LC11/LA30

TERMINAL TEST
MD-11-DZLCA-C

EP-DZLCA-C-DL-A

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MADE IN USA

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZLCA-C

PRODUCT NAME: LC11/LA30 TERMINAL TEST

DATE: JUNE 21,1976

MAINTAINER: DIAGNOSTIC GROUP

NOTE: THIS PROGRAM IS A MODIFIED VERSION OF THE TELETYPE DIAGNOSTIC MAINDEC-11-D2AB

1. ABSTRACT

THE LA30 TERMINAL TESTS CONSISTS OF A PACKAGE OF TEST PROGRAMS DESIGNED TO TEST THE LC11 INPUT-OUTPUT LOGIC, THE LA30 PRINTER AND KEYBOARD. ALL TESTS ARE INCLUDED IN ONE OBJECT TAPE.

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-NON-PRINTING CHARACTER TEST
PRG12-WORST CASE NOISE
PRG13-LAST CHARACTER VISIBILITY

2. REQUIREMENTS

2.1 EQUIPMENT

A. PDP-11.20 SYSTEM. (4 K CORE).
B. LC11 INTERFACE/LA30 TERMINAL
C. HIGH SPEED READER

THE LC11 MUST HAVE STANDARD TELETYPE ADDRESSES. REFER TO SECTION 7.3 IF THE LC11 DOES NOT HAVE STANDARD PERIPHERAL ADDRESSES.

2.2 STORAGE

THIS PROGRAM USES LOCATION 00200 THROUGH 12132.

3. LOADING PROCEDURE

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

4.1 LC11 IDENTIFICATION

THIS TEST DIAGNOSTIC ASSUMES THE LA30 IS AN 80 COLUMN KSR35
AND LOCATION 000224 IS SET TO 000001.

4.2 PRGO USE PROCEDURE

A. CHECK POWER SWITCH IS "ON"
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.

4.3 PRG1 USE PROCEDURE

A. SET LA30 TO ON
B. LOAD ADDRESS 000200.
C. SET SR TO 000001. PRESS START
D. 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
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 LA30 WILL BE EXERCISED AND
THE PROGRAM WILL STOP AT PROGRAM END HALT WHEN COMPLETED.
G. ERROR DETECTION IS BY VISUAL INSPECTION OF DISPLAY.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.2

EXECUTION TIME:

ONE NORMAL PASS TAKES APPROXIMATELY 12 MINUTES.

4.4 PRG2 USE PROCEDURE

A. SET LA30 ON-LINE.
B. LOAD ADDRESS 000200.
C. SET SR TO 000002. PRESS START
D. THE PROGRAM TYPES "KEYBOARD TEST" AND 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
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. FOLLOW TYPED INSTRUCTIONS. WHEN DONE
PROGRAM STOPS AT PROGRAM END HALT.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.5

4.5 PRG3 USE PROCEDURE

A. SET LA30 TO ON
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

4.6 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 8.10

4.7 PRG5 USE PROCEDURE

PRG5 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 HE 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 8.11

4.8 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 8.12

EXECUTION TIME:

CONTINUOUSLY RUNNING PROGRAM.

4.9 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 8.13

EXECUTION TIME:

CONTINUOUSLY RUNNING PROGRAM.

4.10 PRG10 USER PROCEDURE

A. LOAD ADDRESS 000200.
B. SET SR TO 000010. PRESS START
C. PROGRAM RUNS CONTINUOUSLY. THE PAGE IS FILLED WITH ALTERNATE LINES OF A CHARACTER AND ITS COMPLEMENT AND A LINE OF THE COMPLEMENT OF THE CHATACTER FOLLOWED BY THE CHARACTER.
D. REFER TO SECTION 6. ERRORS, IF ERRORS OCCUR.

A DESCRIPTION OF THIS PROGRAM IS GIVEN IN SECTION 8.14

4.11 PRG11 USER PROCEDURE

A. LOAD ADDRESS 200.
B. SET SR TO 000011. PRESS START.
C. PROGRAM RUNS CONTINUOUSLY. AN A IS PRINTED FOLLOWED BY AN ATTEMPT TO PRINT ALL NON-PRINTING CHARACTERS. THIS SEQUENCE IS REPEATED FOR A FULL LINE OF A'S.
D. REFER TO SECTION 6. ERRORS, IF ERRORS OCCUR.

EXECUTION TIME:

CONTINUOUSLY RUNNING PROGRAM.

4.12 PRG12 USER PROCEDURE

A. LOAD ADDRESS 000200.
B. SET SR TO 000012. PRESS START.
C. THIS PROGRAM WAS WRITTEN TO SERVE AS A WORST CASE NOISE TEST IF A WORST CASE PATTERN IS EVER ESTABLISHED. THE PROGRAM ACCEPTS UP TO 80 CHARACTERS FROM THE KEYBOARD OR UNTIL A RUBOUT IS DETECTED. AT THAT POINT THE PROGRAM CONTINUOUSLY ECHOS THE CHARACTER STRING. SWITCH 15 SELECTS NEW CHARACTER STRING.
D. REFER TO SECTION 6. ERRORS, IF ERRORS OCCUR.

EXECUTION TIME:

PROGRAM RUNS CONTINUOUSLY.

4.13 PRG13 USER PROCEDURE

A. LOAD ADDRESS 000200.
B. SET SR TO 000013. PRESS START.
C. THIS TEST VERIFIES THE "LAST CHARACTER" VISIBILITY FEATURE OF THE LA30 PRINT HEAD BY WAITING TWO SECONDS BETWEEN CHARACTERS.
D. REFER TO SECTION 6. ERRORS, IF ERRORS ARE DETECTED.

EXECUTION TIME:

PROGRAM RUNS CONTINUOUSLY.

5. PROGRAM AND/OR OPERATOR ACTION

5.1 NORMAL HALTS

LOC 001502 — 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 001612 — 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 002120 — PROGRAM END HALT. THIS HALT NORMALLY OCCURS AT THE END OF PROGRAMS PRG0, PRG1 AND UNLESS THE LOOP PROGRAM OPTION IS SET. (SR10)

6. ERRORS

6.1 ERROR HALTS

LOC 001514 — UNCONDITIONAL ERROR HALT. DATA LIGHTS CONTAIN ADDRESS OF INSTRUCTION THAT GENERATED THE ERROR CALL. REFER TO PROGRAM LISTING.

LOC 001574 — 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 001534 — 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.

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
000040 THROUGH 000176	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 ADDRRESS, 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 LA30. 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 PRGD. 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.

(7.1 CONT'D)

SR13 - 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 SR13 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.

7.2 TESTING LC11 AT NON-STANDARD ADDRESSES AND/OR VECTORS

THIS PROGRAM CAN TEST A LC11 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
001306	177560	RECEIVER CSR ADDRESS
001310	177562	RECEIVER BUFFER ADDRESS
001312	177564	TRANSMITTER CSR ADDRESS
001314	177566	TRANSMITTER BUFFER ADDRESS
001316	000060	RECEIVER VECTOR ADDRESS
001320	000200	RECEIVER PRIORITY LEVEL
001322	000064	TRANSMITTER VECTOR ADDRESS
001324	000200	TRANSMITTER PRIORITY LEVEL

B. PROCEED TO USE PROGRAM, OR

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.

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.
(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.
RTN30 TESTS THAT RESET SETS THE PUNCH READY BIT, AND THAT THE READY BIT CAN BE READ RELIABLY.

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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.
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8.2 PRG1 PROGRAM DESCRIPTION

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PRG1 EXERCISES THE PRINTER FUNCTIONS. VERIFICATION OF PRINTER
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 80 PRINT POSITIONS. THE TEST
        TYPES 83 CHARACTERS. IF THE RIGHT MARGIN IS CORRECTLY SET,
        THE TYPED LINE SHOULD LOOK AS FOLLOWS:

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

RTN2    SPACE TEST. CHECKS ABILITY OF THE LA30 TO SPACE CORRECTLY.
        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:

\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/ETC
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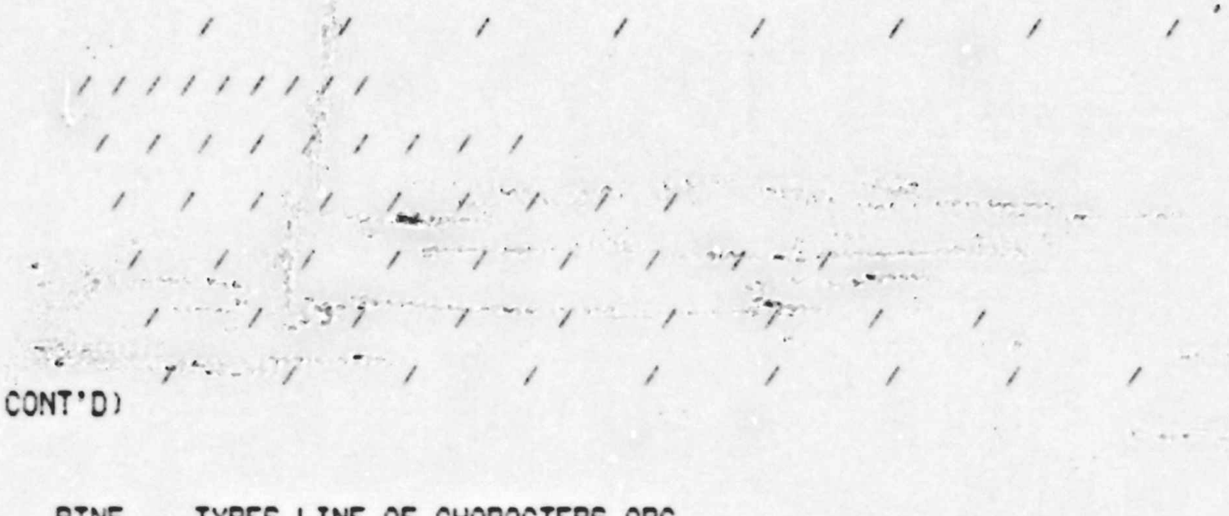
RTN3 LINE FEED TEST. TESTS FOR ABILITY TO CORRECTLY PERFORM A LINE FEED. A RANDOM STALL OCCURS BETWEEN EACH LINE FEED. A CORRECTLY PERFORMED TEST WILL APPEAR AS DIAGONAL LINE BETWEEN PRINT POSITION 0 AND PRINT POSITION 80.

RTN4 SPACE TEST. CHECKS ABILITY OF THE DISPLAY TO SPACE TO POSITIONS 1 TO 7. 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.

8.3 PRG2 PROGRAM DESCRIPTION

PRG2 IS USED TO TEST THE LA30 KEYBOARD. THE PROGRAM CONTAINS 3 ROUTINES NUMBERED FROM 00 TO 02.

RTN0 TESTS THAT LC11 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 LC11 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 LC11 CONTROL.

8.4 PRG3 PROGRAM DESCRIPTION

PRG3 IS A PRINTER EXERCISER DESIGNED AS AN AID IN MAKING LA30 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.

8.5 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.

8.6 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.

8.7 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.

8.8 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 RECIEVE 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 PUNAH DONE BIT TO SET AND GO TO STEP C.

```
799
800                         8.9     PROGRAM 10 DESCRIPTION
801                                 ++++++++++++++++++++++
802
803                                 THE PURPOSE OF THIS TEST WAS TO VERIFY THAT THE VT06 MEMORY HAS
804                                 ROLL-UP CAPABILITIES.THE TEST FUNCTIONS AS FOLLOWS:
805
806                                 A.  A LINE . AND ITS COMPLEMENT . IS DISPLAYED
807                                 B.  THIS LINE IS FOLLOWED BY A LINE OF ITS EXACT COMPLEMENT
808
809                                 THIS PROCEDURE RUNS CONTINUOUSLY. IF SWITCH 15 IS HELD UP
810                                 MOMENTARILY THE ASCII CODE FOR THE CHARACTER IS INCREMENTED
811                                 BY ONE. BY UTILIZING SWITCH 15 IN THIS MANNER, PROGRAM 10 CAN
812                                 TEST THE ROLL-UP CAPIBILITYOF ALL CHARACTERS.
813
814                         8.10    PROGRAM 11 DESCRIPITION
815                                 +++++++++++++++++++++++
816
817                                 SEE SECTION 4.11 USER PROCEDURE
818
819                         8.11    PROGRAM 12 DESCRIPITION
820                                 +++++++++++++++++++++++
821
822                                 SEE SECTION 4.12 USER PROCEDURE
823
824                         8.12    PROGRAM 13 DESCRIPTION
825                                 ++++++++++++++++++++++
826
827                                 SEE SECTION 4.13 USER PROCEDURE
```

```
                                ;
                                ;KL11  TESTS FOR THE LA30 TERMINAL
                                ;COPYRIGHT 1971, 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- NON-PRINTING CHARACTER TEST
                                ;PRG12- WORST CASE NOISE
                                ;PRG13- LAST CHARACTER VISIBILITY 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.
                                .ABS
        000000                          .=0
000000  000000                          HALT                    ;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  000000                          HALT
000030  002254                          EMTINT                  ;EMT TRAP
000032  000340                          PRTY7
000034  002320                          TRPINT                  ;TRAP TRAP. SIMILAR TO EMT
000036  000340                          PRTY7
                                        .REPT   200
                                        .+2
                                        HALT                    ;TRAPPED TO PREVIOUS ADDRESS.
                                        .ENDR
```

```
                                ;EQUATE STATEMENTS
177570                                  SR=177570
177776                                  CC=177776
177776                                  PSW=177776
000240                                  NOP=240
000000                                  OPEN=0
100000                                  HLTSW=BIT15             ;HALT SWITCH DEFINITION
040000                                  SCOPSW=BIT14            ;SCOPE SWITCH DEFINITION
020000                                  NPRTSW=BIT13            ;INHIBIT PRINT SWITCH DEFINITION
010000                                  NTRCSW=BIT12            ;INHIBIT TRACE SWITCH DEFINITION
004000                                  NITRSW=BIT11            ;INHIBIT ITERATION SWITCH DEFINITION
002000                                  LPRGSW=BIT10            ;LOOP PROGRAM SWITCH DEFINITION
001000                                  SRTSW=BIT9              ;SELECT ROUTINE SWITCH DEFINITION
000400                                  BYPMAN=BIT8             ;BYPASS MANUAL INTERVENTION DEFINITION.
100000                                  MANUAL=BIT15
100000                                  BIT15=100000
040000                                  BIT14=40000
020000                                  BIT13=20000
010000                                  BIT12=10000
004000                                  BIT11=4000
002000                                  BIT10=2000
001000                                  BIT9=1000
000400                                  BIT8=400
000200                                  BIT7=200
000100                                  BIT6=100
000040                                  BIT5=40
000020                                  BIT4=20
000010                                  BIT3=10
000004                                  BIT2=4
000002                                  BIT1=2
000000                                  BIT0=0
000001                          R1=%1
000002                          R2=%2
005726                                  POPSP=5726              ;POP THE STACK. SAME AS TST (6)+
022626                                  POPSP2=022626           ;POP STACK TWICE. SAME AS CMP (6)+,(6)+
000340                                  PRTY7=340               ;PRIORITY LEVEL DEFINITIONS
000300                                  PRTY6=300
000240                                  PRTY5=240
000200                                  PRTY4=200
000140                                  PRTY3=140
000100                                  PRTY2=100
000040                                  PRTY1=40
000000                                  PRTY0=0
104000                                  TYPE=EMT+0
104001                                  TYPES=EMT+1
104002                                  STALL=EMT+2
104003                                  ERROR=EMT+3
104004                                  DATCHK=EMT+4
104005                                  CHALT=EMT+5
104006                                  STRDRV=EMT+6
104007                                  STPCHV=EMT+7
104010                                  EHALT=EMT+10
104011                                  SRESET=EMT+11
104012                                  CHAIN=EMT+12
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
                012103                  BLOCKA=DEND
                012105                  BLOCK1=BLOCKA+2
                012225                  BLOCKB=BLOCKA+82.
                012226                  BLKBB=BLOCKA+123
                012217                  BLOCK2=BLOCKA+114
                012230                  BLK2=BLOCKA+125
                012327                  BLOCKC=BLOCKA+224
                012340                  BLKCC=BLOCKA+235
                000200                  .=200
        000200  000167  001412          JMP     START           ;GO TO START OF PROGRAM.
                001304          .=.+1100                        ;GET CODE OUT OF VECTOR AREA
        001304  000000          SPBOT:  0                       ;BOTTOM OF STACK
        001306  177560          TKS:    177560                  ;LSR CSR
        001310  177562          TKB:    177562                  ;LSR BUFFER
        001312  177564          TPS:    177564                  ;LSP CSR
        001314  177566          TPB:    177566                  ;LSP BUFFER
        001316  000060          TKVTR:  60                      ;LSR INTERRUPT VECTOR
        001320  000200          TKLVL:  PRTY4                   ;LSR PRIORITY LEVEL
        001322  000064          TPVTR:  64                      ;LSP INTERRUPT VECTOR
        001324  000200          TPLVL:  PRTY4                   ;LSP PRIORITY LEVEL
        001326  000001          TTYTYP: 01                      ;LA30 = KSR35
        001330  000000          PRGNUM: OPEN                    ;CONTAINS CURRENT PROGRAM#
        001332  000000          KSTART: OPEN                    ;CURRENT PROGRAM START ADDRESS.
        001334  000000          CURTST: OPEN                    ;CONTAINS ADDR OF CURRENT TEST.
        001336  000000          RTNNO:  OPEN                    ;CONTAINS CURRENT TEST #.
        001340  000000          NXTST:  OPEN                    ;CONTAINS ADDR OF NEXT TEST.
        001342  000000          ICTR:   OPEN                    ;CONTAINS CURRENT ITERATION COUNT
        001344  000000          SCOPTR: OPEN                    ;CONTAINS CURRENT SCOPE POINTER.
        001346  000000          PRGID:  OPEN                    ;CONTAINS PROGRAM INDICATORS
        001350  004536          PRGTAB: PRG0                    ;PRG0 START ADDRESS
        001352  005764                  PRG1                    ;PRG1 START ADDRESS
        001354  007246                  PRG2                    ;PRG2 START ADDRESS
        001356  007546                  PRG3                    ;PRG3 START ADDRESS
        001360  007732                  PRG4                    ;PRG4 START ADDRESS
        001362  007742                  PRG5                    ;PRG5 START ADDRESS
        001364  010032                  PRG6                    ;PRG6 START ADDRESS
        001366  010076                  PRG7                    ;PRG7 START ADDRESS
        001370  010200                  PRG10                   ;PRG10 START ADDRESS
        001372  010340                  PRG11                   ;NON PRINTING CHAR TEST
        001374  010500                  PRG12                   ;WORST CASE NOISE
        001376  010636                  PRG13                   ;LAST CHAR VISIBILITY
```

```
  987
  988  001400  003054                EMTTAB: TYP             ;POINTER TO TYPEOUT ROUTINE
  989  001402  003176                        TYPS            ;POINTER TO CHAINED MESSAGES ROUTINE
  990  001404  003274                        STAL            ;POINTER TO RANDOM STALL ROUTINE
  991  001406  001540                        ERR             ;POINTER TO ERROR ROUTINE
  992  001410  001520                        DTCHK
  993  001412  001474                        CHLT            ;COMMON HALT
  994  001414  002604                        STLSRV
  995  001416  002634                        STLSPV
  996  001420  001506                        EHLT            ;POINTER TO ERROR HALT ROUTINE.
  997  001422  002664                        SRSETT
  998  001424  002000                        CHAINN
  999  001426  002364                        CHK33
 1000  001430  002400                        CHK35
 1001  001432  002376                        CHK330
 1002  001434  004354                        TYPL3
 1003  001436  001530                        DTHLT
 1004  001440  002442                        SAVRG
 1005  001442  002502                        RSTRG
 1006  001444  002416                        CKASR
 1007  001446  003230                TRPTAB: DLY
 1008  001450  000000                RCNT:   OPEN            ;CHARACTER COUNT
 1009  001452  000000                CRBUF:  OPEN            ;HOLDS ONE CHARACTER FROM READER.
 1010  001454  000000                CHR1:   OPEN
 1011  001456  000000                CHR2:   OPEN
 1012  001460  000000                CHR3:   OPEN
 1013  001462  000000                ERCTR:  OPEN
 1014  001464  000000                CTRA:   OPEN
 1015  001466  000000                CTRB:   OPEN
 1016  001470  000000                CTRC:   OPEN
 1017  001472  000000                CTRD:   OPEN
```

```
1018
1019                                        ;COMMON HALT ROUTINE
1020  001474  011600                        CHLT:   MOV     @%6,%0          ;DEVELOP ADDRESS OF CALLER.
1021  001476  162700  000002                        SUB     #2,%0
1022  001502  000000                                HALT                    ;HALT. ADDRESS OF CALL INSTRUCTION
1023  001504  000002                                RTI                     ;IN DATA LIGHTS.
1024                                        ;UNCONDITIONAL ERROR HALT ROUTINE.
1025  001506  011600                        EHLT:   MOV     @%6,%0          ;DEVELOP ADDRESS OF CALLER.
1026  001510  162700  000002                        SUB     #2,%0
1027  001514  000000                                HALT                    ;HALT. ADDR OF ERROR CALL
1028  001516  000002                                RTI                     ;IN DATA LIGHTS.
1029                                        ;DATA CHECK ROUTINE.
1030  001520  126767  177726  177725  DTCHK:  CMPB    CRBUF,CRBUF+1   ;COMPARE EXPECTED AND RECEIVED
1031  001526  001403                                BEQ     DTCHKA          ;CHARS. BRANCH IF SAME.
1032  001530  016700  177716          DTHLT:  MOV     CRBUF,%0        ;MOVE S/B AND WAS CHARS TO R0.
1033  001534  000000                                HALT                    ;DATA ERROR HALT. GOOD CHAR IN
1034                                                                        ;DATA LIGHTS LEFT. BAD CHAR IN DATA
1035  001536  000002                        DTCHKA: RTI                     ;LIGHTS RIGHT. EXIT.
1036                                        ;CONDITIONAL ERROR HALT.
1037  001540  032767  040000  176022  ERR:    BIT     #SCOPSW,SR      ;CHECK SCOPE SWITCH.
1038  001546  001404                                BEQ     ERRA            ;BRANCH IF NO SCOPE DESIRED.
1039  001550  005767  177572                        TST     PRGID           ;SCOPING WANTED. FIRST ERROR?
1040  001554  100001                                BPL     ERRA            ;NO SCOPE IF FIRST ERROR.
1041  001556  000002                                RTI                     ;SCOPE EXIT.
1042  001560  052767  100000  177560  ERRA:   BIS     #BIT15,PRGID    ;SET ERROR INDICATOR.
1043  001566  011600                                MOV     @%6,%0          ;DEVELOP CALLER'S ADDRESS.
1044  001570  162700  000002                        SUB     #2,%0
1045  001574  000000                                HALT                    ;ERROR HALT.
1046  001576  000002                                RTI                     ;EXIT.
1047                                        ;ROUTINE END HALT SUBROUTINE.
1048  001600  005767  175764          SHALT:  TST     SR              ;CHECK HALT SWITCH.
1049  001604  100003                                BPL     SHLTA           ;BRANCH IF NO HALT DESIRED.
1050  001606  116700  177524                        MOVB    RTNNO,%0        ;CURRENT TEST # TO R0.
1051  001612  000000                                HALT                    ;ROUTINE END HALT.
1052  001614  000207                        SHLTA:  RTS     %7              ;EXIT.
```

```
 1053
 1054  001616  012706  001304          START:  MOV     #SPBOT,%6       ;SET BOTTOM OF SP STACK.
 1055  001622  005067  176150                  CLR     PSW
 1056  001626  012767  000006  176150          MOV     #6,MACHER
 1057  001634  005067  177476                  CLR     RTNNO
 1058  001640  016700  175724                  MOV     SR,%0           ;(SR) TO R0
 1059  001644  042700  177760                  BIC     #177760,%0      ;LIMIT (SR) TO BITS 3-0
 1060  001650  020027  000014                  CMP     %0,#14          ;COMPARE (SR) TO PROGRAM LIMIT
 1061  001654  101402                          BLOS    CRTA            ;VALID PROGRAM NUMBER?
 1062  001656  104010                  INCPRG: EHALT                   ;NO. INCORRECT PRG NUMBER
 1063  001660  000756                          BR      START           ;START OVER.
 1064  001662  005067  177460          CRTA:   CLR     PRGID
 1065  001666  010067  177436                  MOV     %0,PRGNUM       ;SAVE PROGRAM NUMBER AT PRGNUM
 1066  001672  006100                          ROL     %0              ;ROX2
 1067  001674  000170  001350                  JMP     @PRGTAB(0)      ;GO TO SELECTED PROGRAM.
 1068  001700  104005                  SRSET:  CHALT                   ;SET SR OPTIONS DESIRED
 1069  001702  016767  177424  177430  GETRDY: MOV     KSTART,NXTST    ;ADDR OF 1ST ROUTINE TO NXTST
 1070  001710  000167  000314                  JMP     CLEAN           ;GO CLEAN UP.
 1071  001714  004767  000204          GTRDYA: JSR     %7,FORWD        ;ROLL FORWARD TO "NEXT" ROUTINE.
 1072  001720  032767  001000  175642  GTRDYB: BIT     #SRTSW,SR       ;CHECK FOR SELECT ROUTINE SWITCH
 1073  001726  001003                          BNE     GTRDYC          ;BRANCH IF SELECT ROUTINE SWITCH IS SET.
 1074  001730  004767  000246                  JSR     %7,GOTST        ;GO RUN CURRENT ROUTINE.
 1075  001734  000455                          BR      CHNB            ;NO GO. MANUAL RTN BYPASSED.
 1076  001736  016700  175626          GTRDYC: MOV     SR,%0           ;(SR) TO R0
 1077  001742  042700  177600                  BIC     #177600,%0      ;MASK UNDESIRED BITS
 1078  001746  126700  177364                  CMPB    RTNNO,%0        ;COMPARE RTNNO TO (R0)
 1079  001752  001004                          BNE     GTRDYD          ;BRANCH IF ROUTINE NOT FOUND YET.
 1080  001754  004767  000222                  JSR     %7,GOTST        ;GO RUN ROUTINE.
 1081  001760  104010                          EHALT                   ;NO GO. MANUAL RTN SELECTED BYPASSED.
 1082  001762  000747                          BR      GETRDY
 1083  001764  022767  177777  177346  GTRDYD: CMP     #-1,NXTST       ;NO. CHECK FOR LAST ROUTINE.
 1084  001772  001350                          BNE     GTRDYA          ;LAST ROUTINE?
 1085  001774  104010                  INCRTN: EHALT                   ;YES. INCORRECT ROUTINE SELECTED.
 1086  001776  000741                          BR      GETRDY          ;START OVER.
 1087  002000  005767  177342          CHAINN: TST     PRGID           ;TEST ERROR BIT IN PRGID.
 1088  002004  100013                          BPL     CHNA            ;BRANCH IF ERROR BIT NOT SET.
 1089  002006  032767  040000  175554          BIT     #SCOPSW,SR      ;ERROR BIT SET. CHECK FOR SCOPE OPTION.
 1090  002014  001407                          BEQ     CHNA            ;SCOPE SWITCH SET IN SR?
 1091  002016  022767  177777  177320          CMP     #-1,SCOPTR      ;YES. CHECK SCOPE ENTRY POINTER
 1092  002024  001403                          BEQ     CHNA            ;BRANCH IF SCOPE ENTRY IS -1.
 1093  002026  017716  177312                  MOV     @SCOPTR,@%6     ;SET UP TO GO SCOPING
 1094  002032  000002                          RTI                     ;GO TO SCOPE ENTRY.
 1095  002034  042767  100000  177304  CHNA:   BIC     #BIT15,PRGID    ;CLEAR ERROR BIT IN PRGID.
 1096  002042  032767  004000  175520          BIT     #NITRSW,SR      ;TEST INHIBIT ITERATION SWITCH
 1097  002050  001004                          BNE     CHNAA           ;INHIBIT ITERATION?
 1098  002052  005367  177264                  DEC     ICTR            ;NO
 1099  002056  001401                          BEQ     CHNAA           ;COUNT 0?
 1100  002060  000002                          RTI                     ;NO. RETURN TO TEST ROUTINE
 1101  002062  022626                  CHNAA:  POPSP2                  ;POP STACK TWICE
 1102  002064  004767  177510                  JSR     %7,SHALT        ;GO HALT IF HALT SWITCH IS SET
```

```
1103
1104  002070  032767  001000  175472  CHNB:   BIT     #SRTSW,SR       ;CHECK SELECT ROUTINE SWITCH
1105  002076  001301                          BNE     GETRDY          ;SELECT ROUTINE SWITCH SET?
1106  002100  022767  177777  177232          CMP     #-1,NXTST       ;NO.
1107  002106  001300                          BNE     GTRDYA-4        ;LAST TEST?
1108  002110  032767  002000  175452          BIT     #LPRGSW,SR      ;YES. TEST LOOP PROGRAM SWITCH.
1109  002116  001271                          BNE     GETRDY          ;LOOP PROGRAM?
1110  002120  000000                  PRGEND: HALT                    ;NO. PROGRAM END.
1111  002122  000762                          BR      CHNB
1112  002124  016705  177210          FORWD:  MOV     NXTST,%5        ;ADDR OF NEXT ROUTINE TO R5.
1113  002130  012567  177202                  MOV     (5)+,RTNNO      ;GET NEXT ROUTINE NUMBER.
1114  002134  012567  177200                  MOV     (5)+,NXTST      ;GET ADDR OF NEXT "NEXT" ROUTINE.
1115  002140  105767  177202                  TSTB    PRGID           ;CHECK IF PROGRAM SCOPE AND I COUNT
1116  002144  100407                          BMI     FORWDB          ;PARAMETERS. BRANCH IF NOT.
1117  002146  012567  177170                  MOV     (5)+,ICTR       ;GET ITERATION COUNT.
1118  002152  012567  177166                  MOV     (5)+,SCOPTR     ;GET SCOPE LOOP ENTRY POINTER.
1119  002156  010567  177152          FORWDA: MOV     %5,CURTST       ;ADDR OF NOW CURRENT TEST TO CURTST.
1120  002162  000207                          RTS     %7              ;EXIT FORWD SUBROUTINE.
1121  002164  012767  177777  177152  FORWDB: MOV     #-1,SCOPTR      ;FORCE "NO SCOPE"
1122  002172  012767  000001  177142          MOV     #1,ICTR         ;FORCE I COUNT OF 1
1123  002200  000766                          BR      FORWDA
1124  002202  005767  177130          GOTST:  TST     RTNNO           ;CHECK FOR MANUAL RTN.
1125  002206  100005                          BPL     GOTSTA          ;BRANCH IF NOT MANUAL RTN.
1126  002210  032767  000400  175352          BIT     #BYPMAN,SR      ;MANUAL RTN. BYPASS IT?
1127  002216  001401                          BEQ     GOTSTA          ;NO. RUN IT.
1128  002220  000207                          RTS     %7              ;BYPASS MANUAL ROUTINE.
1129  002222  005726                  GOTSTA: POPSP
1130  002224  000177  177104                  JMP     @CURTST         ;GO RUN TEST.
1131  002230  012767  000006  175546  CLEAN:. MOV     #6,MACHER       ;RESET MACHER TRAP.
1132  002236  005067  175534                  CLR     PSW
1133  002242  012706  001304                  MOV     #SPBOT,%6       ;SET UP BOTTOM OF STACK.
1134  002246  104011                          SRESET
1135  002250  000167  177440                  JMP     GTRDYA
1136  002254  011646                  EMTINT: MOV     @%6,-(6)        ;GET SAVED PC.
1137  002256  162716  000002                  SUB     #2,@%6          ;DECREMENT PC BY 2.
1138  002262  017616  000000                  MOV     @(6),@%6
1139  002266  121627  000022                  CMPB    @%6,#22         ;CHECK THAT CALL IS
1140  002272  101402                          BLOS    EMTA            ;WITHIN LIMITS.
1141  002274  000000                          HALT                    ;CALL NOT WITHIN LIMITS.
1142  002276  000776                          BR      .-2
1143  002300  006116                  EMTA:   ROL     @%6             ;EMT ARG X 2.
1144  002302  042716  177001                  BIC     #177001,@%6     ;REMOVE 7 MSB.
1145  002306  062716  001400                  ADD     #EMTTAB,@%6     ;FORM EMT RTN ADDR.
1146  002312  017616  000000                  MOV     @(6),@%6
1147  002316  000136                          JMP     @(6)+           ;GO TO EMT ROUTINE.
1148  002320  011646                  TRPINT: MOV     @%6,-(6)        ;GET SAVED PC.
1149  002322  162716  000002                  SUB     #2,@%6          ;DECREMENT PC BY 2.
1150  002326  017616  000000                  MOV     @(6),@%6
1151  002332  121627  000000                  CMPB    @%6,#0          ;CHECK THAT EMT
1152  002336  101402                          BLOS    TRPA            ;IS WITHIN LIMITS.
1153  002340  000000                          HALT                    ;TRAP CALL NOT IN LIMIT.
1154  002342  000776                          BR      .-2
```

```
1155
1156  002344  006116                  TRPA:   ROL     @%6             ;TRAP ARG X 2.
1157  002346  042716  177001                  BIC     #177001,@%6     ;REMOVE 7 MSB.
1158  002352  062716  001446                  ADD     #TRPTAB,@%6     ;FORM TRAP RTN ADDR.
1159  002356  017616  000000                  MOV     @(6),@%6
1160  002362  000136                         JMP     @(6)+           ;GO TO TRAP ROUTINE.
1161  002364  005767  176736          CHK33:  TST     TTYTYP          ;CHECK FOR 33.
1162  002370  001002                         BNE     .+6             ;BRANCH IF NOT 33.
1163  002372  062716  000002                  ADD     #2,@%6          ;+2 TO EXIT POINTER
1164  002376  000002                 CHK330: RTI                     ;EXIT
1165  002400  022767  000001  176720 CHK35:  CMP     #1,TTYTYP       ;CHECK FOR 35.
1166  002406  001002                         BNE     .+6             ;BRANCH IF NOT 35.
1167  002410  062716  000002                  ADD     #2,@%6          ;+2 TO EXIT POINTER
1168  002414  000002                         RTI                     ;EXIT
1169  002416  032767  000010  176702 CKASR:  BIT     #BIT3,TTYTYP    ;CHECK FOR ASR TTY.
1170  002424  001001                         BNE     .+4             ;BRANCH IF NOT ASR.
1171  002426  000002                         RTI                     ;ASR. EXIT.
1172  002430  022626                         POPSP2                  ;POP STACK TWICE.
1173  002432  012767  000001  176702         MOV     #1,ICTR         ;FORCE I COUNT TO A 1.
1174  002440  104012                         CHAIN                   ;CHAIN TO BYPASS ROUTINE.
1175                                  ;SAVE REGS 0 TO 4 SUBROUTINE.
1176  002442  012667  000030          SAVRG:  MOV     (6)+,SVRPC      ;SAVE PC AND PSW.
1177  002446  012667  000026                  MOV     (6)+,SVRPSW
1178  002452  010446                         MOV     %4,-(6)         ;SAVE REGS 0 - 4
1179  002454  010346                         MOV     %3,-(6)         ;IN STACK.
1180  002456  010246                         MOV     %2,-(6)
1181  002460  010146                         MOV     %1,-(6)
1182  002462  010046                         MOV     %0,-(6)
1183  002464  016746  000010                  MOV     SVRPSW,-(6)     ;RESTORE PC AND PSW.
1184  002470  016746  000002                  MOV     SVRPC,-(6)
1185  002474  000002                         RTI                     ;EXIT.
1186  002476  000000                 SVRPC:  OPEN
1187  002500  000000                 SVRPSW: OPEN
1188                                  ;RESTORE REGS 0 TO 4 SUBROUTINE.
1189  002502  012667  000030          RSTRG:  MOV     (6)+,RSTPC      ;SAVE PC AND PSW.
1190  002506  012667  000026                  MOV     (6)+,RSTPSW
1191  002512  012600                         MOV     (6)+,%0         ;RESTORE REGS 0 - 4
1192  002514  012601                         MOV     (6)+,%1         ;FROM STACK.
1193  002516  012602                         MOV     (6)+,%2
1194  002520  012603                         MOV     (6)+,%3
1195  002522  012604                         MOV     (6)+,%4
1196  002524  016746  000010                  MOV     RSTPSW,-(6)     ;RESTORE PC AND PSW.
1197  002530  016746  000002                  MOV     RSTPC,-(6)
1198  002534  000002                         RTI                     ;EXIT
1199  002536  000000                 RSTPC:  OPEN
1200  002540  000000                 RSTPSW: OPEN
```

```
1201
1202                                        ;ROUTINE TO FETCH A CHARACTER
1203   002542  012767  000310  000302  AREAD:  MOV     #200.,BRCTR     ;SET UP DELAY COUNT.******
1204   002550  012777  000012  176536          MOV     #12,@#TPB
1205   002556  105777  176524          ARDA:   TSTB    @#TKS           ;CHECK DONE BIT.
1206   002562  100407                          BMI     ARDB            ;BRANCH IF DONE.
1207   002564  104400                          DELAY                   ;DELAY 1 MILLISECOND.
1208   002566  000001                          1
1209   002570  005367  000256                  DEC     BRCTR           ;TIME UP?
1210   002574  001370                          BNE     ARDA            ;BRANCH IF TIME NOT UP YET.
1211   002576  104010                          EHALT                   ;ERROR. NO RESPONSE FROM READER.
1212   002600  000760                          BR      AREAD           ;TRY AGAIN.
1213   002602  000207                  ARDB:   RTS     %7              ;EXIT
1214                                        ;ROUTINE TO SET LSR INTERRUPT VECTOR AND PRIORITY
1215   002604  017667  000000  000012  STLSRV: MOV     @(6),STPRA+2    ;MOVE VECTOR ADDR TO STPRA+2
1216   002612  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
1217   002616  016701  176474                  MOV     TKVTR,%1
1218   002622  012721  000000          STPRA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS
1219   002626  016721  176466                  MOV     TKLVL,(1)+      ;SET PRIORITY
1220   002632  000002                          RTI                     ;EXIT
1221                                        ;ROUTINE TO SET LSP INTERRUPT VECTOR AND PRIORITY.
1222   002634  017667  000000  000012  STLSPV: MOV     @(6),STPPA+2    ;MOVE VECTOR ADDR TO STPPA+2
1223   002642  062716  000002                  ADD     #2,@%6          ;SET UP EXIT
1224   002646  016701  176450                  MOV     TPVTR,%1
1225   002652  012721  000000          STPPA:  MOV     #OPEN,(1)+      ;SET VECTOR ADDRESS.
1226   002656  016721  176442                  MOV     TPLVL,(1)+      ;SET PRIORITY
1227   002662  000002                          RTI                     ;EXIT.
1228                                        ;ROUTINE TO ISSUE RESET.
1229   002664  012700  052525          SRSETT: MOV     #52525,%0               ;DATA TO R0.
1230   002670  005100                          COM     %0              ;COMPLEMENT (R0).
1231   002672  010067  177770                  MOV     %0,SRSETT+2     ;(R0) TO SRSETT+2.
1232   002676  000005                          RESET                   ;ISSUE RESET. (R0) IS
1233   002700  000002                          RTI                     ;DISPLAYED. EXIT.
1234                                        ;RANDOM NUMBER GENERATOR. ROUTINE EXITS WITH NUMBER IN REGISTER 0.
1235   002702  016700  000042          RNGEN:  MOV     RP1,%0
1236   002706  006100                          ROL     %0
1237   002710  006100                          ROL     %0
1238   002712  066700  000034                  ADD     RP2,%0
1239   002716  010067  000026                  MOV     %0,RP1
1240   002722  006100                          ROL     %0
1241   002724  006100                          ROL     %0
1242   002726  066700  000020                  ADD     RP2,%0
1243   002732  006100                          ROL     %0
1244   002734  006100                          ROL     %0
1245   002736  010067  000010                  MOV     %0,RP2
1246   002742  016700  000002                  MOV     RP1,%0
1247   002746  000207                          RTS     %7              ;EXIT. NUMBER IN R0
1248   002750  001233          RP1:    1233
1249   002752  007622          RP2:    7622
```

```
1250  002754  104006                    BREAD:  STRDRV                  ;SET READER VECTOR
1251  002756  003022                            BREADB                  ;TO BREADB
1252  002760  052777  000101  176320            BIS     #101,@TKS       ;ENABLE LSR AND LSRI.
1253  002766  012767  177777  000056            MOV     #177777,BRCTR   ;DELAY APPROX. 400 MSECS.
1254  002774  005367  000052                    DEC     BRCTR
1255  003000  001375                            BNE     .-4
1256  003002  005077  176300                    CLR     @TKS            ;CLEAR LSRI ENABLE.
1257  003006  104010                            EHALT                   ;NO RESPONSE HALT.
1258  003010  000761                            BR      BREAD           ;TRY AGAIN.
1259  003012  117767  176272  176432  BREADA:   MOVB    @TKB,CRBUF      ;CHAR READ TO CRBUF.
1260  003020  000207                            RTS     %7              ;EXIT SUBROUTINE.
1261  003022  005077  176260          BREADB:   CLR     @TKS            ;CLEAR LSR INTERRUPT ENABLE.
1262  003026  105777  176254                    TSTB    @TKS            ;TEST FOR DONE.
1263  003032  100003                            BPL     BREADC          ;BRANCH IF DONE NOT SET.
1264  003034  012716  003012                    MOV     #BREADA,@%6     ;MODIFY INTERRUPT EXIT TO BREADA.
1265  003040  000002                            RTI                     ;OK. EXIT INTERRUPT.
1266  003042  000000          BREADC:   HALT                            ;HALT. DONE BIT NOT SET AFTER INTERRUPT.
1267  003044  012716  002754                    MOV     #BREAD,@%6      ;SET UP TO RETRY.
1268  003050  000002                            RTI                     ;EXIT INTERRUPT.
1269  003052  000000          BRCTR:    OPEN
1270                           ;SUBROUTINE TO OUTPUT ASCII MESSAGE ON TELETYPE PRINTER.
1271  003054  011600          TYP:      MOV     @%6,%0                  ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS.
1272  003056  062716  000002                    ADD     #2,@%6          ;SET UP EXIT.
1273  003062  011000                            MOV     @%0,%0          ;ADDRESS OF MESSAGE TO R0.
1274  003064  112067  000104  TYPA:     MOVB    (0)+,TYPDAT     ;GET CHARACTER
1275  003070  122767  000100  000076            CMPB    #100,TYPDAT     ;CHECK FOR"@"CHARACTER
1276  003076  001001                            BNE     TYPC            ;BRANCH IF NOT"@".
1277  003100  000002                            RTI                     ;TERMINATOR CHAR. DONE. EXIT.
1278  003102  122767  000045  000064  TYPC:     CMPB    #45,TYPDAT      ;CHECK FOR"%".
1279  003110  001416                            BEQ     TYPF            ;BRANCH IF"%"
1280  003112  122767  000043  000054            CMPB    #43,TYPDAT      ;NOT"%".CHECK FOR"#".
1281  003120  001417                            BEQ     TYPG            ;BRANCH IF "#"
1282  003122  004767  000002                    JSR     %7,TYPD         ;TYPE CHAR IN TYPDAT
1283  003126  000756                            BR      TYPA
1284  003130  116777  000040  176156  TYPD:     MOVB    TYPDAT,@TPB     ;OUTPUT CHARACTER TO PRINTER
1285  003136  105777  176150                    TSTB    @TPS            ;WAIT FOR DONE FLAG.
1286  003142  100375                            BPL     .-4
1287  003144  000207                            RTS     %7              ;EXIT
1288  003146  112767  000015  000020  TYPF:     MOVB    #15,TYPDAT      ;MOVE CARRIAGE RETURN CODE TO TYPDAT
1289  003154  004767  177750                    JSR     %7,TYPD         ;GO TYPE CHAR.
1290  003160  112767  000012  000006  TYPG:     MOVB    #12,TYPDAT      ;MOVE LF CODE TO TYPDAT.
1291  003166  004767  177736                    JSR     %7,TYPD         ;GO TYPE CHAR.
1292  003172  000734                            BR      TYPA
1293  003174  000000          TYPDAT:   OPEN
1294                           ;SUBROUTINE TO OUTPUT A SERIES OF ASCII MESSAGES ON TELETYPE PRINTER
1295  003176  011600          TYPS:     MOV     @%6,%0                  ;GET ADDRESS THAT CONTAINS MESSAGE ADDRESS
1296  003200  062716  000002                    ADD     #2,@%6          ;UPDATE TO NEXT MESSAGE ADDRESS
1297  003204  011067  000014                    MOV     @%0,TYPSB       ;ADDRESS OF MESSAGE TO TYPSB
1298  003210  022767  177777  000006            CMP     #-1,TYPSB       ;CHECK FOR TERMINATOR
1299  003216  001001                            BNE     TYPSA           ;BRANCH IF NOT TERMINATOR.
1300  003220  000002                            RTI                     ;TERMINATOR, EXIT
1301  003222  104000          TYPSA:    TYPE                            ;CALL ON TYP SUB TO TYPE MESSAGE
1302  003224  000000          TYPSB:    OPEN                            ;ADDRESS OF MESSAGE GOES HERE
1303  003226  000763                            BR      TYPS            ;GO PROCESS NEXT MESSAGE
```

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1304
1305  003230  011667  000036            ;SUBROUTINE TO DELAY A SPECIFIED NUMBER OF MILLISECONDS
1306  003234  062716  000002  DLY:   MOV     @%6,DLCNT       ;GET DELAY COUNT ADDRESS.
1307  003240  017746  000026          ADD     #2,@%6          ;SET UP EXIT ADDRESS
1308  003244  005067  174526          MOV     @DLCNT,-(6)     ;DELAY COUNT TO STACK
1309  003250  012746  000226          CLR     PSW             ;SET PRIORITY 0
1310  003254  005316          DLYA:   MOV     #226,-(6)       ;1 MSEC COUNT TO STACK
1311  003256  001376          DLYB:   DEC     @%6             ;DECREMENT 1 MSEC COUNT
1312  003260  005726                  BNE     DLYB            ;BRANCH IF NOT 0.
1313  003262  005316                  POPSP                   ;ZERO. UNCOVER MSECS. COUNT.
1314  003264  001371                  DEC     @%6             ;DECREMENT IT
1315  003266  005726                  BNE     DLYA            ;BR IF NOT DONE DELAYING
1316  003270  000002                  POPSP                   ;DONE
1317  003272  000000                  RTI                     ;EXIT.
1318                            DLCNT:  OPEN                    ;CONTAINS MILLISECONDS COUNT ADDRESS.
1319                            ;SUBROUTINE TO STALL A RANDOM NUMBER OF MILLISECONDS. MAXIMUM STALL
1320  003274  032767  040000  176044  ;DETERMINED BY CONTENTS OF LOC STLMSK.
1321  003302  001001  STAL:   BIT     #BIT14,PRGID    ;TEST FOR STALLS ALLOWED.
1322  003304  000002          BNE     STALAA          ;ALLOWED.
1323  003306  004767  177370          RTI             ;NOT ALLOWED.
1324  003312  046700  000014  STALAA: JSR     %7,RNGEN        ;GO GET RANDOM NUMBER.
1325  003316  001404          BIC     STLMSK,%0       ;# IN R0. APPLY STALL MASK.
1326  003320  010067  000002          BEQ     STALB           ;BRANCH IF RESULT IS 0.
1327  003324  104400                  MOV     %0,STALA
1328  003326  000000                  DELAY                   ;DELAY
1329  003330  000002  STALA:  OPEN                    ;DELAY COUNT
1330  003332  000000  STALB:  RTI                     ;DONE. EXIT.
1331                    STLMSK: OPEN                    ;STALL MASK.
1332  003334  004767  177342  ;SUBROUTINE TO GENERATE RANDOM CHARACTER COUNT
1333  003340  046700  000010  GRCNT:  JSR     %7,RNGEN        ;GET RANDOM NUMBER
1334  003344  001773          BIC     RCMSK,%0        ;APPLY MASK
1335  003346  010067  000004          BEQ     GRCNT           ;TRY AGAIN IF RESULT 0
1336  003352  000207                  MOV     %0,RNCNT        ;COUNT TO RNCNT
1337  003354  000000                  RTS     %7              ;EXIT.
1338  003356  000000          RCMSK:  OPEN                    ;RANDOM CHARACTER MASK.
1339                            RNCNT:  OPEN                    ;RANDOM CHARACTER COUNT.
1340  003360  004767  000260  ;SUBROUTINE TO COMPARE DATA READ FROM READER AGAINST EXPECTED DATA AND REPORT ERRORS.
1341  003364  110067  176063  BCHECK: JSR     %7,GTBIN        ;GET BIN CHARACTER(IN R0)
1342  003370  126767  176056  176055  MOVB    %0,CRBUF+1      ;S/B CHAR TO CRBUF+1
1343  003376  001001          CMPB    CRBUF,CRBUF+1   ;COMPARE S/B AND WAS CHARS.
1344  003400  000207          BNE     .+4             ;BRANCH IF NOT SAME.
1345  003402  104017          RTS     %7              ;SAME. EXIT.
1346  003404  005367  176052          DATHLT                  ;GO HALT AND DISPLAY DATA.
1347  003410  001002          DEC ERCTR               ;3 ERRORS?
1348  003412  004767  000002          BNE     .+6             ;BRANCH IF NOT 3 YET.
1349  003416  000207                  JSR     %7,BSYNC        ;3 ERRORS. RESYNC READER.
                                        RTS     %7              ;EXIT.
```

```
 1350                                          ;SUBROUTINE TO SYNC THE LSR TO A SPECIAL BINARY COUNT PATTERN TEST TAPE.
 1351  003420  004767  000162          BSYNC:  JSR     %7,INBIN        ;INITIALIZE BINARY PATTERN
 1352  003424  004767  177324                  JSR     %7,BREAD        ;READ CHAR AND STORE AT CHR1
 1353  003430  116767  176016  176016          MOVB    CRBUF,CHR1
 1354  003436  004767  177312                  JSR     %7,BREAD        ;READ CHAR AND STORE AT CHR2
 1355  003442  116767  176004  176006          MOVB    CRBUF,CHR2
 1356  003450  004767  177300                  JSR     %7,BREAD        ;READ CHAR AND STORE AT CHR3.
 1357  003454  116767  175772  175776          MOVB    CRBUF,CHR3
 1358  003462  004767  000012                  JSR     %7,SYNCA        ;GO SYNC
 1359  003466  000754                          BR      BSYNC           ;NO SYNC. TRY AGAIN.
 1360  003470  012767  000003  175764          MOV     #3,ERCTR
 1361  003476  000207                          RTS     %7              ;SUCCESS.EXIT.
 1362  003500  012767  001000  000074  SYNCA:  MOV     #512.,SYCTRA    ;512 TO SYCTRA
 1363  003506  012767  000012  000070          MOV     #10.,SYCTRB     ;10 TO SYCTRB
 1364  003514  004767  000124          SYNCB:  JSR     %7,GTBIN        ;GET BIN CHARACTER(CHAR IN R0)
 1365  003520  120067  175730                  CMPB    %0,CHR1         ;COMPARE TO CHR1
 1366  003524  001373                          BNE     SYNCB           ;BRANCH IF NOT EQUAL
 1367  003526  004767  000112                  JSR     %7,GTBIN        ;SAME. GET ANOTHER BIN CHAR.
 1368  003532  120067  175720                  CMPB    %0,CHR2         ;COMPARE TO CHR2
 1369  003536  001405                          BEQ     SYNCD           ;BRANCH IF EQUAL
 1370  003540  005367  000036                  DEC     SYCTRA          ;DECREMENT SYCTRA
 1371  003544  001363                          BNE     SYNCB           ;BRANCH IF NOT DONE 512 TIMES.
 1372  003546  104010          SYNCC:  EHALT                           ;DONE 512. SYNC ERROR.
 1373  003550  000207                          RTS     %7              ;ERROR EXIT
 1374  003552  004767  000066          SYNCD:  JSR     %7,GTBIN        ;GET BIN CHARACTER
 1375  003556  120067  175676                  CMPB    %0,CHR3         ;COMPARE TO CHR3
 1376  003562  001404                          BEQ     SYNCE           ;BRANCH IF SAME
 1377  003564  005367  000014                  DEC     SYCTRB          ;DECREMENT SYCTRB.
 1378  003570  001351                          BNE     SYNCB           ;BRANCH IF NOT DONE 10 TIMES
 1379  003572  000765                          BR      SYNCC           ;SYNC ERROR. BRANCH
 1380  003574  062716  000002          SYNCE:  ADD     #2,@%6          ;SET UP SUCCESS EXIT
 1381  003600  000207                          RTS     %7              ;EXIT.
 1382  003602  000000          SYCTRA: OPEN
 1383  003604  000000          SYCTRB: OPEN
 1384                                          ;SUBROUTINE TO INITIALIZE BINARY COUNT PATTERNS
 1385  003606  012767  177777  000014  INBIN:  MOV     #-1,RIND        ;SET ALL VARIABLES
 1386  003614  004567  000300                  JSR     %5,BMOVE        ;TO MINUS 1.
 1387  003620  003630                          RIND
 1388  003622  003631                          RIND+1
 1389  003624  000013                          11.
 1390  003626  000207                          RTS     %7              ;EXIT
 1391  003630  000000          RIND:   OPEN
 1392  003632  000000          PT0:    OPEN
 1393  003634  000000          PT1:    OPEN
 1394  003636  000000          PIND:   OPEN
 1395  003640  000000          PTOP:   OPEN
 1396  003642  000000          PT1P:   OPEN
```

```
1397
1398                                            ;SPECIAL BINARY COUNT PATTERN SUBROUTINE. EXITS WITH BIN CHAR IN R0
1399  003644  016767  177762  177762  GTBIN:    MOV     PT0,PT1         ;PREVIOUS BIN CHAR TO PT1
1400  003652  005167  177756                    COM     PT1
1401  003656  005167  177746                    COM     RIND
1402  003662  001002                            BNE     .+6
1403  003664  005267  177744                    INC     PT1
1404  003670  042767  177400  177736           BIC     #177400,PT1     ;MASK TO 8 BITS
1405  003676  016767  177732  177726           MOV     PT1,PT0         ;SAVE BIN CHAR IN PT0
1406  003704  016700  177724                    MOV     PT1,%0          ;BIN CHAR TO R0.
1407  003710  000207                            RTS     %7              ;EXIT.
1408  003712  016767  177722  177722  GTBINP:   MOV     PT0P,PT1P       ;PREVIOUS BIN CHAR TO PT1P
1409  003720  005167  177716                    COM     PT1P
1410  003724  005167  177706                    COM     PIND
1411  003730  001002                            BNE     .+6
1412  003732  005267  177704                    INC     PT1P
1413  003736  042767  177400  177676           BIC     #177400,PT1P    ;MASK TO 8 BITS.
1414  003744  016767  177672  177666           MOV     PT1P,PT0P       ;SAVE BIN CHAR IN PT0P.
1415  003752  016701  177664                    MOV     PT1P,%1         ;BIN CHAR TO R1.
1416  003756  000207                            RTS     %7              ;EXIT.
1417                                          ;OCTAL TO ASCII CONVERT ROUTINES
1418  003760  012500                  ACNV6:    MOV     (5)+,%0         ;CONVERT TO 6 ASCII. GET OCTAL ADDRESS
1419  003762  012567  000012                    MOV     (5)+,ACNVB      ;GET ASCII ADDRESS
1420  003766  004767  000052                    JSR     %7,ACNV         ;CONVERT TO ASCII
1421  003772  004567  000122                    JSR     %5,BMOVE        ;MOVE 6 CHARS TO ASCII ADDRESS
1422  003776  004034                            A1ST
1423  004000  000000                  ACNVB:    OPEN
1424  004002  000006                            6
1425  004004  000205                            RTS     %5              ;EXIT
1426  004006  012500                  ACNV4:    MOV     (5)+,%0         ;CONVERT TO 4 ASCII. GET OCTAL ADDRESS
1427  004010  012567  000012                    MOV     (5)+,ACNVC      ;GET ASCII ADDRESS
1428  004014  004767  000024                    JSR     %7,ACNV         ;CONVERT TO ASCII
1429  004020  004567  000074                    JSR     %5,BMOVE        ;MOVE 4 CHARS TO ASCII ADDRESS.
1430  004024  004036                            A1ST+2
1431  004026  000000                  ACNVC:    OPEN
1432  004030  000004                            4
1433  004032  000205                            RTS     %5              ;EXIT
1434  004034  000000                  A1ST:     OPEN
1435  004036  000000                            OPEN
1436  004040  000000                            OPEN
1437  004042  000000                  ACNVX:    OPEN
1438  004044  012701  004042          ACNV:     MOV     #A1ST+6,%1      ;ADDR TO STORE ASCII TO R1
1439  004050  012702  000006                    MOV     #6,%2           ;6 TO R2
1440  004054  011067  177762                    MOV     @%0,ACNVX       ;OCTAL WORD TO ACNVX
1441  004060  016703  177756          ACNVM:    MOV     ACNVX,%3
1442  004064  042703  177770                    BIC     #177770,%3      ;ISOLATE LEAST SIGNIFICANT OCTAL #
1443  004070  062703  000060                    ADD     #60,%3          ;ADD 60 TO CONVERT TO ASCII
1444  004074  110341                            MOVB    %3,-(1)         ;STORE ASCII BYTE
1445  004076  006067  177740                    ROR     ACNVX           ;MOVE NEXT OCTAL DIGIT TO LEAST
1446  004102  006067  177734                    ROR     ACNVX           ;SIGNIFICANT POSITION
1447  004106  006067  177730                    ROR     ACNVX
1448  004112  005302                            DEC     %2              ;DONE 6 TIMES?
1449  004114  001361                            BNE     ACNVM           ;NO. REPEAT.
1450  004116  000207                            RTS     %7              ;YES. EXIT.
```

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                                              ;SUBROUTINE TO MOVE A VARIABLE NUMBER OF BYTES.
004120  104020                                BMOVE:  SAVREG                    ;SAVE REGS.
004122  012501                                        MOV     (5)+,%1           ;GET"FROM"ADDRESS
004124  012502                                        MOV     (5)+,%2           ;GET"TO"ADDRESS
004126  012503                                        MOV     (5)+,%3           ;GET COUNT
004130  112122                                BMOVA:  MOVB    (1)+,(2)+         ;MOVE BYTE
004132  005303                                        DEC     %3                ;DECREMENT COUNT
004134  001375                                        BNE     BMOVA             ;BRANCH IF NOT DONE.
004136  104021                                        RSTREG                    ;RESTORE REGS.
004140  000205                                        RTS     %5                ;DONE EXIT
                                              ;SUBROUTINE TO CHECK FOR PUNCH READY.
004142  105777  175144                        CPRDY:  TSTB    @TPS              ;TEST FOR READY BIT.
004146  100001                                        BPL     CPRDYA            ;BRANCH IF READY NOT SET.
004150  000207                                        RTS     %7                ;OK. EXIT.
004152  104010                                CPRDYA: EHALT                     ;NOT READY. HALT.
004154  000772                                        BR      CPRDY
                                              ;SUBROUTINE TO PUNCH ON LSP CHARACTER IN REG 0.
004156  004767  177760                        LSPCH:  JSR     %7,CPRDY          ;GO CHECK FOR PUNCH READY.
004162  010077  175126                                MOV     %0,@TPB           ;LOAD PUNCH BUFFER.
004166  105777  175120                                TSTB    @TPS              ;WAIT FOR DONE.
004172  100375                                        BPL     .-4
004174  005000                                        CLR     %0
004176  000207                                        RTS     %7                ;DONE. EXIT.
                                              ;BINARY TO DECIMAL ASCII CONVERT SUBROUTINE.
004200  012700  011672                        BDCNV:  MOV     #DECVAL,%0        ;SET UP ADDR TO STORE DECIMAL ASCII IN R0
004204  013501                                        MOV     @(5)+,%1          ;BINARY VALUE TO R1.
004206  012702  004306                                MOV     #ADTENP,%2        ;ADDR OF TEN POWER STRING TO R2.
004212  012767  000005  000060                        MOV     #5,CNVCTR         ;SET UP FOR 5 POWER CONVERSIONS.
004220  012267  000060                        BDCNVA: MOV     (2)+,TENPWR       ;MOVE POWER OF TEN VALUE TO TENPWR.
004224  004767  000010                                JSR     %7,SUBTEN         ;PERFORM CONVERSION
004230  005367  000044                                DEC     CNVCTR            ;DONE 5 CONVERSIONS?
004234  001371                                        BNE     BDCNVA            ;BRANCH IF NOT YET 5.
004236  000205                                        RTS     %5                ;YES, EXIT.
004240  005067  000036                        SUBTEN: CLR     DIGIT             ;CLEAR DIGIT
004244  166701  000034                        SUBTNA: SUB     TENPWR,%1         ;SUBTRACT TEN POWER FROM BINARY VALUE.
004250  103403                                        BCS     SUBTNB            ;BRANCH IF UNSUCCESSFUL SUBTRACTION.
004252  005267  000024                                INC     DIGIT
004256  000772                                        BR      SUBTNA
004260  066701  000020                        SUBTNB: ADD     TENPWR,%1         ;RESTORE SUBTRACTED VALUE.
004264  062767  000060  000010                        ADD     #60,DIGIT         ;CONVERT (DIGIT) TO ASCII
004272  116720  000004                                MOVB    DIGIT,(0)+        ;MOVE ASCII CHAR TO DECVAL FIELD.
004276  000207                                        RTS     %7                ;EXIT.
004300  000000                                CNVCTR: OPEN
004302  000000                                DIGIT:  OPEN
004304  000000                                TENPWR: OPEN
004306  023420                                ADTENP: 10000.
004310  001750                                        1000.
004312  000144                                        100.
004314  000012                                        10.
004316  000001                                        1
```

```
1502
1503                                        ;SUBROUTINE TO TYPE A LINE OF CHARACTERS
1504  004320  012767  000122  000024  TYPLN:  MOV     #82.,TCTR       ;80 TO CHAR COUNT +CR,LF
1505  004326  012704  012103          TYPLA:  MOV     #BLOCKA,%4      ;SET LINE ADDRESS IN R4.
1506  004332  104002                  TYPLB:  STALL                   ;STALL IF ALLOWED.
1507  004334  112400                          MOVB    (4)+,%0         ;GET CHARACTER
1508  004336  004767  177614                  JSR     %7,LSPCH        ;GO OUTPUT CHARACTER.
1509  004342  005367  000004                  DEC     TCTR            ;DONE?
1510  004346  001371                          BNE     TYPLB           ;BRANCH IF NOT DONE.
1511  004350  000207                          RTS     %7              ;DONE. EXIT
1512  004352  000000                  TCTR:   OPEN
1513                                        ;SUBROUTINE TO TYPE LINE OF 3 CHARACTERS
1514  004354  011667  000016          TYPL3:  MOV     @%6,TPL3A       ;DEVELOP AND SET ADDRESS OF
1515  004360  017767  000012  000010          MOV     @TPL3A,TPL3A    ;DATA IN TPL3A.
1516  004366  062716  000002                  ADD     #2,@%6          ;SET UP EXIT.
1517  004372  004567  000034                  JSR     %5,FBF3         ;FILL BUFFER WITH 3 CHARACTERS
1518  004376  000000                  TPL3A:  OPEN
1519  004400  042767  040000  174740          BIC     #BIT14,PRGID    ;DISABLE STALLS.
1520  004406  004767  177706                  JSR     %7,TYPLN        ;GO TYPE LINE OF CHARACTERS.
1521  004412  000002                          RTI                     ;EXIT.
1522  004414  112767  000015  005461  STBF:   MOVB    #15,BLOCKA      ;SUB TO SET UP BUFFER AREA.
1523  004422  112767  000012  005454          MOVB    #12,BLOCKA+1
1524  004430  000207                          RTS     %7              ;EXIT
1525                                        ;SUBROUTINE TO FILL CHARACTER BUFFER WITH 3 CHARACTERS.
1526  004432  012567  000004          FBF3:   MOV     (5)+,FBF3A
1527  004436  004567  177456                  JSR     %5,BMOVE        ;MOVE 3 CHARS TO BUFFER.
1528  004442  000000                  FBF3A:  OPEN
1529  004444  012105                          BLOCK1
1530  004446  000003                          3
1531  004450  004567  177444          FBF3B:  JSR     %5,BMOVE        ;FILL 80 CHARACTERS BUFFER
1532  004454  012105                          BLOCK1                  ;WITH 3 CHARACTERS
1533  004456  012110                          BLOCK1+3
1534  004460  000116                          78.
1535  004462  004567  177432                  JSR     %5,BMOVE
1536  004466  012105                          BLOCK1
1537  004470  012217                          BLOCK2
1538  004472  000120                          80.
1539  004474  000205                          RTS     %5              ;EXIT
1540
1541                                        ;SUBROUTINE TO FILL BUFFER WITH ALL CHARACTERS
1542  004476  004567  177416          FBALL:  JSR     %5,BMOVE        ;FILL 80 CHAR BUFFER WITH
1543  004502  010730                          A                       ;ALL CHARACTERS
1544  004504  012105                          BLOCK1
1545  004506  000063                          63
1546  004510  004567  177404                  JSR     %5,BMOVE
1547  004514  010730                          A
1548  004516  012204                          BLOCK1+63.
1549  004520  000022                          18.
1550  004522  004567  177372                  JSR     %5,BMOVE
1551  004526  012105                          BLOCK1
1552  004530  012217                          BLOCK2
1553  004532  000120                          80.
1554  004534  000207                          RTS     %7              ;EXIT.
```

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1555
1556                                        ;PRGO - INPUT-OUTPUT LOGIC TESTS
1557  004536  012767  004550  174566  PRGO: MOV     #ATO,KSTART     ;ADDRESS OF 1ST ROUTINE TO KSTART.
1558  004544  000167  175130              JMP     SRSET           ;GO GET STARTED.
1559                                        ;TEST ABILITY TO REFERENCE THE KEYBOARD/READER STATUS WORD (TKS)
1560  004550  000000                  ATO:  0                       ;TEST #.
1561  004552  004602                        AT1                     ;NEXT TEST.
1562  004554  001750                        1000.                   ;I COUNT.
1563  004556  004566                        ATOA                    ;SCOPE ENTRY.
1564  004560  012767  004576  173216        MOV     #ATOE,MACHER    ;SET UP MACHINE ERROR TRAP.
1565  004566  005777  174514          ATOA: TST     @TKS            ;REFERENCE CODER STATUS WORD.
1566  004572  104012                  ATOB: CHAIN                   ;CHAIN
1567  004574  000774                        BR      ATOA            ;REPEAT TEST.
1568  004576  104003                  ATOE: ERROR                   ;ERROR. TRAPPED WHEN REFERENCING READER.
1569  004600  000774                        BR      ATOB            ;STATUS WORD (TKS).
1570                                        ;TEST ABILITY TO REFERENCE THE KEYBOARD/READER BUFFER (TKB).
1571  004602  000001                  AT1:  1                       ;TEST #.
1572  004604  004634                        AT2                     ;NEXT TEST.
1573  004606  001750                        1000.                   ;I COUNT.
1574  004610  004620                        AT1A                    ;SCOPE ENTRY.
1575  004612  012767  004630  173164        MOV     #AT1E,MACHER    ;SET UP MACHINE ERROR TRAP
1576  004620  005777  174464          AT1A: TST     @TKB            ;REFERENCE READER BUFFER.
1577  004624  104012                  AT1B: CHAIN                   ;CHAIN
1578  004626  000774                        BR      AT1A            ;REPEAT TEST.
1579  004630  104003                  AT1E: ERROR                   ;ERROR. TRAPPED WHEN REFERENCING
1580  004632  000774                        BR      AT1B            ;READER BUFFER. (TKB).
1581                                        ;TEST ABILITY TO REFERENCE PUNCH/PRINTER STATUS WORD (TPS).
1582  004634  000002                  AT2:  2                       ;TEST #.
1583  004636  004666                        AT3                     ;NEXT TEST
1584  004640  001750                        1000.                   ;I COUNT.
1585  004642  004652                        AT2A                    ;SCOPE ENTRY.
1586  004644  012767  004662  173132        MOV     #AT2E,MACHER    ;SETUP MACHINE ERROR TRAP.
1587  004652  005777  174434          AT2A: TST     @TPS            ;REFERENCE PUNCH/PRINTER STATUS WORD.
1588  004656  104012                  AT2B: CHAIN                   ;CHAIN
1589  004660  000774                        BR      AT2A            ;REPEAT TEST.
1590  004662  104003                  AT2E: ERROR                   ;ERROR. TRAPPED WHEN REFERENCING
1591  004664  000774                        BR      AT2B            ;PUNCH/PRINTER STATUS WORD (TPS).
1592                                        ;TEST ABILITY TO REFERENCE PUNCH/PRINTER BUFFER (TPB).
1593  004666  000003                  AT3:  3
1594  004670  004720                        AT4
1595  004672  001750                        1000.
1596  004674  004704                        AT3A
1597  004676  012767  004714  173100        MOV     #AT3E,MACHER    ;SETUP MACHINE ERROR TRAP.
1598  004704  005777  174404          AT3A: TST     @TPB            ;REFERENCE PUNCH/PRINTER BUFFER.
1599  004710  104012                  AT3B: CHAIN                   ;CHAIN
1600  004712  000774                        BR      AT3A            ;REPEAT TEST.
1601  004714  104003                  AT3E: ERROR                   ;ERROR. TRAPPED WHEN REFERENCING
1602  004716  000774                        BR      AT3B            ;PUNCH/PRINTER BUFFER. (TPS).
```

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1603
1604                                        ;TEST ABILITY TO SET AND CLEAR READER/KYBD ID BIT
1605  004720  000004                AT4:    4                       ;TEST #
1606  004722  005004                        AT5                     ;NEXT TEST
1607  004724  001750                        1000.                   ;I COUNT
1608  004726  004736                        AT4A                    ;SCOPE ENTRY
1609  004730  012767  000340  173040        MOV     #PRTY7,PSW      ;SET PRIORITY 7.
1610  004736  052777  000100  174342  AT4A:  BIS     #BIT6,@TKS      ;SET ID BIT IN TKS.
1611  004744  032777  000100  174334        BIT     #BIT6,@TKS      ;CHECK ID BIT IN TKS
1612  004752  001002                        BNE     AT4B            ;BRANCH IF ID BIT IS SET.
1613  004754  104003                AT4E1:  ERROR                   ;ERROR 1 ID BIT NOT SET.
1614  004756  000410                        BR      AT4C
1615  004760  042777  000100  174320  AT4B:  BIC     #BIT6,@TKS      ;CLEAR ID BIT IN TKS
1616  004766  032777  000100  174312        BIT     #BIT6,@TKS      ;CHECK ID BIT IN TKS.
1617  004774  001401                        BEQ     AT4C            ;BRANCH IF ID BIT IS CLEARED.
1618  004776  104003                AT4E2:  ERROR                   ;ERROR. ID BIT FAILED TO CLEAR.
1619  005000  104012                AT4C:   CHAIN                   ;CHAIN
1620  005002  000755                        BR      AT4A            ;REPEAT TEST.
1621                                      ;TEST ABILITY TO CLEAR ID BIT WITH RESET INSTRUCTION.
1622  005004  000005                AT5:    5                       ;TEST #
1623  005006  005050                        AT24                    ;NEXT TEST
1624  005010  000144                        100.                    ;I COUNT
1625  005012  005022                        AT5A                    ;SCOPE ENTRY.
1626  005014  012767  000340  172754        MOV     #PRTY7,PSW      ;SET PRIORITY 7.
1627  005022  052777  000100  174256  AT5A:  BIS     #BIT6,@TKS      ;SET ID BIT IN TKS
1628  005030  104011                        SRESET                  ;RESET
1629  005032  032777  000100  174246        BIT     #BIT6,@TKS      ;TEST ID BIT.
1630  005040  001401                        BEQ     AT5B            ;BRANCH IF ID BIT IS CLEAR.
1631  005042  104003                AT5E:   ERROR                   ;ERROR. RESET FAILED TO CLEAR ID BIT.
1632  005044  104012                AT5B:   CHAIN                   ;CHAIN
1633  005046  000765                        BR      AT5A            ;REPEAT TEST.
```

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1634
1635                                        ;TEST ABILITY TO SET AND CLEAR PUNCH ID BIT
1636  005050  000024                AT24:   24                      ;TEST#
1637  005052  005134                        AT25                    ;NEXT TEST.
1638  005054  001750                        1000.                   ;I COUNT
1639  005056  005066                        AT24A                   ;SCOPE ENTRY.
1640  005060  012767  000340  172710        MOV     #PRTY7,PSW      ;SET PRIORITY 7.
1641  005066  052777  000100  174216 AT24A: BIS     #BIT6,@TPS      ;SET PUNCH ID BIT.
1642  005074  032777  000100  174210        BIT     #BIT6,@TPS      ;CHECK PUNCH ID BIT.
1643  005102  001002                        BNE     AT24B           ;BRANCH IF PUNCH ID BIT IS SET.
1644  005104  104003                AT24E1: ERROR                   ;ERROR1. PUNCH ID BIT DID NOT SET.
1645  005106  000410                        BR      AT24C
1646  005110  042777  000100  174174 AT24B: BIC     #BIT6,@TPS      ;CLEAR PUNCH ID BIT.
1647  005116  032777  000100  174166        BIT     #BIT6,@TPS      ;CHECK PUNCH ID BIT.
1648  005124  001401                        BEQ     AT24C           ;BRANCH IF PUNCH ID BIT IS CLEAR
1649  005126  104003                AT24E2: ERROR                   ;ERROR2. PUNCH ID BIT FAILED TO CLEAR.
1650  005130  104012                AT24C:  CHAIN                   ;CHAIN
1651  005132  000776                        BR      AT24C           ;REPEAT TEST
1652                                      ;TEST ABILITY TO CLEAR PUNCH ID BIT WITH RESET INSTRUCTION
1653  005134  000025                AT25:   25                      ;TEST#
1654  005136  005200                        AT30                    ;NEXT TEST.
1655  005140  000144                        100.                    ;I COUNT.
1656  005142  005152                        AT25A                   ;SCOPE ENTRY.
1657  005144  012767  000340  172624        MOV     #PRTY7,PSW      ;SET PRIORITY 7.
1658  005152  052777  000100  174132 AT25A: BIS     #BIT6,@TPS      ;SET PUNCH ID BIT.
1659  005160  104011                        SRESET                  ;RESET
1660  005162  032777  000100  174122        BIT     #BIT6,@TPS      ;CHECK PUNCH ID BIT.
1661  005170  001401                        BEQ     AT25B           ;BRANCH IF PUNCH ID BIT IS CLEAR.
1662  005172  104003                AT25E:  ERROR                   ;ERROR. RESET FAILED TO CLEAR PUNCH ID BIT.
1663  005174  104012                AT25B:  CHAIN                   ;CHAIN
1664  005176  000765                        BR      AT25A           ;REPEAT TEST.
```

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 1665
 1666                                   ;TEST THAT RESET SETS THE PUNCH READY BIT, AND THAT READY CAN BE READ RELIABLY.
 1667  005200  000030                  AT30:   30                      ;TEST#
 1668  005202  005224                          AT31                    ;NEXT TEST
 1669  005204  001750                          1000.                   ;I COUNT
 1670  005206  005210                          AT30A                   ;SCOPE ENTRY
 1671  005210  105777  174076          AT30A:  TSTB    @TPS            ;CHECK PUNCH READY.
 1672  005214  100401                          BMI     AT30B           ;BRANCH IF PUNCH READY IS SET.
 1673  005216  104003                  AT30E:  ERROR                   ;ERROR. RESET FAILED TO SET READY, OR FAILED TO READ  IT
 1674  005220  104012                  AT30B:  CHAIN                   ;CHAIN
 1675  005222  000772                          BR      AT30A           ;REPEAT TEST.
 1676                                   ;TEST THAT PUNCH READY RESETS BY LOADING PUNCH BUFFER.
 1677  005224  000031                  AT31:   31                      ;TEST#
 1678  005226  005264                          AT32                    ;NEXT TEST
 1679  005230  000024                          20.                     ;I COUNT
 1680  005232  005234                          AT31A                   ;SCOPE ENTRY
 1681  005234  104400                  AT31A:  DELAY                   ;WAIT 150 MSECS
 1682  005236  000226                          150.
 1683  005240  104011                          SRESET                  ;RESET
 1684  005242  012777  000040  174044          MOV     #40,@TPB        ;LOAD PUNCH BUFFER
 1685  005250  105777  174036                  TSTB    @TPS            ;CHECK PUNCH READY BIT.
 1686  005254  100001                          BPL     AT31B           ;BRANCH IF PUNCH READY IS CLEAR.
 1687  005256  104003                  AT31E:  ERROR                   ;ERROR. BUFFER LOAD FAILED TO CLEAR READY.
 1688  005260  104012                  AT31B:  CHAIN                   ;CHAIN
 1689  005262  000764                          BR      AT31A           ;REPEAT TEST.
 1690                                   ;TEST THAT BYTE LOAD OF PUNCH BUFFER +1 DOES NOT RESET READY.
 1691  005264  000032                  AT32:   32                      ;TEST#
 1692  005266  005326                          AT33                    ;NEXT TEST
 1693  005270  000024                          20.                     ;I COUNT
 1694  005272  005274                          AT32A                   ;SCOPE ENTRY
 1695  005274  104400                  AT32A:  DELAY                   ;WAIT 150 MSECS
 1696  005276  000226                          150.
 1697  005300  104011                          SRESET                  ;RESET
 1698  005302  016700  174006                  MOV     TPB,%0
 1699  005306  005200                          INC     %0
 1700  005310  105010                          CLRB    @%0             ;BYTE LOAD PUNCH BUFFER+1
 1701  005312  105777  173774                  TSTB    @TPS            ;CHECK PUNCH READY BIT
 1702  005316  100401                          BMI     AT32B           ;BRANCH IF PUNCH READY STILL SET.
 1703  005320  104003                  AT32E:  ERROR                   ;ERROR. BYTE LOAD OF PUNCH BUFFER+1
 1704  005322  104012                  AT32B:  CHAIN                   ;CLEARED READY. CHAIN
 1705  005324  000763                          BR      AT32A           ;REPEAT TEST.
```

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 1706
 1707                                   ;TEST THAT PUNCH BECOMES READY BY 200 MSECS AFTER BUFFER LOAD.
 1708  005326  000033                   AT33:   33                      ;TEST #
 1709  005330  005366                           AT34                    ;NEXT TEST
 1710  005332  000024                           20.                     ;I COUNT
 1711  005334  005336                           AT33A                   ;SCOPE ENTRY.
 1712  005336  104400                   AT33A:  DELAY                   ;WAIT 150 MSECS.
 1713  005340  000226                           150.
 1714  005342  005077  173746                   CLR     @TPB            ;LOAD PUNCH BUFFER.
 1715  005346  104400                           DELAY                   ;WAIT 200 MSECS.
 1716  005350  000310                           200.
 1717  005352  105777  173734                   TSTB    @TPS            ;CHECK PUNCH READY BIT.
 1718  005356  100401                           BMI     AT33B           ;BRANCH IF PUNCH READY IS SET.
 1719  005360  104003                   AT33E:  ERROR                   ;ERROR. READY NOT SET 200 MSECS AFTER BUFFER LOAD.
 1720  005362  104012                   AT33B:  CHAIN                   ;CHAIN
 1721  005364  000764                           BR      AT33A           ;REPEAT TEST.
 1722                                   ;TEST THAT PUNCH READY BIT CAN CAUSE AN INTERRUPT. IF THE INTERRUPT
 1723                                   ;IS SERVICED, IT WILL HAVE OCCURRED AT THE CORRECT VECTOR.
 1724  005366  000034                   AT34:   34                      ;TEST #
 1725  005370  005434                           AT35                    ;NEXT TEST
 1726  005372  001750                           1000.                   ;I COUNT
 1727  005374  005402                           AT34A                   ;SCOPE ENTRY
 1728  005376  104007                           STPCHV                  ;SET PUNCH INTERRUPT SERVICE
 1729  005400  005430                           AT34C                   ;TO AT34C
 1730  005402  005077  173704           AT34A:  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
 1731  005406  005067  172364                   CLR     PSW             ;SET PRIORITY 0.
 1732  005412  052777  000100  173672           BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS.
 1733  005420  000240                           NOP
 1734  005422  104003                   AT34E:  ERROR                   ;PUNCH READY FAILED TO CAUSE
 1735  005424  104012                   AT34B:  CHAIN                   ;INTERRUPT. CHAIN
 1736  005426  000765                           BR      AT34A           ;REPEAT TEST.
 1737  005430  022626                   AT34C:  POPSP2                  ;HERE IF INTERRUPT OCCURS. POP THE
 1738  005432  000774                           BR      AT34B           ;STOCK TWICE.
 1739                                   ;TEST THAT PUNCH READY DOES NOT CAUSE AN INTERRUPT WITH PROCESSOR
 1740                                   ;AT SAME PRIORITY LEVEL AS THE PUNCH INTERRUPT REQUEST LEVEL.
 1741  005434  000035                   AT35:   35                      ;TEST #
 1742  005436  005510                           AT36                    ;NEXT TEST
 1743  005440  001750                           1000.                   ;I COUNT
 1744  005442  005450                           AT35A                   ;SCOPE ENTRY
 1745  005444  104007                           STPCHV                  ;SET PUNCH INTERRUPT SERVICE
 1746  005446  005502                           AT35E                   ;TO AT35E.
 1747  005450  016767  173650  172320   AT35A:  MOV     TPLVL,PSW       ;SET PROCESSOR TO SAME PRIORITY AS PUNCH.
 1748  005456  005077  173630                   CLR     @TPS            ;DISABLE PUNCH INTERRUPTS.
 1749  005462  052777  000100  173622           BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS.
 1750  005470  000240                           NOP
 1751  005472  005077  173614           AT35B:  CLR     @TPS            ;OK IF NO INTERRUPT OCCURS.
 1752  005476  104012                           CHAIN                   ;CHAIN
 1753  005500  000763                           BR      AT35A           ;REPEAT TEST.
 1754  005502  022626                   AT35E:  POPSP2                  ;ERROR. PUNCH INTERRUPTED WITH PROCESSOR
 1755  005504  104003                           ERROR                   ;SET TO SAVE PRIORITY AS THE PUNCH.
 1756  005506  000771                           BR      AT35B
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                                        ;TEST THAT THE PUNCH INTERRUPTS WITH PROCESSOR AT PRIORITY ONE LEVEL LOWER
                                        ;THAN THE PUNCH PRIORITY.
005510  000036                  AT36:   36                      ;TEST #
005512  005572                          AT37                    ;NEXT TEST
005514  001750                          1000.                   ;I COUNT
005516  005524                          AT36A                   ;SCOPE ENTRY
005520  104007                          STPCHV                  ;SET PUNCH INTERRUPT SERVICE
005522  005560                          AT36B                   ;TO AT36B.
005524  005077  173562          AT36A:  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
005530  016767  173570  172240        MOV     TPLVL,PSW       ;SET PROCESSOR PRIORITY ONE LEVEL
005536  162767  000040  172232        SUB     #40,PSW         ;LOWER THAN PUNCH PRIORITY
005544  052777  000100  173540        BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS
005552  000240                        NOP
005554  104003                        ERROR                   ;ERROR. PUNCH FAILED TO INTERRUPT.
005556  000401                        BR      AT36C
005560  022626                  AT36B:  POPSP2                  ;HERE IF INTERRUPT OCCURS. POP
005562  005077  173524          AT36C:  CLR     @TPS            ;THE STOCK TWICE. DISABLE PUNCH INTERRUPT
005566  104012                        CHAIN                   ;CHAIN
005570  000755                        BR      AT36A           ;REPEAT TEST.
                                        ;TEST THAT PUNCH READY DOES NOT REINTERRUPT AFTER RTI WHEN READY
                                        ;BIT HAS NOT BEEN RESET.
005572  000037                  AT37:   37                      ;TEST #
005574  005666                          AT40                    ;NEXT TEST
005576  001750                          1000.                   ;I COUNT
005600  005602                          AT37A                   ;SCOPE ENTRY
005602  104007                  AT37A:  STPCHV                  ;SET PUNCH INTERRUPT SERVICE TO
005604  005640                          AT37C                   ;AT37C
005606  005077  173500                  CLR     @TPS            ;DISABLE PUNCH INTERRUPTS
005612  005067  172160                  CLR     PSW             ;SET PROCESSOR PRIORITY TO 0
005616  052777  000100  173466          BIS     #BIT6,@TPS      ;ENABLE PUNCH INTERRUPTS
005624  000240                          NOP
005626  104003                  AT37E1: ERROR                   ;ERROR 1. PUNCH FAILED TO INTERRUPT.
005630  005077  173456          AT37B:  CLR     @TPS            ;DISABLE PUNCH INTERRUPT.
005634  104012                        CHAIN                   ;CHAIN
005636  000761                        BR      AT37A           ;REPEAT TEST.
005640  012777  005660  173454  AT37C:  MOV     #AT37E2,@TPVTR  ;HERE IF INTERRUPT OCCURS. CHANGE
005646  012716  005654                  MOV     #AT37D,(SP)     ;PUNCH VECTOR TO AT37E2 AND EXIT
005652  000002                          RTI                     ;INTERRUPT
005654  000240                  AT37D:  NOP                     ;OK IF NO REINTERRUPT OCCURS
005656  000764                          BR      AT37B
005660  022626                  AT37E2: POPSP2                  ;ERROR 2.  PUNCH REINTERRUPTED AFTER
005662  104003                          ERROR                   ;RTI WITH READY BIT LEFT ON
005664  000761                          BR      AT37B
```

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 1801
 1802                                          ;TEST THAT THE PUNCH INTERRUPTS IMMEDIATELY UPON LOWERING
 1803                                          ;PROCESSOR PRIORITY TO 0.
 1804  005666  000040                 AT40:    40                          ;TEST #
 1805  005670  177777                          -1                          ;LAST TEST
 1806  005672  001750                          1000.                       ;I COUNT
 1807  005674  005702                          AT40A                       ;SCOPE ENTRY
 1808  005676  104007                          STPCHV                      ;SET PUNCH INTERRUPT
 1809  005700  005740                          AT40B                       ;SERVICE TO AT40B
 1810  005702  012767  000340  172066  AT40A:  MOV     #PRTY7,PSW          ;SET PROCESSOR PRIORITY TO 7.
 1811  005710  005077  173376                  CLR     @TPS                ;DISABLE PUNCH INTERRUPTS
 1812  005714  052777  000100  173370          BIS     #BIT6,@TPS          ;ENABLE PUNCH INTERRUPTS
 1813  005722  005067  172050                  CLR     PSW                 ;LOWER PROCESSOR PRIORITY TO 0.
 1814  005726  012767  000340  172042          MOV     #PRTY7,PSW          ;RAISE PRIORITY TO 7.
 1815  005734  104003                          ERROR                       ;ERROR. PUNCH FAILED TO INTERRUPT
 1816  005736  000401                          BR      AT40C               ;IMMEDIATELY AFTER CP PRIORITY WAS SET TO 0.
 1817  005740  022626                  AT40B:  POPSP2                      ;HERE IF INTERRUPT OCCURS
 1818  005742  005077  173344          AT40C:  CLR     @TPS                ;DISABLE PUNCH INTERRUPTS
 1819  005746  005737  000042                  TST     @#42    ;TEST FOR ACT11
 1820  005752  001402                          BEQ     AT40D               ;BRANCH IF NOT ACT11
 1821  005754  004737  005764                  JSR     %7,@#PRG1           ;
 1822  005760  104012                  AT40D:  CHAIN                       ;CHAIN
 1823  005762  000747                          BR      AT40A               ;REPEAT TEST
```

```
1824
1825                                            ;PRG1-PRINTER TESTS
1826  005764  012767  006016  173340  PRG1:     MOV     #CT0,KSTART     ;SET ADDRESS IF 1ST ROUTINE.
1827  005772  052767  000200  173346            BIS     #BIT7,PRGID     ;BYPASS SCOPE AND ICNT.
1828  006000  012767  177600  175324            MOV     #177600,STLMSK  ;SET STALL LIMIT
1829  006006  004767  176402                    JSR     %7,STBF         ;SET UP BUFFER AREA.
1830  006012  000167  173662                    JMP     SRSET           ;GO GET STARTED.
1831                                            ;CARRIAGE RETURN TEST.
1832  006016  000000                  CT0:      0                       ;TEST#
1833  006020  006120                            CT1                     ;NEXT TEST ADDRESS.
1834  006022  104000                            TYPE                    ;TYPE TITLE.
1835  006024  011122                            CRTST
1836  006026  012767  000120  173414            MOV     #80.,RCNT
1837  006034  016767  173410  173422            MOV     RCNT,CTRA       ;RCNT TO CTRA
1838  006042  005367  173416          CT0A:     DEC     CTRA            ;DECREMENT CTRA
1839  006046  001001                            BNE     CT0B            ;BRANCH IF NOT 0
1840  006050  104012                            CHAIN                   ;0. CHAIN
1841  006052  016767  173406  173406  CT0B:     MOV     CTRA,CTRB       ;SPACE COUNT TO CTRB.
1842  006060  112700  000105          CT0C:     MOVB    #105,%0         ;CHAR=E
1843  006064  004767  176066                    JSR     %7,LSPCH        ;SPACE.
1844  006070  005367  173372                    DEC     CTRB            ;DECREMENT CTRB.
1845  006074  001371                            BNE     CT0C            ;BRANCH IF NOT DONE SPACING.
1846  006076  112700  000015                    MOVB    #15,%0
1847  006102  004767  176050                    JSR     %7,LSPCH        ;CARRIAGE RETURN.
1848  006106  012700  000012                    MOV     #12,%0          ;LINE FEED
1849  006112  004767  176040                    JSR     %7,LSPCH        ;
1850  006116  000751                            BR      CT0A
1851                                            ;RIGHT MARGIN TEST
1852  006120  000001                  CT1:      1                       ;TEST#
1853  006122  006164                            CT2                     ;NEXT TEST.
1854  006124  104000                            TYPE                    ;TYPE TITLE
1855  006126  011153                            RMTST
1856  006130  012767  000024  173326            MOV     #20.,CTRA       ;SET UP FOR 33/35
1857  006136  012767  011103  000014            MOV     #RM33B,RMB
1858  006144  104000                  CT1A:     TYPE                    ;TYPE----I
1859  006146  011075                            RM33A
1860  006150  005367  173310                    DEC     CTRA            ;DONE N TIMES.
1861  006154  001373                            BNE     CT1A            ;BRANCH IF NOT N TIMES
1862  006156  104000                            TYPE                    ;TYPE-I-.
1863  006160  000000                  RMB:      OPEN
1864  006162  104012                            CHAIN                   ;CHAIN.
```

```
1865                                        ;SPACE TEST
1866  006164  000002                        CT2:    2                       ;TEST#
1867  006166  006320                                CT3                     ;NEXT TEST
1868  006170  104000                                TYPE                    ;TYPE TITLE.
1869  006172  011201                                SPTST
1870  006174  012767  000050  173262                MOV     #40.,CTRA       ;33/35 COUNT TO CTRA.
1871  006202  104000                        CT2A:   TYPE                    ;TYPE SPACE,\.
1872  006204  011117                                SPTSTC
1873  006206  005367  173252                        DEC     CTRA            ;DONE TIMES SET IN CTRA?
1874  006212  001373                                BNE     CT2A            ;BRANCH IF NOT DONE
1875  006214  012767  000050  173242                MOV     #40.,CTRA       ;SET UP CTRA COUNT FOR 33/35
1876  006222  012767  000001  173236  CT2B:   MOV     #1,CTRB
1877  006230  016767  173232  173232  CT2C:   MOV     CTRB,CTRC
1878  006236  112700  000015                        MOVB    #15,%0          ;CARRIAGE RETURN.
1879  006242  004767  175710                        JSR     %7,LSPCH
1880  006246  104400                                DELAY                   ;DELAY 450MS
1881  006250  000702                                450.
1882
1883  006252  112700  000040          CT2D:   MOVB    #40,%0          ;CURSOR RIGHT
1884  006256  004767  175674                        JSR     %7,LSPCH        ;SET IN CTRC.
1885  006262  005367  173202                        DEC     CTRC            ;DONE SPACING.
1886  006266  001371                                BNE     CT2D            ;BRANCH IF NOT DONE SPACING.
1887  006270  112700  000057                        MOVB    #'/,%0          ;DONE. TYPE A "/".
1888  006274  004767  175656                        JSR     %7,LSPCH
1889  006300  005367  173160                        DEC     CTRA            ;DONE 36 TIMES?
1890  006304  001001                                BNE     CT2E            ;BRANCH IF NOT DONE.
1891  006306  104012                                CHAIN                   ;DONE. CHAIN.
1892  006310  062767  000002  173150  CT2E:   ADD     #2,CTRB         ;MODIFY CTRB FOR NEXT TRY.
1893  006316  000744                                BR      CT2C            ;GO DO IT AGAIN.
1894                                        ;LINE FEED TEST
1895  006320  000003                        CT3:    3                       ;TEST #
1896  006322  006400                                CT4                     ;NEXT TEST.
1897  006324  104000                                TYPE                    ;TYPE TITLE
1898  006326  011221                                LFTST
1899  006330  052767  040000  173010                BIS     #BIT14,PRGID    ;ALLOW STALLS.
1900  006336  012767  000120  173120                MOV     #80.,CTRA       ;SET 33/35 LINE FEED COUNT.
1901  006344  112700  000134          CT3A:   MOVB    #'\,%0          ;TYPE "\"
1902  006350  004767  175602                        JSR     %7,LSPCH
1903  006354  112700  000012                        MOVB    #12,%0          ;LINE FEED.
1904  006360  004767  175572                        JSR     %7,LSPCH
1905  006364  005367  173074                        DEC     CTRA            ;DONE N TIMES?
1906  006370  001001                                BNE     CT3B            ;BRANCH IF NOT DONE.
1907  006372  104012                                CHAIN                   ;DONE. CHAIN
1908  006374  104002                        CT3B:   STALL                   ;STALL
1909  006376  000762                                BR      CT3A            ;REPEAT
```

```
1910                                            ;TAB TEST
1911   006400  000004                   CT4:    4                       ;TEST#
1912   006402  006612                           CT5                     ;NEXT TEST.
1913   006404  012767  000011  000074           MOV     #9.,TBCNT       ;SET TAB COUNT.
1914   006412  104014                           CK35                    ;35?
1915   006414  104012                           CHAIN                   ;NO.
1916   006416  004567  000040                   JSR     %5,TPBM         ;TYPE MARKERS
1917   006422  000007                           7
1918   006424  104000                           TYPE
1919   006426  011051                           TBMRK+1
1920   006430  012767  000007  173026  CT4A:    MOV     #7,CTRA         ;LINE COUNT TO CTRA
1921   006436  005067  000046                   CLR     SPCNT           ;0 TO SPACE COUNT.
1922   006442  004767  000044           CT4B:   JSR     %7,TABP         ;GO SPACE-TAB.
1923   006446  005267  000036                   INC     SPCNT           ;INCREMENT SPACE COUNT.
1924   006452  005367  173006                   DEC     CTRA            ;DONE 7 LINES?
1925   006456  001371                           BNE     CT4B            ;BRANCH IF NOT DONE.
1926   006460  104012                           CHAIN                   ;DONE. CHAIN.
1927   006462  012567  172776           TPBM:   MOV     (5)+,CTRA       ;TYPE TEST TITLE.
1928   006466  104000                           TYPE
1929   006470  011032                           TBTST
1930   006472  104000                   TPBMA:  TYPE                    ;TYPE MARKERS
1931   006474  011062                           TBMRK1
1932   006476  005367  172762                   DEC     CTRA
1933   006502  001373                           BNE     TPBMA
1934   006504  000205                           RTS     %5              ;EXIT.
1935   006506  000000                   TBCNT:  OPEN                    ;TAB COUNT
1936   006510  000000                   SPCNT:  OPEN                    ;SPACE COUNT
1937   006512  104000                   TABP:   TYPE                    ;CRLF.
1938   006514  011073                           CRLF
1939   006516  016767  177764  172742           MOV     TBCNT,CTRB      ;TAB COUNT TO CTRB
1940   006524  016767  177760  172736  TABPA:   MOV     SPCNT,CTRC      ;SPACE COUNT TO CTRC
1941   006532  001407                           BEQ     TABPC           ;BRANCH IF SPACE COUNT IS 0.
1942   006534  112700  000040           TABPB:  MOVB    #40,%0          ;SPACE
1943   006540  004767  175412                   JSR     %7,LSPCH
1944   006544  005367  172720                   DEC     CTRC            ;DECREMENT SPACE COUNT
1945   006550  001371                           BNE     TABPB           ;BRANCH IF NOT YET 0.
1946   006552  112700  000011           TABPC:  MOVB    #11,%0          ;TAB
1947   006556  004767  175374                   JSR     %7,LSPCH
1948   006562  004767  175370                   JSR     %7,LSPCH        ;DUMMY CYCLE
1949   006566  004767  175364                   JSR     %7,LSPCH        ;DUMMY CYCLE.
1950   006572  112700  000057                   MOVB    #'/,%0          ;TYPE "/"
1951   006576  004767  175354                   JSR     %7,LSPCH
1952   006602  005367  172660                   DEC     CTRB            ;DECREMENT TAB COUNT.
1953   006606  001346                           BNE     TABPA           ;BRANCH IF NOT DONE TABBING.
1954   006610  000207                           RTS     %7              ;DONE. EXIT.
```

```
1955
1956  006612  000005          ;TYPE LINE OF CHARACTERS ABC
1957  006614  006630  CT5:    5                       ;TEST #
1958  006616  104000          CT6                     ;NEXT TEST
1959  006620  011244          TYPE                    ;TYPE "CHARACTER TESTS"
1960  006622  104016          CHRTST
1961  006624  010730          TYPLN3                  ;TYPE LINE
1962  006626  104012          A
1963                          CHAIN                   ;CHAIN
1964  006630  000006  ;TYPE LINE OF CHARACTERS DEF
1965  006632  006642  CT6:    6                       ;TEST #
1966  006634  104016          CT7                     ;NEXT TEST
1967  006636  010733          TYPLN3                  ;TYPE LINE
1968  006640  104012          D
1969                          CHAIN                   ;CHAIN
1970  006642  000007  ;TYPE LINE OF CHARACTERS GHI
1971  006644  006654  CT7:    7                       ;TEST#
1972  006646  104016          CT10                    ;NEXT TEST.
1973  006650  010736          TYPLN3                  ;TYPE LINE
1974  006652  104012          G
1975                          CHAIN                   ;CHAIN
1976  006654  000010  ;TYPE LINE OF CHARACTERS OF JKL
1977  006656  006666  CT10:   10                      ;TEST #
1978  006660  104016          CT11                    ;NEXT TEST.
1979  006662  010741          TYPLN3                  ;TYPELINE
1980  006664  104012          J
1981                          CHAIN                   ;CHAIN
1982  006666  000011  ;TYPE LINE OF CHARACTERS MNO
1983  006670  006700  CT11:   11                      ;TEST #
1984  006672  104016          CT12                    ;NEXT TEST
1985  006674  010744          TYPLN3                  ;TYPE LINE
1986  006676  104012          M
1987                          CHAIN                   ;CHAIN
1988                  ;TYPE LINE OF CHARACTERS PQR
1989  006700  000012
1990  006702  006712  CT12:   12                      ;TEST #
1991  006704  104016          CT13                    ;NEXT TEST
1992  006706  010747          TYPLN3                  ;TYPE LINE
1993  006710  104012          P
1994                          CHAIN                   ;CHAIN
1995  006712  000013  ;TYPE LINE OF CHARACTERS STU
1996  006714  006724  CT13:   13                      ;TEST #
1997  006716  104016          CT14                    ;NEXT TEST
1998  006720  010752          TYPLN3
1999  006722  104012          S
                              CHAIN
```

```
  2000
  2001
  2002  006724  000014                ;TYPE LINE OF CHARACTERS VWX
                                    CT14:   14                      ;TEST #
  2003  006726  006736                      CT15                    ;NEXT TEST
  2004  006730  104016                      TYPLN3                  ;TYPE LINE
  2005  006732  010755                      V
  2006  006734  104012                      CHAIN                   ;CHAIN
  2007                              ;TYPE LINE OF CHARACTERS YZ0
  2008  006736  000015                CT15:   15                      ;TEST #
  2009  006740  006750                      CT16                    ;NEXT TEST
  2010  006742  104016                      TYPLN3                  ;TYPE LINE
  2011  006744  010760                      Y
  2012  006746  104012                      CHAIN                   ;CHAIN
  2013                              ;TYPE LINE OF CHARACTERS 123
  2014  006750  000016                CT16:   16                      ;TEST #
  2015  006752  006762                      CT17                    ;NEXT TEST
  2016  006754  104016                      TYPLN3                  ;TYPE LINE
  2017  006756  010763                      ONE
  2018  006760  104012                      CHAIN                   ;CHAIN
  2019                              ;TYPE LINE OF CHARACTERS 456
  2020  006762  000017                CT17:   17                      ;TEST #
  2021  006764  006774                      CT20                    ;NEXT TEST
  2022  006766  104016                      TYPLN3                  ;TYPE LINE
  2023  006770  010766                      FOUR
  2024  006772  104012                      CHAIN                   ;CHAIN
  2025                              ;TYPE LINE OF CHARACTERS 789
  2026  006774  000020                CT20:   20                      ;TEST #
  2027  006776  007006                      CT21                    ;NEXT TEST
  2028  007000  104016                      TYPLN3                  ;TYPE LINE
  2029  007002  010771                      SEVEN
  2030  007004  104012                      CHAIN                   ;CHAIN
  2031                              ;TYPE LINE OF CHARACTERS!"#
  2032  007006  000021                CT21:   21                      ;TEST #
  2033  007010  007020                      CT22                    ;NEXT TEST
  2034  007012  104016                      TYPLN3                  ;TYPE LINE
  2035  007014  010774                      C41
  2036  007016  104012                      CHAIN                   ;CHAIN
  2037                              ;TYPE LINE OF CHARACTERS $%&
  2038  007020  000022                CT22:   22                      ;TEST #
  2039  007022  007032                      CT23                    ;NEXT TEST
  2040  007024  104016                      TYPLN3                  ;TYPE LINE
  2041  007026  010777                      C44
  2042  007030  104012                      CHAIN                   ;CHAIN
  2043                              ;TYPE LINE OF CHARACTERS '()
  2044  007032  000023                CT23:   23                      ;TEST #
  2045  007034  007044                      CT24                    ;NEXT TEST
  2046  007036  104016                      TYPLN3                  ;TYPE LINE
  2047  007040  011002                      C47
  2048  007042  104012                      CHAIN                   ;CHAIN.
```

```
                                        ;TYPE LINE OF CHARACTERS *+,
007044  000024                  CT24:   24                      ;TEST #
007046  007056                          CT25                    ;NEXT TEST
007050  104016                          TYPLN3                  ;TYPE LINE
007052  011005                          C52
007054  104012                          CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS -./
007056  000025                  CT25:   25                      ;TEST #
007060  007070                          CT26                    ;NEXT TEST
007062  104016                          TYPLN3                  ;TYPE LINE
007064  011010                          C55
007066  104012                          CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS :;<
007070  000026                  CT26:   26                      ;TEST #
007072  007102                          CT27                    ;NEXT TEST
007074  104016                          TYPLN3                  ;TYPE LINE
007076  011013                          C72
007100  104012                          CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS =>?
007102  000027                  CT27:   27                      ;TEST #
007104  007114                          CT30                    ;NEXT TEST
007106  104016                          TYPLN3                  ;TYPE LINE
007110  011016                          C75
007112  104012                          CHAIN                   ;CHAIN.
                                        ;TYPE LINE OF CHARACTERS @[\
007114  000030                  CT30:   30                      ;TEST #
007116  007126                          CT31                    ;NEXT TEST
007120  104016                          TYPLN3                  ;TYPE LINE
007122  011021                          C100
007124  104012                          CHAIN                   ;CHAIN
                                        ;TYPE LINE OF CHARACTERS ]↑AND LEFT ARROW
007126  000031                  CT31:   31                      ;TEST #
007130  007140                          CT32                    ;NEXT TEST
007132  104016                          TYPLN3                  ;TYPE LINE
007134  011024                          C135
007136  104012                          CHAIN                   ;CHAIN
```

```
                                        ;TYPE 20 LINES OF ALL CHARACTERS
                                        ;FIRST 10 FULL SPEED
                                        ;SECOND 10 AT STALL SPEED

007140  000032                  CT32:   32                      ;TEST #
007142  177777                          -1                      ;LAST TEST
007144  004767  175326                  JSR     %7,FBALL        ;FILL BUFFER WITH ALL CHARACTERS
007150  042767  040000  172170          BIC     #BIT14,PRGID    ;CLEAR STALL BIT
007156  012767  000012  001146          MOV     #10.,CNT                ;SET LINE COUNT = 10.
007164  004767  175130          CT32A:  JSR     %7,TYPLN        ;TYPE A LINE
007170  005367  001136                  DEC     CNT             ;
007174  001373                          BNE     CT32A           ;
007176  052767  040000  172142          BIS     #BIT14,PRGID    ;SET STALL
007204  012767  000012  001120          MOV     #10.,CNT                ;LINE COUNT = 10
007212  004767  175102          CT32B:  JSR     %7,TYPLN        ;TYPE A LINE AT STALL SPEED
007216  005367  001110                  DEC     CNT
007222  001373                          BNE     CT32B
007224  013700  000042                  MOV     @#42,%0
007230  001405                          BEQ     CT32C           ;BRANCH IF NOT ACT11
007232  000005                          RESET
007234  004710                  LOGICAL:        JSR     %7,@%0
007236  000240                          NOP
007240  000240                          NOP
007242  000240                          NOP
007244  104012                  CT32C:  CHAIN
                                        ;NOTE:  FOR PRINT RATE TEST
                                        ;1)   TIME FIRST 20. LINES = APPROX 30 SECONDS.
                                        ;2)   CLEAR STALL BIT (BIT14 IN BIS #BIT14,PRGID).
                                        ;     TIME ENTIRE TEST = APPROX 60 SECONDS.
```

```
                                        ;PRG2-KEYBOARD TEST
007246  012767  007272  172056  PRG2:   MOV     #ETO,KSTART
007254  052767  000200  172064          BIS     #BIT7,PRGID
007262  104000                          TYPE
007264  011324                          KMSG1
007266  000167  172406                  JMP     SRSET
                                        ;TEST THAT PRESSING KEY SETS DONE FLAG.
007272  000000                  ETO:    0                               ;TEST #
007274  007376                          ET1                             ;NEXT TEST.
007276  012767  000005  172160          MOV     #5,CTRA
007304  104006                  ETOA:   STRDRV
007306  007342                          ETOB
007310  104000                          TYPE                            ;TYPE "PRESS A KEY WITHIN 10 SECS."
007312  011342                          KMSG2
007314  052777  000100  171764          BIS     #BIT6,@TKS              ;ENABLE KYBD INTERRUPT.
007322  005067  170450                  CLR     PSW
007326  104400                          DELAY                           ;WAIT 10 SECONDS
007330  023420                          10000.
007332  104000                          TYPE                            ;TYPE "NO KEYBOARD REQUEST."
007334  011544                          KMSG6
007336  104010                          EHALT                           ;HALT.
007340  000411                          BR      ETOCA
007342  105777  171740          ETOB:   TSTB    @TKS                    ;TEST FOR DONE BIT ON
007346  100403                          BMI     ETOC                    ;BRANCH IF DONE BIT SET.
007350  104000                          TYPE                            ;DONE BIT NOT SET. TYPE:FALSE  KEY-
007352  011572                          KMSG7                           ;BOARD OR READER INTERRUPT.
007354  104010                          EHALT                           ;HALT
007356  012716  007364          ETOC:   MOV     #ETOCA,@%6
007362  000002                          RTI                             ;EXIT INTERRUPT.
007364  104011                  ETOCA:  SRESET
007366  005367  172072                  DEC     CTRA                    ;DONE 5 TIMES?
007372  001344                          BNE     ETOA                    ;BRANCH IF NOT DONE.
007374  104012                          CHAIN                           ;CHAIN
                                        ;ECHO TEST. KEYED CHARACTER IS TYPED. RUBOUT ENDS ROUTINE.
007376  000001                  ET1:    1                               ;TEST #
007400  007456                          ET2                             ;NEXT TEST.
007402  104000                          TYPE                            ;TYPE TITLE AND INSTRUCTIONS.
007404  011402                          KMSG3
007406  105777  171674          ET1A:   TSTB    @TKS                    ;WAIT FOR DONE FLAG
007412  100375                          BPL     .-4
007414  117767  171670  172030          MOVB    @TKB,CRBUF              ;MOVE KYBD CHAR TO CRBUF.
007422  116777  172024  171664          MOVB    CRBUF,@TPB              ;ECHO CHAR READ.
007430  105777  171656                  TSTB    @TPS                    ;WAIT FOR PRINTER DONE.
007434  100375                          BPL     .-4
007436  042767  000200  172006          BIC     #BIT7,CRBUF             ;CLEAR BIT 7 FROM CRBUF.
007444  122767  000177  172000          CMPB    #177,CRBUF              ;COMPARE CRBUF TO RUBOUT (177)
007452  001355                          BNE     ET1A                    ;BRANCH IF NOT RUBOUT (177)
007454  104012                          CHAIN                           ;CHAIN
```

```
2164
2165                                    ;OCTAL EQUIVALENT TEST. THE OCTAL EQUIVALENT OF ANY CHARACTER KEYED
2166                                    ;IS PRINTED. RUBOUT ENDS ROUTINE.
2167  007456  000002                    ET2:    2                               ;TEST #
2168  007460  177777                            -1                              ;LAST TEST
2169  007462  104001                            TYPES                           ;TYPE TITLE AND INSTRUCTIONS.
2170  007464  011504                            KMSG4
2171  007466  011415                            KMSG3A
2172  007470  177777                            -1
2173  007472  005067  171754                    CLR     CRBUF
2174  007476  105777  171604            ET2A:   TSTB    @TKS                    ;WAIT FOR DONE FLAG.
2175  007502  100375                            BPL     .-4
2176  007504  117767  171600  171740            MOVB    @TKB,CRBUF              ;CHARACTER TO CRBUF
2177  007512  004567  174270                    JSR     %5,ACNV4                ;CONVERT CHAR IN CRBUF TO
2178  007516  001452                            CRBUF                           ;PRINTABLE OCTAL
2179  007520  011536                            OCTEQV
2180  007522  104000                            TYPE                            ;TYPE OCTAL EQUIVALENT
2181  007524  011534                            KMSG5
2182  007526  042767  000200  171716            BIC     #BIT7,CRBUF             ;CLEAR BIT 7 FROM CRBUF
2183  007534  022767  000177  171710            CMP     #177,CRBUF              ;TEST FOR RUBOUT CHARACTER.
2184  007542  001355                            BNE     ET2A                    ;BRANCH IF NOT RUBOUT (177).
2185  007544  104012                            CHAIN                           ;CHAIN.
```

```
                                        ;PRG3-PRINTER EXERCISER. KEYBOARD CONTROLLED.
                                        ;TYPES LINES WITH ANY 5 CHARACTERS. STALLS OR FULL SPEED.
007546  004767  174642          PRG3:   JSR     %7,STBF         ;SET UP BUFFER.
007552  104000                          TYPE                    ;TYPE TITLE
007554  011620                          P7MG1
007556  052767  040000  171562  HTA:    BIS     #BIT14,PRGID    ;SET STALL BIT IN PRGID.
007564  012767  177600  173540          MOV     #177600,STLMSK  ;SET STALL MASK
007572  012703  012105                  MOV     #BLOCK1,%3
007576  104000                          TYPE                    ;TYPE "TYPE IN DATA".
007600  011646                          P7MG2
007602  005777  171502                  TST     @TKB            ;REMOVE FLAG
007606  012767  000006  171650          MOV     #6,CTRA         ;CHAR COUNT TO CTRA.
007614  004767  000060          HTB:    JSR     %7,GKBCR        ;GET AND STORE KYBD CHARACTER.
007620  005367  171640                  DEC     CTRA            ;GOT 6 CHARACTERS?
007624  001373                          BNE     HTB             ;BRANCH IF NOT 6 CHARS YET.
007626  042767  000200  171616          BIC     #BIT7,CRBUF
007634  122767  000177  171610          CMPB    #177,CRBUF      ;CHECK 6TH CHAR FOR RUBOUT.
007642  001003                          BNE     HTC             ;BRANCH IF NOT A RUBOUT.
007644  042767  040000  171474          BIC     #BIT14,PRGID    ;RUBOUT. CLEAR STALL BIT IN PRGID.
007652  004567  174242          HTC:    JSR     %5,BMOVE        ;FILL 80 CHAR LINE.
007656  012105                          BLOCK1
007660  012112                          BLOCK1+5
007662  000120                          80.
007664  004767  174430          HTD:    JSR     %7,TYPLN        ;TYPE LINE.
007670  005767  167674                  TST     SR              ;CHANGE DATA? (SR15=1).
007674  100730                          BMI     HTA             ;YES. GO CHANGE DATA
007676  000772                          BR      HTD             ;NO CONTINUE WITH SAME DATA.
007700  105777  171402          GKBCR:  TSTB    @TKS            ;WAIT FOR DONE FLAG.
007704  100375                          BPL     .-4
007706  117767  171376  171536          MOVB    @TKB,CRBUF      ;CHARACTER TO CRBUF.
007714  116723  171532                  MOVB    CRBUF,(3)+      ;CHARACTER TO LINE BUFFER.
007720  116700  171526                  MOVB    CRBUF,%0
007724  004767  174226                  JSR     %7,LSPCH        ;ECHO CHARACTER.
007730  000207                          RTS     %7
```

```
2221                                    ;
2222                                    ;
2223                                    ;PRG4-PUNCH CLOCK ADJUSTMENT ROUTINE.
2224                                    ;OUTPUTS CHARACTER SET IN LEFT HALF OF SR, AND
2225                                    ;STALLS FOR NUMBER OF MILLISECONDS SET IN RIGHT HALF OF SR.
2226  007732  104005                    PRG4:   CHALT                   ;HALT TO SET SR.
2227  007734  004767  000036            ITA:    JSR     %7,C1112        ;GO OUTPUT CHARACTER SET IN LEFT
2228  007740  000775                            BR      ITA             ;HALF OF SR AND STALL PER SR RIGHT.
2229                                    ;
2230                                    ;
2231                                    ;PRG5-READER CLOCK ADJUSTMENT ROUTINE.
2232                                    ;PERFORMS SAME FUNCTION AS PRG11, AND IN ADDITION,
2233                                    ;USING THE PUNCH MAINTENANCE BIT, SHIFTS OUTPUT OF PUNCH
2234                                    ;SHIFT REGISTER ONTO THE READER BUFFER. THE CONTENTS OF THE
2235                                    ;READER BUFFER ARE THEN "FIXED" ON THE CONSOLE DATA LIGHTS
2236                                    ;BY ISSUING A RESET WITH CONTENTS OF READER BUFFER LOADED IN R0.
2237  007742  104005                    PRG5:   CHALT                   ;HALT TO SET SR.
2238  007744  004767  000020            JTA:    JSR     %7,C1112M       ;GO OUTPUT CHARACTER FROM SR LEFT AND
2239  007750  017700  171334                    MOV     @TKB,%0         ;STALL PER SR RIGHT. (TKB) TO R0.
2240  007754  000005                            RESET                   ;"FIX" (TKB) IN DATA LIGHTS.
2241  007756  000005                            RESET
2242  007760  000005                            RESET
2243  007762  000005                            RESET
2244  007764  000005                            RESET
2245  007766  000766                            BR      JTA             ;REPEAT.
2246                                    ;
2247  007770  052777  000004  171314    C1112M: BIS     #4,@TPS         ;SET MAINTENANCE MODE (PUNCH).
2248  007776  116767  167566  000022    C1112:  MOVB    SR,XTY          ;STALL COUNT TO XTY.
2249  010004  005767  000016                    TST     XTY             ;DISREGARD 0 DELAY.
2250  010010  001002                            BNE     C1112A
2251  010012  005267  000010                    INC     XTY
2252  010016  116777  167547  171270    C1112A: MOVB    SR+1,@TPB       ;LOAD PUNCH BUFFER.
2253  010024  104400                            DELAY                   ;DELAY (APPROXIMATELY) THE NUMBER OF
2254  010026  000000                    XTY:    OPEN                    ;MSECS. SPECIFIED AT SR RIGHT
2255  010030  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.
010032  104005                  PRG6:   CHALT                   ;HALT TO SET SR.
010034  052777  000004  171250  KTA:    BIS     #4,@TPS         ;SET MAINTENANCE MODE.
010042  105777  171244          KTB:    TSTB    @TPS            ;WAIT FOR READY.
010046  100375                          BPL     .-4
010050  116777  171377  171236          MOVB    CRBUF+1,@TPB    ;OUTPUT CHARACTER.
010056  105777  171224                  TSTB    @TKS            ;WAIT FOR READER DONE FLAG.
010062  100375                          BPL     .-4
010064  117767  171220  171360          MOVB    @TKB,CRBUF      ;CHAR READ TO CRBUF.
010072  104004                          DATCHK                  ;GO CHECK AGAINST S/B CHAR.
010074  000757                          BR      KTA             ;REPEAT.

                                        ;PRG7-MAINTENANCE MODE SPECIAL BINARY COUNT PATTERN DATA TEST.
                                        ;PERFORMS SAME OPERATION AS PRG13, EXCEPT THAT SPECIAL BINARY COUNT
                                        ;PATTERN IS USED.
010076  004767  173504          PRG7:   JSR     %7,INBIN        ;INITIALIZE BINARY COUNT
010102  012767  177600  173222          MOV     #177600,STLMSK  ;SET STALL LIMIT
010110  052767  040000  171230          BIS     #BIT14,PRGID    ;ALLOW STALLS
010116  052777  000004  171166  LTA:    BIS     #4,@TPS         ;SET MAINTENANCE MODE.
010124  032767  000400  167436          BIT     #BIT8,SR        ;CHECK STALL SWITCH
010132  001001                          BNE     LTB             ;BRANCH IF NO STALL WANTED
010134  104002                          STALL                   ;STALL
010136  105777  171150          LTB:    TSTB    @TPS            ;WAIT FOR READY.
010142  100375                          BPL     .-4
010144  004767  173542                  JSR     %7,GTBINP       ;GET BIN CHARACTER.
010150  105067  171277                  CLRB    CRBUF+1         ;MOVE TO S/B CHAR.
010154  110177  171134                  MOVB    %1,@TPB         ;OUTPUT BIN CHARACTER.
010160  105777  171122                  TSTB    @TKS            ;WAIT FOR READER DONE.
010164  100375                          BPL     .-4
010166  117767  171116  171256          MOVB    @TKB,CRBUF      ;CHAR IN READ BUFFER TO CRBUF.
010174  104004                          DATCHK                  ;GO CHECK AGAINST S/B CHAR.
010176  000747                          BR      LTA             ;CONTINUE.

                                        ;PRG10 ROLE UP TEST
                                        ;THE FUNCTION OF THIS TEST IS TO TEST THE ROLL-UP CAPABILITY
                                        ;OF THE VT06
                                        ;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

010200  012767  177736  000126  PRG10:  MOV     #-42,TCHAR      ;INIT TEMP CHAR
010206  016767  000122  000122  RENIT:  MOV     TCHAR,CHAR      ;COMPLEMENT OF "!"
010214  012767  177660  000110  PRG10C: MOV     #-80.,CNT       ;72 CHAR/LINE
010222  005167  000110          PRG10D: COM     CHAR            ;
010226  016700  000104          PRG10A: MOV     CHAR,%0         ;LOAD "!"
010232  004767  173720                  JSR     %7,LSPCH        ;PUNCH "!"
```

```
 2312  010236  005167  000074                 COM     CHAR            ;COMPLEMENT TO "↑"
 2313  010242  016700  000070                 MOV     CHAR,%0         ;LOAD "↑"
 2314  010246  004767  173704                 JSR     %7,LSPCH        ;PUNCH "↑"
 2315  010252  005167  000060                 COM     CHAR            ; "!"
 2316  010256  062767  000002  000046         ADD     #2,CNT          ;END OF LINE?
 2317  010264  001360                         BNE     PRG10A          ;NO
 2318  010266  012700  000015                 MOV     #15,%0          ;CR
 2319  010272  004767  173660                 JSR     %7,LSPCH
 2320  010276  012700  000012                 MOV     #12,%0          ;LF
 2321  010302  004767  173650                 JSR     %7,LSPCH
 2322  010306  005767  167256                 TST     SR              ;NEXT CHAR
 2323  010312  100340                         BPL     PRG10C          ;NO
 2324  010314  005367  000014                 DEC     TCHAR           ;YES CHANGE TCHAR
 2325  010320  022767  177677  000006         CMP     #177677,TCHAR   ;CHAR STRING COMPLETE
 2326  010326  001724                         BEQ     PRG10
 2327  010330  000726                         BR      RENIT
 2328  010332  000000                 CNT:    0
 2329  010334  177736                 TCHAR:  -42
 2330  010336  000041                 CHAR:   41
 2331
 2332                                 ;PRG11, NON-PRINTING CHAR TEST
 2333
 2334  010340  104000                 PRG11:  TYPE                    ;PRINT TEST TITLE
 2335  010342  011677                         NPCT
 2336  010344  012767  000120  000124         MOV     #80.,CCNT       ;CHAR COUNT
 2337  010352  012700  000101         PRG11A: MOV     #'A,%0          ;PRINTABLE CHARACTER
 2338  010356  004767  173574                 JSR     %7,LSPCH        ;PRINT PRINTABLE CHAR
 2339
 2340
 2341  010362  012767  000000  177742         MOV     #0,CNT          ;FIRST NON-PRINTABLE CHAR
 2342  010370  016700  177736         PRG11B: MOV     CNT,%0          ;
 2343  010374  004767  173556                 JSR     %7,LSPCH        ;PRINT NON-PRINTABLE CHAR
 2344  010400  105267  177726                 INCB    CNT             ;
 2345  010404  022767  000012  177720         CMP     #12,CNT         ;LINE FEED
 2346  010412  001366                         BNE     PRG11B          ;NO
 2347  010414  012700  000013                 MOV     #13,%0          ;PRINT NON-PRINTABLES
 2348  010420  004767  173532                 JSR     %7,LSPCH
 2349  010424  012700  000014                 MOV     #14,%0
 2350  010430  004767  173522                 JSR     %7,LSPCH
 2351  010434  012767  000016  177670         MOV     #16,CNT
 2352  010442  016700  177664         PRG11C: MOV     CNT,%0          ;PRINT NEST SET OF NON-PRINTABLES
```

```
 2353  010446  004767  173504                    JSR     %7,LSPCH
 2354  010452  005267  177654                    INC     CNT
 2355  010456  022767  000040  177646           CMP     #40,CNT
 2356  010464  001366                            BNE     PRG11C
 2357  010466  005367  000004                    DEC     CCNT            ;DEC CHAR COUNT
 2358  010472  001327                            BNE     PRG11A          ;BRANCH IF NOT END OF TEST
 2359  010474  000721                            BR      PRG11           ;RERUN TEST
 2360  010476  000000                  CCNT:     0                       ;CHAR COUNT
 2361
 2362                                  ;PRG12, WORST CASE NOISE
 2363                                  ;THIS PROGRAM READ IN DATA FROM THE KEYBOARD UNTIL (1) A
 2364                                  ;RUBOUT CHARACTER IS SENSED OR (2) UNTIL AN EIGHTY CHARACTER
 2365                                  ;BUFFER IS FILLED.  IT THEN ECHOS THE DATA UNTIL SWITCH 15 IS PUT UP.
 2366
 2367  010500  104000                  PRG12:    TYPE                    ;TYPE PROGRAM TITLE
 2368  010502  011737                            WSTCN
 2369  010504  104000                  PRG12C:   TYPE                    ;TYPE
 2370  010506  011764                            RUB80                   ;RUBOUT OR 80 CHAR ENDS DATA
 2371  010510  012767  000120  177760           MOV     #80.,CCNT       ;SET CHAR COUNT = 80
 2372  010516  012701  012105                    MOV     #DEND+2,R1
 2373  010522  105777  170560          PRG12A:   TSTB    @TKS            ;TEST FOR KEYBOARD DONE
 2374  010526  100375                            BPL     .-4
 2375  010530  117711  170554                    MOVB    @TKB,@R1        ;LOAD CHAR INTO BUFFER
 2376  010534  111100                            MOVB    @R1,%0          ;ECHO CHAR
 2377  010536  004767  173414                    JSR     %7,LSPCH
 2378  010542  142711  000200                    BICB    #200,(R1)       ;CLEAR UNWANTED BIT
 2379  010546  122127  000177                    CMPB    (R1)+,#177      ;TEST FOR RUBOUT
 2380  010552  001403                            BEQ     PRG12B          ;DUMP BUFFER IF END OF DATA
 2381  010554  005367  177716                    DEC     CCNT            ;DECREASE CHAR COUNT
 2382  010560  001360                            BNE     PRG12A          ;BRANCH IF NOT 80 CHAR
 2383  010562  004767  000010          PRG12B:   JSR     %7,DUMP         ;DUMP BUFFER
 2384  010566  005767  166776                    TST     SR              ;TEST FOR END ROUTINE
 2385  010572  100373                            BPL     PRG12B          ;CONTINUE DUMP IF NOT END
 2386  010574  000743                            BR      PRG12C          ;ASK FOR NEW DATA
 2387
 2388  010576  012700  000015          DUMP:     MOV     #15,%0          ;CARRIAGE RETURN
 2389  010602  004767  173350                    JSR     %7,LSPCH
 2390  010606  012700  000012                    MOV     #12,%0          ;LINE FEED
 2391  010612  004767  173340                    JSR     %7,LSPCH
 2392  010616  012702  012105                    MOV     #DEND+2,R2      ;R2 = BEGINNING OF BUFFER
 2393  010622  112200                  DMPA:     MOVB    (R2)+,%0        ;FETCH CHARACTER FROM BUFFER
 2394  010624  004767  173326                    JSR     %7,LSPCH        ;PRINT CHAR
 2395  010630  020201                            CMP     R2,R1           ;TEST FOR END OF BUFFER
 2396  010632  001373                            BNE     DMPA            ;BRANCH IF NOT END
 2397  010634  000207                            RTS     %7              ;END OF BUFFER
 2398
 2399
 2400                                  ;PROGRAM 13, LAST CHARACTER VISIBILITY
 2401
 2402  010636  104000                  PRG13:    TYPE                    ;TYPE TITLE OF TEST
 2403  010640  012040                            LCVIS
 2404  010642  012767  000120  177626           MOV     #80.,CCNT       ;SET CHAR COUNT = 80.
 2405  010650  012700  000015                    MOV     #15,%0          ;CR
 2406  010654  004767  173276                    JSR     %7,LSPCH        ;
 2407  010660  012700  000012                    MOV     #12,%0          ;LF
 2408  010664  004767  173266                    JSR     %7,LSPCH
```

```
 2409  010670  012700  000102          PRG13A: MOV     #'B,%0          ;LOAD TEST CHAR
 2410  010674  004767  173256                  JSR     %7,LSPCH        ;PRINT
 2411  010700  104400                          DELAY
 2412  010702  003720                          2000.                   ;DELAY 2 SECONDS FOR
 2413                                                                  ;PRINT HEAD TO STEP ASIDE
 2414  010704  005367  177566                  DEC     CCNT            ;DEC CHAR COUNT
 2415  010710  001367                          BNE     PRG13A          ;BRANCH IF NOT 80 CHAR
 2416  010712  000751                          BR      PRG13           ;CONTINUE TEST
```

```
2417
2418  010714  047     137     127   A33WP6: .BYTE   047,137,127,057,127,137
2419  010717  057     127     137
2420  010722  047     133     077   A35WP6: .BYTE   047,133,077,103,077,133
2421  010725  103     077     133
2422  010730  101     102     103   A:      .BYTE   101,102,103
2423  010733  104     105     106   D:      .BYTE   104,105,106
2424  010736  107     110     111   G:      .BYTE   107,110,111
2425  010741  112     113     114   J:      .BYTE   112,113,114
2426  010744  115     116     117   M:      .BYTE   115,116,117
2427  010747  120     121     122   P:      .BYTE   120,121,122
2428  010752  123     124     125   S:      .BYTE   123,124,125
2429  010755  126     127     130   V:      .BYTE   126,127,130
2430  010760  131     132     060   Y:      .BYTE   131,132,060
2431  010763  061     062     063   ONE:    .BYTE   061,062,063
2432  010766  064     065     066   FOUR:   .BYTE   064,065,066
2433  010771  067     070     071   SEVEN:  .BYTE   067,070,071
2434  010774  041     042     043   C41:    .BYTE   041,042,043
2435  010777  044     045     046   C44:    .BYTE   044,045,046
2436  011002  047     050     051   C47:    .BYTE   047,050,051
2437  011005  052     053     054   C52:    .BYTE   052,053,054
2438  011010  055     056     057   C55:    .BYTE   055,056,057
2439  011013  072     073     074   C72:    .BYTE   072,073,074
2440  011016  075     076     077   C75:    .BYTE   075,076,077
2441  011021  100     133     134   C100:   .BYTE   100,133,134
2442  011024  135     136     137   C135:   .BYTE   135,136,137
2443  011027  377     000     377   C377:   .BYTE   377,000,377
2444  011032  021445  050123  041501  TBTST:  .ASCII  '%#SPACE TEST%#'
2445  011040  020105  042524  052123
2446  011046  021445
2447  011050  020040  020040  020040  TBMRK:  .ASCII  '         /@'
2448  011056  020040  040057
2449  011062  020040  020040  02004C  TBMRK1: .ASCII  '        /@'
2450  011070  027440     100
2451  011073     045     100          CRLF:   .ASCII  '%@'
2452  011075     055  026455  044455  RM33A:  .ASCII  '----I@'
2453  011102     100
2454  011103     055  026511     100  RM33B:  .ASCII  '-I-@'
2455  011107     055  026455  044455  RM37A:  .ASCII  '----I-I@'
2456  011114  044455     100
2457  011117     134  040040          SPTSTC: .ASCII  '\ @'
2458  011122  021445  040503  051122  CRTST:  .ASCII  '%#CARRIAGE RETURN TEST%#@'
2459  011130  040511  042507  051040
2460  011136  052105  051125  020116
2461  011144  042524  052123  021445
2462  011152     100
2463  011153     045  051043  043511  RMTST:  .ASCII  '%#RIGHT MARGIN TEST%#@'
2464  011160  052110  046440  051101
2465  011166  044507  020116  042524
2466  011174  052123  021445     100
2467  011201     045  051443  040520  SPTST:  .ASCII  '%#SPACE  TEST%#@'
2468  011206  042503  020040  042524
2469  011214  052123  021445     100
2470  011221     045  046043  047111  LFTST:  .ASCII  '%#LINE FEED TEST%#@'
2471  011226  020105  042506  042105
2472  011234  052040  051505  022524
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 2473  011242  040043
 2474  011244  021445  044103  051101  CHRTST: .ASCII  '%#CHARACTER TESTS%#@'
 2475  011252  041501  042524  020122
 2476  011260  042524  052123  022523
 2477  011266  040043
 2478  011270  021445  047527  051522  WCPTST: .ASCII  '%#WORST CASE PATTERN TEST%#@'
 2479  011276  020124  040503  042523
 2480  011304  050040  052101  042524
 2481  011312  047122  052040  051505
 2482  011320  022524  040043
 2483  011324  021445  054513  042102  KMSG1:  .ASCII  '%#KYBD TEST%#@'
 2484  011332  052040  051505  022524
 2485  011340  040043
 2486  011342  050045  042522  051523  KMSG2:  .ASCII  '%PRESS A KEY WITHIN 10 SECONDS.@'
 2487  011350  040440  045440  054505
 2488  011356  053440  052111  044510
 2489  011364  020116  030061  051440
 2490  011372  041505  047117  051504
 2491  011400  040056
 2492  011402  021445  041505  047510  KMSG3:  .ASCII  '%#ECHO TEST'
 2493  011410  052040  051505     124
 2494  011415     045  044103  051101  KMSG3A: .ASCII  '%CHARACTER KEYED WILL BE TYPED.'
 2495  011422  041501  042524  020122
 2496  011430  042513  042531  020104
 2497  011436  044527  046114  041040
 2498  011444  020105  054524  042520
 2499  011452  027104
 2500  011454  051045  041125  052517          .ASCII  '%RUBOUT ENDS ROUTINE.%#@'
 2501  011462  020124  047105  051504
 2502  011470  051040  052517  044524
 2503  011476  042516  022456  040043
 2504  011504  021445  041517  040524  KMSG4:  .ASCII  '%#OCTAL EQUIVALENT TEST@'
 2505  011512  020114  050505  044525
 2506  011520  040526  042514  052116
 2507  011526  052040  051505  040124
 2508  011534  020045                  KMSG5:  .ASCII  '% '
 2509  011536  020040  020040  040045  OCTEQV: .ASCII  '    %@'
 2510  011544  047045  020117  042513  KMSG6:  .ASCII  '%NO KEYBOARD REQUEST.@'
 2511  011552  041131  040517  042122
 2512  011560  051040  050505  042525
 2513  011566  052123  040056
 2514  011572  043045  046101  042523  KMSG7:  .ASCII  '%FALSE KYBD INTERRUPT@'
 2515  011600  045440  041131  020104
 2516  011606  047111  042524  051122
 2517  011614  050125  040124
 2518  011620  021445  044504  050123  P7MG1:  .ASCII  '%#DISPLAY EXERCISER%#@'
 2519  011626  040514  020131  054105
 2520  011634  051105  044503  042523
 2521  011642  022522  040043
 2522  011646  021445  054524  042520  P7MG2:  .ASCII  '%#TYPE IN DATA :@'
 2523  011654  044440  020116  040504
 2524  011662  040524  035040     100
 2525  011667     125  040040          BKSU:   .ASCII  'U @' ,
 2526  011672  020040  020040     040  DECVAL: .ASCII  '    ' ,
 2527  011677     045  047043  047117  NPCT:   .ASCII  '%#NON-PRINTING CHARACTER TEST%#@'
 2528  011704  050055  044522  052116
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  2529  011712  047111  020107  044103
  2530  011720  051101  041501  042524
  2531  011726  020122  042524  052123
  2532  011734  021445     100
  2533  011737     045  053443  051117  WSTCN:  .ASCII  '%#WORST CASE NOISE%#@'
  2534  011744  052123  041440  051501
  2535  011752  020105  047516  051511
  2536  011760  022505  040043
  2537  011764  021445  054524  042520  RUB80:  .ASCII  '%#TYPE DATA - RUBOUT OR 80 CHAR ENDS DATA%#@'
  2538  011772  042040  052101  020101
  2539  012000  020055  052522  047502
  2540  012006  052125  047440  020122
  2541  012014  030070  041440  040510
  2542  012022  020122  047105  051504
  2543  012030  042040  052101  022501
  2544  012036  040043
  2545  012040  021445  040514  052123  LCVIS:  .ASCII  '%#LAST CHARACTER VISIBILITY TEST%#@'
  2546  012046  041440  040510  040522
  2547  012054  052103  051105  053040
  2548  012062  051511  041111  046111
  2549  012070  052111  020131  042524
  2550  012076  052123  021445     100
  2551  012103  000001                  DEND:   .END
```

DZLCAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
A       010730          1543    1547    1961    2422#
ACNV    004044          1420    1428    1438#
ACNVB   004000          1419*   1423#
ACNVC   004026          1427*   1431#
ACNVM   004060          1441#   1449
ACNVX   004042          1437#   1440*   1441    1445*   1446*   1447*
ACNV4   004006          1426#   2177
ACNV6   003760          1418#
ADTENP  004306          1478    1497#
ARDA    002556          1205#   1210
ARDB    002602          1206    1213#
AREAD   002542          1203#   1212
ATO     004550          1557    1560#
ATOA    004566          1563    1565#   1567
ATOB    004572          1566#   1569
ATOE    004576          1564    1568#
AT1     004602          1561    1571#
AT1A    004620          1574    1576#   1578
AT1B    004624          1577#   1580
AT1E    004630          1575    1579#
AT2     004634          1572    1582#
AT2A    004652          1585    1587#   1589
AT2B    004656          1588#   1591
AT2E    004662          1586    1590#
AT24    005050          1623    1636#
AT24A   005066          1639    1641#
AT24B   005110          1643    1646#
AT24C   005130          1645    1648    1650#   1651
AT24E1  005104          1644#
AT24E2  005126          1649#
AT25    005134          1637    1653#
AT25A   005152          1656    1658#   1664
AT25B   005174          1661    1663#
AT25E   005172          1662#
AT3     004666          1583    1593#
AT3A    004704          1596    1598#   1600
AT3B    004710          1599#   1602
AT3E    004714          1597    1601#
AT30    005200          1654    1667#
AT30A   005210          1670    1671#   1675
AT30B   005220          1672    1674#
AT30E   005216          1673#
AT31    005224          1668    1677#
AT31A   005234          1680    1681#   1689
AT31B   005260          1686    1688#
AT31E   005256          1687#
AT32    005264          1678    1691#
AT32A   005274          1694    1695#   1705
AT32B   005322          1702    1704#
AT32E   005320          1703#
AT33    005326          1692    1708#
AT33A   005336          1711    1712#   1721
AT33B   005362          1718    1720#
AT33E   005360          1719#
AT34    005366          1709    1724#
AT34A   005402          1727    1730#   1736
```

DZLCAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
AT34B   005424          1735#   1738
AT34C   005430          1729    1737#
AT34E   005422          1734#
AT35    005434          1725    1741#
AT35A   005450          1744    1747#   1753
AT35B   005472          1751#   1756
AT35E   005502          1746    1754#
AT36    005510          1742    1760#
AT36A   005524          1763    1766#   1776
AT36B   005560          1765    1773#
AT36C   005562          1772    1774#
AT37    005572          1761    1779#
AT37A   005602          1782    1783#   1792
AT37B   005630          1790#   1797    1800
AT37C   005640          1784    1793#
AT37D   005654          1794    1796#
AT37E1  005626          1789#
AT37E2  005660          1793    1798#
AT4     004720          1594    1605#
AT4A    004736          1608    1610#   1620
AT4B    004760          1612    1615#
AT4C    005000          1614    1617    1619#
AT4E1   004754          1613#
AT4E2   004776          1618#
AT40    005666          1780    1804#
AT40A   005702          1807    1810#   1823
AT40B   005740          1809    1817#
AT40C   005742          1816    1818#
AT40D   005760          1820    1822#
AT5     005004          1606    1622#
AT5A    005022          1625    1627#   1633
AT5B    005044          1630    1632#
AT5E    005042          1631#
A1ST    004034          1422    1430    1434#   1438
A33WP6  010714          2418#
A35WP6  010722          2420#
BCHECK  003360          1340#
BDCNV   004200          1476#
BDCNVA  004220          1480#   1483
BELL  = 000007           943#
BIT0  = 000000           910#
BIT1  = 000002           909#
BIT10 = 002000           891     900#
BIT11 = 004000           890     899#
BIT12 = 010000           889     898#
BIT13 = 020000           888     897#
BIT14 = 040000           887     896#    1320    1519    1899    2093    2098    2192    2205    2291
BIT15 = 100000           886     894     895#    1042    1095
BIT2  = 000004           908#
BIT3  = 000010           907#    1169
BIT4  = 000020           906#
BIT5  = 000040           905#
BIT6  = 000100           904#    1610    1611    1615    1616    1627    1629    1641    1642    1646    1647    1658    1660
                        1732    1749    1769    1787    1812    2130
BIT7  = 000200           903#    1827    2118    2160    2182    2202
BIT8  = 000400           893     902#    2283
```

```
BIT9   = 001000            892     901#
BKSU     011667           2525#
BLKBB  = 012226            947#
BLKCC  = 012340            951#
BLK2   = 012230            949#
BLOCKA= 012103             944#    945     946     947     948     949     950     951    1505    1522*   1523*
BLOCKB= 012225             946#
BLOCKC= 012327             950#
BLOCK1= 012105             945#   1529    1532    1533    1536    1544    1548    1551    2194    2207    2208
BLOCK2= 012217             948#   1537    1552
BMOVA    004130           1457#   1459
BMOVE    004120           1386    1421    1429    1453#   1527    1531    1535    1542    1546    1550    2206
BRCTR    003052           1203*   1209*   1253*   1254*   1269#
BREAD    002754           1250#   1258    1267    1352    1354    1356
BREADA   003012           1259#   1264
BREADB   003022           1251    1261#
BREADC   003042           1263    1266#
BSYNC    003420           1348    1351#   1359
BYPMAN= 000400              893#   1126
CC     = 177776             882#
CCNT     010476           2336*   2357*   2360#   2371*   2381*   2404*   2414*
CHAIN  = 104012            933#   1174    1566    1577    1588    1599    1619    1632    1650    1663    1674    1688    1704
                          1720    1735    1752    1775    1791    1822    1840    1864    1891    1907    1915    1926    1962
                          1968    1974    1980    1986    1993    1999    2006    2012    2018    2024    2030    2036    2042
                          2048    2055    2061    2067    2073    2079    2085    2110    2148    2163    2185
CHAINN   002000            998    1087#
CHALT  = 104005            928#   1068    2226    2237    2265
CHAR     010336           2307*   2309*   2310    2312*   2313    2315*   2330#
CHKASR= 104022              941#
CHK33    002364            999    1161#
CHK330   002376           1001    1164#
CHK35    002400           1000    1165#
CHLT     001474            993    1020#
CHNA     002034           1088    1090    1092    1095#
CHNAA    002062           1097    1099    1101#
CHNB     002070           1075    1104#   1111
CHRTST   011244           1959    2474#
CHR1     001454           1010#   1353*   1365
CHR2     001456           1011#   1355*   1368
CHR3     001460           1012#   1357*   1375
CKASR    002416           1006    1169#
CK33   = 104013             934#
CK35   = 104014             936#   1914
CLEAN    002230           1070    1131#
CNT      010332           2094*   2096*   2099*   2101*   2308*   2316*   2328#   2341*   2342    2344*   2345    2351*   2352
                          2354*   2355
CNVCTR   004300           1479*   1482*   1494#
CPRDY    004142           1463#   1467    1469
CPRDYA   004152           1464    1466#
CRBUF    001452           1009#   1030    1032    1259*   1341*   1342    1353    1355    1357    2156*   2157    2160*   2161
                          2173*   2176*   2178    2182*   2183    2202*   2203    2216*   2217    2218    2269    2272*   2289*
                          2293*
CRLF     011073           1938    2451#
CRTA     001662           1061    1064#
CRTST    011122           1835    2458#
CTRA     001464           1014#   1837*   1838*   1841    1856*   1860*   1870*   1873*   1875*   1889*   1900*   1905*   1920*
```

DZLCAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
                        1924*   1927*   1932*   2125*   2146*   2198*   2200*
CTRB    001466          1015#   1841*   1844*   1876*   1877    1892*   1939*   1952*
CTRC    001470          1016#   1877*   1885*   1940*   1944*
CTRD    001472          1017#
CTO     006016          1826    1832#
CTOA    006042          1838#   1850
CTOB    006052          1839    1841#
CTOC    006060          1842#   1845
CT1     006120          1833    1852#
CT1A    006144          1858#   1861
CT1D    006654          1971    1976#
CT11    006666          1977    1982#
CT12    006700          1983    1989#
CT13    006712          1990    1995#
CT14    006724          1996    2002#
CT15    006736          2003    2008#
CT16    006750          2009    2014#
CT17    006762          2015    2020#
CT2     006164          1853    1866#
CT2A    006202          1871#   1874
CT2B    006222          1876#
CT2C    006230          1877#   1893
CT2D    006252          1883#   1886
CT2E    006310          1890    1892#
CT2O    006774          2021    2026#
CT21    007006          2027    2032#
CT22    007020          2033    2038#
CT23    007032          2039    2044#
CT24    007044          2045    2051#
CT25    007056          2052    2057#
CT26    007070          2058    2063#
CT27    007102          2064    2069#
CT3     006320          1867    1895#
CT3A    006344          1901#   1909
CT3B    006374          1906    1908#
CT3O    007114          2070    2075#
CT31    007126          2076    2081#
CT32    007140          2082    2090#
CT32A   007164          2095#   2097
CT32B   007212          2100#   2102
CT32C   007244          2104    2110#
CT4     006400          1896    1911#
CT4A    006430          1920#
CT4B    006442          1922#   1925
CT5     006612          1912    1956#
CT6     006630          1957    1964#
CT7     006642          1965    1970#
CURTST  001334           967#   1119*   1130
C100    011021          2078    2441#
C1112   007776          2227    2248#
C1112A  010016          2250    2252#
C1112M  007770          2238    2247#
C135    011024          2084    2442#
C377    011027          2443#
C41     010774          2035    2434#
C44     010777          2041    2435#
```

DZLCAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
C47       011002            2047    2436#
C52       011005            2054    2437#
C55       011010            2060    2438#
C72       011013            2066    2439#
C75       011016            2072    2440#
D         010733            1967    2423#
DATCHK=   104004             927#   2273    2294
DATHLT=   104017             938#   1345
DECVAL    011672            1476    2526#
DELAY =   104400             942#   1207    1327    1681    1695    1712    1715    1880    2132    2253    2411
DEND      012103             944    2372    2392    2551#
DIGIT     004302            1485*   1488*   1491*   1492    1495#
DLCNT     003272            1305*   1307    1317#
DLY       003230            1007    1305#
DLYA      003250            1309#   1314
DLYB      003254            1310#   1311
DMPA      010622            2393#   2396
DTCHK     001520             992    1030#
DTCHKA    001536            1031    1035#
DTHLT     001530            1003    1032#
DUMP      010576            2383    2388#
EHALT =   104010             931#   1062    1081    1085    1211    1257    1372    1466    2136    2142
EHLT      001506             996    1025#
EMTA      002300            1140    1143#
EMTINT    002254             871    1136#
EMTTAB    001400             988#   1145
ERCTR     001462            1013#   1346*   1360*
ERR       001540             991    1037#
ERRA      001560            1038    1040    1042#
ERROR =   104003             926#   1568    1579    1590    1601    1613    1618    1631    1644    1649    1662    1673    1687
                            1703    1719    1734    1755    1771    1789    1799    1815
ETO       007272            2117    2123#
ETOA      007304            2126#   2147
ETOB      007342            2127    2138#
ETOC      007356            2139    2143#
ETOCA     007364            2137    2143    2145#
ET1       007376            2124    2150#
ET1A      007406            2154#   2162
ET2       007456            2151    2167#
ET2A      007476            2174#   2184
FBALL     004476            1542#   2092
FBF3      004432            1517    1526#
FBF3A     004442            1526*   1528#
FBF3B     004450            1531#
FORWD     002124            1071    1112#
FORWDA    002156            1119#   1123
FORWDB    002164            1116    1121#
FOUR      010766            2023    2432#
G         010736            1973    2424#
GETRDY    001702            1069#   1082    1086    1105    1109
GKBCR     007700            2199    2214#
GOTST     002202            1074    1080    1124#
GOTSTA    002222            1125    1127    1129#
GRCNT     003334            1332#   1334
GTBIN     003644            1340    1364    1367    1374    1399#
GTBINP    003712            1408#   2288
```

DZLCAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
GTRDYA  001714          1071#   1084    1107    1135
GTRDYB  001720          1072#
GTRDYC  001736          1073    1076#
GTRDYD  001764          1079    1083#
HLTSW = 100000           886#
HTA     007556          2192#   2212
HTB     007614          2199#   2201
HTC     007652          2204    2206#
HTD     007664          2210#   2213
ICTR    001342           970#   1098*   1117*   1122*   1173*
INBIN   003606          1351    1385#   2279
INCPRG  001656          1062#
INCRTN  001774          1085#
ITA     007734          2227#   2228
J       010741          1979    2425#
JTA     007744          2238#   2245
KMSG1   011324          2120    2483#
KMSG2   011342          2129    2486#
KMSG3   011402          2153    2492#
KMSG3A  011415          2171    2494#
KMSG4   011504          2170    2504#
KMSG5   011534          2181    2508#
KMSG6   011544          2135    2510#
KMSG7   011572          2141    2514#
KSTART  001332           966#   1069    1557*   1826*   2117*
KTA     010034          2266#   2274
KTB     010042          2267#
LCVIS   012040          2403    2545#
LFTST   011221          1898    2470#
LOGICA  007234          2106#
LPRGSW= 002000           891#   1108
LSPCH   004156          1469#   1508    1843    1847    1849    1879    1884    1888    1902    1904    1943    1947    1948
                        1949    1951    2219    2311    2314    2319    2321    2338    2343    2348    2350    2353    2377
                        2389    2391    2394    2406    2408    2410
LTA     010116          2282#   2295
LTB     010136          2284    2286#
M       010744          1985    2426#
MACHER  000004           861#   1056*   1131*   1564*   1575*   1586*   1597*
MANUAL= 100000           894#
NITRSW= 004000           890#   1096
NOP   = 000240           884#
NPCT    011677          2335    2527#
NPRTSW= 020000           888#
NTRCSW= 010000           889#
NXTST   001340           969#   1069*   1083    1106    1112    1114*
OCTEQV  011536          2179    2509#
ONE     010763          2017    2431#
OPEN  = 000000           885#    965     966     967     968     969     970     971     972    1008    1009    1010    1011
                        1012    1013    1014    1015    1016    1017    1186    1187    1199    1200    1218    1225    1269
                        1293    1302    1317    1328    1330    1337    1338    1382    1383    1391    1392    1393    1394
                        1395    1396    1423    1431    1434    1435    1436    1437    1494    1495    1496    1512    1518
                        1528    1863    1935    1936    2254
P       010747          1992    2427#
PIND    003636          1394#   1410*
POPSP = 005726           913#   1129    1312    1315
POPSP2= 022626           914#   1101    1172    1737    1754    1773    1798    1817
```

```
PRGEND  002120          1110#
PRGID   001346           972#   1039    1042*   1064*   1087    1095*   1115    1320    1513*   1827*   1899*   2093*   2098*
                        2118*   2192*   2205*   2281*
PRGNUM  001330           965#   1065*
PRGTAB  001350           973#   1067
PRGO    004536           973    1557#
PRG1    005764           974    1821    1826#
PRG10   010200           981    2306#   2326
PRG10A  010226          2310#   2317
PRG10C  010214          2308#   2323
PRG10D  010222          2309#
PRG11   010340           982    2334#   2359
PRG11A  010352          2337#   2358
PRG11B  010370          2342#   2346
PRG11C  010442          2352#   2356
PRG12   010500           983    2367#
PRG12A  010522          2373#   2382
PRG12B  010562          2380    2383#   2385
PRG12C  010504          2369#   2386
PRG13   010636           984    2402#   2416
PRG13A  010670          2409#   2415
PRG2    007246           975    2117#
PRG3    007546           976    2189#
PRG4    007732           977    2226#
PRG5    007742           978    2237#
PRG6    010032           979    2265#
PRG7    010076           980    2279#
PRTY0 = 000000           922#
PRTY1 = 000040           921#
PRTY2 = 000100           920#
PRTY3 = 000140           919#
PRTY4 = 000200           918#    961     963
PRTY5 = 000240           917#
PRTY6 = 000300           916#
PRTY7 = 000340           872     874     915#    1609    1626    1640    1657    1810    1814
PSW   = 177776           883#   1055*   1132*   1308*   1609*   1626*   1640*   1657*   1731*   1747*   1767*   1768*   1785*
                        1810*   1813*   1814*   2131*
PTO     003632          1392#   1399    1405*
PTOP    003640          1395#   1408    1414*
PT1     003634          1393#   1399*   1400*   1403*   1404*   1405    1406
PT1P    003642          1396#   1408*   1409*   1412*   1413*   1414    1415
P7MG1   011620   2191    2518#
P7MG2   011646   2196    2522#
RCMSK   003354          1333    1337#
RCNT    001450          1008#   1836*   1837
RENIT   010206          2307#   2327
RIND    003630          1385*   1387    1388    1391#   1401*
RMB     006160          1857*   1863#
RMTST   011153          1855    2463#
RM33A   011075          1859    2452#
RM33B   011103          1857    2454#
RM37A   011107          2455#
RNCNT   003356          1335*   1338#
RNGEN   002702          1235#   1323    1332
RP1     002750          1235    1239*   1246    1248#
RP2     002752          1238    1242    1245*   1249#
```

```
RSTPC   002536          1189*   1197    1199#
RSTPSW  002540          1190*   1196    1200#
RSTREG= 104021           940#   1460
RSTRG   002502          1005    1189#
RTNNO   001336           968#   1050    1057*   1078    1113*   1124
RUBBO   011764          2370    2537#
R1     =%000001          911#   2372*   2375*   2376    2378*   2379    2395
R2     =%000002          912#   2392*   2393    2395
S       010752          1998    2428#
SAVREG= 104020           939#   1453
SAVRG   002442          1004    1176#
SCOPSW= 040000           887#   1037    1089
SCOPTR  001344           971#   1091    1093    1118*   1121*
SEVEN   010771          2029    2433#
SHALT   001600          1048#   1102
SHLTA   001614          1049    1052#
SPBOT   001304           955#   1054    1133
SPCNT   006510          1921*   1923*   1936#   1940
SPTST   011201          1869    2467#
SPTSTC  011117          1872    2457#
SR     = 177570           881#   1037    1048    1058    1072    1076    1089    1096    1104    1108    1126    2211    2248
                        2252    2283    2322    2384
SRESET= 104011           932#   1134    1628    1659    1683    1697    2145
SRSET   001700          1068#   1558    1830    2121
SRSETT  002664           997    1229#   1231*
SRTSW = 001000           892#   1072    1104
STAL    003274           990    1320#
STALA   003326          1326*   1328#
STALAA  003306          1321    1323#
STALB   003330          1325    1329#
STALL = 104002           925#   1506    1908    2285
START   001616           953    1054#   1063
STBF    004414          1522#   1829    2189
STLMSK  003332          1324    1330#   1828*   2193*   2280*
STLSPV  002634           995    1222#
STLSRV  002604           994    1215#
STPCHV= 104007           930#   1728    1745    1764    1783    1808
STPPA   002652          1222*   1225#
STPRA   002622          1215*   1218#
STRDRV= 104006           929#   1250    2126
SUBTEN  004240          1481    1485#
SUBTNA  004244          1486#   1489
SUBTNB  004260          1487    1490#
SVRPC   002476          1176*   1184    1186#
SVRPSW  002500          1177*   1183    1187#
SYCTRA  003602          1362*   1370*   1382#
SYCTRB  003604          1363*   1377*   1383#
SYNCA   003500          1358    1362#
SYNCB   003514          1364#   1366    1371    1378
SYNCC   003546          1372#   1379
SYNCD   003552          1369    1374#
SYNCE   003574          1376    1380#
TABP    006512          1922    1937#
TABPA   006524          1940#   1953
TABPB   006534          1942#   1945
TABPC   006552          1941    1946#
```

DZLCAC.P11 CROSS REFERENCE TABLE -- USER SYMBOLS

```
TBCNT   006506          1913* 1935* 1939
TBMRK   011050          1919  2447*
TBMRK1  011062          1931  2449*
TBTST   011032          1929  2444*
TCHAR   010334          2306* 2307  2324* 2325  2329*
TCTR    004352          1504* 1509* 1512*
TENPWR  004304          1480* 1486  1490  1496*
TKB     001310           957* 1259  1576  2156  2176  2197  2216  2239  2272  2293  2375
TKLVL   001320           961* 1219
TKS     001306           956* 1205  1252* 1256* 1261* 1262  1565  1610* 1611  1615* 1616  1627* 1629
                        2130* 2138  2154  2174  2214  2270  2291  2373
TKVTR   001316           960* 1217
TPB     001314           959* 1204* 1284* 1470* 1598  1684* 1698  1714* 2157* 2252* 2269* 2290*
TPBM    006462          1916  1927*
TPBMA   006472          1930* 1933
TPLVL   001324           963* 1226  1747  1767
TPL3A   004376          1514* 1515* 1518*
TPS     001312           958* 1285  1463  1471  1587  1641* 1642  1646* 1647  1658* 1660  1671  1685
                        1701  1717  1730* 1732* 1748* 1749* 1751* 1766* 1769* 1774* 1785* 1787* 1790*
                        1811* 1812* 1818* 2158  2247* 2266* 2267  2282* 2286
TPVTR   001322           962* 1224  1793*
TRPA    002344          1152  1156*
TRPINT  002320           873  1148*
TRPTAB  001446          1007* 1158
TTYTYP  001326           964* 1161  1165  1169
TYP     003054           988  1271*
TYPA    003064          1274* 1283  1292
TYPC    003102          1276  1278*
TYPD    003130          1282  1284* 1289  1291
TYPDAT  003174          1274* 1275  1278  1280  1284  1288* 1290* 1293*
TYPE  = 104000           923* 1301  1834  1854  1858  1862  1868  1871  1897  1918  1928  1930  1937
                        1958  2119  2128  2134  2140  2152  2180  2190  2195  2334  2367  2369  2402
TYPES = 104001           924* 2169
TYPF    003146          1279  1288*
TYPG    003160          1281  1290*
TYPLA   004326          1505*
TYPLB   004332          1506* 1510
TYPLN   004320          1504* 1520  2095  2100  2210
TYPLN3= 104016           937* 1960  1966  1972  1978  1984  1991  1997  2004  2010  2016  2022  2028
                        2034  2040  2046  2053  2059  2065  2071  2077  2083
TYPL3   004354          1002  1514*
TYPS    003176           989  1295* 1303
TYPSA   003222          1299  1301*
TYPSB   003224          1297* 1298  1302*
V       010755          2005  2429*
WCPTST  011270          2478*
WSTCN   011737          2368  2533*
XTY     010026          2248* 2249  2251* 2254*
Y       010760          2011  2430*
.     = 012103           858*  861   863   865   867   869   879   952*  954*  1142  1154  1162  1166
                        1170  1255  1286  1343  1347  1402  1411  1472  2155  2159  2175  2215  2268
                        2271  2287  2292  2374
```

DZLCAC.P11 CROSS REFERENCE TABLE -- PERMANENT SYMBOLS

```
ADD     1145  1158  1163  1167  1216  1223  1238  1242  1272  1296  1306  1380  1443  1490  1491
        1515  1892  2316
BCS     1487
BEQ     1031  1038  1090  1092  1099  1127  1279  1281  1325  1334  1369  1376  1617  1630  1648
        1661  1820  1941  2104  2326  2380
BIC     1059  1077  1095  1144  1157  1324  1333  1404  1413  1442  1519  1615  1646  2093  2160
        2182  2202  2205
BICB    2378
BIS     1042  1252  1610  1627  1641  1658  1732  1749  1769  1787  1812  1827  1899  2098  2118
        2130  2192  2247  2266  2281  2282
BIT     1037  1072  1089  1096  1104  1108  1126  1169  1320  1611  1616  1629  1642  1647  1660
        2293
BLOS    1061  1140  1152
BMI     1116  1206  1672  1702  1718  2139  2212
BNE     1073  1079  1084  1097  1105  1107  1109  1162  1166  1170  1210  1255  1276  1299  1311
        1314  1321  1343  1347  1366  1371  1378  1402  1411  1449  1459  1483  1510  1612  1643
        1839  1845  1861  1874  1886  1890  1906  1925  1933  1945  1953  2097  2102  2147  2162
        2184  2201  2204  2250  2284  2317  2346  2356  2358  2382  2396  2415
BPL     1040  1049  1088  1125  1263  1286  1464  1472  1686  2155  2159  2175  2215  2268  2271
        2287  2292  2323  2374  2385
BR      1063  1075  1082  1086  1111  1123  1142  1154  1212  1258  1283  1292  1303  1359  1379
        1467  1489  1567  1569  1578  1580  1589  1591  1600  1602  1614  1620  1633  1645  1651
        1664  1675  1689  1705  1721  1736  1738  1753  1756  1772  1776  1792  1797  1800  1816
        1823  1850  1893  1909  2137  2213  2228  2245  2274  2295  2327  2359  2386  2416
CLR     1055  1057  1064  1132  1256  1261  1308  1473  1485  1714  1730  1731  1748  1751  1766
        1774  1785  1786  1790  1811  1813  1818  1921  2131  2173
CLRB    1700  2289
CMP     1060  1083  1091  1106  1165  1298  2183  2325  2345  2355  2395
CMPB    1030  1078  1139  1151  1275  1278  1280  1342  1365  1368  1375  2161  2203  2379
COM     1230  1400  1401  1409  1410  2309  2312  2315
DEC     1098  1209  1254  1310  1313  1346  1370  1377  1448  1458  1482  1509  1838  1844  1860
        1873  1885  1889  1905  1924  1932  1944  1952  2096  2101  2146  2200  2324  2357  2381
        2414
EMT      923   924   925   926   927   928   929   930   931   932   933   934   936   937   938
         939   940   941
HALT     859   860   862   864   866   868   870   879  1022  1027  1033  1045  1051  1110  1141
        1153  1266
INC     1403  1412  1488  1699  1923  2251  2354
INCB    2344
JMP      953  1067  1070  1130  1135  1147  1160  1558  1830  2121
JSR     1071  1074  1080  1102  1282  1289  1291  1323  1332  1340  1348  1351  1352  1354  1356
        1358  1364  1367  1374  1386  1420  1421  1428  1429  1469  1481  1508  1517  1520  1527
        1531  1535  1542  1546  1550  1821  1829  1843  1847  1849  1879  1884  1888  1902  1904
        1916  1922  1943  1947  1948  1949  1951  2092  2095  2100  2106  2177  2189  2199  2206
        2210  2219  2227  2238  2279  2288  2311  2314  2319  2321  2338  2343  2348  2350  2353
        2377  2383  2389  2391  2394  2406  2408  2410
MOV     1020  1025  1032  1043  1054  1056  1058  1065  1069  1076  1093  1112  1113  1114  1117
        1118  1119  1121  1122  1131  1133  1136  1138  1146  1148  1150  1159  1173  1176  1177
        1178  1179  1180  1181  1182  1183  1184  1189  1190  1191  1192  1193  1194  1195  1196
        1197  1203  1204  1215  1217  1218  1219  1222  1224  1225  1226  1229  1231  1235  1239
        1245  1246  1253  1264  1267  1271  1273  1295  1297  1305  1307  1309  1326  1335  1360
        1362  1363  1385  1399  1405  1406  1408  1414  1415  1418  1419  1426  1427  1438  1439
        1440  1441  1454  1455  1456  1470  1476  1477  1478  1479  1480  1504  1505  1514  1515
        1526  1557  1564  1575  1586  1597  1609  1626  1640  1657  1684  1698  1747  1767  1793
        1794  1810  1814  1826  1828  1836  1837  1841  1848  1856  1857  1870  1875  1876  1877
        1900  1913  1920  1927  1939  1940  2094  2099  2103  2117  2125  2143  2193  2194  2198
```

F06


```
        2239    2280    2306    2307    2308    2310    2313    2318    2320    2336    2337    2341    2342    2347    2349
        2351    2352    2371    2372    2388    2390    2392    2404    2405    2407    2409
MOVB    1050    1259    1274    1284    1288    1290    1341    1353    1355    1357    1444    1457    1492    1507    1522
        1523    1842    1846    1878    1883    1887    1901    1903    1942    1946    1950    2156    2157    2176    2216
        2217    2218    2248    2252    2269    2272    2290    2293    2375    2376    2393
NOP     1733    1750    1770    1788    1796    2107    2108    2109
RESET   1232    2105    2240    2241    2242    2243    2244
ROL     1066    1143    1156    1236    1237    1240    1241    1243    1244
ROR     1445    1446    1447
RTI     1023    1028    1035    1041    1046    1094    1100    1164    1168    1171    1185    1198    1220    1227    1233
        1265    1268    1277    1300    1316    1322    1329    1521    1795    2144
RTS     1052    1120    1128    1213    1247    1260    1287    1336    1344    1349    1361    1373    1381    1390    1407
        1416    1425    1433    1450    1461    1465    1474    1484    1493    1511    1524    1539    1554    1934    1954
        2220    2255    2397
SUB     1021    1026    1044    1137    1149    1486    1768
TRAP     942
TST     1039    1048    1087    1124    1161    1565    1576    1587    1598    1819    2197    2211    2249    2322    2384
TSTB    1115    1205    1262    1285    1463    1471    1671    1685    1701    1717    2138    2154    2158    2174    2214
        2267    2270    2286    2291    2373
.ABS     857
.ASCII  2444    2447    2449    2451    2452    2454    2455    2457    2458    2463    2467    2470    2474    2478    2483
        2486    2492    2494    2500    2504    2508    2509    2510    2514    2518    2522    2525    2526    2527    2533
        2537    2545
.BYTE   2418    2420    2422    2423    2424    2425    2426    2427    2428    2429    2430    2431    2432    2433    2434
        2435    2436    2437    2438    2439    2440    2441    2442    2443
.END    2551
.REM       1
.REPT    875
```

```
ERRORS DETECTED:  0
DEFAULT GLOBALS GENERATED:  0

*DZLCAC,DZLCAC/SOL/CRF=DZLCAC.P11
RUN-TIME:  8 16 3 SECONDS
RUN-TIME RATIO: 94/27=3.3
CORE USED:  10K  (19 PAGES)
```

G06

Spooler runtime 9 Seconds, 268 KCS, 253 disk reads, 4 disk writes, 70 pages