNCH FAILED TO INTERRUPT
010050  000401                          BR      AT40C           ;IMMEDIATELY AFTER CP PRIORITY WAS SET TO 0.
010052  022626                  AT40B:  POPSP2                  ;HERE IF INTERRUPT OCCURS
010054  005077  171042          AT40C:  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
010060  104012                          CHAIN                   ;CHAIN
010062  000754                          BR      AT40A           ;REPEAT TEST
                                        ;TEST FOR CORRECT OPERATION OF THE WAIT INSTRUCTION.  A WAIT INSTRUCTION
                                        ;IS PERFORMED WHILE WAITING FOR A PUNCH INTERRUPT.  WHEN THE INTERRUPT
                                        ;OCCURS, THE SERVICE ROUTINE CHANGES THE WAIT INSTRUCTION TO AN ERROR
                                        ;CALL AND THEN EXITS THE INTERRUPT WITH AN RTI.  EXITING THE INTERRUPT
                                        ;SHOULD RETURN CONTROL TO THE INSTRUCTION FOLLOWING THE WAIT INSTRUCTION.
                                        ;IF CONTROL IS INSTEAD RETURNED TO THE SAME LOCATION WHERE THE WAIT
                                        ;INSTRUCTION WAS LOCATED AN ERROR CALL WILL OCCUR, INDICATING A FAILURE
                                        ;OF THE WAIT INSTRUCTION.
010064  000041                  AT41:   41                      ;TEST#
010066  010152                          AT42                    ;NEXT TEST
010070  000062                          50.                     ;I COUNT
010072  010104                          AT41A                   ;SCOPE ENTRY
010074  104400                          DELAY                   ;WAIT 150 MSECS
010076  000226                          150.
010100  104007                          STPCHV                  ;SET PUNCH INTERRUPT SERVICE
010102  010142                          AT41C                   ;TO AT41C
010104  012767  000001  000016  AT41A:  MOV     #WAIT,AT41B     ;MOVE WAIT INSTRUCTION TO AT41B
010112  005077  171006                  CLR     @TPB            ;LOAD PUNCH BUFFER .ENABLES PUNCH
010116  052777  000100  170776          BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS
010124  005067  167646                  CLR     PSW             ;SET PRIORITY 0.
010130  000000                  AT41B:  OPEN                    ;THIS LOCATION CAN BE EITHER
                                        ;A WAIT INSTRUCTION OR AN ERROR CALL.
                                        ;IF AN ERROR CALL IS EXECUTED, IT
                                        ;INDICATES A FAILURE OF THE WAIT INSTRUCTION.
010132  005077  170764                  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
010136  104012                          CHAIN                   ;CHAIN
010140  000761                          BR      AT41A           ;REPEAT TEST
010142  012767  104003  177760  AT41C:  MOV     #ERROR,AT41B    ;MOVE ERROR CALL TO AT41B.
010150  000002                          RTI                     ;EXIT INTERRUPT.
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2511
2512                                    ;TEST THAT LOADING THE PUNCH BUFFER WITH THE MAINTENANCE BIT SET
2513                                    ;CAUSES THE READER DONE BIT TO SET AFTER APPROX. 200 MSECS
2514  010152  000042                   AT42:   42                      ;TEST #
2515  010154  006224                           AT11                    ;NEXT TEST
2516  010156  000062                           50.                     ;I COUNT
2517  010160  010166                           AT42A                   ;SCOPE ENTRY
2518  010162  104400                           DELAY
2519  010164  000226                           150.
2520  010166  052777  000004  170726  AT42A:   BIS     #BIT2,@TPS      ;SET MAINTENANCE BIT
2521  010174  005077  170724                   CLR     @TPB            ;LOAD PUNCH BUFFER
2522  010200  104400                           DELAY                   ;WAIT 200 MSECS
2523  010202  000310                           200.
2524  010204  105777  170706                   TSTB    @TKS            ;TEST READER DONE BIT
2525  010210  100401                           BMI     AT42B           ;BRANCH IF READER DONE BIT SET.
2526  010212  104003                   AT42E:  ERROR                   ;ERROR. 200 MSECS AFTER PUNCH
2527                                                                   ;BUFFER LOAD WITH MAINTENANCE BIT
2528                                                                   ;SET THE READER DONE BIT WAS NOT SET
2529  010214  104012                   AT42B:  CHAIN                   ;CHAIN
2530  010216  000763                           BR      AT42A           ;REPEAT TEST
2531                                    ;TESTS THAT DATA CAN BE RELIABLY
2532                                    ;TRANSFERRED WITH THE MAINTENANCE BIT
2533                                    ;SET.  CAUSES PROGRAM 7 TO BE
2534                                    ;EXECUTED AS A SUBROUTINE IF THIS
2535                                    ;WAS A MONITOR LOAD OR IF THE
2536                                    ;MONITOR CELL IS NON-ZERO
2537  010220  000043                   AT43:   43                      ;TEST #
2538  010222  177777                           -1                      ;LAST TEST
2539  010224  001750                           1000.                   ;ICOUNT
2540  010226  012562                           LTA                     ;SCOPE ENTRY
2541  010230  005767  167606                   TST     MONITR          ;IS THIS AUTOMATIC TESTING
2542  010234  001402                           BEQ     AT43B           ;NO - EXIT
2543  010236  004767  002300           AT43A:  JSR     %7,PRG7         ;RUN PROGRAM 7
2544  010242  104012                   AT43B:  CHAIN                   ;CHAIN
2545  010244  005767  167572                   TST     MONITR
2546  010250  001774                           BEQ     AT43B
2547  010252  004767  002304                   JSR     %7,LTA          ;REPEAT TEST
2548  010256  000771                           BR      AT43B
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2549
2550                                                ;PRG1-PRINTER TESTS
2551  010260  012767  010312  170654  PRG1:   MOV     #CTO,KSTART     ;SET ADDRESS IF 1ST ROUTINE.
2552  010266  052767  000200  170662          BIS     #BIT7,PRGID     ;BYPASS SCOPE AND ICNT.
2553  010274  012767  177600  174314          MOV     #177600,STLMSK  ;SET STALL LIMIT
2554  010302  004767  175162                  JSR     %7,STBF         ;SET UP BUFFER AREA.
2555  010306  000167  172016                  JMP     SRSET           ;GO GET STARTED.
2556                                          ;CARRIAGE RETURN TEST.
2557  010312  000000                  CTO:    0                       ;TEST#
2558  010314  010414                          CT1                     ;NEXT TEST ADDRESS.
2559  010316  104000                          TYPE                    ;TYPE TITLE.
2560  010320  017036                          CRTST
2561  010322  012767  000111  170724          MOV     #73.,RCNT
2562  010330  016767  170720  170732          MOV     RCNT,CTRA       ;RCNT TO CTRA
2563  010336  005367  170726          CTOA:   DEC     CTRA            ;DECREMENT CTRA
2564  010342  001001                          BNE     CTOB            ;BRANCH IF NOT 0
2565  010344  104012                          CHAIN                   ;0. CHAIN
2566  010346  016767  170716  170716  CTOB:   MOV     CTRA,CTRB       ;SPACE COUNT TO CTRB.
2567  010354  112700  000105          CTOC:   MOVB    #105,%0         ;CHAR=E
2568  010360  004767  174630                  JSR     %7,LSPCH        ;SPACE.
2569  010364  005367  170702                  DEC     CTRB            ;DECREMENT CTRB.
2570  010370  001371                          BNE     CTOC            ;BRANCH IF NOT DONE SPACING.
2571  010372  112700  000015                  MOVB    #15,%0
2572  010376  004767  174612                  JSR     %7,LSPCH        ;CARRIAGE RETURN.
2573  010402  012700  000012                  MOV     #12,%0          ;LINE FEED
2574  010406  004767  174602                  JSR     %7,LSPCH        ;
2575  010412  000751                          BR      CTOA
2576                                          ;RIGHT MARGIN TEST
2577  010414  000001                  CT1:    1                       ;TEST#
2578  010416  010460                          CT2                     ;NEXT TEST.
2579  010420  104000                          TYPE                    ;TYPE TITLE
2580  010422  017067                          RMTST
2581  010424  012767  000016  170636          MOV     #14.,CTRA       ;SET UP FOR 33/35
2582  010432  012767  017017  000014          MOV     #RM33B,RMB
2583  010440  104000                  CT1A:   TYPE                    ;TYPE----I
2584  010442  017011                          RM33A
2585  010444  005367  170620                  DEC     CTRA            ;DONE N TIMES.
2586  010450  001373                          BNE     CT1A            ;BRANCH IF NOT N TIMES
2587  010452  104000                          TYPE                    ;TYPE-I-.
2588  010454  000000                  RMB:    OPEN
2589  010456  104012                          CHAIN                   ;CHAIN.
```

```
                                        ;CURSOR RIGHT TEST
010460  000002                          CT2:    2                               ;TEST#
010462  010632                                  CT3                             ;NEXT TEST
010464  104000                                  TYPE                            ;TYPE TITLE.
010466  017115                                  SPTST
010470  012767  000044  170572                  MOV     #36.,CTRA               ;33/35 COUNT TO CTRA.
010476  104000                          CT2A:   TYPE                            ;TYPE SPACE,\.
010500  017033                                  SPTSTC
010502  005367  170562                          DEC     CTRA                    ;DONE TIMES SET IN CTRA?
010506  001373                                  BNE     CT2A                    ;BRANCH IF NOT DONE
010510  012767  000044  170552                  MOV     #36.,CTRA               ;SET UP CTRA COUNT FOR 33/35
010516  012767  000001  170546  CT2B:   MOV     #1,CTRB
010524  016767  170542  170542  CT2C:   MOV     CTRB,CTRC
010532  112700  000015                          MOVB    #15,%0                  ;CARRIAGE RETURN.
010536  004767  174452                          JSR     %7,LSPCH
010542  004767  174446                          JSR     %7,LSPCH                ;DUMMY CYCLE.
010546  005000                          CT2D:   CLR     %0                      ;NULL CHAR FOR FILLER
010550  004767  174440                          JSR     %7,LSPCH                ;TRANSMIT NULL CHAR
010554  004767  174434                          JSR     %7,LSPCH                ;TRANSMIT NULL CHAR
010560  004767  174430                          JSR     %7,LSPCH                ;TRANSMIT NULL CHAR
010564  112700  000030                          MOVB    #30,%0                  ;CURSOR RIGHT
010570  004767  174420                          JSR     %7,LSPCH                ;SET IN CTRC.
010574  005367  170474                          DEC     CTRC                    ;DONE SPACING.
010600  001362                                  BNE     CT2D                    ;BRANCH IF NOT DONE SPACING.
010602  112700  000057                          MOVB    #'/,%0                  ;DONE. TYPE A "/".
010606  004767  174402                          JSR     %7,LSPCH
010612  005367  170452                          DEC     CTRA                    ;DONE 36 TIMES?
010616  001001                                  BNE     CT2E                    ;BRANCH IF NOT DONE.
010620  104012                                  CHAIN                           ;DONE. CHAIN.
010622  062767  000002  170442  CT2E:   ADD     #2,CTRB                 ;MODIFY CTRB FOR NEXT TRY.
010630  000735                                  BR      CT2C                    ;GO DO IT AGAIN.
                                        ;LINE FEED TEST
010632  000003                          CT3:    3                               ;TEST #
010634  010712                                  CT4                             ;NEXT TEST.
010636  104000                                  TYPE                            ;TYPE TITLE
010640  017143                                  LFTST
010642  052767  040000  170306                  BIS     #BIT14,PRGID            ;ALLOW STALLS.
010650  012767  000110  170412                  MOV     #72.,CTRA               ;SET 33/35 LINE FEED COUNT.
010656  112700  000134                  CT3A:   MOVB    #'\,%0                  ;TYPE "\"
010662  004767  174326                          JSR     %7,LSPCH
010666  112700  000012                          MOVB    #12,%0                  ;LINE FEED.
010672  004767  174316                          JSR     %7,LSPCH
010676  005367  170366                          DEC     CTRA                    ;DONE N TIMES?
010702  001001                                  BNE     CT3B                    ;BRANCH IF NOT DONE.
010704  104012                                  CHAIN                           ;DONE. CHAIN
010706  104002                          CT3B:   STALL                           ;STALL
010710  000762                                  BR      CT3A                    ;REPEAT
```

```
                                        ;TAB TEST
010712  000004                CT4:    4                       ;TEST#
010714  011130                        CT5                     ;NEXT TEST.
010716  012767  000011  000100        MOV     #9.,TBCNT       ;SET TAB COUNT.
010724  104014                        CK35                    ;35?
010726  104012                        CHAIN                   ;NO.
010730  004567  000044                JSR     %5,TPBM         ;TYPE MARKERS
010734  000007                        7
010736  104000                        TYPE
010740  016765                        TBMRK+1
010742  012767  000007  170320 CT4A:  MOV     #7,CTRA         ;LINE COUNT TO CTRA
010750  005067  000052                CLR     SPCNT           ;0 TO SPACE COUNT.
010754  004767  000050        CT4B:   JSR     %7,TABP         ;GO SPACE-TAB.
010760  005267  000042                INC     SPCNT           ;INCREMENT SPACE COUNT.
010764  005367  170300                DEC     CTRA            ;DONE 7 LINES?
010770  001371                        BNE     CT4B            ;BRANCH IF NOT DONE.
010772  004767  174402                JSR     %7,TYPCLR       ;CLEAR DOUBLE BUFFER
010776  104012                        CHAIN                   ;DONE. CHAIN.
011000  012567  170264        TPBM:   MOV     (5)+,CTRA       ;TYPE TEST TITLE.
011004  104000                        TYPE
011006  016750                        TBTST
011010  104000                TPBMA:  TYPE                    ;TYPE MARKERS
011012  016776                        TBMRK1
011014  005367  170250                DEC     CTRA
011020  001373                        BNE     TPBMA
011022  000205                        RTS     %5              ;EXIT.
011024  000000                TBCNT:  OPEN                    ;TAB COUNT
011026  000000                SPCNT:  OPEN                    ;SPACE COUNT
011030  104000                TABP:   TYPE                    ;CRLF.
011032  017007                        CRLF
011034  016767  177764  170230        MOV     TBCNT,CTRB      ;TAB COUNT TO CTRB
011042  016767  177760  170224 TABPA:  MOV     SPCNT,CTRC      ;SPACE COUNT TO CTRC
011050  001407                        BEQ     TABPC           ;BRANCH IF SPACE COUNT IS 0.
011052  112700  000040        TABPB:  MOVB    #40,%0          ;SPACE
011056  004767  174132                JSR     %7,LSPCH
011062  005367  170236                DEC     CTRC            ;DECREMENT SPACE COUNT
011066  001371                        BNE     TABPB           ;BRANCH IF NOT YET 0.
011070  112700  000011        TABPC:  MOVB    #11,%0          ;TAB
011074  004767  174114                JSR     %7,LSPCH
011100  004767  174110                JSR     %7,LSPCH        ;DUMMY CYCLE
011104  004767  174104                JSR     %7,LSPCH        ;DUMMY CYCLE.
011110  112700  000057                MOVB    #'/,%0          ;TYPE "/"
011114  004767  174074                JSR     %7,LSPCH
011120  005367  170146                DEC     CTRB            ;DECREMENT TAB COUNT.
011124  001346                        BNE     TABPA           ;BRANCH IF NOT DONE TABBING.
011126  000207                        RTS     %7              ;DONE. EXIT.
```

```
2683
2684
2685  011130  000005          ;TYPE LINE OF CHARACTERS ABC
2686  011132  011146  CT5:    5                       ;TEST #
2687  011134  104000          CT6                     ;NEXT TEST
2688  011136  017166          TYPE                    ;TYPE "CHARACTER TESTS"
2689  011140  104016          CHRTST
2690  011142  016646          TYPLN3                  ;TYPE LINE
2691  011144  104012          A
2692                          CHAIN                   ;CHAIN
2693  011146  000006  ;TYPE LINE OF CHARACTERS DEF
2694  011150  011160  CT6:    6                       ;TEST #
2695  011152  104016          CT7                     ;NEXT TEST
2696  011154  016651          TYPLN3                  ;TYPE LINE
2697  011156  104012          D
2698                          CHAIN                   ;CHAIN
2699  011160  000007  ;TYPE LINE OF CHARACTERS GHI
2700  011162  011172  CT7:    7                       ;TEST#
2701  011164  104016          CT10                    ;NEXT TEST.
2702  011166  016654          TYPLN3                  ;TYPE LINE
2703  011170  104012          G
2704                          CHAIN                   ;CHAIN
2705  011172  000010  ;TYPE LINE OF CHARACTERS OF JKL
2706  011174  011204  CT10:   10                      ;TEST #
2707  011176  104016          CT11                    ;NEXT TEST.
2708  011200  016657          TYPLN3                  ;TYPELINE
2709  011202  104012          J
2710                          CHAIN                   ;CHAIN
2711  011204  000011  ;TYPE LINE OF CHARACTERS MNO
2712  011206  011216  CT11:   11                      ;TEST #
2713  011210  104016          CT12                    ;NEXT TEST
2714  011212  016662          TYPLN3                  ;TYPE LINE
2715  011214  104012          M
2716                          CHAIN                   ;CHAIN
2717                  ;TYPE LINE OF CHARACTERS PQR
2718  011216  000012
2719  011220  011230  CT12:   12                      ;TEST #
2720  011222  104016          CT13                    ;NEXT TEST
2721  011224  016665          TYPLN3                  ;TYPE LINE
2722  011226  104012          P
2723                          CHAIN                   ;CHAIN
2724  011230  000013  ;TYPE LINE OF CHARACTERS STU
2725  011232  011242  CT13:   13                      ;TEST #
2726  011234  104016          CT14                    ;NEXT TEST
2727  011236  016670          TYPLN3
2728  011240  104012          S
                              CHAIN
```

```
 2729
 2730                                   ;TYPE LINE OF CHARACTERS VWX
 2731  011242  000014                   CT14:   14                      ;TEST #
 2732  011244  011254                           CT15                    ;NEXT TEST
 2733  011246  104016                           TYPLN3                  ;TYPE LINE
 2734  011250  016673                           V
 2735  011252  104012                           CHAIN                   ;CHAIN
 2736                                   ;TYPE LINE OF CHARACTERS YZ0
 2737  011254  000015                   CT15:   15                      ;TEST #
 2738  011256  011266                           CT16                    ;NEXT TEST
 2739  011260  104016                           TYPLN3                  ;TYPE LINE
 2740  011262  016674                           Y
 2741  011264  104012                           CHAIN                   ;CHAIN
 2742                                   ;TYPE LINE OF CHARACTERS 123
 2743  011266  000016                   CT16:   16                      ;TEST #
 2744  011270  011300                           CT17                    ;NEXT TEST
 2745  011272  104016                           TYPLN3                  ;TYPE LINE
 2746  011274  016701                           ONE
 2747  011276  104012                           CHAIN                   ;CHAIN
 2748                                   ;TYPE LINE OF CHARACTERS 456
 2749  011300  000017                   CT17:   17                      ;TEST #
 2750  011302  011312                           CT20                    ;NEXT TEST
 2751  011304  104016                           TYPLN3                  ;TYPE LINE
 2752  011306  016704                           FOUR
 2753  011310  104012                           CHAIN                   ;CHAIN
 2754                                   ;TYPE LINE OF CHARACTERS 789
 2755  011312  000020                   CT20:   20                      ;TEST #
 2756  011314  011324                           CT21                    ;NEXT TEST
 2757  011316  104016                           TYPLN3                  ;TYPE LINE
 2758  011320  016707                           SEVEN
 2759  011322  104012                           CHAIN                   ;CHAIN
 2760                                   ;TYPE LINE OF CHARACTERS!"#
 2761  011324  000021                   CT21:   21                      ;TEST #
 2762  011326  011336                           CT22                    ;NEXT TEST
 2763  011330  104016                           TYPLN3                  ;TYPE LINE
 2764  011332  016712                           C41
 2765  011334  104012                           CHAIN                   ;CHAIN
 2766                                   ;TYPE LINE OF CHARACTERS $%&
 2767  011336  000022                   CT22:   22                      ;TEST #
 2768  011340  011350                           CT23                    ;NEXT TEST
 2769  011342  104016                           TYPLN3                  ;TYPE LINE
 2770  011344  016715                           C44
 2771  011346  104012                           CHAIN                   ;CHAIN
 2772                                   ;TYPE LINE OF CHARACTERS '()
 2773  011350  000023                   CT23:   23                      ;TEST #
 2774  011352  011362                           CT24                    ;NEXT TEST
 2775  011354  104016                           TYPLN3                  ;TYPE LINE
 2776  011356  016720                           C47
 2777  011360  104012                           CHAIN                   ;CHAIN.
```

```
                                        ;TYPE LINE OF CHARACTERS *+,
      011362  000024                    CT24:   24                      ;TEST #
      011364  011374                            CT25                    ;NEXT TEST
      011366  104016                            TYPLN3                  ;TYPE LINE
      011370  016723                            C52
      011372  104012                            CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS -./
      011374  000025                    CT25:   25                      ;TEST #
      011376  011406                            CT26                    ;NEXT TEST
      011400  104016                            TYPLN3                  ;TYPE LINE
      011402  016726                            C55
      011404  104012                            CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS :;<
      011406  000026                    CT26:   26                      ;TEST #
      011410  011420                            CT27                    ;NEXT TEST
      011412  104016                            TYPLN3                  ;TYPE LINE
      011414  016731                            C72
      011416  104012                            CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS =>?
      011420  000027                    CT27:   27                      ;TEST #
      011422  011432                            CT30                    ;NEXT TEST
      011424  104016                            TYPLN3                  ;TYPE LINE
      011426  016734                            C75
      011430  104012                            CHAIN                   ;CHAIN.
                                        ;TYPE LINE OF CHARACTERS @[\
      011432  000030                    CT30:   30                      ;TEST #
      011434  011444                            CT31                    ;NEXT TEST
      011436  104016                            TYPLN3                  ;TYPE LINE
      011440  016737                            C100
      011442  104012                            CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS ]↑AND LEFT ARROW
      011444  000031                    CT31:   31                      ;TEST #
      011446  011456                            CT32                    ;NEXT TEST
      011450  104016                            TYPLN3                  ;TYPE LINE
      011452  016742                            C135
      011454  104012                            CHAIN                   ;CHAIN
                                        ;TYPE 2 LINES OF ALL CHARACTERS. FIRST LINE FULL SPEED. SECOND LINE WITH STALLS.
      011456  000032                    CT32:   32                      ;TEST #
      011460  011514                            CT33                    ;NEXT TEST.
      011462  004767  174064                    JSR     %7,FBALL        ;FILL BUFFER WITH ALL CHARACTERS.
      011466  042767  040000  167462            BIC     #BIT14,PRGID    ;CLEAR STALL BIT IN PRGID
      011474  004767  173650                    JSR     %7,TYPLN        ;TYPE LINE.
      011500  052767  040000  167450            BIS     #BIT14,PRGID    ;SET STALL BIT IN PRGID
      011506  004767  173636                    JSR     %7,TYPLN        ;TYPE LINE.
      011512  104012                            CHAIN                   ;CHAIN.
```

```
2824
2825                                        ;TYPE 12 LINES OF ASR33 WORST CASE PATTERN. ALTERNATE LINES WITH STALLS.
2826  011514  000033                  CT33:   33                      ;TEST #
2827  011516  011576                          CT34                    ;NEXT TEST
2828  011520  104013                          CK33                    ;33?
2829  011522  104012                          CHAIN                   ;NO. BYPASS TEST.
2830  011524  104000                          TYPE                    ;TYPE "WORST CASE PATTERN TEST"
2831  011526  017212                          WCPTST
2832  011530  004767  174056                  JSR     %7,FW336        ;PATTERN TO BUFFER.
2833  011534  012767  000006  167526          MOV     #6,CTRA         ;SET COUNT TO 6
2834  011542  042767  040000  167406  CT33A:  BIC     #BIT14,PRGID    ;CLEAR STALL BIT IN PRGID.
2835  011550  004767  173574                  JSR     %7,TYPLN        ;TYPE LINE
2836  011554  052767  040000  167374          BIS     #BIT14,PRGID    ;SET STALL BIT IN PRGID.
2837  011562  004767  173562                  JSR     %7,TYPLN        ;TYPE LINE.
2838  011566  005367  167476                  DEC     CTRA            ;DONE 6 TIMES?
2839  011572  001363                          BNE     CT33A           ;BRANCH IF NOT 6 TIMES YET.
2840  011574  104012                          CHAIN                   ;DONE. CHAIN.
2841                                      ;TYPE 12 LINES OF ASR35 WORST CASE PATTERN. ALTERNATE LINES WITH STALLS.
2842  011576  000034                  CT34:   34                      ;TEST #
2843  011600  011660                          CT35                    ;NEXT TEST.
2844  011602  104014                          CK35                    ;35?
2845  011604  104012                          CHAIN                   ;NO. BYPASS TEST.
2846  011606  104000                          TYPE                    ;TYPE "WORST CASE PATTERN TEST"
2847  011610  017212                          WCPTST
2848  011612  004767  174034                  JSR     %7,FW356        ;PATTERN TO BUFFER.
2849  011616  012767  000006  167444          MOV     #6,CTRA         ;SET COUNT TO 6.
2850  011624  042767  040000  167324  CT34A:  BIC     #BIT14,PRGID    ;CLEAR STALL BIT  IN PRGID.
2851  011632  004767  173512                  JSR     %7,TYPLN        ;TYPE LINE.
2852  011636  052767  040000  167312          BIS     #BIT14,PRGID    ;SET STALL BIT IN PRGID.
2853  011644  004767  173500                  JSR     %7,TYPLN        ;TYPE LINE
2854  011650  005367  167414                  DEC     CTRA            ;DONE 6 TIMES?
2855  011654  001363                          BNE     CT34A           ;BRANCH IF NOT 6 TIMES YET.
2856  011656  104012                          CHAIN                   ;CHAIN.
2857                                      ;RUN PROGRAM 11 AS A SUBROUTINE TO EXERCISE
2858                                      ;CURSOR ADDRESSING FUNCTIONS IF THIS WAS A MONITOR
2859                                      ;LOAD OR IF CELL MONITOR IS NON ZERO.
2860  011660  000035                  CT35:   35                      ;TEST #
2861  011662  177777                          -1                      ;LAST TEST
2862  011664  005767  166152                  TST     MONITR          ;IS THIS AN AUTOMATIC TEST?
2863  011670  001404                          BEQ     CT35A           ;NO - EXIT
2864  011672  004767  001116                  JSR     %7,PRG11        ;RUN PROG. 11 TEST
2865  011676  004767  173476                  JSR     %7,TYPCLR       ;CLEAR DOUBLE BUFFER
2866  011702  104012                  CT35A:  CHAIN                   ;DONE CHAIN
```

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2867
2868                                        ;PRG2-KEYBOARD TEST
2869  011704  012767  011730  167230  PRG2:   MOV     #ETO,KSTART
2870  011712  052767  000200  167236          BIS     #BIT7,PRGID
2871  011720  104000                          TYPE
2872  011722  017246                          KMSG1
2873  011724  000167  170400                  JMP     SRSET
2874                                        ;TEST THAT PRESSING KEY SETS DONE FLAG.
2875  011730  000000                  ETO:    0                               ;TEST #
2876  011732  012034                          ET1                             ;NEXT TEST.
2877  011734  012767  000005  167326          MOV     #5,CTRA
2878  011742  104006                  ETOA:   STRDRV
2879  011744  012000                          ETOB
2880  011746  104003                          TYPE                            ;TYPE "PRESS A KEY WITHIN 10 SECS."
2881  011750  017264                          KMSG2
2882  011752  052777  000100  167136          BIS     #BIT6,@TKS              ;ENABLE KYBD INTERRUPT.
2883  011760  005067  166012                  CLR     PSW
2884  011764  104400                          DELAY                           ;WAIT 10 SECONDS
2885  011766  023420                          10000.
2886  011770  104000                          TYPE                            ;TYPE "NO KEYBOARD REQUEST."
2887  011772  017466                          KMSG6
2888  011774  104010                          EHALT                           ;HALT.
2889  011776  000411                          BR      ETOCA
2890  012000  105777  167112          ETOB:   TSTB    @TKS                    ;TEST FOR DONE BIT ON
2891  012004  100403                          BMI     ETOC                    ;BRANCH IF DONE BIT SET.
2892  012006  104000                          TYPE                            ;DONE BIT NOT SET. TYPE:FALSE  KEY-
2893  012010  017514                          KMSG7                           ;BOARD OR READER INTERRUPT.
2894  012012  104010                          EHALT                           ;HALT
2895  012014  012716  012022          ETOC:   MOV     #ETOCA,@'.6
2896  012020  000002                          RTI                             ;EXIT INTERRUPT.
2897  012022  104011                  ETOCA:  SRESET
2898  012024  005367  167240                  DEC     CTRA                    ;DONE 5 TIMES?
2899  012030  001344                          BNE     ETOA                    ;BRANCH IF NOT DONE.
2900  012032  104012                          CHAIN                           ;CHAIN
2901                                        ;ECHO TEST. KEYED CHARACTER IS TYPED. RUBOUT ENDS ROUTINE.
2902  012034  000001                  ET1:    1                               ;TEST #
2903  012036  012114                          ET2                             ;NEXT TEST.
2904  012040  104000                          TYPE                            ;TYPE TITLE AND INSTRUCTIONS.
2905  012042  017324                          KMSG3
2906  012044  105777  167046          ET1A:   TSTB    @TKS                    ;WAIT FOR DONE FLAG
2907  012050  100375                          BPL     .-4
2908  012052  117767  167042  167176          MOVB    @TKB,CRBUF              ;MOVE KYBD CHAR TO CRBUF.
2909  012060  116777  167172  167036          MOVB    CRBUF,@TPB              ;ECHO CHAR READ.
2910  012066  105777  167030                  TSTB    @TPS                    ;WAIT FOR PRINTER DONE.
2911  012072  100375                          BPL     .-4
2912  012074  042767  000200  167154          BIC     #BIT7,CRBUF             ;CLEAR BIT 7 FROM CRBUF.
2913  012102  122767  000177  167146          CMPB    #177,CRBUF              ;COMPARE CRBUF TO RUBOUT (177)
2914  012110  001355                          BNE     ET1A                    ;BRANCH IF NOT RUBOUT (177)
2915  012112  104012                          CHAIN                           ;CHAIN
```

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2916
2917                                        ;OCTAL EQUIVALENT TEST. THE OCTAL EQUIVALENT OF ANY CHARACTER KEYED
2918                                        ;IS PRINTED. RUBOUT ENDS ROUTINE.
2919  012114  000002                       ET2:    2                               ;TEST #
2920  012116  177777                               -1                              ;LAST TEST
2921  012120  104001                               TYPES                           ;TYPE TITLE AND INSTRUCTIONS.
2922  012122  017426                               KMSG4
2923  012124  017337                               KMSG3A
2924  012126  177777                               -1
2925  012130  005067  167122                       CLR     CRBUF
2926  012134  105777  166756               ET2A:   TSTB    @TKS                    ;WAIT FOR DONE FLAG.
2927  012140  100375                               BPL     .-4
2928  012142  117767  166752  167106               MOVB    @TKB,CRBUF              ;CHARACTER TO CRBUF
2929  012150  004567  172670                       JSR     %5,ACNV4                ;CONVERT CHAR IN CRBUF TO
2930  012154  001256                               CRBUF                           ;PRINTABLE OCTAL
2931  012156  017460                               OCTEQV
2932  012160  104000                               TYPE                            ;TYPE OCTAL EQUIVALENT
2933  012162  017456                               KMSG5
2934  012164  042767  000200  167064               BIC     #BIT7,CRBUF             ;CLEAR BIT 7 FROM CRBUF
2935  012172  022767  000177  167056               CMP     #177,CRBUF              ;TEST FOR RUBOUT CHARACTER.
2936  012200  001355                               BNE     ET2A                    ;BRANCH IF NOT RUBOUT (177).
2937  012202  104012                               CHAIN                           ;CHAIN.
```

```
2938
2939                                        ;PRG3-PRINTER EXERCISER. KEYBOARD CONTROLLED.
2940                                        ;TYPES LINES WITH ANY 5 CHARACTERS. STALLS OR FULL SPEED.
2941  012204  004767  173260        PRG3:   JSR     %7,STBF         ;SET UP BUFFER.
2942  012210  104000                        TYPE                    ;TYPE TITLE
2943  012212  017542                        P7MG1
2944  012214  052767  040000  166734 HTA:   BIS     #BIT14,PRGID    ;SET STALL BIT IN PRGID.
2945  012222  012767  177600  172366        MOV     #177600,STLMSK  ;SET STALL MASK
2946  012230  012703  017623               MOV     #BLOCK1,%3
2947  012234  104000                        TYPE                    ;TYPE "TYPE IN DATA".
2948  012236  017570                        P7MG2
2949  012240  012767  000006  167022        MOV     #6,CTRA         ;CHAR COUNT TO CTRA.
2950  012246  004767  000060        HTB:    JSR     %7,GKBCR        ;GET AND STORE KYBD CHARACTER.
2951  012252  005367  167012               DEC     CTRA            ;GOT 6 CHARACTERS?
2952  012256  001373                        BNE     HTB             ;BRANCH IF NOT 6 CHARS YET.
2953  012260  042767  000200  166770        BIC     #BIT7,CRBUF
2954  012266  122767  000177  166762        CMPB    #177,CRBUF      ;CHECK 6TH CHAR FOR RUBOUT.
2955  012274  001003                        BNE     HTC             ;BRANCH IF NOT A RUBOUT.
2956  012276  042767  040000  166652        BIC     #BIT14,PRGID    ;RUBOUT. CLEAR STALL BIT IN PRGID.
2957  012304  004567  172646        HTC:    JSR     %5,BMOVE        ;FILL 72 CHAR LINE.
2958  012310  017623                        BLOCK1
2959  012312  017630                        BLOCK1+5
2960  012314  000103                        67.
2961  012316  004767  173026        HTD:    JSR     %7,TYPLN        ;TYPE LINE.
2962  012322  005777  166560               TST     @SR             ;CHANGE DATA? (SR15=1).
2963  012326  100732                        BMI     HTA             ;YES. GO CHANGE DATA
2964  012330  000772                        BR      HTD             ;NO CONTINUE WITH SAME DATA.
2965  012332  105777  166560        GKBCR:  TSTB    @TKS            ;WAIT FOR DONE FLAG.
2966  012336  100375                        BPL     .-4
2967  012340  117767  166554  166710        MOVB    @TKB,CRBUF      ;CHARACTER TO CRBUF.
2968  012346  116713  166704               MOVB    CRBUF,(3)       ;CHARACTER TO LINE BUFFER.
2969  012352  142723  000200               BICB    #200,(3)+
2970  012356  116700  166674               MOVB    CRBUF,%0
2971  012362  004767  172626               JSR     %7,LSPCH        ;ECHO CHARACTER.
2972  012366  000207                        RTS     %7
```

```
 2973                                           ;
 2974                                           ;
 2975                                           ;PRG4-PUNCH CLOCK ADJUSTMENT ROUTINE.
 2976                                           ;OUTPUTS CHARACTER SET IN LEFT HALF OF SR, AND
 2977                                           ;STALLS FOR NUMBER OF MILLISECONDS SET IN RIGHT HALF OF SR.
 2978  012370  104005                           PRG4:   CHALT                   ;HALT TO SET SR.
 2979  012372  004767  000036                   ITA:    JSR     %7,C1112        ;GO OUTPUT CHARACTER SET IN LEFT
 2980  012376  000775                                   BR      ITA             ;HALF OF SR AND STALL PER SR RIGHT.
 2981                                           ;
 2982                                           ;
 2983                                           ;PRG5-READER CLOCK ADJUSTMENT ROUTINE.
 2984                                           ;PERFORMS SAME FUNCTION AS PRG11, AND IN ADDITION,
 2985                                           ;USING THE PUNCH MAINTENANCE BIT, SHIFTS OUTPUT OF PUNCH
 2986                                           ;SHIFT REGISTER ONTO THE READER BUFFER. THE CONTENTS OF THE
 2987                                           ;READER BUFFER ARE THEN "FIXED" ON THE CONSOLE DATA LIGHTS
 2988                                           ;BY ISSUING A RESET WITH CONTENTS OF READER BUFFER LOADED IN R0.
 2989  012400  104005                           PRG5:   CHALT                   ;HALT TO SET SR.
 2990  012402  004767  000020                   JTA:    JSR     %7,C1112M       ;GO OUTPUT CHARACTER FROM SR LEFT AND
 2991  012406  017700  166506                           MOV     @TKB,%0         ;STALL PER SR RIGHT. (TKB) TO R0.
 2992  012412  000005                                   RESET                   ;"FIX" (TKB) IN DATA LIGHTS.
 2993  012414  000005                                   RESET
 2994  012416  000005                                   RESET
 2995  012420  000005                                   RESET
 2996  012422  000005                                   RESET
 2997  012424  000766                                   BR      JTA             ;REPEAT.
 2998                                           ;
 2999  012426  052777  000004  166466  C1112M: BIS     #4,@TPS         ;SET MAINTENANCE MODE (PUNCH).
 3000  012434  117767  166446  000022  C1112:  MOVB    @SR,XTY         ;STALL COUNT TO XTY.
 3001  012442  005767  000016                   TST     XTY             ;DISREGARD 0 DELAY.
 3002  012446  001002                           BNE     C1112A
 3003  012450  005267  000010                   INC     XTY
 3004  012454  117777  166427  166442  C1112A: MOVB    @SR+1,@TPB      ;LOAD PUNCH BUFFER.
 3005  012462  104400                           DELAY                   ;DELAY (APPROXIMATELY) THE NUMBER OF
 3006  012464  000000                   XTY:    OPEN                    ;MSECS. SPECIFIED AT SR RIGHT
 3007  012466  000207                           RTS     %7              ;EXIT
```

```
                                        ;PRG6-MAINTENANCE MODE SINGLE CHARACTER DATA TEST.
                                        ;WITH MAINTENANCE MODE SET, OUTPUTS ONTO PUNCH BUFFER AND BACK ONTO
                                        ;READER BUFFER THE CHARACTER SET IN SR LEFT. THE CHARACTER IN THE
                                        ;READER BUFFER IS COMPARED TO THE CHARACTER IN SR LEFT. IF THE 2 CHARACTERS
                                        ;DISAGREE THE PROGRAM HALTS. THE DATA LIGHTS WILL THEN CONTAIN:
                                        ;
                                        ;LEFT HALF: THE EXPECTED CHARACTER (SR LEFT).
                                        ;RIGHT HALF: THE CHARACTER IN THE READER BUFFER.
012470  104005                  PRG6:   CHALT                   ;HALT TO SET SR.
012472  052777  000004  166422  KTA:    BIS     #4,@TPS         ;SET MAINTENANCE MODE.
012500  105777  166416          KTB:    TSTB    @TPS            ;WAIT FOR READY.
012504  100375                          BPL     .-4
012506  117767  166375  166543          MOVB    @SR+1,CRBUF+1   ;S/B CHAR TO CRBUF+1.
012514  116777  166537  166402          MOVB    CRBUF+1,@TPB    ;OUTPUT CHARACTER.
012522  105777  166370                  TSTB    @TKS            ;WAIT FOR READER DONE FLAG.
012526  100375                          BPL     .-4
012530  117767  166364  166520          MOVB    @TKB,CRBUF      ;CHAR READ TO CRBUF.
012536  104004                          DATCHK                  ;GO CHECK AGAINST S/B CHAR.
012540  000754                          BR      KTA             ;REPEAT.

                                        ;PRG7-MAINTENANCE MODE SPECIAL BINARY COUNT PATTERN DATA TEST.
                                        ;PERFORMS SAME OPERATION AS PRG6, EXCEPT THAT SPECIAL BINARY COUNT
                                        ;PATTERN IS USED.
012542  004767  172076          PRG7:   JSR     %7,INBIN        ;INITIALIZE BINARY COUNT
012546  012767  177600  172042          MOV     #177600,STLMSK  ;SET STALL LIMIT
012554  052767  040000  166374          BIS     #BIT14,PRGID    ;ALLOW STALLS
012562  052777  000004  166332  LTA:    BIS     #4,@TPS         ;SET MAINTENANCE MODE.
012570  032777  000400  166310          BIT     #BIT8,@SR       ;CHECK STALL SWITCH
012576  001001                          BNE     LTB             ;BRANCH IF NO STALL WANTED
012600  104002                          STALL                   ;STALL
012602  105777  166314          LTB:    TSTB    @TPS            ;WAIT FOR READY.
012606  100375                          BPL     .-4
012610  004767  172134                  JSR     %7,GTBINP       ;GET BIN CHARACTER.
012614  110167  166437                  MOVB    %1,CRBUF+1      ;MOVE TO S/B CHAR.
012620  110177  166300                  MOVB    %1,@TPB         ;OUTPUT BIN CHARACTER.
012624  105777  166266                  TSTB    @TKS            ;WAIT FOR READER DONE.
012630  100375                          BPL     .-4
012632  117767  166262  166416          MOVB    @TKB,CRBUF      ;CHAR IN READ BUFFER TO CRBUF.
012640  104004                          DATCHK                  ;GO CHECK AGAINST S/B CHAR.
012642  005767  165174                  TST     MONITR          ;MONITOR LOAD?
012646  001401                          BEQ     LTC             ;NO - CONTINUE
012650  000207                          RTS     %7              ;YES - RETURN
012652  000743          LTC:    BR      LTA             ;CONTINUE.

                                        ;PRG10 ROLE UP TEST
                                        ;THE FUNCTION OF THIS TEST IS TO TEST THE ROLL-UP CAPABILITY
                                        ;OF THE VT05
                                        ;TO DO THIS A LINE OF A CHARACTER AND IT'S COMPLEMENT FOLLOWED
                                        ;BY A LINE OF THE COMPLEMENT AND THE CHARACTER IS TRANSMITTED
                                        ;THIS SCHEME IS CONTINUED UNTIL SWITCH 15 IS RAISED
                                        ;THE CHARACTER SHOULD NOT BE CHANGED UNTIL THE SCREEN HAS BEEN
                                        ;COMPLETELY FILLED

012654  012767  177736  000126  PRG10:  MOV     #-42,TCHAR      ;INIT TEMP CHAR
012662  016767  000122  000122  RENIT:  MOV     TCHAR,CHAR      ;COMPLEMENT OF "!"
```

```
3064  012670  012767  177670  000110  PRG10C: MOV     #-72.,CNT       ;72 CHAR/LINE
3065  012676  005167  000110          PRG10D: COM     CHAR            ;
3066  012702  016700  000104          PRG10A: MOV     CHAR,%0         ;LOAD "!"
3067  012706  004767  172302                  JSR     %7,LSPCH        ;PUNCH "!"
3068  012712  005167  000074                  COM     CHAR            ;COMPLEMENT TO "↑"
3069  012716  016700  000070                  MOV     CHAR,%0         ;LOAD "↑"
3070  012722  004767  172266                  JSR     %7,LSPCH        ;PUNCH "↑"
3071  012726  005167  000060                  COM     CHAR            ; "!"
3072  012732  062767  000002  000046         ADD     #2,CNT          ;END OF LINE?
3073  012740  001360                          BNE     PRG10A          ;NO
3074  012742  012700  000015                  MOV     #15,%0          ;CR
3075  012746  004767  172242                  JSR     %7,LSPCH
3076  012752  012700  000012                  MOV     #12,%0          ;LF
3077  012756  004767  172232                  JSR     %7,LSPCH
3078  012762  005777  166120                  TST     @SR             ;NEXT CHAR
3079  012766  100340                          BPL     PRG10C          ;NO
3080  012770  005367  000014                  DEC     TCHAR           ;YES CHANGE TCHAR
3081  012774  022767  177677  000006         CMP     #177677,TCHAR   ;CHAR STRING COMPLETE
3082  013002  001724                          BEQ     PRG10
3083  013004  000726                          BR      RENIT
3084  013006  000000                  CNT:    0
3085  013010  177736                  TCHAR:  -42
3086  013012  000041                  CHAR:   41
3087
3088                                  ;PRG11-CURSOR ADDRESS TEST
3089                                  ;   RANDOM NUMBERS ARE GENERATED AND USED AS "X" AND "Y" COORDINATES
3090                                  ;ADDRESSING A 1440 CHARACTER PRINTOUT.
3091                                  ;VERIFICATION OF DISPLAY IS PERFORMED VISUALLY BY THE USER
3092                                  ;THIS PROGRAM MAY BE RERUN AFTER COMPLETION, BY DEPRESSING THE CONT. KEY
3093
3094  013014  005067  000442          PRG11:  CLR     OVRAL
3095  013020  000167  000262                  JMP     SRT
3096  013024  012700  000035          PGO:    MOV     #35,%0          ;LOAD "CURSOR HOME"
3097  013030  004767  172160                  JSR     %7,LSPCH        ;PRINT (MOVE) CURSOR "HOME"
3098  013034  012700  000037                  MOV     #37,%0          ;LOAD "PAGE ERASE"
3099  013040  004767  172150                  JSR     %7,LSPCH        ;ERASE CRT FACE
3100  013044  016767  000414  000406  GENER: MOV     RTWY1,SET       ;SETUP PRINTOUT
3101  013052  004767  171006                  JSR     %7,RNGEN        ;GENERATE RANDOM NUMBER
3102  013056  005100                          COM     %0
3103  013060  042700  177700                  BIC     #177700,%0      ;RANDOM NO. MUST BE TWO DIGITS
3104  013064  020027  000037                  CMP     %0,#37          ;NO. MUST BE LESS THAN 40
3105  013070  101765                          BLOS    GENER           ;LOWER, REGENERATION
3106  013072  020067  000352                  CMP     %0,HYCOR        ;NO. MUST NOT BE GREATER THAN 63
3107  013076  101362                          BHI     GENER           ;GREATER, REGENERATION
3108  013100  010067  000346                  MOV     %0,YADDS        ;STORE RANDOM Y COORDINATE
3109  013104  010001                          MOV     %0,%1           ;STORE Y COORDINATE IN HI BYTE OF BUFFER
3110  013106  166701  000334                  SUB     LYCOR,%1        ;MINIMUM X,Y COORDINATE
3111  013112  001405                          BEQ     GENRX           ;RESULT, MINIMUM Y COORDINATE
3112  013114  062767  000110  000336  RATZ:   ADD     #110,SET        ;SETUP MINIMUM Y LOCATION FOR PRINTOUT
3113  013122  005301                          DEC     %1
3114  013124  001373                          BNE     RATZ            ;Y COORDINATE IS SET
3115  013126  004767  170732          GENRX:  JSR     %7,RNGEN        ;GENERATE RANDOM NUMBER
3116  013132  005100                          COM     %0
3117  013134  042700  177600                  BIC     #177600,%0      ;RANDOM NO. MAY BE LESS THAN 200
3118  013140  020027  000037                  CMP     %0,#37          ;NO. MUST NOT BE LESS THAN 40
3119  013144  101770                          BLOS    GENRX           ;LOWER, REGENERATION
```

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3120  013146  020067  000302                  CMP     %0,HXCOR        ;NO. MUST NOT BE GREATER THAN 147
3121  013152  101365                          BHI     GENRX           ;GREATER, REGENERATION
3122  013154  010067  000276                  MOV     %0,XADDS        ;STORE RANDOM X COORDINATE
3123  013160  166700  000262                  SUB     LYCOR,%0        ;SETUP MINIMUM LOCATION
3124  013164  060067  000270                  ADD     %0,SET          ;SETUP X COOR. FOR PNTOUT.
3125  013170  016701  000264                  MOV     SET,%1          ;SETUP CHECK
3126  013174  105711                          TSTB    (1)             ;HAS CURRENT CHAR. ALREADY BEEN USED?
3127  013176  100502                          BMI     TROB            ;YES, INCREMENT RANDOM PATTERNS
3128  013200  012700  000016                  MOV     #16,%0          ;LOAD CURSOR ADDRESSING CODE
3129  013204  004767  172004                  JSR     %7,LSPCH        ;PRINT CAD
3130  013210  016700  000236                  MOV     YADDS,%0        ;LOAD Y COORDINATE
3131  013214  004767  171774                  JSR     %7,LSPCH        ;PRINT (MOVE) CURSOR TO Y COORDINATE
3132  013220  016700  000232                  MOV     XADDS,%0        ;LOAD X COORDINATE
3133  013224  004767  171764                  JSR     %7,LSPCH        ;PRINT (MOVE) CURSOR TO X COORDINATE
3134  013230  111100                          MOVB    (1),%0          ;LOAD CHARACTER TO BE PRINTED
3135  013232  004767  171756                  JSR     %7,LSPCH        ;PRINT CHARACTER
3136  013236  152711  000200                  BISB    #200,(1)        ;INDICATE USE OF CURSOR POSITION
3137  013242  005367  000214                  DEC     OVRAL           ;MAXIMUM NO. OF COORDINATES
3138  013246  001402                          BEQ     RESRT           ;IS CRT COMPLETE?
3139  013250  000167  177570                  JMP     GENER           ;NO, GENERATE ANOTHER NUMBER
3140  013254  005767  164562          RESRT:  TST     MONITR          ;AUTOMATIC TESTING DESIRED?
3141  013260  001401                          BEQ     RESRT1          ;NO - HALT
3142  013262  000207                          RTS     %7              ;YES - RETURN
3143  013264  000000                  RESRT1: HALT                    ;WAIT FOR CONTINUE
3144  013266  012767  001233  170636          MOV     #1233,RP1       ;SETUP RANDOM GENERATOR
3145  013274  012767  005622  170632          MOV     #5622,RP2
3146  013302  000167  177506                  JMP     PRG11
3147  013306  016703  000152          SRT:    MOV     RTWY1,%3        ;SETUP BUFFER FOR REFRESHING
3148  013312  142723  000200          SRT1:   BICB    #200,(3)+       ;REFRESH BUFFER
3149  013316  005267  000140                  INC     OVRAL           ;MAXIMUM NO. OF COORDINATES
3150  013322  026727  000134  002640          CMP     OVRAL,#2640     ;RESET MAX. NO OF CHARACTERS
3151  013330  001402                          BEQ     WT              ;ONCE RESET, WAIT FOR VISUAL INSP.
3152  013332  000167  177754                  JMP     SRT1            ;IF NOT RESET, CONTINUE
3153  013336  012767  000010  000074  WT:     MOV     #10,TWW         ;RESET COUNTERS
3154  013344  012767  000001  000070          MOV     #1,STEP
3155  013352  012767  000001  000064          MOV     #1,STEP1
3156  013360  000167  177440                  JMP     PGO             ;RESTART
3157  013364  016767  000052  170540  NUM:    MOV     STEP,RP1        ;USED BY RANDOM NO. GENERATOR
3158  013372  016767  000046  170534          MOV     STEP1,RP2
3159  013400  000167  177440                  JMP     GENER
3160  013404  005367  000030          TROB:   DEC     TWW             ;NOS. BEING GENERATED HAVE BEEN USED
3161  013410  001402                          BEQ     SAD
3162  013412  000167  177426                  JMP     GENER
3163  013416  012767  000010  000014  SAD:    MOV     #10,TWW         ;CHANGE RANDOM PATTERNS
3164  013424  005267  000012                  INC     STEP
3165  013430  005267  000010                  INC     STEP1
3166  013434  000167  177724                  JMP     NUM
3167
3168  013440  000010                  TWW:    10
3169  013442  000001                  STEP:   1
3170  013444  000001                  STEP1:  1
3171  013446  000040                  LYCOR:  40
3172  013450  000063                  HYCOR:  63
3173  013452  000000                  YADDS:  OPEN
3174  013454  000147                  HXCOR:  147
3175  013456  000000                  XADDS:  OPEN
```

```
013460  000000                          SET:     OPEN
013462  000000                          OVRAL:   OPEN
013464  013500                          RTWY1:   RTWY
013466  004777  164350                  LOGICAL:          JSR     %7,@MONITR
013472  000240                                   NOP
013474  000240                                   NOP
013476  000240                                   NOP
013500  042074  043511  052111          RTWY:    .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>"""""""""""""""""""""""""""""""""""""""""
013506  046101  042452  052521
013514  050111  042515  052116
013522  041452  051117  047520
013530  040522  044524  047117
013536  021076  021042  021042
013544  021042  021042  021042
013552  021042  021042  021042
013560  021042  021042  021042
013566  021042  021042  021042
013574  021042  021042  021042
013602  021042  021042  021042
013610  042074  043511  052111                   .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>#########################################
013616  046101  042452  052521
013624  050111  042515  052116
013632  041452  051117  047520
013640  040522  044524  047117
013646  021476  021443  021443
013654  021443  021443  021443
013662  021443  021443  021443
013670  021443  021443  021443
013676  021443  021443  021443
013704  021443  021443  021443
013712  021443  021443  021443
013720  042074  043511  052111                   .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
013726  046101  042452  052521
013734  050111  042515  052116
013742  041452  051117  047520
013750  040522  044524  047117
013756  022076  022044  022044
013764  022044  022044  022044
013772  022044  022044  022044
014000  022044  022044  022044
014006  022044  022044  022044
014014  022044  022044  022044
014022  022044  022044  022044
014030  042074  043511  052111                   .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
014036  046101  042452  052521
014044  050111  042515  052116
014052  041452  051117  047520
014060  040522  044524  047117
014066  022476  022445  022445
014074  022445  022445  022445
014102  022445  022445  022445
014110  022445  022445  022445
014116  022445  022445  022445
014124  022445  022445  022445
014132  022445  022445  022445
014140  042074  043511  052111                   .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&&
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3232  014146  046101  042452  052521
3233  014154  050111  042515  052116
3234  014162  041452  051117  047520
3235  014170  040522  044524  047117
3236  014176  023076  023046  023046
3237  014204  023046  023046  023046
3238  014212  023046  023046  023046
3239  014220  023046  023046  023046
3240  014226  023046  023046  023046
3241  014234  023046  023046  023046
3242  014242  023046  023046  023046
3243  014250  042074  043511  052111        .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>((((((((((((((((((((((((((((((((((((((((((((((((
3244  014256  046101  042452  052521
3245  014264  050111  042515  052116
3246  014272  041452  051117  047520
3247  014300  040522  044524  047117
3248  014306  024076  024050  024050
3249  014314  024050  024050  024050
3250  014322  024050  024050  024050
3251  014330  024050  024050  024050
3252  014336  024050  024050  024050
3253  014344  024050  024050  024050
3254  014352  024050  024050  024050
3255  014360  042074  043511  052111        .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>))))))))))))))))))))))))))))))))))))))))))))))))
3256  014366  046101  042452  052521
3257  014374  050111  042515  052116
3258  014402  041452  051117  047520
3259  014410  040522  044524  047117
3260  014416  024476  024451  024451
3261  014424  024451  024451  024451
3262  014432  024451  024451  024451
3263  014440  024451  024451  024451
3264  014446  024451  024451  024451
3265  014454  024451  024451  024451
3266  014462  024451  024451  024451
3267  014470  042074  043511  052111        .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>****************************************
3268  014476  046101  042452  052521
3269  014504  050111  042515  052116
3270  014512  041452  051117  047520
3271  014520  040522  044524  047117
3272  014526  025076  025052  025052
3273  014534  025052  025052  025052
3274  014542  025052  025052  025052
3275  014550  025052  025052  025052
3276  014556  025052  025052  025052
3277  014564  025052  025052  025052
3278  014572  025052  025052  025052
3279  014600  042074  043511  052111        .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>++++++++++++++++++++++++++++++++++++++++
3280  014606  046101  042452  052521
3281  014614  050111  042515  052116
3282  014622  041452  051117  047520
3283  014630  040522  044524  047117
3284  014636  025476  025453  025453
3285  014644  025453  025453  025453
3286  014652  025453  025453  025453
3287  014660  025453  025453  025453
```

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  3288  014666  025453  025453  025453
  3289  014674  025453  025453  025453
  3290  014702  025453  025453  025453
  3291  014710  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>==========================================
  3292  014716  046101  042452  052521
  3293  014724  050111  042515  052116
  3294  014732  041452  051117  047520
  3295  014740  040522  044524  047117
  3296  014746  036475  036475  036475
  3297  014754  036475  036475  036475
  3298  014762  036475  036475  036475
  3299  014770  036475  036475  036475
  3300  014776  036475  036475  036475
  3301  015004  036475  036475  036475
  3302  015012  036475  036475  036475
  3303  015020  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>..................................
  3304  015026  046101  042452  052521
  3305  015034  050111  042515  052116
  3306  015042  041452  051117  047520
  3307  015050  040522  044524  047117
  3308  015056  027076  027056  027056
  3309  015064  027056  027056  027056
  3310  015072  027056  027056  027056
  3311  015100  027056  027056  027056
  3312  015106  027056  027056  027056
  3313  015114  027056  027056  027056
  3314  015122  027056  027056  027056
  3315  015130  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>//////////////////////////////////////
  3316  015136  046101  042452  052521
  3317  015144  050111  042515  052116
  3318  015152  041452  051117  047520
  3319  015160  040522  044524  047117
  3320  015166  027476  027457  027457
  3321  015174  027457  027457  027457
  3322  015202  027457  027457  027457
  3323  015210  027457  027457  027457
  3324  015216  027457  027457  027457
  3325  015224  027457  027457  027457
  3326  015232  027457  027457  027457
  3327  015240  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
  3328  015246  046101  042452  052521
  3329  015254  050111  042515  052116
  3330  015262  041452  051117  047520
  3331  015270  040522  044524  047117
  3332  015276  030076  030060  030060
  3333  015304  030060  030060  030060
  3334  015312  030060  030060  030060
  3335  015320  030060  030060  030060
  3336  015326  030060  030060  030060
  3337  015334  030060  030060  030060
  3338  015342  030060  030060  030060
  3339  015350  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>111111111111111111111111111111111111111
  3340  015356  046101  042452  052521
  3341  015364  050111  042515  052116
  3342  015372  041452  051117  047520
  3343  015400  040522  044524  047117
```

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3344  015406  030476  030461  030461
3345  015414  030461  030461  030461
3346  015422  030461  030461  030461
3347  015430  030461  030461  030461
3348  015436  030461  030461  030461
3349  015444  030461  030461  030461
3350  015452  030461  030461  030461
3351  015460  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>2222222222222222222222222222222222222222
3352  015466  046101  042452  052521
3353  015474  050111  042515  052116
3354  015502  041452  051117  047520
3355  015510  040522  044524  047117
3356  015516  031076  031062  031062
3357  015524  031062  031062  031062
3358  015532  031062  031062  031062
3359  015540  031062  031062  031062
3360  015546  031062  031062  031062
3361  015554  031062  031062  031062
3362  015562  031062  031062  031062
3363  015570  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>3333333333333333333333333333333333333333
3364  015576  046101  042452  052521
3365  015604  050111  042515  052116
3366  015612  041452  051117  047520
3367  015620  040522  044524  047117
3368  015626  031476  031463  031463
3369  015634  031463  031463  031463
3370  015642  031463  031463  031463
3371  015650  031463  031463  031463
3372  015656  031463  031463  031463
3373  015664  031463  031463  031463
3374  015672  031463  031463  031463
3375  015700  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>4444444444444444444444444444444444444444
3376  015706  046101  042452  052521
3377  015714  050111  042515  052116
3378  015722  041452  051117  047520
3379  015730  040522  044524  047117
3380  015736  032076  032064  032064
3381  015744  032064  032064  032064
3382  015752  032064  032064  032064
3383  015760  032064  032064  032064
3384  015766  032064  032064  032064
3385  015774  032064  032064  032064
3386  016002  032064  032064  032064
3387  016010  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>5555555555555555555555555555555555555555
3388  016016  046101  042452  052521
3389  016024  050111  042515  052116
3390  016032  041452  051117  047520
3391  016040  040522  044524  047117
3392  016046  032476  032465  032465
3393  016054  032465  032465  032465
3394  016062  032465  032465  032465
3395  016070  032465  032465  032465
3396  016076  032465  032465  032465
3397  016104  032465  032465  032465
3398  016112  032465  032465  032465
3399  016120  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>6666666666666666666666666666666666666666
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3400  016126  046101  042452  052521
3401  016134  050111  042515  052116
3402  016142  041452  051117  047520
3403  016150  040522  044524  047117
3404  016156  033076  033066  033066
3405  016164  033066  033066  033066
3406  016172  033066  033066  033066
3407  016200  033066  033066  033066
3408  016206  033066  033066  033066
3409  016214  033066  033066  033066
3410  016222  033066  033066  033066
3411  016230  042074  043511  052111          .ASCII  '<DIGITAL*EQUIPMENT*CORPORATION>777777777777777777777777777777777777777777
3412  016236  046101  042452  052521
3413  016244  050111  042515  052116
3414  016252  041452  051117  047520
3415  016260  040522  044524  047117
3416  016266  033476  033467  033467
3417  016274  033467  033467  033467
3418  016302  033467  033467  033467
3419  016310  033467  033467  033467
3420  016316  033467  033467  033467
3421  016324  033467  033467  033467
3422  016332  033467  033467  033467
3423  016340  021445  052040  051505  DONE:    .ASCII  '%# TEST COMPLETED@'
3424  016346  020124  047503  050115
3425  016354  042514  042524  040104
3426  016362  021445  051440  044527  ERRORM:  .ASCII  '%# SWITCH OR CONSOLE ERROR DEVICE '
3427  016370  041524  020110  051117
3428  016376  041440  047117  047523
3429  016404  042514  042440  051122
3430  016412  051117  042040  053105
3431  016420  041511  020105
3432  016424  033461  032466  030060  ERRORA:  .ASCII  '176500 PROGRAM ADDRESS '
3433  016432  050040  047522  051107
3434  016440  046501  040440  042104
3435  016446  042522  051523     040
3436  016453     060  030060  030060  ERRORB:  .ASCII  '000000@ '
3437  016460  040060     040
3438  016463     045  020043  051105  CERR:    .ASCII  '%# ERROR DEVICE '
3439  016470  047522  020122  042504
3440  016476  044526  042503     040
3441  016503     061  033067  030065  CERRA:   .ASCII  '176500 PROGRAM ADDRESS '
3442  016510  020060  051120  043517
3443  016516  040522  020115  042101
3444  016524  051104  051505  020123
3445  016532  030060  030060  030060  CERRB:   .ASCII  '000000@'
3446  016540     100
3447  016541     045  020043  040504  DERR:    .ASCII  '%# DATA ERROR DEVICE '
3448  016546  040524  042440  051122
3449  016554  051117  042040  053105
3450  016562  041511  020105
3451  016566  033461  032466  030060  DERRA:   .ASCII  '176500@'
3452  016574     100
3453  016575     045  020043  053523  ABORT:   .ASCII  '%# SWITCH ERROR TEST ABORTED@'
3454  016602  052111  044103  042440
3455  016610  051122  051117  052040
```

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 3456  016616  051505  020124  041101
 3457  016624  051117  042524  040104
 3458
 3459
 3460
 3461  016632      047      137      127  A33WP6: .BYTE   047,137,127,057,127,137
 3462  016635      057      127      137
 3463  016640      047      133      077  A35WP6: .BYTE   047,133,077,103,077,133
 3464  016643      103      077      133
 3465  016646      101      102      103  A:      .BYTE   101,102,103
 3466  016651      104      105      106  D:      .BYTE   104,105,106
 3467  016654      107      110      111  G:      .BYTE   107,110,111
 3468  016657      112      113      114  J:      .BYTE   112,113,114
 3469  016662      115      116      117  M:      .BYTE   115,116,117
 3470  016665      120      121      122  P:      .BYTE   120,121,122
 3471  016670      123      124      125  S:      .BYTE   123,124,125
 3472  016673      126      127      130  V:      .BYTE   126,127,130
 3473  016676      131      132      060  Y:      .BYTE   131,132,060
 3474  016701      061      062      063  ONE:    .BYTE   061,062,063
 3475  016704      064      065      066  FOUR:   .BYTE   064,065,066
 3476  016707      067      070      071  SEVEN:  .BYTE   067,070,071
 3477  016712      041      042      043  C41:    .BYTE   041,042,043
 3478  016715      044      045      046  C44:    .BYTE   044,045,046
 3479  016720      047      050      051  C47:    .BYTE   047,050,051
 3480  016723      052      053      054  C52:    .BYTE   052,053,054
 3481  016726      055      056      057  C55:    .BYTE   055,056,057
 3482  016731      072      073      074  C72:    .BYTE   072,073,074
 3483  016734      075      076      077  C75:    .BYTE   075,076,077
 3484  016737      100      133      134  C100:   .BYTE   100,133,134
 3485  016742      135      136      137  C135:   .BYTE   135,136,137
 3486  016745      377      000      377  C377:   .BYTE   377,000,377
 3487  016750  021445  040524  020102  TBTST:  .ASCII  '%*TAB TEST%*'
 3488  016756  042524  052123  021445
 3489  016764  020040  020040  020040  TBMRK:  .ASCII  '         /@'
 3490  016772  020040  040057
 3491  016776  020040  020040  020040  TBMRK1: .ASCII  '        /@'
 3492  017004  027440      100
 3493  017007      045      100          CRLF:   .ASCII  '%@'
 3494  017011      055  026455  044455  RM33A:  .ASCII  '----I@'
 3495  017016      100
 3496  017017      055  026511      100  RM33B:  .ASCII  '-I-@'
 3497  017023      055  026455  044455  RM37A:  .ASCII  '----I-I@'
 3498  017030  044455      100
 3499  017033      134  040040          SPTSTC: .ASCII  '\ @'
 3500  017036  021445  040503  051122  CRTST:  .ASCII  '%*CARRIAGE RETURN TEST%*@'
 3501  017044  040511  042507  051040
 3502  017052  052105  051125  020116
 3503  017060  042524  052123  021445
 3504  017066      100
 3505  017067      045  051043  043511  RMTST:  .ASCII  '%*RIGHT MARGIN TEST%*@'
 3506  017074  052110  046440  051101
 3507  017102  044507  020116  042524
 3508  017110  052123  021445      100
 3509  017115      045  041443  051125  SPTST:  .ASCII  '%*CURSOR RIGHT TEST%*@'
 3510  017122  047523  020122  044522
 3511  017130  044107  020124  042524
```

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3512  017136  052123  021445     100
3513  017143     045  046043  047111  LFTST:  .ASCII  '%*LINE FEED TEST%*@'
3514  017150  020105  042506  042105
3515  017156  052040  051505  022524
3516  017164  040043
3517  017166  021445  044103  051101  CHRTST: .ASCII  '%*CHARACTER TESTS%*@'
3518  017174  041501  042524  020122
3519  017202  042524  052123  022523
3520  017210  040043
3521  017212  021445  047527  051522  WCPTST: .ASCII  '%*WORST CASE PATTERN TEST%*@'
3522  017220  020124  040503  042523
3523  017226  050040  052101  042524
3524  017234  047122  052040  051505
3525  017242  022524  040043
3526  017246  021445  054513  042102  KMSG1:  .ASCII  '%*KYBD TEST%*@'
3527  017254  052040  051505  022524
3528  017262  040043
3529  017264  050045  042522  051523  KMSG2:  .ASCII  '%PRESS A KEY WITHIN 10 SECONDS.@'
3530  017272  040440  045440  054505
3531  017300  053440  052111  044510
3532  017306  020116  030061  051440
3533  017314  041505  047117  051504
3534  017322  040056
3535  017324  021445  041505  047510  KMSG3:  .ASCII  '%*ECHO TEST'
3536  017332  052040  051505     124  KMSG3A: .ASCII  '%CHARACTER KEYED WILL BE TYPED.'
3537  017337     045  044103  051101
3538  017344  041501  042524  020122
3539  017352  042513  042531  020104
3540  017360  044527  046114  041040
3541  017366  020105  054524  042520
3542  017374  027104
3543  017376  051045  041125  052517          .ASCII  '%RUBOUT ENDS ROUTINE.%*@'
3544  017404  020124  047105  051504
3545  017412  051040  052517  044524
3546  017420  042516  022456  040043
3547  017426  021445  041517  040524  KMSG4:  .ASCII  '%*OCTAL EQUIVALENT TEST@'
3548  017434  020114  050505  044525
3549  017442  040526  042514  052116
3550  017450  052040  051505  040124
3551  017456  020045                  KMSG5:  .ASCII  '% '
3552  017460  020040  020040  040045  OCTEQV: .ASCII  '    %@'
3553  017466  047045  020117  042513  KMSG6:  .ASCII  '%NO KEYBOARD REQUEST.@'
3554  017474  041131  040517  042122
3555  017502  051040  050505  042525
3556  017510  052123  040056
3557  017514  043045  046101  042523  KMSG7:  .ASCII  '%FALSE KYBD INTERRUPT@'
3558  017522  045440  041131  020104
3559  017530  047111  042524  051122
3560  017536  050125  040124
3561  017542  021445  044504  050123  P7MG1:  .ASCII  '%*DISPLAY EXERCISER%*@'
3562  017550  040514  020131  054105
3563  017556  051105  044503  042523
3564  017564  022522  040043
3565  017570  021445  054524  042520  P7MG2:  .ASCII  '%*TYPE IN DATA :@'
3566  017576  044440  020116  040504
3567  017604  040524  035040     100
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  3568  017611     125  040040          BKSU:   .ASCII  'U @'
  3569  017614  020040  020040     040  DECVAL: .ASCII  '    '
  3570  017621  000001                  DEND:   .END
```

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A       016646          AT20    006514          AT31B   007372          AT5B    006220          CHNA    002464
ABORT   016575          AT20A   006530          AT31E   007370          AT5E    006216          CHNAA   002512
ACNV    005102          AT20B   006540          AT32    007376          A1ST    005072          CHNB    002526
ACNVB   005036          AT20C   006564          AT32A   007406          A33WP6  016632          CHRTST  017166
ACNVC   005064          AT20D   006566          AT32B   007434          A35WP6  016640          CHR1    001260
ACNVE   001714          AT20E   006560          AT32E   007432          B       002066          CHR2    001262
ACNVM   005116          AT21    006572          AT33    007440          BDCNV   005230          CHR3    001264
ACNVX   005100          AT21A   006606          AT33A   007450          BDCNVA  005250          CKASR   003240
ACNV4   005044          AT21B   006616          AT33B   007474          BELL  = 000007          CK33  = 104013
ACNV6   005016          AT21C   006640          AT33E   007472          BIT0  = 000000          CK35  = 104014
ACTEMP  005336          AT21E   006650          AT34    007500          BIT1  = 000002          CLEAN   002736
ARDA    003736          AT22    006656          AT34A   007514          BIT10 = 002000          CNT     013006
ARDB    003762          AT22A   006702          AT34B   007536          BIT11 = 004000          CNVCTR  005330
AREAD   003716          AT22B   006736          AT34C   007542          BIT12 = 010000          CONADD  001112
AT0     005724          AT22C   006740          AT34E   007534          BIT13 = 020000          CONIT   003264
AT0A    005742          AT22E   006732          AT35    007546          BIT14 = 040000          CONVEC  001114
AT0B    005746          AT23    006750          AT35A   007562          BIT15 = 100000          CPRDY   005200
AT0E    005752          AT23A   006770          AT35B   007604          BIT2  = 000004          CPRDYA  005210
AT1     005756          AT23B   007012          AT35E   007614          BIT3  = 000010          CRBUF   001256
AT1A    005774          AT23C   007022          AT36    007622          BIT4  = 000020          CRLF    017007
AT1B    006000          AT23D   007036          AT36A   007636          BIT5  = 000040          CRTA    002312
AT1E    006004          AT23E1  007010          AT36B   007672          BIT6  = 000100          CRTST   017036
AT11    006224          AT23E2  007042          AT36C   007674          BIT7  = 000200          CTRA    001270
AT11A   006234          AT24    007050          AT37    007704          BIT8  = 000400          CTRB    001272
AT11B   006244          AT24A   007066          AT37A   007714          BIT9  = 001000          CTRC    001274
AT12    006250          AT24B   007110          AT37B   007742          BKSW    017611          CTRD    001276
AT12A   006260          AT24C   007130          AT37C   007752          BLKBB = 017744          CTO     010312
AT12B   006264          AT24E1  007104          AT37D   007766          BLKCC = 020056          CTOA    010336
AT12C   006276          AT24E2  007126          AT37E1  007740          BLK2  = 017746          CTOB    010346
AT12D   006310          AT25    007134          AT37E2  007772          BLOCKA= 017621          CTOC    010354
AT12E   006304          AT25A   007152          AT4     006074          BLOCKB= 017733          CT1     010414
AT12F   006316          AT25B   007174          AT4A    006112          BLOCKC= 020045          CT1A    010440
AT13    006322          AT25E   007172          AT4B    006134          BLOCK1= 017623          CT10    011172
AT13A   006332          AT26    007200          AT4C    006154          BLOCK2= 017735          CT11    011204
AT13B   006336          AT26A   007210          AT4E1   006130          BMOVA   005166          CT12    011216
AT13C   006354          AT26B   007232          AT4E2   006152          BMOVE   005156          CT13    011230
AT13E   006352          AT26C   007256          AT40    010000          BRCTR   003764          CT14    011242
AT14    006360          AT26E1  007226          AT40A   010014          BYPMAN= 000400          CT15    011254
AT14A   006370          AT26E2  007250          AT40B   010052          CC    = 177776          CT16    011266
AT14B   006374          AT27    007256          AT40C   010054          CERR    016463          CT17    011300
AT14C   006414          AT27A   007266          AT41    010064          CERRA   016503          CT2     010460
AT14E   006412          AT27B   007310          AT41A   010104          CERRB   016532          CT2A    010476
AT17    006420          AT27E   007306          AT41B   010130          CERRH   001672          CT2B    010516
AT17A   006430          AT3     006042          AT41C   010142          CHAIN = 104012          CT2C    010524
AT17B   006434          AT3A    006060          AT42    010152          CHAINN  002430          CT2D    010546
AT17C   006454          AT3B    006064          AT42A   010166          CHALT = 104005          CT2E    010622
AT17D   006502          AT3E    006070          AT42B   010214          CHAR    013012          CT20    011312
AT17E   006476          AT30    007314          AT42E   010212          CHKASR= 104022          CT21    011324
AT17F   006510          AT30A   007324          AT43    010220          CHK33   003206          CT22    011336
AT2     006010          AT30B   007334          AT43A   010236          CHK330  003220          CT23    011350
AT2A    006026          AT30E   007332          AT43B   010242          CHK35   003222          CT24    011362
AT2B    006032          AT31    007340          AT5     006160          CHLT    001300          CT25    011374
AT2E    006036          AT31A   007350          AT5A    006176          CHLTR   001320          CT26    011406
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CT27    011420          DTCHKA  001534          HTA     012214          OUTNUL  004350          RMTST   017067
CT3     010632          DTHLT   001526          HTB     012246          OUTTYP  004242          RM33A   017011
CT3A    010656          EHALT = 104010          HTC     012304          OVRAL   013462          RM33B   017017
CT3B    010706          EHLT    001322          HTD     012316          P       016665          RM37A   017023
CT30    011432          EHLTA   001424          HXCOR   013454          PC     =%000007         RNCNT   004642
CT31    011444          EHLTB   001334          HYCOR   013450          PFAIL   003066          RNGEN   004064
CT32    011456          EMTA    003022          ICTR    001152          PGO     013024          RP1     004132
CT33    011514          EMTINT  002776          INBIN   004644          PIND    004674          RP2     004134
CT33A   011542          EMTTAB  001204          INCPRG  002306          POPSP = 005726          RSTA    003376
CT34    011576          END     002104          INCRTN  002424          POPSP2= 022626          RSTART  003342
CT34A   011624          ERCTR   001266          ITA     012372          PRGEND  002624          RSTB    003522
CT35    011660          ERR     001536          J       016657          PRGID   001156          RSTC    003546
CT35A   011702          ERRA    001556          JTA     012402          PRGNUM  001140          RSTPC   003656
CT4     010712          ERRB    001664          KMSG1   017246          PRGTAB  001160          RSTPSW  003660
CT4A    010742          ERRH    001432          KMSG2   017264          PRG0    005712          RSTREG= 104021
CT4B    010754          ERROR = 104003          KMSG3   017324          PRG1    010260          RSTRG   003622
CT5     011130          ERRORA  016424          KMSG3A  017337          PRG10   012654          RTNNO   001146
CT6     011146          ERRORB  016453          KMSG4   017426          PRG10A  012702          RTWY    013500
CT7     011160          ERRORM  016362          KMSG5   017456          PRG10C  012670          RTWY1   013464
CURADD  003552          ETO     011730          KMSG6   017466          PRG10D  012676          R0     =%000000
CURTST  001144          ETOA    011742          KMSG7   017514          PRG11   013014          R1     =%000001
CURVEC  003560          ETOB    012000          KSTART  001142          PRG2    011704          R2     =%000002
C100    016737          ETOC    012014          KTA     012472          PRG3    012204          R3     =%000003
C1112   012434          ETOCA   012022          KTB     012500          PRG4    012370          R4     =%000004
C1112A  012454          ET1     012034          LFTST   017143          PRG5    012400          R5     =%000005
C1112M  012426          ET1A    012044          LOGICA  013466          PRG6    012470          S       016670
C135    016742          ET2     012114          LOWADD  003554          PRG7    012542          SAD     013416
C377    016745          ET2A    012134          LPRGSW= 002000          PRTY0 = 000000          SAVREG= 104020
C41     016712          FBALL   005552          LSPCH   005214          PRTY1 = 000040          SAVRG   003562
C44     016715          FBF3    005506          LSTADD  003556          PRTY2 = 000100          SAVR6   003126
C47     016720          FBF3A   005516          LTA     012562          PRTY3 = 000140          SCOPSW= 040000
C52     016723          FBF3B   005524          LTB     012602          PRTY4 = 000200          SCOPTR  001154
C55     016726          FORWD   002632          LTC     012652          PRTY5 = 000240          SET     013460
C72     016731          FORWDA  002664          LYCOR   013446          PRTY6 = 000300          SEVEN   016707
C75     016734          FORWDB  002672          M       016662          PRTY7 = 000340          SHALT   001676
D       016651          FOUR    016704          MACHER  000004          PSW    = 177776         SHLTA   001712
DATCHK= 104004          FW336   005612          MANUAL= 100000          PTO     004670          SP     =%000006
DATHLT= 104017          FW356   005652          MONITR  000042          PTOP    004676          SPBOT   001104
DECVAL  017614          G       016654          NITRSW= 004000          PTI     004672          SPCNT   011026
DELAY = 104400          GENER   013044          NOP    = 000240         PTIP    004700          SPTST   017115
DEND    017621          GENRX   013126          NPRTSW= 020000          P7MG1   017542          SPTSTC  017033
DERR    016541          GETRDY  002332          NSTART  002212          P7MG2   017570          SR      001106
DERRA   016566          GKBCR   012332          NTRCSW= 010000          RATZ    013114          SRESET= 104011
DERRH   001532          GOTST   002710          NULL    004430          RCMSK   004640          SRSET   002330
DIGIT   005332          GOTSTA  002730          NUM     013364          RCNT    001254          SRSETT  004046
DISPLA  001110          GRCNT   004620          NXTST   001150          RENIT   012662          SRT     013306
DISPRE  000174          GTBIN   004702          OCTEQV  017460          RESRT   013254          SRTSW = 001000
DLCNT   004556          GTBINP  004750          ONE     016701          RESRT1  013264          SRT1    013312
DLY     004514          GTRDYA  002344          OPEN   = 000000         RESTAR  003130          STAL    004560
DLYA    004534          GTRDYB  002350          OUT     004236          RETPVT  003662          STALA   004612
DLYB    004540          GTRDYC  002366          OUTCAR  004356          RHLTA   001710          STALAA  004572
DONE    016340          GTRDYD  002414          OUTEX   004426          RIND    004666          STALB   004614
DTCHK   001436          HLTSW = 100000          OUTNCT  004340          RMB     010454          STALL = 104002
```

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START   001740          SUBTNB  005310          TKB     001120          TTYTYP  001136          TYPL3   005430
STARTO  002246          SVRPC   003616          TKLVL   001130          TWW     013440          TYPS    004462
STBF    005470          SVRPSW  003620          TKS     001116          TYP     004136          TYPSA   004506
STEP    013442          SWREG   000176          TKVTR   001126          TYPA    004146          TYPSB   004510
STEP1   013444          TABP    011030          TPB     001124          TYPC    004210          V       016673
STLMSK  004616          TABPA   011042          TPBM    011000          TYPCLR  005400          WCPTST  017212
STLSPV  004016          TABPB   011052          TPBMA   011010          TYPDAT  004460          WT      013336
STLSRV  003766          TABPC   011070          TPLVL   001134          TYPE  = 104000          XADDS   013456
STNUM   003550          TBCNT   011024          TPL3A   005452          TYPES = 104001          XTY     012464
STPCHV= 104007          TBMRK   016764          TPS     001122          TYPF    004432          Y       016676
STPPA   004034          TBMRK1  016776          TPVTR   001132          TYPG    004444          YADDS   013452
STPRA   004004          TBTST   016750          TROB    013404          TYPLA   005356          $ENDAD  002614
STRDRV= 104006          TCHAR   013010          TRPA    003166          TYPLB   005362          .     = 017621


 ERRORS DETECTED:  0
 DEFAULT GLOBALS GENERATED:  0

 *DZVTBD,DZVTBD/SOL=DZVTBD
 RUN-TIME:  12 24 1 SECONDS
 RUN-TIME RATIO:  124/38=3.2
 CORE USED:  16K  (31 PAGES)
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Spooler runtime 13 Seconds, 56 KCS, 314 disk reads, 3 disk writes, 89 pages

[redacted] Date 03-Dec-76 09:46:40 Monitor IPC-0 602 [680] [redacted]