LP11/LP05

LINE PRINTER TEST

MD-11-DZLPK-D

EP-DZLPK-D-DL-A

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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZLPK-D-D

PRODUCT NAME: LP11/LP05 LINE PRINTER TEST

DATE : OCT, 1975

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: ROBERT W. BAKER

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1.0 ABSTRACT

THE LINE PRINTER DIAGNOSTIC PROGRAM IS DIVIDED INTO THREE SECTIONS. INTERNALLY DETECTED ERROR CONDITIONS ARE DISPLAYED ON THE TELEPRINTER, WHILE BRIEF DESCRIPTIONS OF EACH ERROR ARE PRESENTED IN THE LISTING. PRINT PATTERNS USED IN THESE TESTS HAVE BEEN CHOSEN FOR EASE OF VISUAL VERIFICATION.

THE FIRST SECTION IS DESIGNED TO CHECK-OUT THE PROCESSOR INTERFACE CONTROL ELECTRONICS AND THE INTER-COMMUNICATIONS DATA PATHS. IT WILL ALSO PERFORM ALL TESTS THAT REQUIRE OPERATOR INTERVENTION. THE SECOND SECTION IS A PRINTING TEST DESIGNED TO TEST THE LINE PRINTER MECHANISM ITSELF. THE LAST SECTION IS A SCOPE DRIVER ROUTINE FOR USE IN TROUBLE SHOOTING THE PRINTER INTERFACE.

2.0 REQUIREMENTS

2.1 EQUIPMENT

THIS DIAGNOSTIC SHOULD RUN ON ALL PDP-11 FAMILY COMPUTERS HAVING LINE PRINTER CONTROLS, LINE PRINTERS, AND TELETYPES COMPATIBLE WITH THE FOLLOWING:

LPC11	LINE PRINTER INTERFACE
LPOS	DATA PRODUCTS 132 COLUMN 64 OR 96 CHARACTER LINE PRINTER
TELETYPE	MODEL 33 OR EQUIVALENT CONSOLE UNIT

2.2 STORAGE

MEMORY LOCATIONS 0 - TO - 14600 ARE USED BY THIS DIAGNOSTIC.

2.3 PRELIMINARY PROGRAMS

ALL APPLICABLE PDP-11 DIAGNOSTICS SHOULD RUN ON THE PROCESSOR AND TELETYPE.

3.0 LOADING PROCEDURE

3.1 METHOD

POWER DOWN THE LINE PRINTER

POWER UP THE PROCESSOR ONLY

LOAD THE BOOTSTRAP AND ABSOLUTE LOADERS

LOAD THE LP11/LPOS DIAGNOSTIC PROGRAM TAPE

4.0 STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

SET CONTROL SWITCHES AS DESIRED - (SEE SECTION 5.1 FOR DESCRIPTION OF SWITCH FUNCTIONS) MAKE SURE SWITCH 0 IS DOWN BEFORE STARTING THE TEST.

4.2 STARTING ADDRESS OR ADDRESSES

THE INITIAL STARTING ADDRESS TO RUN THE ENTIRE LP11/LPOS DIAGNOSTIC IS LOCATION 200(8). TO SKIP THE OPERATOR INTERVENTION TESTS AND START WITH THE PRINTING TESTS, START AT LOCATION 600(8). TO RUN THE SPECIAL SCOPE DRIVER ROUTINE USE START ADDRESS 700 8) OR 720(8). TO START AT ANY OTHER TEST USE THE START ADDRESS FROM THE FOLLOWING TABLE:

START ADDRESS	TEST
300	DAVFU ILLEGAL LOAD TEST
304	DAVFU NO STOP BIT TEST
310	DAVFU LINE COUNT SLEW TEST
314	DAVFU CHANNEL SLEW TEST
400	PRINT SPEED TEST USING MANUAL TIMING
404	PRINT SPEED TEST USING KW11-L
410	PRINT SPEED TEST USING KW11-P
414	CHECK TOP OF FORM SWITCH SETTINGS

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                        600         TEST 2  INTERFACE & DATA PATHS TEST
                                    (ALSO GENERAL PRINT TEST STARTING ADDRESS)

                        610         TEST 3  CHAR COMPARATOR TEST
                        614         TEST 4  OVER PRINT TEST
                        620         TEST 5  SHUTTLE POSITIONING TEST
                        624         TEST 6  PRINT CONTROL TEST
                        630         TEST 7  MULTIPLE LINE ADVANCE TEST
                        634         TEST 8  HIGH SPEED PRINT TEST
                        640         TEST 9  SINGLE CHAR, ALL COLUMNS
                        644         TEST 10  DRUM PATTERN CHAR TEST
                        650         TEST 11  SPURIOUS HAMMER FIRING TESTS
                                             (LEFT & RIGHT WEDGES)
                        654         TEST 12  HAMMER ALIGNMENT

                        700         SCOPE DRIVER ROUTINE
                        720         SCOPE DRIVER WITHOUT LINE FEEDS

THE PROGRAM WILL START THROUGH THE TEST SEQUENCE BEGINNING WITH THE
SELECTED TEST UNLESS SWITCH 12 IS SET TO LOOP ON TEST (SEE SECTION
5.1)


4.3  PROGRAM AND/OR OPERATOR ACTION

DURING INITIAL START-UP OF THE LINE PRINTER DIAGNOSTIC TEST, THE
HEADER MESSAGE "LPDS LINE PRINTER TEST" WILL BE TYPED OUT ON THE
TELEPRINTER FOLLOWED BY EXECUTION OF THE PRINTER READY PORTION OF TEST
1.  PRINTING OF THE MESSAGE "POWER-UP" ON THE TELEPRINTER FOLLOWING
THE TEST HEADER PRINT-OUT INDICATES START OF THIS TEST SEQUENCE.  THIS
TEST IS CARRIED OUT BY AN INTERACTIVE EXCHANGE BETWEEN THE OPERATOR
AND THE TEST PROGRAM.  THE OPERATIONAL DESCRIPTION OF THIS TEST
APPEARS AS PART OF THE TEST DESCRIPTION FOR TEST 1 (SEE SECTION
7.1.1).  AFTER SUCCESSFUL COMPLETION OF THIS SECTION OF TEST 1, THE
PRINT SPEED AND TOP OF FORM SWITCH SETTINGS TESTS WILL BE PERFORMED.
(SEE SECTIONS 7.1.2 AND 7.1.3 RESPECTIVELY.) IF THE DMF11 IS AVAILABLE
AND SWITCH 14 IS SET, THE DMF11 TESTS WILL ALSO BE PERFORMED.  AFTER
COMPLETION OF ALL OF TEST 1, PRESS CONTINUE TO ENTER THE PRINTING
TESTS DIRECTLY.  NO OTHER OPERATOR ACTION WILL BE REQUIRED.

NOTE:               IN TEST 1 - SECTION 2 - PRINT SPEED TIMING
TEST, SWITCH  0  IS  NOT  READILY  ACCESSIBLE  WITH
PROCESSORS HAVING A  SOFTWARE SWR, SO THIS TEST SHOULD  NOT  BE
RUN IN THE MANUAL MODE.
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5.0 OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

THE USE OF THIS PROGRAM ON PROCESSORS NOT HAVING A HARDWARE SWITCH REGISTER NECESSITATES OPERATOR INTERACTION. THE OPERATOR MUST SET UP LOCATION 174 WITH THE SOFTWARE DISPLAY VALUES AND LOCATION 176 WITH THE SOFTWARE SWITCH VALUES.

SWITCH	FUNCTION IN "UP" POSITION
15	LOOP ON ERROR (IN TEST 1 ONLY)
14	OPTIONAL DAVFU AVAILABLE
13	DOWN - 64 CHARACTER SET UP - 96 CHARACTER SET
12	LOOP ON TEST
11	SEND ONLY ONE CHARACTER TO LINE PRINTER IN SCOPE DRIVER - THEN HALT
0	USED FOR PRINT SPEED MANUAL TIMING IF NO CLOCK AVAILABLE

1. SWITCH - 0

   TO START PRINTING IN THE MANUAL PRINT SPEED TEST, PLACE SWITCH 0 IN THE UP POSITION. AT THE END OF ONE MINUTE PUT SWITCH 0 DOWN. THE APPORXIMATE PRINT SPEED WILL BE PRINTED ON BOTH THE LINE PRINTER AND THE TELEPRINTER. SWITCH 0 IS NOT USED IN ANY OTHER TESTS. MAKE SURE SWITCH 0 IS DOWN AT THE START OF THE TEST IF USING MANUAL TIMING OR UP IF USING AN INTERNAL CLOCK OPTION (KW11-L OR KW11-P).

2. SWITCH - 11

   SWITCH 11 IN THE UP POSITION CAUSES THE CONTENTS OF THE SWITCH REGISTER TO BE SENT ONLY ONCE TO THE LINE PRINTER THEN HALT IN THE SCOPE DRIVER ROUTINE. TO SEND ANOTHER CHARACTER, RESET SWITCHES AND DEPRESS CONTINUE. WITH SWITCH 11 DOWN, THE SWITCH REGISTER IS SENT CONTINUOUSLY TO THE LINE PRINTER WITH A LINE FEED SENT AFTER EVERY 132 CHARACTERS. TO STOP SENDING CHARACTERS, PUT SWITCH 11 UP.

3. SWITCH - 12

SWITCH 12 IN THE UP POSITION IS USED TO AUTOMATICALLY LOOP ON THE CURRENT TEST IF IN TESTS 2 TO 12. PLACING SWITCH 12 IN THE UP POSITION WILL FORCE THE PROGRAM TO CONSTANTLY LOOP ON THE CURRENT TEST. REPLACING THE SWITCH TO THE DOWN POSITION WILL MAKE THE PROGRAM RESUME ITS NORMAL TEST SEQUENCE AT THE COMPLETION OF THE CURRENT TEST.

4. SWITCH - 13

SWITCH 13 SHOULD BE SET UP IF THE 96 CHARACTER SET IS AVAILABLE. IF THE 64 CHARACTER SET IS USED SWITCH 13 SHOULD BE DOWN.

5. SWITCH - 14

SWITCH 14 SHOULD BE SET UP IF THE OPTIONAL DAVFU IS AVAILABLE AND IT IS DESIRED TO RUN THE DAVFU DIAGNOSTIC TESTS.

6. SWITCH - 15

WITH SWITCH 15 IN THE DOWN POSITION THE PROGRAM WILL HALT AFTER AN ERROR TYPE OUT IN TEST 1. WITH SWITCH 15 IN THE UP POSITION, THE PROGRAM WILL LOOP ON THE ERROR IN TEST 1.

REFER TO SECTION 6.1 TO CONTINUE AFTER AN ERROR DURING ANY OTHER TESTS.

5.2 IOT CHANGES

THE LINE PRINTER STATUS IS LOCATION 177514 AS USED BY THE PROGRAM.
THE LINE PRINTER BUFFER IS LOCATION 177516 AS USED BY THE PROGRAM.

FOR OTHER THAN THESE, PLACE THE CORRECT STATUS LOCATION IN LOCATION 1000(8) AND THE CORRECT BUFFER LOCATION IN LOCATION 1002(8).

6.0 ERRORS

6.1 COMPUTER DETECTED ERRORS

THE FOLLOWING DISCUSSION DESCRIBES (IN GENERAL) THE METHOD USED FOR INTERNAL ERROR DETECTION AND ERROR DISPLAY BY THE LINE PRINTER DIAGNOSTIC PROGRAM. MONITORING OF THE CURRENT CONDITION OF THE READY LINE AFTER EACH OPERATION IS CARRIED ON CONTINUOUSLY DURING ALL TESTS WHERE APPROPRIATE AND IS DESCRIBED IN THE FOLLOWING PARAGRAPHS. HOWEVER, ADDITIONAL TESTING IS PERFORMED ESPECIALLY DURING EXECUTION OF THE FIRST TEST. FOR A COMPLETE DESCRIPTION OF THE TESTING PROCEDURES USED IN TEST 1 AND THE CORRESPONDING ERROR CONDITIONS, THE READER IS REFERRED TO THE DESCRIPTION OF THE TEST AND THE TEST LISTING.

ERROR PRINT-OUTS ARE LIMITED TO THE ERROR NUMBER (ERROR COUNT). ADDITIONAL INFORMATION MAY BE OBTAINED FROM THE TEST DESCRIPTION OR FROM THE LISTING. TO FIND THE ERROR IN THE LISTING, SEE THE SYMBOL TABLE AT THE END OF THE LISTING TO FIND THE LOCATION OF THE ERROR.

ERROR TAGS WILL BE LISTED AS "ERRXX" WHERE XX = ERROR NUMBER.

IN GENERAL, THE TEST PROGRAM MONITORS PROPER OPERATION OF THE LINE PRINTER AFTER EACH PRINTER OPERATION HAS BEEN COMPLETED, THROUGH THE PRINTER "READY" LINE AND THE SETTING OF THE CHARACTER FLAG OF THE PRINTER "DEMAND" RETURN LINE. WITH REGARDS TO THE READY LINE, THE FOLLOWING ERROR CONDITIONS, IF DETECTED WITHIN THE LINE PRINTER ITSELF, WILL CAUSE THE READY LINE TO DROP:

1. PAPER OUT OR TORN
2. DRUM GATE OPEN
3. RIBBON STALL CONDITION
4. POWER SUPPLY FAULT
5. HAMMER BANK FAULT
6. DAVFU ERROR (IF AVAILABLE)
7. SWITCHED OFF LINE

IT SHOULD BE NOTED THAT THE "DEMAND" RETURN FROM THE PRINTER IS CONDITIONAL UPON THE PRINTER "READY" AND THEREFORE THESE ITEMS SHOULD BE CHECKED FIRST IN CASE OF DIFFICULTY.

6.2 VISUALLY DETECTED ERRORS

SINCE THE COMPUTER CAN ONLY DETECT THE CURRENT CONDITION OF THE READY AND DEMAND RETURN LINES AND DOES NOT RECEIVE ANY ADDITIONAL DATA BACK FROM THE LINE PRINTER, IT IS NECESSARY TO EXAMINE THE PRINT PATTERNS PRODUCED BY THE VARIOUS TEST ROUTINES OR RESORT TO MANUAL SCOPING PROCEDURES, AS PROVIDED BY THE SCOPE DRIVER ROUTINE, TO DETECT AND DIAGNOSE ADDITIONAL DIFFICULTITIES. DETAILED DESCRIPTIONS OF EACH TEST PATTERN APPEARS IN THE DESCRIPTION OF THE CORRESPONDING TEST ROUTINES.

7.0 TEST DESCRIPTIONS

7.1 TEST 1 - CONTROL TESTS AND OPERATOR INTERACTIVE TESTS

TEST 1 IS MADE UP OF FOUR SECTIONS LINKED TOGETHER AND EXECUTED IN SEQUENCE AS A SINGLE TEST. THE FOLLOWING DESCRIPTIONS TREAT EACH SECTION SPEARATELY.

7.1.1 TEST 1 - SECTION 1 - COMMAND DECODE, CONTROL INTERFACE

THIS PORTION OF TEST 1 IS DESIGNED AS A COMMAND DECODE AND CONTROL INTERFACE TEST AND INCLUDES CHECKOUT OF THE PRINTER INTERRUPT FACILITY. UPON INITIAL ENTRY INTO THIS ROUTINE, MANUAL INTERVENTION IS REQUIRED TO TEST THE VARIOUS TESTABLE ERROR (NON-READY) CONDITIONS OF THE PRINTER. THE OPERATING SEQUENCE IS DESCRIBED IN DETAIL BELOW.

THE PRINTER READY LINE CONTINUOUSLY MONITORS THE FOLLOWING CONDITIONS WITHIN THE PRINTER AND ITS TRUE STATE AT THE CONTROL ELECTRONICS INTERFACE IS CONDITIONAL UPON NONE OF THEM EXISTING:

1. PAPER OUT OR TORN
2. DRUM GATE OPEN
3. RIBBON STALL CONDITION
4. POWER SUPPLY FAULT
5. HAMMER BANK FAULT
6. DAVFU ERROR (IF AVAILABLE)
7. SWITCHED OFF LINE

THE MANUAL-INTERACTIVE TEST SEQUENCE WHICH FOLLOWS IS DESIGNED TO TEST THE PROPER OPERATION OF THE READY LINE AS IT APPEARS AT THE INTERFACE ELECTRONICS WITH RESPECT TO THOSE OF THE ABOVE ITEMS WHICH ARE TESTABLE (I.E. - A,B,F&G) INITIAL MANUAL TEST SEQUENCE:

1. AFTER "POWER ON - TURN ON LINE" HAS BEEN TYPED ON THE TELEPRINTER BRING POWER - UP ON THE LINE PRINTER AND TURN ON LINE, MAKING SURE THAT THE PAPER IS IN PLACE IN THE TRACTORS AND THAT THE DRUM GATE IS CLOSED.

2. DEPRESS CONTINUE, "READY SET OK - TRY TORN PAPER SWITCH" WILL BE TYPED OUT IF PRINTER IS ON LINE AND NO ERRORS EXIST.

3. PAPER - TEAR THE PAPER OFF BELOW THE PRINTER DRUM GATE AND USE THE MANUAL TOP OF FORM SWITCH TO DRIVE ALL THE PAPER OUT OF THE PRINTER AND OBSERVE THAT THE PRINTER READY LIGHT GOES OUT AND THE PAPER ERROR LIGHT GOES ON ON THE PRINTER CONTROL PANEL. ATTEMPT TO PLACE THE PRINTER ON LINE. THE ON-LINE AND READY LIGHTS ON THE PRINTER CONTROL PANEL SHOULD REMAIN OFF.

4. DEPRESS CONTINUE, AN ERROR TYPE-OUT (ERROR COUNT 2) WILL OCCUR IF THE PRINTER READY LINE REMAINS HIGH AT THE INTERFACE ELECTRONICS.

5. READY - AFTER SUCCESSFUL COMPLETION OF STEPS 3 AND 4 THE MESSAGE "ERROR SET OK - TURN ON LINE" WILL BE TYPED. RESTORE PAPER TO THE TRACTORS, CLOSE THE DRUM GATE AND PLACE THE PRINTER IN THE READY-ON LINE STATE. OBSERVE THAT BOTH THE ON-LINE AND READY LIGHTS COME ON ON THE PRINTER CONTROL PANEL.

6. DEPRESS CONTINUE, AN ERROR TYPE-OUT (ERROR COUNT 4) WILL OCCUR IF THE PRINTER READY LINE DOES NOT GO HIGH AT THE INTERFACE ELECTRONICS.

7. DRUM GATE - AFTER SUCCESSFUL COMPLETION OF STEPS 5 & 6 THE MESSAGE "READY SET OK-TRY, DRUM GATE SWITCH" WILL BE TYPED. OPEN THE PRINTER DRUM GATE AND OBSERVE THAT THE ON-LINE AND READY LIGHTS GO OUT AND THE DRUM GATE ERROR LIGHT GOES ON ON THE PRINTER CONTROL PANEL.

8. DEPRESS CONTINUE, AN ERROR TYPE-OUT (ERROR COUNT 5) WILL OCCUR IF THE PRINTER READY LINE APPEARS TO REMAIN HIGH AT THE INTERFACE ELECTRONICS.

9. READY - AFTER SUCCESSFUL COMPLETION OF STEPS 7 & 8 THE MESSAGE "ERROR SET OK - TURN ON LINE" WILL BE TYPED.

10. DEPRESS CONTINUE TO COMPLETE THE COMMAND AND REGISTER TESTING ALONG WITH THE INTERRUPT TESTING. IF ANY ERROR CONDITIONS EXIST, ERROR TYPE-OUTS GIVING THE ERROR COUNT WILL BE PRINTED. CHECK THE LISTING FOR DESCRIPTIONS OF THESE ERRORS.

11. SECTION 2 OF TEST 1 WILL BE ENTERED DIRECTLY UPON COMPLETION OF SECTION 1.

7.1.2 TEST 1 - SECTION 2 - PRINT SPEED TIMING TEST.

THIS SECTION OF TEST 1 IS DESIGNED TO TIME THE PRINTER FOR ONE FULL MINUTE. DURING THIS TIME THE PRINTER WILL PRINT THE DIAGNOL OF THE DRUM PATTERN SO THAT ONLY TWO HAMMERS (MAXIMUM) WILL FIRE AT ANY GIVEN INSTANT AND MAXIMUM PRINT TIME IS USED FOR EACH LINE.

IF A KW11-L OR KW11-P ARE AVAILABLE THEY WILL BE USED TO TIME THE PRINTER. IF BOTH ARE AVAILABLE, THE KW11-L WILL BE USED. IF NEITHER ARE AVAILABLE, MANUAL TIMING WILL BE USED. WHEN MANUAL TIMING IS USED INSTRUCTIONS WILL BE TYPED ON THE TELEPRINTER. TO START THE TIMING PLACE SWITCH 0 IN THE UP POSITION. AT THE END OF ONE FULL MINUTE PLACE SWITCH 0 IN THE DOWN POSITION TO STOP THE TIMING. IF USING AN INTERNAL CLOCK FOR TIMING, PLACE SWITCH 0 IN THE UP POSITION BEFORE STARTING THE TEST. WHICH EVER METHOD OF TIMING IS USED, AT THE END OF ONE FULL MINUTE THE APPROXIMATE PRINT SPEED WILL BE TYPED ON BOTH THE TELEPRINTER AND LINE PRINTER.

IF BOTH A KW11-L OR KW11-P ARE AVAILABLE OR IT IS DESIRED TO MANUALLY TIME THE PRINTER IF EITHER IS AVAILABLE USE THE FOLLOWING START ADDRESSES TO RUN THE DESIRED PRINT SPEED TIMING TEST:

    400 FOR MANUAL TIMING
    404 FOR KW11-L
    410 FOR KW11-P

NOTE: IF THE LINE FREQUENCY IS 50 HZ. CHANGE THE CONTENTS OF "MINCNT TO 5670(8) .... REFER TO THE END OF THE PRINTING ROUTINE. (SEARCH FOR "MINCNT" IN THE CROSS REFERENCE LISTING)

SECTION 3 OF TEST 1 WILL BE ENTERED DIRECTLY AFTER COMPLETION OF SECTION 2.

7.1.3 TEST 1 - SECTION 3 - TOP OF FORM SWITCH TEST

THIS TEST CHECKS ALL POSITIONS OF THE TOP OF FORM SWITCH. THE PROGRAM WILL GIVE THE CORRECT SETTINGS FOR THE TOP OF FORM SWITCH ON THE TELETYPE AND THEN WAIT FOR THE OPERATOR. AFTER SETTING THE SWITCH, DEPRESS CONTINUE TO TEST THAT SWITCH POSITION. AFTER CHECKING ALL POSITIONS THE PRINTER OUTPUT CAN BE MANUALLY VERIFIED. A LINE OF ALL DASHES IS PRINTED AS A STARTING POINT FOR EACH SETTING AND THEN A LINE IS PRINTED TELLING THE PROPER SPACING (IN INCHES) FROM THE DASHED LINE TO THAT LINE.

UPON COMPLETION OF THIS SECTION OF TEST 1 THE MESSAGE "TURN ON DAVFU IF AVAILABLE AND RESET TOP OF FORM SWITCH TO 11 INCHES" WILL BE TYPED, THEN THE PROGRAM WILL HALT. RESET THE TOP OF FORM SWITCH TO 11 INCHES AND TURN ON THE DAVFU (IF AVAILABLE).

DEPRESS CONTINUE TO ENTER DIRECTLY INTO THE PRINTING TEST SEQUENCE STARTING WITH TEST 2 IF THE DAVFU IS NOT AVAILABLE (SWITCH 14 DOWN). IF THE DAVFU IS AVAILABLE (SWITCH 14 UP) SECTION 4 OF TEST 1 WILL BE ENTERED DIRECTLY AFTER DEPRESSING CONTINUE.

7.1.4 TEST 1 - SECTION 4 - DAVFU ERROR TESTS

THIS SECTION OF TEST 1 CONTAINS TWO PARTS DESIGNED TO TEST THE DAVFU ERROR CONDITIONS. THE FIRST PART OF THIS TEST ATTEMPTS TO LOAD THE DAVFU WITH INCOMPLETE DATA (AN ODD NUMBER OF DATA WORDS) BETWEEN THE START LOAD AND STOP LOAD COMMANDS. THIS SHOULD CAUSE A FORMAT ERROR TO OCCUR IN THE LINE PRINTER. FAILURE TO CAUSE AN ERROR IN THE LINE PRINTER WILL CAUSE AN ERROR TYPE-OUT "ERROR COUNT 27" TO OCCUR. UPON SUCCESSFUL COMPLETION OF THIS PART OF THE TEST THE MESSAGE "ERROR SET OK - CLEAR AND TURN ON LINE" WILL BE TYPED. CLEAR THE FORMAT ERROR IN THE PRINTER AND PLACE THE PRINTER IN THE READY - ON LINE STATE. PART TWO OF THIS TEST WILL NOW BE EXECUTED TO TEST THAT CHANNEL SLEW COMMANDS REFERENCING CHANNELS WITH NO STOP BITS WILL CAUSE AN ERROR IN THE LINE PRINTER. THE DAVFU WILL BE LOADED WITH ALL ZEROS BETWEEN THE START LOAD AND STOP LOAD COMMANDS. EACH CHANNEL WILL THEN BE TESTED IN SEQUENCE STARTING WITH CHANNEL 0. IF THE ERROR DOES NOT OCCUR MESSAGE "ERROR COUNT 31" WILL BE TYPED. UPON SUCCESSFUL COMPLETION OF THE TEST ON EACH CHANNEL A MESSAGE "ERROR SET OK - CLEAR AND TRY NEXT CHANNEL" WILL BE TYPED. AFTER THIS MESSAGE, CLEAR THE PRINTER ERROR AND PRESS CONTINUE. THE DAVFU WILL THEN BE RELOADED WITH ALL ZEROS AND THE NEXT CHANNEL WILL BE TESTED.
UPON SUCCESSFUL COMPLETION OF THIS TEST, THE MESSAGE "ERROR SET OK - CLEAR AND TURN ON LINE" WILL BE TYPED.
CLEAR THE PRINTER ERROR AND PLACE THE PRINTER IN THE READY, ON-LINE STATE. DEPRESS CONTINUE TO ENTER THE PRINTING TEST SEQUENCE DIRECTLY STARTING WITH TEST 2.

7.2 LINE PRINTER PRINTING TESTS

TESTS 2 TO 12 PRODUCE VARIOUS PRINT PATTERNS DESIGNED FOR EASE OF VISUAL VERIFICATION. THESE TESTS CHECK ALL OF THE VARIOUS PRINTING ASPECTS OF THE PRINTER. DETAILED DESCRIPTIONS OF EACH INDIVIDUAL TEST FOLLOWS.

7.2.1 TEST 2 - DATA TRANSFER PATHS TEST
THIS TEST IS DESIGNED TO TEST THE DATA TRANSFER PATHS (WITH ALTERNATING ONES AND ZEROS), FROM THE PROCESSOR INTERFACE, THRU THE LINE PRINTER INPUT REGISTER, AND INTO THE PRINTER'S BUFFER. AN ALTERNATING STRING OF "*" AND "U" CHARACTERS ARE TRANSMITTED TO THE PRINTER ON A FULL 132 COLUMN BASIS. SINCE THESE CHARACTERS ARE COMPLIMENTARY BITWISE, THEY PROVIDE BOTH A ONES AND ZEROES CHECK OF ALL TRANSMISSION LINES. END OF LINE IS SENSED WITHIN THE PROCESSOR AND A LINE FEED CHARACTER IS TRANSMITTED TO PRINT EACH LINE. PRINTING OF THE TEST LINE IS REPEATED 32 TIMES, ALTERNATING THE COLUMN POSITIONS OF THE "*" AND "U" CHARACTERS TO PRODUCE A CHECKER-BOARD PATTERN.

7.2.2 TEST 3 - CHARACTER GENERATOR AND COMPARATOR TEST

TEST 3 IS DESIGNED PRIMARILY TO TEST THE LINE PRINTER CHARACTER GENERATOR AND COMPARATOR LOGIC AND ITS ABILITY TO DETECT AND ACT UPON BOTH PRINTABLE AND ILLEGAL (NON-PRINTING) CHARACTERS. A SERIES OF ALL 64 OR 96 PRINTABLE CHARACTERS ARE TRANSMITTED IN SEQUENCE TO THE LINE PRINTER AND PRINTED ON A SINGLE LINE BEGINNING WITH THE SPACE CHARACTER. THIS IS FOLLOWED BY AN ALTERNATE LINE OF ALL 64 OR 32 ILLEGAL CHARACTERS, EACH OF WHICH SHOULD BE CONVERTED TO A SPACE CHARACTER PRODUCING NO VISIBLE PRINTING. THIS SEQUENCE OF ALTERNATING ALL PRINTABLE CHARACTERS FOLLOWED BY ALL ILLEGAL CHARACTERS IS REPEATED 10 TIMES ALONG WITH AN EXTRA LINE OF ILLEGAL CHARACTERS INSERTED AT THE BEGINNING OF THE TEST TO PRODUCE 21 LINES OF PRINT (11 OF WHICH WILL BE BLANK).

7.2.3 TEST 4 - OVER PRINT TEST

THIS TEST CHECKS THE CARRIAGE RETURN (015) CONTROL FOR OVERPRINTING A LINE. THE TEST PRODUCES 24 LINES OF ALTERNATING E'S AND SPACES, OVERPRINTED WITH E'S AND SPACES IN THE SAME LOCATIONS. THE STARTING CHARACTER FOR EACH LINE IS ALSO ALTERNATED PRODUCING A CHECKERBOARD PATTERN. OVERPRINTED E'S SHOULD BE ALIGNED WITH THE FIRST E'S PRINTED.

7.2.4 TEST 5 - SHUTTLE POSITIONING TEST

THIS TEST CHECKS THE HAMMER SHUTTLE FOR CORRECT OPERATION. FULL LINES OF E'S ARE PRINTED BY PRINTING A PAIR OF E'S AT A TIME THEN OVERPRINTING THOSE E'S PRINTED WITH SPACES AND ADDING ANOTHER PAIR OF E'S TO THE LINE UNTIL THE LINE IS COMPLETED. THEN A FULL LINE OF M'S ARE PRINTED FOR COMPARISON. A TOTAL OF 16 LINES ARE PRINTED DURING THIS TEST.

7.2.5 TEST 6 - PRINT CONTROL TEST

THIS TEST CHECKS THE PRINT CONTROL LOGIC BY SENDING MORE THAN 132 CHARACTERS BEFORE SENDING A PRINT COMMAND. THE PRINTER SHOULD SAVE THE FIRST 132 CHARACTERS RECEIVED AND PRINT THEM CORRECTLY WHEN THE PRINT COMMAND IS RECEIVED. ALL CHARACTERS AFTER THE FIPST 132 SHOULD BE LOST. THE PROGRAM SENDS A FULL LINE OF 132 ZEROS THEN THE FULL CHARACTER SET BEFORE SENDING A LINE FEED TO PRINT THE LINE. THE PRINTED LINE SHOULD CONTAIN ONLY ZEROS. THIS IS REPEATED USING ONES, TWOS, THREES, FOURS, AND FIVES. THEN A LINE OF SPACES ARE SENT AND THE FULL CHARACTER SET BEFORE THE LINE FEED. A BLANK LINE SHOULD BE PRINTED. AFTER THE BLANK LINE, THE NUMBERS 6 TO 9 ARE SENT AS BEFORE. A TOTAL OF 11 LINES WILL BE PRINTED WITH THE MIDDLE LINE BLANK.

7.2.6 TEST 7 - MULTIPLE LINE ADVANCE TEST

THIS TEST CHECKS THE MULTIPLE LINE ADVANCE OF THE LINE PRINTER. A LINE OF NUMBERS IS PRINTED THEN THE PAPER IS ADVANCED THAT NUMBER OF LINES. THUS THE NUMBER PRINTED WILL INDICATE THE NUMBER OF BLANK LINES FOLLOWING THAT LINE. THE NUMBER IS VARIED BETWEEN 2 AND 9, AND A LINE OF ALL ZEROS WILL END THE TEST.

7.2.7 TEST 8 - HIGH SPEED PRINT TEST

THIS TEST PRINTS AT A SPEED GREATER THAN 300 LINES PER MINUTE (APPROXIMATELY 500 LINES PER MINUTE) BY PRINTING FULL LINES OF THE DRUM PATTERN AND THEN SKIPPING FOUR (4) LINES AND PRINTING THAT DRUM LINE. THIS WILL TEST THE HAMMER SUPPLY FOR MAXIMUM CURRENT SURGE AND WILL TEST FOR WORST CASE NOISE SINCE ALL HAMMERS WILL FIRE AT ONCE ON EACH LINE.

7.2.8 TEST 9 - SINGLE CHAR, ALL COLUMNS TEST

THIS TEST IS DESIGNED AS AN ENDURANCE TEST OF THE LINE PRINTER AS WELL AS A CHARACTER CHECK OF THE DRUM. 132 COLUMNS OF EACH OF THE 64 OR 96 CHARACTERS ARE TRANSMITTED TO THE LINE PRINTER AND PRINTED IN ROTATION. A SAMPLE OF THE PRINT OUT FOLLOWS:

```
?????----------?????
@@@@@----------@@@@@
AAAAA----------AAAAA
BBBBB----------BBBBB
     ----------
     ----------
ZZZZZ----------ZZZZZ
```

7.2.9 TEST 10 - DRUM PATTERN TEST

THIS TEST IS DESIGNED TO PRODUCE AN IMAGE OF THE ENTIRE DRUM PATTERN. THIS IS A WORST CASE NOISE AND ENDURANCE TEST, AND A CHECK OF THE DRUM PATTERN.

7.2.10 TEST 11 - SPURIOUS HAMMER FIRING TEST

THIS TEST IS DESIGNED TO DETECT SPURIOUS HAMMER FIRINGS AND DEFECTIVE HAMMER DRIVERS DURING OPERATION OF THE LINE PRINTER. THE PATTERNS WHICH ARE PRODUCED ARE RIGHT AND LEFT HAND WEDGES, EACH COMPOSED OF 132 LINES OF PRINT USING THE DRUM PATTERN AS FOLLOWS:

LEFT HAND WEDGE - WILL END EACH LINE WITH A "?" CHARACTER.

RIGHT HAND WEDGE - WILL START EACH LINE WITH A "?" CHARACTER.

ANY PRINT OUTSIDE OF THE WEDGE WILL BE CAUSED BY A HAMMER MISFIRE OR HAMMER BOUNCE.

7.2.11 TEST 12 - HAMMER ALIGNMENT TEST

THIS ROUTINE IS DESIGNED TO BE USED AS A DRIVER FOR MANUAL HAMMER ALIGNMENT AND INTENSITY ADJUSTMENTS ON THE LINE PRINTER. THIS TEST PRINTS A FULL 132 COLUMN LINE OF "E" CHARACTERS FOR 63 LINES.

7.2.12 TESTS D1 & D2 - DAVFU LINE COUNT SLEWING TESTS

THIS TEST IS DESIGNED TO TEST THE LINE COUNT METHOD OF PAPER CONTROL USING THE DAVFU. BEFORE STARTING THIS TEST, A MESSAGE WILL BE TYPED INSTRUCTING THE OPERATOR THAT THE DAVFU TESTS ARE BEING RUN. THE DAVFU MEMORY WILL BE LOADED WITH DUMMY DATA, THEN EACH OF THE LINE COUNT SLEWING COMMANDS WILL BE TESTED IN TURN STARTING WITH A SLEW OF ZERO (0) LINES. IF THE SLEW OF ZERO LINES OPERATES CORRECTLY, THE MESSAGE "THIS LINE SHOULD BE PRINTED ALL ON ONE LINE --- IF SLEWED 0 LINES" WILL BE PRINTED ALL ON ONE LINE. THEN EACH OF THE REMAINING COMMANDS WILL BE TESTED. AFTER EACH SLEW, A LINE WILL BE PRINTED INDICATING THE CORRECT NUMBER OF BLANK LINES BETWEEN THE LAST PRINTED LINE AND THAT LINE. AFTER COMPLETION OF TEST D1, THE SEQUENCE IS REPEATED (TEST D2), CHANGING THE TWO (2) UNUSED BITS IN THE PAPER INSTRUCTION TO INSURE THEY HAVE NO EFFECT ON THE DAVFU. UPON COMPLETION OF TEST D2, TEST D3 IS ENTERED DIRECTLY.

7.2.13 TEST D3 - DAVFU CHANNEL SLEW COMMAND TEST

THIS TEST IS DESIGNED TO TEST THE CHANNEL SLEW COMMANDS ON THE DAVFU. THE DAVFU IS FIRST LOADED, THEN EACH OF THE CHANNELS IS TESTED IN TURN STARTING WITH CHANNEL 0. THE DATA PATTERNS (STOP BITS) LOADED INTO THE DAVFU ARE CHOSEN SUCH THAT NO TWO ADJACENT CHANNELS HAVE THE SAME PATTERN. CHANNELS 1 AND 7 WILL CAUSE ONE BLANK LINE BETWEEN EACH PRINTED LINE. CHANNELS 2 AND 8 WILL CAUSE TWO BLANK LINES BETWEEN EACH PRINTED LINE. CHANNELS 3 AND 9 WILL CAUSE THREE BLANK LINES BETWEEN EACH PRINTED LINE. CHANNELS 4 AND 10 WILL CAUSE SIX BLANK LINES BETWEEN EACH LINE. CHANNELS 5 AND 11 WILL CAUSE 24 LINES BETWEEN EACH PRINTED LINE. CHANNELS 6 AND 12 WILL CAUSE 143 BLANK LINES BETWEEN THE HEADER AND THE PRINTED REFERENCELINE. BEFORE TESTING EACH CHANNEL, A HEADER MESSAGE IS PRINTED TELLING WHICH CHANNEL IS BEING TESTED. AFTER TESTING EACH SLEW COMMAND, A LINE IS PRINTED GIVING THE CORRECT NUMBER OF BLANK LINES FROM THE LAST PRINTED LINE TO THAT LINE. UPON COMPLETION OF THIS TEST THE DIAGNOSTIC WILL RESTART THE PRINTING TESTS WITH TEST 2.

```
                                7.3  SCOPE DRIVE ROUTINE

                        THE PRUPOSE OF THIS TEST SEQUENCE IS TO PROVIDE THE  OPERATOR  WITH  A
                        SHORT  BUT  COMPREHENSIVE  SCOPE  DRIVER  ROUTINE  FOR  USE IN TROUBLE
                        SHOOTING  THE  PRINTER  INTERFACE  CONTROL  MODULE  WITH  THE  SCOPE.
                        DEPENDING  ON  THE  SETTING  OF  SWITCH  11  THIS  TEST  WILL  EITHER
                        CONTINUALLY SEND WHATEVER CHARACTER IS SET IN THE SWITCH  REGISTER  TO
                        THE  LINE PRINTER, OR ONLY SEND IT ONCE AND HALT.  (SEE DESCRIPTION OF
                        SWITCH 11 OPERATION IN SECTION 5.1)

                        TO INSERT A LINE FEED  CHARACTER  AFTER  EVERY  132  CHARACTERS,  WHEN
                        SENDING CHARACTERS CONTINUOUSLY, START AT LOCATION 700(8).

                        TO LEAVE OUT THE LINE FEED, START AT LOCATION  710(8).   THIS  ROUTINE
                        SHOULD BE USEFUL WHEN TPOUBLE SHOOTING THE DAVFU.

                        WHEN SWITCH 11 IS UP, TO SEND ONLY ONE CHARACTER  THEN  HALT,  DEPRESS
                        CONTINUE  TO SEND THE NEXT CHARACTER AFTER SETTING THE SWITCH REGISTER
                        AS DESIRED.  TO RESUME SENDING CONTINUOUS CHARACTERS, PLACE SWITCH  11
                        DOWN,  SET  THE  SWITCHES,  AND  DEPRESS  CONTINUE.   TO  STOP SENDING
                        CONTINUOUSLY PLACE SWITCH 11 UP.
                        .ENDR
```

```
                                .TITLE MAINDEC-11-DZLPK-D-D
                                ;COPYRIGHT (C) 1975,1974 DIGITAL EQUIPMENT CORP., MAYNARD, MASS.
                                
                                ;******   LP11/LPOS LINE PRINTER TEST   ******
                                
                                ;AUTHOR:        ROBERT BAKER
                                
                                
                                ;LIST OF SWITCH SETTINGS USED IN THIS TEST
                                
                                ;SWITCH NO.     DESCRIPTION
                                
                                ;       15      LOOP ON ERROR IN TEST 1  ONLY !!!
                                ;       14      OPTIONAL DAVFU AVAILABLE
                                ;       13      "DOWN" 64 CHAR./"UP"-96 CHAR OPTION
                                ;       12      LOOP ON TEST
                                ;       11      SEND ONLY ONE CHAR TO LINE PRINTER IN SCOPE TEST - THEN HALT
                                ;       0       USED TO TEST PRINT SPEED IN TEST 1 IF NO CLOCK IS AVAILABLE
                                
000000                          R0=%0
000001                          R1=%1
000002                          R2=%2
000003                          R3=%3
000004                          R4=%4
000005                          R5=%5
000006                          R6=%6
000007                          R7=%7
000006                          SP=R6
000007                          PC=R7
                                
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
000001                          BIT0    =1
                                
                                        .ENABLE ABS
                                        .ENABLE AMA
                                
000000                          .=0
                                
                                .REPT   100
```

```
                                        .+2
                                        HALT
                                        .ENDR

                000030                  .=30
000030  010040                          TYP
000032  000340                          340

                000042                  .=42
000042  000000                          0

                000046                  .=46
000046  002662                          LOGICAL
                000052                  .=52
000052  040000                          BIT14

                000100                  .=100
000100  002620                          LKSRV                   ;LINE CLOCK SERVICE ROUTINE
000102  000340                          340
000104  002630                          CONVRT
000106  000340                          340

                000174                  .=174
000174  000000                          DISPREG: 0
000176  000000                          SWREG:   0

                000200                  .=200
000200  012706  001000                  MOV     #1000,%6
000204  000137  001060                  JMP     SETUP

                000300                  .=300
                                                        ;START FOR DAVFU TESTS
000300  000137  003424                  JMP     INDAT   ;ILLEGAL LOAD TEST
000304  000137  003574                  JMP     NODAT   ;NO STOP BIT - CHANNEL SLEW TEST
000310  000137  012416                  JMP     DAVFU   ;LINE COUNT SLEW TEST
000314  000137  013134                  JMP     DAV2    ;CHANNEL SLEW TEST

                000400                  .=400
                                                        ;1 MINUTE PRINT SPEED CHECK
000400  000137  002240                  JMP     SWTIME  ;START FOR USING SWITCH REG FOR TIMING
000404  000137  002344                  JMP     KW11L   ;START FOR KW11-L LINE CLOCK
000410  000137  002302                  JMP     KW11P   ;START FOR KW11-P LINE CLOCK
```

```
                                                JMP     SLEWCK          ;CHECK TOP OF FORM SWITCH

                        000600                  .=600
000600  012706  001000                          MOV     #1000,%6        ;START OF PRINTING TESTS SEQUENCE
000604  000137  004060                          JMP     TEST2           ;TEST 2
000610  000137  004304                          JMP     TEST3           ;TEST 3
000614  000137  004642                          JMP     CHRCHK          ;TEST 4
000620  000137  005106                          JMP     OVRPRT          ;TEST 5
000624  000137  005366                          JMP     PRTCTL          ;TEST 6
000630  000137  005650                          JMP     MLF             ;TEST 7
000634  000137  006046                          JMP     HSPRT           ;TEST 8
000640  000137  006352                          JMP     SNGCHR          ;TEST 9
000644  000137  006530                          JMP     ROTATE          ;TEST 10
000650  000137  007006                          JMP     LFTTR           ;TEST 11
000654  000137  007504                          JMP     HAMALN          ;TEST 12

                        000700                  .=700
000700  012737  014554  014600                  MOV     #LSCA,LOSCOP    ;SEND LF AFTER 132 CHARS
000706  000137  014450                          JMP     SCOPE

                        000720                  .=720
000720  012737  014450  014600                  MOV     #SCOPE,LOSCOP   ;NO LF'S SENT IN SCOPE ROUTINE
000726  000137  014450                          JMP     SCOPE           ;DO SCOPE ROUTINE

                        001000                  .=1000

                                        ;LINE PRINTER HARDWARE REGISTERS

001000  177514                  LPS:    177514          ;STATUS REGISTER
                                                        ;BIT 15=ERROR
                                                        ;BIT 7=READY
                                                        ;BIT 6=INTERRUPT ENABLE

001002  177516                  LPB:    177516          ;DATA BUFFER REGISTER
                                                        ;BITS 0-6=7 BIT ASCII CHARACTER BUFFER
                                                        ;BITS 7-15=NOT USED

001004  177570                  SWR:    177570
001006  177570                  DISPLAY:177570
001010  177776                  PSW:    177776
001012  177566                  TPB:    177566
001014  177562                  TKB:    177562
001016  177564                  TPS:    177564
001020  177560                  TKS:    177560
001022  172542                  CSBR:   172542
001024  172540                  PLKS:   172540
```

```
                                LKS:    177546

                                NOP     =240
                                N       =0
                                M       =2

                                        ;MACRO FOR SETTING UP ERROR COUNT

                                        .LIST ME

                                        .MACR   $ERROR X
                                ERR'X': MOV     #X,     ERCOUNT         ;SET UP ERROR COUNT X
                                        N=N+1
                                        .ENDM   $ERROR


                                        ;MACRO FOR PRINTING TEST NUMBER AT START OF TEST

                                        .LIST ME

                                        .MACR   $PRINT Y
                                        MOV     TNO'Y',MES15            ;SET TEST NUMBER FOR MESSAGE
                                        JSR     %4,PRINT                ;PRINT TEST NUMBER
                                        M=M+1
                                        .ENDM   $PRINT


                                        ;MACRO FOR WAITING FOR PRINTER TO PRINT OR SLEW

                                        .LIST ME

                                        .MACR   $WAIT
                                        TSTB    @LPS            ;TEST READY
                                        BPL     .-4             ;WAIT FOR READY
                                        .ENDM   $WAIT




                                ;MEMORY LOCATIONS USED AS PROGRAM FLAGS AND COUNTERS

001030  000000                  SEGCNT: 0
001032  000000                  CHRCNT: 0
001034  000000                  CHRLEN: 0
001036  000000                  LINCNT: 0
001040  000000                  CYCCNT: 0
001042  000000                  WORK:   0
001044  000000                  SAVE:   0
001046  000000                  ERCOUNT:0
001050  000000                  STRCHR: 0
001052  000000                  STRCNT: 0
001054  000000                  LEGCHR: 0
```

```
1013  001056  000000                    NUMCHR: 0
1014
1015                                    ;ROUTINE TO TEST THE MECH. OPERATION OF THE LPOS
1016
1017  001060  004437  010022            SETUP:  JSR     %4,TYPINT
1018  001064  000005                            RESET                   ;CLEAR WORLD
1019  001066  013746  000004                    MOV     4,-(SP)         ;SAVE CURRENT VECTORS
1020  001072  013746  000006                    MOV     6,-(SP)         ;
1021  001076  012737  001112  000004            MOV     #1$,4           ;SET UP TIMEOUT VECTOR
1022  001104  005777  177674                    TST     @SWR            ;TRY TO ACCESS HARDWARE SWR
1023  001110  000406                            BR      2$              ;IF THERE, GO TO 2$
1024  001112                            1$:
1025  001112  012737  000176  001004            MOV     #SWREG,SWR      ;POINT TO SOFTWARE SWR
1026  001120  012737  000174  001006            MOV     #DISPREG,DISPLAY';POINT TO SOFTWARE DISPLAY
1027  001126                            2$:
1028  001126  022626                            CMP     (SP)+,(SP)+     ;RESTORE STACK
1029  001130  012637  000004                    MOV     (SP)+,4         ;RESTORE TIMEOUT VECTORS
1030  001134  012637  000006                    MOV     (SP)+,6         ;
1031  001140  104000                            EMT     +0
1032  001142  010642                            MES1                    ;TYPE DIAGNOSTIC TITLE
1033  001144  104000                            EMT     +0
1034  001146  010673                            MES2                    ;TYPE RESTART ADDRESS INFO
1035  001150  104000                            EMT     +0              ;TYPE MESSAGE
1036  001152  010720                            MES3                    ;POWER UP
1037  001154  000000                            HALT                    ;DEPRESS CONTINUE WHEN READY TO START TEST
1038
1039  001156  005777  177616            STP1:   TST     @LPS            ;TEST FOR ERROR
1040  001162  100006                            BPL     STP2            ;NO ERROR TEST FOR READY
1041  001164                                    $ERROR  \N
1042  001164  012737  000000  001046    ERR0:   MOV     #0,     ERCOUNT         ;SET UP ERROR COUNT 0
1043          000001                            N=N+1
1044  001172  004537  010236                    JSR     %5,STAER        ;REPORT ERROR BIT SET
1045  001176  000767                            BR      STP1            ;GO TEST FOR ERROR
1046  001200  105777  177574            STP2:   TSTB    @LPS            ;TEST FOR READY
1047  001204  100406                            BMI     STP3            ; READY SET OK
1048  001206                                    $ERROR  \N
1049  001206  012737  000001  001046    ERR1:   MOV     #1,     ERCOUNT         ;SET UP ERROR COUNT 1
1050          000002                            N=N+1
1051  001214  004537  010236                    JSR     %5,STAER        ;REPORT READY NOT SET
1052  001220  000767                            BR      STP2            ;GO TEST FOR READY
1053  001222  104000                    STP3:   EMT     +0              ;TYPE MESSAGE
1054  001224  010751                            MES4                    ;PRINTER OK "READY SET" TRY TORN PAPER SWITCH
1055  001226  000000                            HALT                    ;DEPRESS CONTINUE WHEN READY
1056  001230                            STP4:
1057  001230  012777  000014  177544            MOV     #14,@LPB        ;SEND A "FF" TO THE PRINTER
1058  001236  012777  000015  177536            MOV     #15,@LPB        ;ATTEMPT "FF" BY SENDING A "CR"
1059  001244  005777  177530                    TST     @LPS            ;TEST FOR ERROR
1060  001250  100406                            BMI     STP5            ;BRANCH IF ERROR SET
1061  001252                                    $ERROR  \N
1062  001252  012737  000002  001046    ERR2:   MOV     #2,     ERCOUNT         ;SET UP ERROR COUNT 2
1063          000003                            N=N+1
1064  001260  004537  010236                    JSR     %5,STAER        ;REPORT ERROR NOT SET
1065  001264  000761                            BR      STP4            ;LOOP ON ERROR
1066  001266  104000                    STP5:   EMT     +0              ;TYPE MESSAGE
```

```
1067  001270  011062                          MES6                    ;ERROR SET OK - TURN ON LINE
1068  001272  000000                          HALT                    ;WAIT FOR OPERATOR
1069
1070  001274  005777  177500          STPSA:  TST     @LPS            ;TEST FOR ERROR
1071  001300  100006                          BPL     STPSB           ;NO ERROR CONTINUE
1072  001302                                  $ERROR  \N
1073  001302  012737  000003  001046  ERR3:   MOV     #3,     ERCOUNT         ;SET UP ERROR COUNT 3
1074          000004                          N=N+1
1075  001310  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
1076  001314  000767                          BR      STPSA           ;LOOP ON ERROR
1077  001316  105777  177456          STPSB:  TSTB    @LPS            ;TEST READY
1078  001322  100406                          BMI     STPSC           ;READY SET OK
1079  001324                                  $ERROR  \N
1080  001324  012737  000004  001046  ERR4:   MOV     #4,     ERCOUNT         ;SET UP ERROR COUNT 4
1081          000005                          N=N+1
1082  001332  004537  010236                  JSR     %5,STAER        ;REPORT ERROR NOT SET
1083  001336  000767                          BR      STPSB           ;LOOP ON ERROR
1084  001340  104000                  STPSC:  EMT     +0              ;TYPE MESSAGE
1085  001342  011015                          MES5                    ;READY SET OK - TRY DRUM GATE SWITCH
1086  001344  000000                          HALT                    ;DEPRESS CONTINUE WHEN READY
1087
1088  001346  005777  177426          STP6:   TST     @LPS            ;TEST FOR ERROR
1089  001352  100406                          BMI     STP7            ;BRANCH IF ERROR SET
1090  001354                                  $ERROR  \N
1091  001354  012737  000005  001046  ERR5:   MOV     #5,     ERCOUNT         ;SET UP ERROR COUNT 5
1092          000006                          N=N+1
1093  001362  004537  010236                  JSR     %5,STAER        ;REPORT ERROR NOT SET
1094  001366  000767                          BR      STP6            ;LOOP ON ERROR
1095  001370  104000                  STP7:   EMT     +0              ;TYPE MESSAGE
1096  001372  011062                          MES6                    ;ERROR SET OK - TURN ON LINE
1097  001374  000000                          HALT                    ;DEPRESS CONTINUE WHEN READY
1098
1099                                  ;TEST 1
1100                                  ;PERFORMS PRELIMINARY COMMAND AND REGISTER TESTING.
1101
1102                                  ;IS THE PRINTER FREE OF ERRORS
1103
1104  001376  000005                  TEST1:  RESET                   ;CLEAR THE WORLD
1105  001400  005777  177374                  TST     @LPS            ;IS ERROR FLAG CLEAR
1106  001404  100006                          BPL     TEST1A          ;ERROR IS CLEAR OK
1107  001406                                  $ERROR  \N
1108  001406  012737  000006  001046  ERR6:   MOV     #6,     ERCOUNT         ;SET UP ERROR COUNT 6
1109          000007                          N=N+1
1110  001414  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
1111  001420  000766                          BR      TEST1           ;LOOP ON ERROR
1112
1113                                  ;IS READY SET (NO ERRORS EXIST)
1114
1115  001422  000005                  TEST1A: RESET                   ;CLEAR THE WORLD
1116  001424  105777  177350                  TSTB    @LPS            ;IS READY SET
1117  001430  100406                          BMI     TEST1B          ;READY SET! PRINTER OK
1118  001432                                  $ERROR  \N
1119  001432  012737  000007  001046  ERR7:   MOV     #7,     ERCOUNT         ;SET UP ERROR COUNT 7
1120          000010                          N=N+1
```

```
1121  001440  004537  010236                JSR     %5,STAER        ;REPORT READY NOT SET
1122  001444  000766                      BR      TEST1A          ;LOOP ON ERROR
1123
1124                                ;DOES LOADING THE BUFFER RESET READY
1125
1126  001446  005037  001042      TEST1B: CLR     WORK            ;CLEAR COUNTER
1127  001452  012777  000015  177322      MOV     #15,@LPB        ;LOAD CARRIAGE RETURN INTO BUFFER
1128  001460  105777  177314            TSTB    @LPS            ;IS READY CLEAR
1129  001464  100006                      BPL     LP1             ;READY IO CLEAR OK!
1130  001466                              $ERROR  \N
1131  001466  012737  000010  001046 ERR10:  MOV     #10,    ERCOUNT         ;SET UP ERROR COUNT 10
1132          000011                      N=N+1
1133  001474  004537  010236            JSR     %5,STAER        ;REPORT READY STILL SET
1134  001500  000762                      BR      TEST1B          ;LOOP ON ERROR
1135  001502  005777  177272      LP1:    TST     @LPS            ;IS THERE AN ERROR
1136  001506  100006                      BPL     LP2             ;NO ERROR CONTINUE
1137  001510                              $ERROR  \N
1138  001510  012737  000011  001046 ERR11:  MOV     #11,    ERCOUNT         ;SET UP ERROR COUNT 11
1139          000012                      N=N+1
1140  001516  004537  010236            JSR     %5,STAER        ;REPORT ERROR OCCURRED
1141  001522  000751                      BR      TEST1B          ;LOOP ON ERROR
1142  001524  105777  177250      LP2:    TSTB    @LPS            ;IS THE PRINTER STILL BUSY
1143  001530  100411                      BMI     TEST1C          ;NO! GO TO NEXT TEST
1144  001532  005237  001042            INC     WORK            ;YES! GO CHECK FLAGS
1145  001536  001361                      BNE     LP1             ;PRINTER STILL BUSY WAIT
1146  001540                              $ERROR  \N
1147  001540  012737  000012  001046 ERR12:  MOV     #12,    ERCOUNT         ;SET UP ERROR COUNT 12
1148          000013                      N=N+1
1149  001546  004537  010236            JSR     %5,STAER        ;ERROR REPORT TIME OUT
1150  001552  000735                      BR      TEST1B          ;LOOP ON ERROR
1151
1152                                ;CHECK INTERRUPT LEVEL OF PRINTER
1153                                ;THE PRINTER SHOULD BE AT LEVEL 4
1154
1155                                ;TEST THAT THE PRINTER WILL NOT INTERRUPT AT LEVEL 7
1156
1157  001554  012737  002010  000200 TEST1C: MOV     #INT1C,200      ;SET UP INT VECTOR
1158  001562  012737  000340  000202      MOV     #340,202        ;SET PRIORITY
1159  001570  005777  177204            TST     @LPS            ;TEST FOR ERROR
1160  001574  100006                      BPL     LP3             ;NO ERROR CONTINUE
1161  001576                              $ERROR  \N
1162  001576  012737  000013  001046 ERR13:  MOV     #13,    ERCOUNT         ;SET UP ERROR COUNT 13
1163          000014                      N=N+1
1164  001604  004537  010236            JSR     %5,STAER        ;REPORT ERROR SET
1165  001610  000761                      BR      TEST1C          ;LOOP ON ERROR
1166  001612  105777  177162      LP3:    TSTB    @LPS            ;TST FOR READY
1167  001616  100406                      BMI     LP3X            ;READY SET OK
1168  001620                              $ERROR  \N
1169  001620  012737  000014  001046 ERR14:  MOV     #14,    ERCOUNT         ;SET UP ERROR COUNT 14
1170          000015                      N=N+1
1171  001626  004537  010236            JSR     %5,STAER        ;REPORT READY NOT SET
1172  001632  000750                      BR      TEST1C          ;LOOP ON ERROR
1173  001634                      LP3X:   $ERROR  \N
1174  001634  012737  000015  001046 ERR15:  MOV     #15,    ERCOUNT         ;SET UP ERROR COUNT 15
```

```
                    000016                          N=N+1
001642  012777  000340  177140                      MOV     #340,@PSW       ;LOCKUP PROCESSOR
001650  052777  000100  177122                      BIS     #100,@LPS       ;SET PRINTER INTO ENABLE
001656  000240                                      NOP                     ;WAIT
001660  042777  000100  177112                      BIC     #100,@LPS       ;CLEAR PRINTER INT. ENABLE

                                        ;TEST THAT THE PRINTER WILL NOT INTERRUPT AT LEVEL 6

001666                                              $ERROR  \N
001666  012737  000016  001046  ERR16:  MOV     #16,    ERCOUNT         ;SET UP ERROR COUNT 16
                    000017                          N=N+1
001674  012777  000300  177106                      MOV     #300,@PSW       ;SET PROCESSOR PRIORITY LEVEL 6
001702  052777  000100  177070                      BIS     #100,@LPS       ;SET PRINTER INT ENABLE
001710  000240                                      NOP                     ;WAIT
001712  042777  000100  177060                      BIC     #100,@LPS       ;CLEAR PRINTER INT. ENABLE

                                        ;TEST THAT THE PRINTER WILL NOT INT. AT
                                        ;PROCESSOR LEVEL 5

001720                                              $ERROR  \N
001720  012737  000017  001046  ERR17:  MOV     #17,    ERCOUNT         ;SET UP ERROR COUNT 17
                    000020                          N=N+1
001726  012777  000240  177054                      MOV     #240,@PSW       ;SET UP PROCESSOR TO LEVEL 5
001734  052777  000100  177036                      BIS     #100,@LPS       ;SET PRINTER INT ENABLE
001742  000240                                      NOP                     ;WAIT
001744  042777  000100  177026                      BIC     #100,@LPS       ;CLEAR INT ENABLE PRINTER OK

                                        ;TEST THAT THE PRINTER WILL NOT INT
                                        ;WHEN THE PROCESSOR IS AT LEVEL 4

001752                                              $ERROR  \N
001752  012737  000020  001046  ERR20:  MOV     #20,    ERCOUNT         ;SET UP ERROR COUNT 20
                    000021                          N=N+1
001760  012777  000200  177022                      MOV     #200,@PSW       ;SET PROCESSOR TO LEVEL 4
001766  052777  000100  177004                      BIS     #100,@LPS       ;SET PRINTER INT. ENABLE
001774  000240                                      NOP                     ;WAIT
001776  042777  000100  176774                      BIC     #100,@LPS       ;CLEAR PRINTER INT ENABLE
002004  000137  002022                              JMP     TEST1D          ;PRINTER OK CONTINUE

                                        ;INTERRUPT HANDLE FOR TEST1C
                                        ;RESTORE STACK AND REPORT ERROR

002010  022626          INT1C:  CMP     (6)+,(6)+       ;RESTORE STACK
002012  004537  010236          JSR     %5,$TAER        ;REPORT ERROR
002016  000137  001554          JMP     TEST1C          ;RE-ENTER TEST1C

                                        ;TEST THE ABILITY OF THE PRINTER TO INTERRUPT
                                        ;AT PRIORITY LEVEL 4

002022  012737  002134  000200  TEST1D: MOV     #INT1D,200      ;SET UP INTERRUPT VECTOR
002030  012737  000340  000202          MOV     #340,202        ;LOCK UP PRIORITIES
002036  005777  176736                  TST     @LPS            ;IS THERE A PRINTER ERROR
002042  100006                          BPL     LP4             ;NO! CONTINUE
002044                                  $ERROR  \N
```

```
 1229  002044  012737  000021  001046  ERR21:  MOV     #21,    ERCOUNT         ;SET UP ERROR COUNT 21
 1230          000022                          N=N+1
 1231  002052  004537  010236                  JSR     %5,STAER        ;REPORT PRINTER ERROR
 1232  002056  000761                          BR      TEST1D          ;LOOP ON ERROR
 1233  002060  105777  176714          LP4:    TSTB    @LPS            ;IS READY SET
 1234  002064  100406                          BMI     LP5             ;YES - PRINTER READY
 1235  002066                                  $ERROR  \N
 1236  002066  012737  000022  001046  ERR22:  MOV     #22,    ERCOUNT         ;SET UP ERROR COUNT 22
 1237          000023                          N=N+1
 1238  002074  004537  010236                  JSR     %5,STAER        ;REPORT READY NOT SET
 1239  002100  000750                          BR      TEST1D          ;LOOP ON ERROR
 1240  002102  012777  000140  176700  LP5:    MOV     #140,@PSW       ;SET PRIORITY TO LEVEL 3
 1241  002110  052777  000100  176662          BIS     #100,@LPS       ;SET PRINTER INTERRUPT ENABLE
 1242  002116  000240                          NOP                     ;WAIT
 1243  002120                                  $ERROR  \N
 1244  002120  012737  000023  001046  ERR23:  MOV     #23,    ERCOUNT         ;SET UP ERROR COUNT 23
 1245          000024                          N=N+1
 1246  002126  004537  010236                  JSR     %5,STAER        ;REPORT ERROR
 1247  002132  000733                          BR      TEST1D          ;LOOP ON ERROR
 1248
 1249                                  ;INTERRUPT HANDLER FOR TEST1D
 1250
 1251  002134  022626                  INT1D:  CMP     (6)+,(6)+       ;RESET STACK
 1252  002136  042777  000100  176634          BIC     #100,@LPS       ;CLEAR INT.  ENABLE FOR PRINTER
 1253  002144  005077  176640                  CLR     @PSW            ;CLEAR PROCESSOR STATUS
 1254  002150  012737  012706  000200          MOV     #12706,200      ;RESET INSTRUCTION AT 200
 1255  002156  012737  001000  000202          MOV     #1000,202       ;RESET INSTRUCTION AT 202
 1256
 1257                                  ;1 MINUTE PRINT SPEED CHECK
 1258                                  ;IF A KW11-L OR KW11-P ARE NOT AVAILABLE,  THE SR BIT0 IS USED
 1259                                  ;FOR MANUAL TIMING OF THE PRINTER.
 1260
 1261  002164  012737  000002  000006  CLCKAV: MOV     #RTI,@#6        ;SET TRAP TO RETURN
 1262  002172  012737  000006  000004          MOV     #6,@#4
 1263  002200  000261                          SEC
 1264  002202  105777  176620                  TSTB    @LKS            ;KW11-L AVAILABLE?
 1265  002206  103404                          BCS     1$              ;NO,  BRANCH
 1266  002210  005037  000004                  CLR     @#4             ;RESET TRAP VECTOR TO HALT
 1267  002214  000137  002344                  JMP     KW11L           ;USE KW11L FOR TIMING
 1268  002220  000261                  1$:     SEC
 1269  002222  105777  176576                  TSTB    @PLKS           ;KW11-P AVAILABLE?
 1270  002226  103404                          BCS     SWTIME          ;NO,  USE SWITCH REG FOR TIMING
 1271  002230  005037  000004                  CLR     @#4             ;RESET TRAP VECTOR TO HALT
 1272  002234  000137  002302                  JMP     KW11P           ;USE KW11-P FOR TIMING
 1273  002240  005037  001036  SWTIME: CLR     LINCNT          ;CLEAR LINE COUNT
 1274  002244  004437  010022                  JSR     %4,TYPINT
 1275  002250  005037  000004                  CLR     @#4             ;RESET TRAP VECTOR TO HALT
 1276  002254  104000                          EMT     +0              ;TYPE MESSAGE
 1277  002256  010427                          MESC                    ;PRINT SPEED CHECK USING MANUAL TIMING
 1278  002260  012737  000002  002616          MOV     #2,DIA          ;SET DUMMY ADDRESS
 1279  002266  032777  000001  176510  1$:     BIT     #BIT0,@SWR      ;START?
 1280  002274  001774                          BEQ     1$              ;WAIT FOR START
 1281  002276  000137  002402                  JMP     START           ;START PRINTING
 1282
```

```
                                        ;START FOR KW11-P.....
                                        ;
002302  005037  001036          KW11P:  CLR     LINCNT          ;CLEAR LINE COUNT
0023C6  004437  010C12                  JSR     %4,TYPINT
002312  012706  001000                  MOV     #1000,%6        ;RESET STACK
002316  013777  003612  176476          MOV     MINCNT,@CSBR    ;SET CLOCK COUNT
002324  013737  001024  002616          MOV     PLKS,DIA        ;STORE PLKS ADDRESS
002332  012777  000105  176464          MOV     #105,@PLKS      ;START CLOCK
002340  000137  002402                  JMP     STARD           ;START PRINTING
                                        ;
                                        ;START FOR KW11-L.....
                                        ;
002344  005037  001036          KW11L:  CLR     LINCNT          ;CLEAR LINE COUNT
0023[illegible]  004437  010022                  JSR     %4,TYPINT
002[illegible]  012706  001000                  MOV     #1000,%6        ;RESET STACK
002[illegible]  013737  003612  002614          MOV     MINCNT,CNTR     ;SET CLOCK COUNT
002[illegible]  013737  001026  002616          MOV     LKS,DIA         ;STORE LKS ADDRESS
002374  012777  000100  176424          MOV     #100,@LKS       ;ENABLE CLOCK INTERRUPT
                                        ;
                                        ;PRINTING ROUTINE.....
                                        ;
002402  032777  020000  176374  STARD:  BIT     #BIT13,@SWR     ;CHECK CHAR SET
002410  001007                          BNE     STARDA          ;BRANCH IF 96
002412  012737  000140  001054          MOV     #140,LEGCHR     ;LEGAL CHECK
002420  012737  000100  001056          MOV     #100,NUMCHR     ;#CHARS
002426  000406                          BR      STARDB          ;CONTINUE
002430  012737  000200  001054  STARDA: MOV     #200,LEGCHR     ;LEGAL CHECK
002436  012737  000140  001056          MOV     #140,NUMCHR     ;#CHARS
                        STARDB:
002444  012737  000264  001032          MOV     #132.,CHRCNT    ;SET CHAR COUNT
002452  012737  001210  001050          MOV     #PATTB,STRCHR   ;INITIALIZE TABLE POINTER
002460  012737  000021  001040  STARA:  MOV     #17.,CYCCNT     ;SET GROUP COUNT
002466  017737  176[illegible]6  001034          MOV     @STRCHR,CHRGEN  ;GET CHAR FROM TABLE
002474  063737  001036  001034          ADD     LINCNT,CHRGEN   ;ADD LINE COUNT
002502  023737  001054  001034  1$:     CMP     LEGCHR,CHRGEN   ;LEGAL CHAR?
002510  003004                          BGT     STAR1           ;YES,  BRANCH
002512  163737  001056  001034          SUB     NUMCHR,CHRGEN   ;NO,  MAKE LEGAL
002520  000770                          BR      1$              ;RECHECK CHAR
002522  013777  001034  176252  STAR1:  MOV     CHRGEN,@LPB     ;LOAD BUFFER
002530  005337  001032                  DEC     CHRCNT          ;DECREMENT CHAR COUNT
002534  001410                          BEQ     STARED          ;BRANCH IF DONE LINE
002536  005337  001040                  DEC     CYCCNT          ;DECREMENT CYCCLE COUNT
002542  001367                          BNE     STAR1           ;CONTINUE IF NOT DONE GROUP
002544  062737  000002  001050          ADD     #2,STRCHR       ;ADD 2 TO TABLE POINTER
002552  000137  002460                  JMP     STARA           ;CONTINUE
002556  005237  001036          STARED: INC     LINCNT          ;INCREMENT LINE COUNT
002562  012777  000012  176212          MOV     #12,@LPB        ;SEND LF
                                        $WAIT
002570  105777  176204                  TSTB    @LPS            ;TEST READY
002574  100375                          BPL     .-4             ;WAIT FOR READY
002576  032777  000001  176200          BIT     #BIT0,@SWR      ;STOP PRINT?
002604  001411                          BEQ     CONVRT          ;YES,  BRANCH
002606  000137  002402                  JMP     STARD           ;CONTINUE
```

```
1337
1338  002612  007020                  MINCNT: 7020
1339  002614  000000                  CNTR:   0
1340  002616  000002                  DIA:    2
1341
1342
1343                                  ;NOTE -- PLACE 5670 (8)   IN MINCNT FOR 50 HZ. LINE FREQUENCY !!!
1344
1345                                  ;LINE CLOCK SERVICE ROUTINE FOR KW11-L
1346
1347  002620  005337  002614          LKSRV:  DEC     CNTR            ;DECREMENT COUNTER
1348  002624  001401                          BEQ     CONVRT          ;EXIT IF 1 MINUTE
1349  002626  000002                          RTI                     ;RETURN
1350
1351
1352                                  ;ROUNTINE TO PRINT NUMBER OF LINES PRINTED IN 1 MINUTE
1353
1354  002630  042777  000100  177760  CONVRT: BIC     #100,@DIA       ;DISABLE CLOCK INTERRUPT IF CLOCK AVAILABLE
1355  002636  005037  010152          CLR     TYPDAT          ;CLEAR DIGIT COUNT
1356  002642  012703  011442          MOV     #MES12,R3       ;SET MESSAGE POINTER
1357  002646  023727  000144  001036  1$:     CMP     #100.,LINCNT    ;GREATER THAN 100?
1358  002654  002006                  BGT     2$              ;NO,  PRINT HUNDRED'S DIGIT
1359  002656  163727  000144  001036          SUB     #100.,LINCNT    ;YES,  SUBTRACT 100
1360  002664  005237  010152          INC     TYPDAT          ;INCREMENT HUNDRED'S DIGIT
1361  002670  000766                  BR      1$              ;CONTINUE CONVERSION
1362  002672  062737  000060  010152  2$:     ADD     #60,TYPDAT      ;MAKE ASCII
1363  002700  113723  010152          MOVB    TYPDAT,(R3)+    ;STORE DIGIT
1364  002704  005037  010152          CLR     TYPDAT          ;CLEAR DIGIT COUNTER
1365  002710  023727  000012  001036  3$:     CMP     #10.,LINCNT     ;GREATER THEN 10?
1366  002716  002006                  BGT     4$              ;NO,  PRINT DIGIT
1367  002720  163727  000012  001036          SUB     #10.,LINCNT     ;YES,  SUBTRACT 10
1368  002726  005237  010152          INC     TYPDAT          ;INCREMENT TEN'S DIGIT
1369  002732  000766                  BR      3$              ;CONTINUE CONVERSION
1370  002734  062737  000060  010152  4$:     ADD     #60,TYPDAT      ;MAKE ASCII
1371  002742  113723  010152          MOVB    TYPDAT,(R3)+    ;STORE DIGIT
1372  002746  013737  001036  010152          MOV     LINCNT,TYPDAT   ;GET ONE'S DIGIT
1373  002754  062737  000060  010152          ADD     #60,TYPDAT      ;MAKE ASCII
1374  002762  113723  010152          MOVB    TYPDAT,(R3)+    ;STORE DIGIT
1375  002766  104000                  EMT     +0              ;TYPE MESSAGE
1376  002770  011404                  MES11                   ;TYPE PRINT SPEED
1377  002772  012737  011402  010020          MOV     #MES11A,PRTMSG  ;SET PRINTER MESSAGE ADDRESS
1378  003000  004437  010002          JSR     R4,RINT         ;PRINT PRINTER SPEED ON LINE PRINTER
1379  003004  000137  003030          JMP     SLEWCK          ;NEXT TEST
1380
1381
1382
1383  003010  000040                  PATTB:  40
1384  003012  000117                          117
1385  003014  000076                          76
1386  003016  000055                          55
1387  003020  000134                          134
1388  003022  000113                          113
1389  003024  000072                          72
1390  003026  000051                          51
```

```
1391
1392                                    ;CHECK TOP OF FORM SWITCH
1393
1394  003030  004437  010022  SLEWCK:   JSR     %4,TYPINT
1395  003034  004537  007676            JSR     %5,PRTINT       ;INITIALIZE PRINTER
1396  003040  000406                    BR      SLW             ;BRANCH IF OK
1397  003042                            $ERROR  \N
1398  003042  012737  000024  001046  ERR24:   MOV     #24,    ERCOUNT         ;SET UP ERROR COUNT 24
1399          000025                    N=N+1
1400  003050  004537  010236            JSR     %5,STAER        ;REPORT PRINTER NOT READY
1401  003054  000000                    HALT                    ;HALT ON ERROR
1402  003056  012737  003272  001036  SLW:     MOV     #FFTAB,LINCNT   ;LINE COUNT FOR SWITCH SETTING
1403  003064  012704  003350            MOV     #FFSET,%4       ;INIT SWITCH SETTING TABLE POINTER
1404  003070  012703  011156          SLW0:   MOV     #MES8,%3        ;INIT MESSAGE POINTER
1405  003074  012702  011271                  MOV     #MES10,%2       ;
1406  003100  111413                  SLW1:   MOVB    (%4),(%3)       ;PUT SWITCH SETTINGS INTO MESSAGES
1407  003102  111412                          MOVB    (%4),(%2)       ;
1408  003104  122423                          CMPB    (%4)+,(%3)+     ;INCREMENT POINTERS
1409  003106  105722                          TSTB    (%2)+
1410  003110  105714                          TSTB    (%4)            ;DONE MOVING SWITCH SETTINGS TO MSG'S?
1411  003112  001372                          BNE     SLW1            ;BRANCH IF NOT DONE
1412  003114  005204                          INC     %4              ;TABLE POINTER SET FOR NEXT SWITCH SETTING
1413  003116  104000                          EMT     +0              ;TYPE MESSAGE
1414  003120  011122                          MES7                    ;SET TOP OF FORM SWITCH TO ---
1415  003122  000000                          HALT                    ;WAIT FOR OPERATOR TO SET SWITCH
1416  003124  005777  175706          SLW11:  TST     @LINCNT         ;CHECK LINE COUNT
1417  003130  001003                          BNE     SLW1A           ;BRANCH IF NOT ZERO
1418  003132  012737  011471  010020          MOV     #MES13,PRTMSG   ;CHANGE PRINTER MESSAGE
1419  003140  005777  175634          SLW1A:  TST     @LPS            ;TEST FOR ERRORS
1420  003144  100006                          BPL     SLW2            ;BRANCH IF NO ERROR
1421  003146                                  $ERROR  \N
1422  003146  012737  000025  001046  ERR25:   MOV     #25,    ERCOUNT         ;SET UP ERROR COUNT 25
1423          000026                    N=N+1
1424  003154  004537  010236            JSR     %5,STAER        ;REPORT ERROR SET
1425  003160  000000                    HALT                    ;HALT ON ERROR
1426  003162  012777  000014  175612  SLW2:   MOV     #14,@LPB        ;SEND FF
1427  003170                            $WAIT
1428  003170  105777  175604            TSTB    @LPS            ;TEST READY
1429  003174  100375                    BPL     .-4             ;WAIT FOR READY
1430  003176  004437  010002            JSR     %4,RINT         ;PRINT MESSAGE ON LINE PRINTER
1431  003202  062737  000002  001036    ADD     #2,LINCNT       ;NEXT LINE COUNT
1432  003210  022737  003346  001036    CMP     #FTABE,LINCNT   ;DONE TEST?
1433  003216  001410                    BEQ     DAVAV           ;YES,  EXIT
1434  003220  005777  175612            TST     @LINCNT         ;DONE CHECK OF THIS SWITCH SETTING?
1435  003224  001721                    BEQ     SLW0            ;YES,  NEXT SWITCH SETTING
1436  003226  012737  011174  010020    MOV     #MES9,PRTMSG    ;NO,  CHECK THIS SETTING
1437  003234  000137  003124            JMP     SLW11           ;CONTINUE
1438  003240  013737  012404  011156  DAVAV:  MOV     TNO13,MES8      ;SET MESSAGE
1439  003246  104000                    EMT     +0              ;TYPE MESSAGE
1440  003250  011120                    MES7A                   ;RESET TOP OF FORM SWITCH
1441  003252  000000                    HALT                    ;WAIT FOR OPERATOR
1442  003254  032777  040000  175522    BIT     #BIT14,@SWR     ;DAVFU AVAILABLE?
1443  003262  001060                    BNE     INDAT           ;YES,  DO DAVFU TESTS
1444  003264  000000                    HALT                    ;DONE OPERATOR TESTS  -  HALT
```

```
  1445  003266  000137  004060                JMP     TEST2           ;DEPRESS CONTINUE TO START PRINTING TESTS
  1446
  1447  003272  000000                FFTAB:  0                       ;LOOP COUNTS FOR SLEW CHECKS
  1448  003274  000022                        18.
  1449  003276  000000                        0
  1450  003300  000025                        21.
  1451  003302  000000                        0
  1452  003304  000030                        24.
  1453  003306  000000                        0
  1454  003310  000041                        33.
  1455  003312  000000                        0
  1456  003314  000044                        36.
  1457  003316  000000                        0
  1458  003320  000052                        42.
  1459  003322  000000                        0
  1460  003324  000060                        48.
  1461  003326  000000                        0
  1462  003330  000063                        51.
  1463  003332  000000                        0
  1464  003334  000102                        66.
  1465  003336  000000                        0
  1466  003340  000110                        72.
  1467  003342  000000                        0
  1468  003344  000124                        84.
  1469  003346  000000                FFABE:  0
  1470
  1471
  1472  003350  020063  000040       FFSET:  .ASCIZ  /3  /           ;SWITCH SETTINGS FOR MESSAGES
  1473  003354  027063  000065               .ASCIZ  /3.5/
  1474  003360  020064  000040               .ASCIZ  /4  /
  1475  003364  027065  000065               .ASCIZ  /5.5/
  1476  003370  020066  000040               .ASCIZ  /6  /
  1477  003374  020067  000040               .ASCIZ  /7  /
  1478  003400  020070  000040               .ASCIZ  /8  /
  1479  003404  027070  000065               .ASCIZ  /8.5/
  1480  003410  030461  000040               .ASCIZ  /11 /
  1481  003414  031061  000040               .ASCIZ  /12 /
  1482  003420  032061  000040               .ASCIZ  /14 /
  1483
  1484
  1485                                  .EVEN
  1486
  1487                                  ;CHECK THAT VFU WILL NOT ACCEPT INCOMPLETE DATA
  1488
  1489  003424  004437  010022       INDAT:  JSR     X4,TYPINT
  1490  003430  012737  003560  001034       MOV     #INDATT,CHRGEN  ;SET TABLE POINTER
  1491  003436  005777  175336       INDO:   TST     @LPS            ;TEST FOR ERROR
  1492  003442  100010                       BPL     INDATO          ;BRANCH IF NO ERROR
  1493  003444                               $ERROR  \N
  1494  003444  012737  000026  001046 ERR26:  MOV     #26,    ERCOUNT         ;SET UP ERROR COUNT 26
  1495          000027                       N=N+1
  1496  003452  004537  010236               JSR     X5,STAER        ;REPORT ERROR SET
  1497  003456  000000                       HALT                    ;HALT ON ERROR
  1498  003460  000137  003424               JMP     INDAT           ;RESTART TEST
```

```
1499  003464  017777  175344  175310  INDATO: MOV     @CHRGEN,@LPB    ;LOAD BUFFER
1500  003472  062737  000002  001034          ADD     #2,CHRGEN       ;NEXT DATA
1501  003500  005777  175330                  TST     @CHRGEN         ;TEST CHAR
1502  003504  001405                          BEQ     IND1            ;CONTINUE IF DONE
1503  003506                                  $WAIT
1504  003506  105777  175266                  TSTB    @LPS            ;TEST READY
1505  003512  100375                          BPL     .-4             ;WAIT FOR READY
1506  003514  000137  003436                  JMP     INDO
1507  003520  005777  175254          IND1:   TST     @LPS            ;TEST FOR ERROR SET
1508  003524  100410                          BMI     INDAT1          ;BRANCH IF ERROR SET
1509  003526                                  $ERROR  \N
1510  003526  012737  000027  001046  ERR27:  MOV     #27,    ERCOUNT         ;SET UP ERROR COUNT 27
1511          000030                          N=N+1
1512  003534  004537  010236                  JSR     X5,STAER        ;REPORT ERROR NOT SET
1513  003540  000000                          HALT                    ;HALT ON ERROR
1514  003542  000137  003424                  JMP     INDAT           ;RESTART TEST
1515  003546  104000          INDAT1: EMT     +0              ;TYPE MESSAGE
1516  003550  010307                  MESA                    ;ERROR SET OK - CLEAR & TURN ON LINE
1517  003552  000000                  HALT                    ;WAIT FOR OPERATOR
1518                                                          ;DEPRESS CONTINUE WHEN READY FOR NEXT TEST
1519  003554  000137  003574                  JMP     NODAT           ;NEXT TEST
1520
1521  003560  000356          INDATT: 356                     ;DATA TABLE FOR ABOVE TEST
1522  003562  000001                  1
1523  003564  000002                  2
1524  003566  000003                  3
1525  003570  000357                  357
1526  003572  000000                  0
1527
1528                          ;CHECK THAT CHANNELS WITH NO STOP BITS CAUSE ERRORS IF CHANNEL SELECTED
1529
1530  003574  004437  010022          NODAT:  JSP     X4,TYPINT
1531  003600  012737  000200  001050          MOV     #200,STRCHR     ;SET PAPER INSTRUCTION
1532  003606  012737  003636  001034  NODDA:  MOV     #NODAT3,CHRGEN  ;SET TABLE POINTER FOR LOAD
1533  003614  005777  175160          NODD:   TST     @LPS            ;TEST FOR ERROR
1534  003620  100007                          BPL     NODATO          ;BRANCH IF NO ERROR
1535  003622                                  $ERROR  \N
1536  003622  012737  000030  001046  ERR30:  MOV     #30,    ERCOUNT         ;SET UP ERROR COUNT 30
1537          000031                          N=N+1
1538  003630  004537  010236                  JSR     X5,STAER        ;REPORT ERROR SET
1539  003634  000000                          HALT                    ;HALT ON ERROR
1540  003636  000756                          BR      NODAT           ;RESTART TEST
1541  003640  017777  175170  175134  NODATO: MOV     @CHRGEN,@LPB    ;LOAD BUFFER
1542  003646  062737  000002  001034          ADD     #2,CHRGEN       ;NEXT DATA
1543  003654  027737  004060  001034          CMP     #NODAT4+2,CHRGEN        ;DONE LOAD?
1544  003662  001405                          BEQ     NODATA          ;BRANCH IF DONE
1545  003664                                  $WAIT
1546  003664  105777  175110                  TSTB    @LPS            ;TEST READY
1547  003670  100375                          BPL     .-4             ;WAIT FOR READY
1548  003672  000137  003614                  JMP     NODD
1549  003676  013777  001050  175076  NODATA: MOV     STRCHR,@LPB     ;SEND DATA
1550  003704  005037  001032                  CLR     CHRCNT          ;DELAY
1551  003710  005237  001032          1$:     INC     CHRCNT
1552  003714  001375                          BNE     1$
```

```
1553  003716  005777  175056                  TST     @LPS            ;TEST FOR ERROR SET
1554  003722  100410                          BMI     NODAT1          ;BRANCH IF ERROR SET
1555  003724                                  $ERROR  \N
1556  003724  012737  000031  001046  ERR31:  MOV     #31,    ERCOUNT         ;SET UP ERROR COUNT 31
1557          000032                          N=N+1
1558  003732  004537  010236                  JSR     x5,STAER        ;REPORT ERROR NOT SET
1559  003736  000000                          HALT                    ;HALT ON ERROR
1560  003740  000137  003606                  JMP     NODOA           ;RETEST
1561  003744  005237  001050          NODAT1: INC     STRCHR          ;NEXT PAPER INSTRUCTION
1562  003750  022737  000214  001050          CMP     #214,STRCHR     ;DONE TEST?
1563  003756  001404                          BEQ     NODAT2          ;CONTINUE IF NOT DONE
1564  003760  104000                          EMT     +0              ;TYPE MESSAGE
1565  003762  010354                          MESB                    ;ERROR SET OK - CLEAR & TRY NEXT CHANNEL
1566  003764  000000                          HALT                    ;WAIT FOR OPERATOR
1567  003766  000707                          BR      NODOA           ;RELOAD & TEST NEXT CHANNEL
1568  003770  104000          NODAT2: EMT     +0              ;TYPE MESSAGE
1569  003772  010307                          MESA                    ;ERROR SET OK - TURN ON LINE
1570  003774  000137  004060                  JMP     TEST2           ;JUMP
1571
1572
1573  004000  000356          NODAT3: 356                             ;START LOAD
1574  004002  000000                          0
1575  004004  000000                          0
1576  004006  000000                          0
1577  004010  000000                          0
1578  004012  000000                          0
1579  004014  000000                          0
1580  004016  000000                          0
1581  004020  000000                          0
1582  004022  000000                          0
1583  004024  000000                          0
1584  004026  000000                          0
1585  004030  000000                          0
1586  004032  000000                          0
1587  004034  000000                          0
1588  004036  000000                          0
1589  004040  000000                          0
1590  004042  000000                          0
1591  004044  000000                          0
1592  004046  000000                          0
1593  004050  000000                          0
1594  004052  000000                          0
1595  004054  000000                          0
1596  004056  000357          NODAT4: 357                             ;STOP LOAD
1597
1598                          ;TEST 2
1599                          ;TESTS INTERFACE AND PRINTER DATA PATHS
1600                          ;WITH ALTERNATING ONES AND ZEROS
1601
1602  004060  004437  010022  TEST2:  JSR     x4,TYPINT
1603  004064  004537  007676          JSR     x5,PRTINT       ;INITIALIZE PRINTER
1604  004070  000406                  BR      TST2AX          ;BRANCH IF OK
1605  004072                          $ERROR  \N
1606  004072  012737  000032  001046  ERR32:  MOV     #32,    ERCOUNT         ;SET UP ERROR COUNT 32
```

```
1607                 000033                          N=N+1
1608  004100  004537 010236                          JSR     %5,STAER        ;REPORT PRINTER NOT READY
1609  004104  000000                                 HALT                    ;HALT ON ERROR
1610  004106                              TST2AX:    $PRINT  \M
1611  004106  013737 012362 011716                   MOV     TNO2,MES15              ;SET TEST NUMBER FOR MESSAGE
1612  004114  004437 007752                          JSR     %4,PRNNT                ;PRINT TEST NUMBER
1613                 000003                          M=M+1
1614  004120  012737 177740 001040                   MOV     #-32.,CYCCNT    ;SET UP LINE COUNT FOR 32 LINES
1615  004126  012737 177574 001032                   MOV     #-132.,CHRCNT   ;SET CHAR COUNT TO 132
1616  004134  013737 004210 001050                   MOV     SCHRSW,STRCHR   ;SET CHAR. SWITCH TO U
1617  004142  005777 174632                 T3A:     TST     @LPS            ;TEST FOR ERROR
1618  004146  100006                                 BPL     LP2B            ;NO ERROR CONTINUE
1619  004150                                         $ERROR  \N
1620  004150  012737 000033 001046          ERR33:   MOV     #33,    ERCOUNT         ;SET UP ERROR COUNT 33
1621                 000034                          N=N+1
1622  004156  004437 010236                          JSR     %5,STAER        ;REPORT ERROR SET
1623  004162  000000                                 HALT                    ;HALT ON ERROR
1624  004164  000177 174660                 LP2B:    JMP     @STRCHR         ;LOAD CHAR
1625  004170  013737 004212 001050          T2A:     MOV     RCHRSW,STRCHR   ;RESET CHAR. SWITCH
1626  004176  012737 000125 001044                   MOV     #125,SAVE       ;STORE CHAR
1627  004204  000137 004230                          JMP     T5A             ;LOAD CHAR
1628
1629  004210  004170                         SCHRSW:  T2A
1630  004212  004214                         RCHRSW:  T1A
1631
1632  004214  013737 004210 001050          T1A:     MOV     SCHRSW,STRCHR   ;SET CHAR. SWITCH TO U
1633  004222  012737 000052 001044                   MOV     #52,SAVE        ;STORE CHAR
1634  004230  013777 001044 174544          T5A:     MOV     SAVE,@LPB       ;LOAD BUFFER
1635  004236  005237 001032                          INC     CHRCNT          ;INC CHARACTER COUNT
1636  004242  001337                                 BNE     T3A             ;CONTINUE
1637  004244  012777 000012 174530                   MOV     #12,@LPB        ;SEND LF
1638  004252                                         $WAIT
1639  004252  105777 174522                          TSTB    @LPS            ;TEST READY
1640  004256  100375                                 BPL     .-4             ;WAIT FOR READY
1641  004260  012737 177574 001032                   MOV     #-132.,CHRCNT   ;RESET CHAR COUNT
1642  004266  005237 001040                          INC     CYCCNT          ;INC CYCLE COUNT
1643  004272  001356                                 BNE     T5A             ;CONTINUE IF NOT DONE
1644  004274  032777 010000 174502                   BIT     #BIT12,@SWR     ;LOOP ON TEST'
1645  004302  001266                                 BNE     TEST2           ;LOOP
1646
1647                                         ;TEST 3
1648                                         ;TEST CHARACTER COMPARATOR WITH ALTERNATE LINES OF
1649                                         ;ALL CHARACTERS AND ILLEGAL CHARACTERS
1650
1651  004304  004437 010022                 TEST3:   JSR     %4,TYPINT
1652  004310                                         $PRINT  \M
1653  004310  013737 012364 011716                   MOV     TNO3,MES15              ;SET TEST NUMBER FOR MESSAGE
1654  004316  004437 007752                          JSR     %4,PRNNT                ;PRINT TEST NUMBER
1655                 000004                          M=M+1
1656  004322  012737 177765 001040                   MOV     #-13,CYCCNT     ;SET 21 LINES
1657  004330  000137 004462                          JMP     LP2H            ;SEND ILLEGAL CHARS FIRST TO GIVE BLANK LINE
1658  004334  012737 177574 001032          T2B0:    MOV     #-132.,CHRCNT   ;SET CHAR COUNT FOR 132
1659  004342  012737 000040 001034          T2B0A:   MOV     #40,CHRGEN      ;SET FIRST CHAR.
1660  004350  005777 174424                 T2B1:    TST     @LPS            ;DOES THE PRINTER HAVE AN ERROR
```

```
1661  004354  100006                                  BPL     LP2E            ;BRANCH IF NO ERROR
1662  004356                                          $ERROR  \N
1663  004356  012737  000034  001046  ERR34:         MOV     #34,    ERCOUNT         ;SET UP ERROR COUNT 34
1664          000035                                  N=N+1
1665  004364  004537  010236                          JSR     %5,STAER        ;REPORT ERROR
1666  004370  000000                                  HALT                    ;HALT ON ERROR
1667  004372  013777  001034  174402  LP2E:          MOV     CHRGEN,@LPB     ;PRINT CHARACTER
1668  004400  005237  001032                          INC     CHRCNT          ;INC. CHAR. COUNT
1669  004404  001420                                  BEQ     T282            ;BRANCH IF LINE IS FINISHED
1670  004406  005237  001034                          INC     CHRGEN          ;NEXT CHAR
1671  004412  032777  020000  174364                  BIT     #BIT13,@SWR     ;CHECK CHAR SET
1672  004420  001405                                  BEQ     T2828           ;BRANCH IF 64 CHARS
1673  004422  022737  000200  001034                  CMP     #200,CHRGEN     ;LEGAL CHAR?
1674  004430  001744                                  BEQ     T280A           ;MAKE SPACE IF ILLEGAL
1675  004432  000746                                  BR      T281            ;CONTINUE IF LEGAL CHAR
1676  004434  022737  000140  001034  T2828:         CMP     #140,CHRGEN     ;LEGAL CHAR?
1677  004442  001737                                  BEQ     T280A           ;MAKE SPACE IF ILLEGAL
1678  004444  000741                                  BR      T281            ;CONTINUE IF LEGAL CHAR
1679  004446  012777  000012  174326  T282:          MOV     #12,@LPB        ;ISSUE LINE FEED
1680  004454                                          $WAIT
1681  004454  105777  174320                          TSTB    @LPS            ;TEST READY
1682  004460  100375                                  BPL     .-4             ;WAIT FOR READY
1683  004462  005037  001034          LP2H:          CLR     CHRGEN          ;FIRST ILLEGAL CHAR
1684  004466  005777  174306          T283:          TST     @LPS            ;TEST FOR ERROR
1685  004472  100006                                  BPL     LDCH            ;BRANCH IF NO ERROR
1686  004474                                          $ERROR  \N
1687  004474  012737  000035  001046  ERR35:         MOV     #35,    ERCOUNT         ;SET UP ERROR COUNT 35
1688          000036                                  N=N+1
1689  004502  004537  010236                          JSR     %5,STAER        ;REPORT ERROR SET
1690  004506  000000                                  HALT                    ;HALT ON ERROR
1691  004510  013777  001034  174264  LDCH:          MOV     CHRGEN,@LPB     ;TRANSMIT CHARACTER
1692  004516  005237  001034          T284:          INC     CHRGEN          ;NEXT CHAR
1693  004522  022737  000012  001034                  CMP     #12,CHRGEN      ;TEST FOR LINE FEED
1694  004530  001772                                  BEQ     T284            ;SKIP IF LF
1695  004532  022737  000014  001034                  CMP     #14,CHRGEN      ;TEST FOR FORM FEED
1696  004540  001766                                  BEQ     T284            ;SKIP IF FF
1697  004542  022737  000015  001034                  CMP     #15,CHRGEN      ;TEST FOR CARRIAGE RETURN
1698  004550  001762                                  BEQ     T284            ;SKIP IF CR
1699  004552  023727  001034  000040                  CMP     CHRGEN,#40      ;CHECK IF LEGAL CHAR
1700  004560  002753                                  BLT     LDCH            ;CONTINUE IF STILL ILLEGAL CHAR
1701  004562  032777  020000  174214                  BIT     #BIT13,@SWR     ;CHECK CHAR SET
1702  004570  001007                                  BNE     T285            ;BRANCH IF 96 CHAR SET
1703  004572  052737  000100  001034                  BIS     #100,CHRGEN     ;SET BIT 7 IF NOT SET
1704  004600  032737  000200  001034                  BIT     #200,CHRGEN     ;DONE ILLEGAL CHARS?
1705  004606  001740                                  BEQ     LDCH            ;BRANCH IF NOT DONE
1706  004610  012777  000012  174164  T285:          MOV     #12,@LPB        ;ISSUE LINE FEED
1707  004616                                          $WAIT
1708  004616  105777  174156                          TSTB    @LPS            ;TEST READY
1709  004622  100375                                  BPL     .-4             ;WAIT FOR READY
1710  004624  005237  001040                          INC     CYCCNT          ;INCREMENT LINE COUNT
1711  004630  001241                                  BNE     T280            ;CONTINUE IF NOT DONE
1712  004632  032777  010000  174144                  BIT     #BIT12,@SWR     ;CHECK TO LOOP ON TEST
1713  004640  001221                                  BNE     TEST3           ;LOOP
1714
```

```
                                        ;TEST 4
                                        ;OVER PRINT TEST
                                        ;OVER PRINT FULL LINES OF ALTERNATING E'S AND SPACES

004642  004437  010022        CHRCHK: JSR     %4,TYPINT
004646                                SPRINT  \M
004646  013737  012366  011716        MOV     TN04,MES15              ;SET TEST NUMBER FOR MESSAGE
004654  004437  007752                JSR     %4,PRNNT                ;PRINT TEST NUMBER
                000005                M=M+1
004660  012737  177750  001036        MOV     #-24.,LINCNT    ;SET UP LINE COUNT FOR 24 LINES
004666  012737  177776  001040        MOV     #-2,CYCCNT      ;SET UP CYCLE COUNT
004674  013737  005036  001050        MOV     CHRE,STRCHR     ;SET CHAR TAG TO SPACE
004702  012737  177574  001032  CR:   MOV     #-132.,CHRCNT   ;SET CHAR COUNT
004710  005777  174064        CR0:    TST     @LPS            ;TEST FOR ERROR
004714  100006                        BPL     CR1             ;CONTINUE IF NO ERROR
004716                                SERROR  \N
004716  012737  000036  001046  ERR36: MOV     #36,    ERCOUNT         ;SET UP ERROR COUNT 36
                000037                M=M+1
004724  004537  010236                JSR     %5,STAER        ;REPORT ERROR SET
004730  000000                        HALT                    ;HALT ON ERROR
004732  000177  174112        CR1:    JMP     @STRCHR         ;OPPOSITE CHAR
004736  013737  005036  001050  CR2:   MOV     CHRE,STRCHR     ;SET CHAR SWITCH TO SPACE
004744  012737  000105  001044        MOV     #105,SAVE       ;SEND E
004752  013777  001044  174022  CR3:   MOV     SAVE,@LPB       ;LOAD BUFFER
004760  005237  001032                INC     CHRCNT          ;INCREMENT CHAR COUNT
004764  001351                        BNE     CR0             ;BRANCH IF NOT DONE
004766  005237  001040                INC     CYCCNT          ;INCREMENT CYCLE COUNT
004772  001422                        BEQ     CR5             ;BRANCH IF FINISHED OVERPRINTS
004774  012777  000015  174000        MOV     #15,@LPB        ;SEND CR
005002                                SWAIT
005002  105777  173772                TSTB    @LPS            ;TEST READY
005006  100375                        BPL     .-4             ;WAIT FOR READY
005010  000137  004702                JMP     CR              ;OVERPRINT LINE
005014  013737  005034  001050  CR7:   MOV     CHRS,STRCHR     ;RESET CHAR SWITCH
005022  012737  000040  001044        MOV     #40,SAVE        ;SEND SPACE
005030  000137  004752                JMP     CR3             ;CONTINUE

005034  004736          CHRS:   CR2
005036  005014          CHRE:   CR7
005040  012777  000012  173734  CR5:   MOV     #12,@LPB        ;SEND LF
005046                                SWAIT
005046  105777  173726                TSTB    @LPS            ;TEST READY
005052  100375                        BPL     .-4             ;WAIT FOR READY
005054  012737  177776  001040        MOV     #-2,CYCCNT      ;RESET CYCLE COUNT
005062  012737  177574  001032        MOV     #-132.,CHRCNT   ;RESET CHAR COUNT
005070  005237  001036                INC     LINCNT          ;INCREMENT LINE COUNT
005074  001326                        BNE     CR3             ;BRANCH IF NOT DONE
005076  032777  010000  173700        BIT     #BIT12,@SWR     ;LOOP ON TEST?
005104  001256                        BNE     CHRCHK          ;YES,  LOOP


                                        ;TEST 5
                                        ;SHUTTLE POSITIONING TEST
```

```
1769                                    ;SENDS PAIRS OF E'S,  THEN OVER PRINTS THEM WITH SPACES AND ADDS ANOTHER
1770                                    ;PAIR OF E'S TO THE LINE ---  THIS IS REPEATED UNTIL A FULL LINE OF E'S
1771                                    ;HAVE BEEN PRINTED,  THEN A FULL LINE OF M'S ARE PRINTED.
1772
1773  005106  004437  010022          OVRPRT: JSR     %4,TYPINT
1774  005112                                  $PRINT  \M
1775  005112  013737  012370  011716          MOV     TNOS,MES15              ;SET TEST NUMBER FOR MESSAGE
1776  005120  004437  007752                  JSR     %4,PRNNT                ;PRINT TEST NUMBER
1777          000006                          M=M+1
1778  005124  012737  177760  001036          MOV     #-16.,LINCNT    ;SET LINE COUNT FOR 16 LINES
1779  005132  012737  177574  001032  OVR:    MOV     #-132.,CHRCNT   ;SET CHAR COUNT
1780  005140  012737  177776  001040  OVRO:   MOV     #-2,CYCCNT      ;SET CYCLE COUNT FOR A PAIR OF E'S
1781  005146  013737  001032  001052          MOV     CHRCNT,STRCNT   ;NO.  CHARS LEFT TO PRINT
1782  005154  062737  000205  001052          ADD     #133.,STRCNT    ;NO.  SPACES +1
1783  005162  012737  000040  001034          MOV     #40,CHRGEN      ;SEND SPACE
1784  005170  000406                          BR      OVR2            ;BRANCH
1785  005172  012737  000105  001034  OVR4:   MOV     #105,CHRGEN     ;SEND E
1786  005200  013777  001034  173574  OVR1:   MOV     CHRGEN,@LPB     ;LOAD BUFFER
1787  005206  005777  173566          OVR2:   TST     @LPS            ;TEST FOR ERROR
1788  005212  100006                          BPL     OVR3            ;BRANCH IF NO ERROR
1789  005214                                  $ERROR  \N
1790  005214  012737  000037  001046  ERR37:  MOV     #37,    ERCOUNT         ;SET UP ERROR COUNT 37
1791          000040                          N=N+1
1792  005222  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
1793  005226  000000                          HALT
1794  005230  005337  001052          OVR3:   DEC     STRCNT          ;DECREMENT SPACE COUNTER
1795  005234  003361                          BGT     OVR1            ;BRANCH IF NOT DONE SPACES
1796  005236  001755                          BEQ     OVR4            ;BRANCH IF NOT FIRST E
1797  005240  005237  001032                  INC     CHRCNT          ;INCREMENT CHAR COUNT
1798  005244  001437                          BEQ     OVR8            ;BRANCH IF DONE LINE
1799  005246  005237  001040          OVR5:   INC     CYCCNT          ;INCREMENT CYCLE COUNT
1800  005252  001352                          BNE     OVR1            ;CONTINUE SENDING E'S IF NOT DONE
1801  005254  012777  000015  173520          MOV     #15,@LPB        ;SEND CR
1802  005262                          OVR6:   SWAIT
1803  005262  105777  173512                  TSTB    @LPS            ;TEST READY
1804  005266  100375                          BPL     .-4             ;WAIT FOR READY
1805  005270  005737  001032                  TST     CHRCNT          ;LINE DONE?
1806  005274  001321                          BNE     OVRO            ;NO,  CONTINUE OVER PRINT
1807  005276  005237  001036                  INC     LINCNT          ;YES,  INCREMENT LINE COUNT
1808  005302  001425                          BEQ     OVREXT          ;EXIT IF DONE TEST
1809  005304  032737  000001  001036          BIT     #1,LINCNT       ;WHICH LINE NEXT?
1810  005312  001707                          BEQ     OVR             ;BRANCH TO SEND E'S
1811  005314  012737  000115  001034          MOV     #115,CHRGEN     ;SET UP TO SEND M'S
1812  005322  012737  177573  001032          MOV     #-133.,CHRCNT   ;SET CHAR COUNT
1813  005330  005037  001052                  CLR     STRCNT          ;CLEAR SPACE COUNT
1814  005334  005037  001040                  CLR     CYCCNT          ;CLEAR CYCLE COUNT
1815  005340  000137  005206                  JMP     OVR2            ;PRINT LINE OF M'S
1816  005344  012777  000012  173430  OVR8:   MOV     #12,@LPB        ;SEND LF
1817  005352  000137  005262                  JMP     OVR6            ;CONTINUE
1818  005356  032777  010000  173420  OVREXT: BIT     #BIT12,@SWR     ;LOOP ON TEST?
1819  005364  001250                          BNE     OVRPRT          ;LOOP
1820
1821                                    ;TEST 6
1822                                    ;PRINT CONTROL TEST
```

```
1823                                    ;SENDS FULL LINE OF SAME CHARACTER THEN FULL CHAR SET
1824                                    ;SHOULD ONLY PRINT THE FIRST 132 CHARACTERS RECEIVED
1825
1826  005366  004437  010022      PRTCTL: JSR     %4,TYPINT
1827  005372                              $PRINT  \M
1828  005372  013737  012372  011716      MOV     TNO6,MES15              ;SET TEST NUMBER FOR MESSAGE
1829  005400  004437  007752              JSR     %4,PRNNT                ;PRINT TEST NUMBER
1830          000007                      M=M+1
1831  005404  012737  000060  001050      MOV     #60,STRCHR      ;FIRST START CHAR
1832  005412  032777  020000  173364 PRT0:  BIT     #BIT13,@SWR     ;TEST FOR CHAR SET
1833  005420  001404                      BEQ     PRT1            ;BRANCH IF 64 CHARS
1834  005422  012737  177641  001030      MOV     #-95.,SEGCNT    ;SET OVERFLOW COUNT
1835  005430  000403                      BR      PRT2            ;BRANCH
1836  005432  012737  177701  001030 PRT1:  MOV     #-63.,SEGCNT    ;SET OVERFLOW COUNT
1837  005440  012737  177574  001032 PRT2:  MOV     #-132.,CHRCNT   ;SET CHAR COUNT
1838  005446  013737  001050  001034      MOV     STRCHR,CHRGEN   ;GET START CHAR
1839  005454  005777  173320      PRT3:   TST     @LPS            ;TEST FOR ERROR
1840  005460  100006                      BPL     PRT4            ;BRANCH IF NO ERROR
1841  005462                              $ERROR  \N
1842  005462  012737  000040  001046 ERR40:  MOV     #40,    ERCOUNT         ;SET UP ERROR COUNT 40
1843          000041                      N=N+1
1844  005470  004537  010236              JSR     %5,STAER        ;REPORT ERROR SET
1845  005474  000000                      HALT                    ;HALT ON ERROR
1846  005476  013777  001034  173276 PRT4:  MOV     CHRGEN,@LPB     ;LOAD BUFFER
1847  005504  005237  001032              INC     CHRCNT          ;INCREMENT CHAR COUNT
1848  005510  002761                      BLT     PRT3            ;BRANCH IF NOT 132 CHARS
1849  005512  001433                      BEQ     PRTA            ;START OVERFLOW
1850  005514  005237  001034              INC     CHRGEN          ;NEXT CHAR
```

```
 1851  005520  005237  001030                 INC     SEQCNT          ;INCREMENT OVERFLOW COUNT
 1852  005524  001353                         BNE     PRT3            ;CONTINUE IF NOT DONE
 1853  005526  012777  000012  173246         MOV     #12,@LPB        ;SEND LF
 1854  005534                                 $WAIT
 1855  005534  105777  173240                 TSTB    @LPS            ;TEST READY
 1856  005540  100375                         BPL     .-4             ;WAIT FOR READY
 1857  005542  022737  000040  001050         CMP     #40,STRCHR      ;LAST START CHAR SPACE?
 1858  005550  001421                         BEQ     PRT6            ;YES,  BRANCH
 1859  005552  022737  000065  001050         CMP     #65,STRCHR      ;LAST START CHAR 5?
 1860  005560  001422                         BEQ     PRT7            ;YES,  BRANCH
 1861  005562  022737  000071  001050         CMP     #71,STRCHR      ;DONE?
 1862  005570  001423                         BEQ     PRT8            ;YES
 1863  005572  005237  001050                 INC     STRCHR          ;NO,  GET NEXT START CHAR
 1864  005576  000137  005412                 JMP     PRTO            ;CONTINUE
 1865  005602  012737  000041  001034  PRTA:  MOV     #41,CHRGEN      ;GET FIRST CHAR IN SET
 1866  005610  000137  005454                 JMP     PRT3            ;START OVERFLOW
 1867  005614  012737  000066  001050  PRT6:  MOV     #66,STRCHR      ;SET START CHAR TO 6
 1868  005622  000137  005412                 JMP     PRTO            ;CONTINUE
 1869  005626  012737  000040  001050  PRT7:  MOV     #40,STRCHR      ;SET START CHAR TO SPACE
 1870  005634  000137  005412                 JMP     PRTO            ;CONTINUE
 1871  005640  032777  010000  173136  PRT8:  BIT     #BIT12,@SWR     ;CHECK LOOP ON TEST
 1872  005646  001247                         BNE     PRTCTL          ;LOOP
 1873
 1874                                 ;TEST 7
 1875                                 ;MULTIPLE LINE ADVANCE TEST
 1876                                 ;TESTS MULTIPLE LINE ADVANCES AND TIMINGS
 1877                                 ;PRINTS THE NUMBER OF LINES SKIPPED ON THE LINE PRINTER
 1878
 1879  005650  004437  010022         MLF:    JSR     %4,TYPINT
 1880  005654                                 $PRINT  \M
 1881  005654  013737  012374  011716         MOV     TN07,MES15              ;SET TEST NUMBER FOR MESSAGE
 1882  005662  004437  007752                 JSR     %4,PRNNT                ;PRINT TEST NUMBER
 1883          000010                         M=M+1
 1884  005666  012737  006020  001050         MOV     #TABSTR,STRCHR  ;FIRST CHAR
 1885  005674  012737  177574  001032  MLFA:  MOV     #-132.,CHRCNT   ;SET CHAR COUNT
 1886  005702  117737  173142  001034         MOVB    @STRCHR,CHRGEN  ;GET CHAR
 1887  005710  001452                         BEQ     MLF4            ;BRANCH IF DONE
 1888  005712  005777  173062         MLF0:  TST     @LPS            ;TEST FOR ERROR
 1889  005716  100006                         BPL     MLF1            ;CONTINUE IF NO ERROR
 1890  005720                                 $ERROR  \N
 1891  005720  012737  000041  001046  ERR41: MOV     #41,    ERCOUNT         ;SET UP ERROR COUNT 41
 1892          000042                         N=N+1
 1893  005726  004537  010236                 JSR     %5,STAER        ;REPORT ERROR
 1894  005732  000000                         HALT                    ;HALT ON ERROR
 1895  005734  013777  001034  173040  MLF1:  MOV     CHRGEN,@LPB     ;LOAD BUFFER
 1896  005742  005237  001032                 INC     CHRCNT          ;INCREMENT CHAR COUNT
 1897  005746  001361                         BNE     MLF0            ;CONTINUE
 1898  005750  117737  173074  001036         MOVB    @STRCHR,LINCNT  ;GET ASCII LINE COUNT
 1899  005756  042737  177770  001036         BIC     #177770,LINCNT  ;MAKE OCTAL
 1900  005764  005237  001036                 INC     LINCNT          ;ADD 1
 1901  005770  012777  000012  173004  MLF2:  MOV     #12,@LPB        ;SEND LF
 1902  005776                                 $WAIT
 1903  005776  105777  172776                 TSTB    @LPS            ;TEST READY
 1904  006002  100375                         BPL     .-4             ;WAIT FOR READY
```

```
 1905  006004  005337  001036                DEC     LINCNT          ;DECREMENT LINE COUNT
 1906  006010  001367                        BNE     MLF2            ;CONTINUE
 1907  006012  005237  001050                INC     STRCHR          ;NEXT CHAR
```

```
 1908  006016  000726                          BR      MLFA            ;CONTINUE
 1909
 1910  006020  033462  033062  033463  TABSTR: .ASCIZ  /272637463540/
 1911  006026  033064  032463  030064
 1912  006034      000
 1913
 1914          006036                          .EVEN
 1915
 1916  006036  032777  010000  172740  MLF4:   BIT     #BIT12,@SWR     ;CHECK LOOP ON TEST
 1917  006044  001301                          BNE     MLF             ;LOOP
 1918                                          .EVEN
 1919
 1920                                  ;TEST 8
 1921                                  ;HIGH SPEED PRINT TEST
 1922
 1923  006046  004437  010022          HSPRT:  JSR     %4,TYPINT
 1924  006052                          $PRINT  \M
 1925  006052  013737  012376  011716          MOV     TN010,MES15             ;SET TEST NUMBER FOR MESSAGE
 1926  006060  004437  007752                  JSR     %4,PRNT                 ;PRINT TEST NUMBER
 1927          000011                          M=M+1
 1928  006064  032777  020000  172712          BIT     #BIT13,@SWR     ;CHECK CHAR SET
 1929  006072  001007                          BNE     HSOOA           ;BRANCH IF 96 CHAR SET
 1930  006074  012737  000140  001054          MOV     #140,LEGCHR     ;LEGAL CHK
 1931  006102  012737  000100  001056          MOV     #100,NUMCHR     ;#CHARS
 1932  006110  000406                          BR      HSOO            ;CONTINUE
 1933  006112  012737  000200  001054  HSOOA:  MOV     #200,LEGCHR     ;LEGAL CHECK
 1934  006120  012737  000140  001056          MOV     #140,NUMCHR     ;#CHARS
 1935  006126  012737  000040  001050  HSOO:   MOV     #40,STRCHR      ;SET UP FIRST LINE
 1936  006134  012737  000177  001036          MOV     #127.,LINCNT    ;SET LINE COUNT FOR 2 PAGES
 1937  006142  012737  177574  001032  HSO:    MOV     #-132.,CHRCNT   ;SET CHAR COUNT
 1938  006150  012737  177757  001040          MOV     #-17.,CYCCNT    ;SET GROUP COUNT
 1939  006156  013737  001050  001034          MOV     STRCHR,CHRGEN   ;STORE START CHAR
 1940  006164  005777  172612          HS1:    TST     @LPB            ;TEST FOR ERROR
 1941  006170  100006                          BPL     HS2             ;BRANCH IF NO ERROR
 1942  006172                          $ERROR  \N
 1943  006172  012737  000042  001046  ERR42:  MOV     #42,    ERCOUNT         ;SET UP ERROR COUNT 42
 1944          000043                          N=N+1
 1945  006200  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
 1946  006204  000000                          HALT                    ;HALT ON ERROR
 1947  006206  013777  001034  172566  HS2:    MOV     CHRGEN,@LPB     ;LOAD BUFFER
 1948  006214  005237  001032                  INC     CHRCNT          ;INCREMENT CHAR COUNT
 1949  006220  001424                          BEQ     HS4             ;BRANCH IF DONE LINE
 1950  006222  005237  001034                  INC     CHRGEN          ;NEXT CHAR
 1951  006226  005237  001040                  INC     CYCCNT          ;INCREMENT GROUP COUNT
 1952  006232  001410                          BEQ     HS3             ;BRANCH IF DONE GROUP
 1953  006234  023737  001054  001034          CMP     LEGCHR,CHRGEN   ;LEGAL CHAR?
 1954  006242  001350                          BNE     HS1             ;BRANCH AND CONTINUE IF LEGAL CHAR
 1955  006244  163737  001056  001034          SUB     NUMCHR,CHRGEN   ;MAKE LEGAL
 1956  006252  000744                          BR      HS1             ;CONTINUE
 1957  006254  013737  001050  001034  HS3:    MOV     STRCHR,CHRGEN   ;GET FIRST CHAR IN GROUP
 1958  006262  012737  177757  001040          MOV     #-17.,CYCCNT    ;RESET CYCLE COUNT
 1959  006270  000735                          BR      HS1             ;CONTINUE
 1960  006272  012777  000012  172502  HS4:    MOV     #12,@LPB        ;SEND LF
 1961  006300                          $WAIT
```

```
1962  006300  105777  172474                    TSTB    @LPS            ;TEST READY
1963  006304  100375                            BPL     .-4             ;WAIT FOR READY
1964  006306  005337  001036                    DEC     LINCNT          ;DECREMENT LINE COUNT
1965  006312  003413                            BLT     HS6             ;EXIT TEST IF DONE
1966  006314  162737  000004  001050            SUB     #4,STRCHR       ;SKIP 4 LINES ON DRUM, FIND START CHAR
1967  006322  026737  000040  001050            CMP     #40,STRCHR      ;START CHAR A LEGAL CHAR?
1968  006330  003404                            BLE     HS0             ;CONTINUE IF LEGAL START CHAR
1969  006332  062737  000100  001050            ADD     #100,STRCHR     ;MAKE LEGAL AND CONTINUE
1970  006340  000700                            BR      HS0             ;CONTINUE
1971  006342  032777  010000  172434  HS6:      BIT     #BIT12,@SWR     ;LOOP ON TEST?
1972  006350  001236                            BNE     HSPRT           ;LOOP
1973
1974                                    ;TEST 9
1975                                    ;WORST CASE NOISE TEST
1976                                    ;SINGLE CHAR. ACROSS ALL COLS.
1977
1978  006352  004437  010022            SNGCHR: JSR     X4,TYPINT
1979  006356                                    $PRINT  \M
1980  006362  013737  012400  011716            MOV     TN011,MES!5             ;SET TEST NUMBER FOR MESSAGE
1981  006364  004437  007752                    JSR     X4,PRINT                ;PRINT TEST NUMBER
1982          000012                            M=M+1
1983  006370  032777  020000  172406            BIT     #BIT13,@SWR     ;TEST CHAR SET
1984  006376  001404                            BEQ     S2              ;BRANCH IF 64
1985  006400  012737  177640  001036            MOV     #-96.,LINCNT    ;96 CHAR.
1986  006406  000403                            BR      .+10            ;BRANCH
1987  006410  012737  177700  001036  S2:       MOV     #-64.,LINCNT    ;64 CHAR.
1988  006416  012737  000040  001034            MOV     #40,CHRGEN      ;SET UP SPACE
1989  006424  012737  177574  001032  S2A:      MOV     #-132.,CHRCNT   ;SET CHAR COUNT FOR 132
1990  006432  005777  172342          S1:       TST     @LPS            ;TEST FOR ERRORS
1991  006436  100006                            BPL     XS1X            ;BRANCH IF NO ERRORS
1992  006440                                    $ERROR  \N
1993  006440  012737  000043  001046  ERR43:   MOV     #43,    ERCOUNT         ;SET UP ERROR COUNT 43
1994          000044                            M=N+1
1995  006446  004537  010236                    JSR     X5,STAER        ;REPORT ERROR
1996  006452  000000                            HALT                    ;HALT ON ERROR
1997  006454  013777  001034  172320  XS1X:     MOV     CHRGEN,@LPB     ;LOAD PRINTER BUFFER
1998  006462  005237  001032                    INC     CHRCNT          ;INCREMENT CHAR COUNT
1999  006466  001361                            BNE     S1              ;CONTINUE IF NOT DONE LINE
2000  006470  012777  000012  172304  S4X2:     MOV     #12,@LPB        ;ISSUE LINE FEED
2001  006476                                    $WAIT
2002  006476  105777  172276                    TSTB    @LPS            ;TEST READY
2003  006502  100375                            BPL     .-4             ;WAIT FOR READY
2004  006504  005237  001034                    INC     CHRGEN          ;+1 CHAR.
2005  006510  005237  001036                    INC     LINCNT          ;+1 LINE COUNT
2006  006514  002743                            BLT     S2A             ;CONTINUE IF NOT DONE
2007  006516  001764                            BEQ     S4X2            ;SEND BLANK LINE AT END OF TEST
2008  006520  032777  010000  172256  LPS7:     BIT     #BIT12,@SWR     ;CHECK TO LOOP ON TEST
2009  006526  001311                            BNE     SNGCHR          ;LOOP ON TEST
2010
2011
2012
2013                                    ;TEST 10
2014                                    ;DRUM PATTERN CHARACTER TEST
2015
```

```
2016  005530  004437  010022          ROTATE: JSR     %4,TYPINT
2017  005534                                  $PRINT  \M
2018  005534  013737  012402  011716          MOV     TNO12,MES15             ;SET TEST NUMBER FOR MESSAGE
2019  006542  004437  007752                  JSR     %4,PRINT                ;PRINT TEST NUMBER
2020          000013                          M=M+1
2021  005546  032777  020000  172230          BIT     #BIT13,@SWR     ;TEST CHAR SET
2022  005554  001012                          BNE     ROTO            ;SKIP IF 96 CHAR
2023  005556  012737  000137  001036          MOV     #137,LINCNT     ;LAST CHAR
2024  005564  012737  000140  001054          MOV     #140,LEGCHR     ;LEGAL CHK
2025  005572  012737  000100  001056          MOV     #100,NUMCHR     ;#CHARS
2026  005600  000411                          BR      ROT1            ;CONTINUE
2027  005602  012737  000177  001036  ROTO:   MOV     #177,LINCNT     ;LAST CHAR
2028  006610  012737  000200  001054          MOV     #200,LEGCHR     ;LEGAL CHK
2029  006616  012737  000140  001056          MOV     #140,NUMCHR     ;#CHARS
2030  005624  005037  001040          ROT1:   CLR     CYCCNT          ;CLEAR CYCLE COUNT
2031  005630  005237  001040          ROT2:   INC     CYCCNT          ;INC CYCLE COUNT
2032  006634  005037  001034                  CLR     CHRGEN          ;CLEAR POINTER
2033  006640  005237  001034          ROT3:   INC     CHRGEN          ;INC POINTER
2034  006644  013737  001034  001050          MOV     CHRGEN,STRCHR   ;STORE POINTER
2035  005652  063737  001036  001050          ADD     LINCNT,STRCHR   ;FIND CHAR
2036  006660  023737  001050  001054          CMP     STRCHR,LEGCHR   ;LEGAL?
2037  006666  002403                          BLT     ROT4            ;BRANCH IF LEGAL
2038  006670  163737  001056  001050          SUB     NUMCHR,STRCHR   ;MAKE LEGAL
2039  005676  005777  172076          ROT4:   TST     @LPS            ;TEST FOR ERRORS
2040  005702  100006                          BPL     ROT5            ;BRANCH IF NO ERRORS
2041  005704                                  $ERROR  \M
2042  006704  012737  000044  001046  ERR44:  MOV     #44,    ERCOUNT         ;SET UP ERROR COUNT 44
2043          005045                          M=N+1
2044  005712  005537  010236                  JSR     %5,STAER        ;REPORT ERROR
2045  005716  000000                          HALT                    ;HALT ON ERROR
2046  006720  013777  001050  172054  ROT5:   MOV     STRCHR,@LPB     ;LOAD BUFFER
2047  006726  023727  001034  000021          CMP     CHRGEN,#17.     ;DONE GROUP?
2048  006734  001341                          BNE     ROT3            ;NO GET NEXT CHAR
2049  006736  023727  001040  000010          CMP     CYCCNT,#8.      ;DONE LINE?
2050  006744  001331                          BNE     ROT2            ;NO, NEXT GROUP
2051  006746  012777  000012  172026          MOV     #12,@LPB        ;YES, SEND LF
2052  006754                                  $WAIT
2053  006754  105777  172020                  TSTB    @LPS            ;TEST READY
2054  006760  100375                          BPL     .-4             ;WAIT FOR READY
2055  006762  005337  001036                  DEC     LINCNT          ;DECREMENT LINE COUNT
2056  006766  023727  001036  000037          CMP     LINCNT,#37      ;DONE?
2057  006774  003313                          BGT     ROT1            ;NO, NEXT LINE
2058  006776  032777  010000  172000          BIT     #BIT12,@SWR     ;LOOP ON TEST?
2059  007004  001251                          BNE     ROTATE          ;LOOP
2060
2061                          ;TEST 11 ----- SPURIOUS HAMMER FIRING TEST
2062                          ;LEFT AND RIGHT TRIANGLES
2063
2064                          ; STARTING WITH A LEFT TRIANGLE
2065
2066  007006  004437  010022  LFTTR:  JSR     %4,TYPINT
2067  007012                          $PRINT  \M
2068  007012  013737  012404  011716          MOV     TNO13,MES15             ;SET TEST NUMBER FOR MESSAGE
2069  007020  004437  007752                  JSR     %4,PRINT                ;PRINT TEST NUMBER
```

```
                    000014                          M=M+1
2070                
2071    007024  012737  000204  001036  LFT:    MOV     #132.,LINCNT    ;SET LINE COUNT
2072    007032  013737  001036  001032  LFTO:   MOV     LINCNT,CHRCNT   ;STORE CHAR COUNT
2073    007040  012737  177757  001040          MOV     #-17.,CYCCNT    ;SET GROUP COUNT
2074    007046  013737  001032  001034          MOV     CHRCNT,CHRGEN   ;FIND FIRST CHAR ON LINE...
2075    007054  022737  000022  001034  LFT1:   CMP     #18.,CHRGEN     ;MORE THAN 17 CHARS?
2076    007062  003004                          BGT     LFT2            ;BRANCH IF LESS THAN 17
2077    007064  162737  000021  001034          SUB     #17.,CHRGEN     ;SUBTRACT 17, IF > 17
2078    007072  000770                          BR      LFT1            ;CONTINUE
2079    007074  005437  001034          LFT2:   NEG     CHRGEN          ;NEGATE CHRGEN
2080    007100  062737  000100  001034          ADD     #100,CHRGEN     ;START CHAR IN CHRGEN
2081    007106  013737  001034  001050          MOV     CHRGEN,STRCHR   ;STORE STARTING CHAR
2082    007114  005777  171660          LFT3:   TST     @LPS            ;TEST FOR ERROR
2083    007120  100006                          BPL     LFT4            ;CONTINUE IF NO ERROR
2084    007122                                  $ERROR  \N
2085    007122  012737  000045  001046  ERR45:  MOV     #45,    ERCOUNT         ;SET UP ERROR COUNT 45
2086                    000046                  N=N+1
2087    007130  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
2088    007134  000000                          HALT                    ;HALT ON ERROR
2089    007136  013777  001034  171636  LFT4:   MOV     CHRGEN,@LPB     ;LOAD BUFFER
2090    007144  005337  001032                  DEC     CHRCNT          ;DECREMENT CHAR COUNT
2091    007150  001415                          BEQ     LFT6            ;BRANCH IF DONE LINE
2092    007152  005237  001040                  INC     CYCCNT          ;INCREMENT GROUP COUNT
2093    007156  001403                          BEQ     LFT5            ;BRANCH IF DONE GROUP
2094    007160  005237  001034                  INC     CHRGEN          ;NEXT CHAR IN GROUP
2095    007164  000753                          BR      LFT3            ;CONTINUE
2096    007166  013737  001050  001034  LFT5:   MOV     STRCHR,CHRGEN   ;GET START CHAR AGAIN
2097    007174  012737  177757  001040          MOV     #-17.,CYCCNT    ;RESET GROUP COUNT
2098    007202  000744                          BR      LFT3            ;CONTINUE
2099    007204  012777  000012  171570  LFT6:   MOV     #12,@LPB        ;SEND LF
2100    007212                                  $WAIT
2101    007212  105777  171562                  TSTB    @LPS            ;TEST READY
2102    007216  100375                          BPL     .-4             ;WAIT FOR READY
2103    007220  005337  001036                  DEC     LINCNT          ;DECREMENT LINE COUNT
2104    007224  003302                          BGT     LFTO            ;BRANCH IF NOT DONE
2105    007226  001766                          BEQ     LFT6            ;SEND BLANK LINE AT END OF TEST
2106    007230  032777  010000  171546          BIT     #BIT12,@SWR     ;LOOP ON TEST?
2107    007236  001263                          BNE     LFTTR           ;LOOP
2108
2109                                    ;TEST 11 ----- CONTINUED
2110                                    ;RIGHT TRIANGLE
2111
2112    007240  012737  000001  001036  RTTR:   MOV     #1,LINCNT       ;INITIALIZE LINE
2113    007246  012737  000077  001034  RT1:    MOV     #77,CHRGEN      ;FIRST CHAR IS A ?
2114    007254  013737  001036  001040          MOV     LINCNT,CYCCNT   ;SAVE NO.  CHARS ON LINE
2115    007262  012737  177757  001052          MOV     #-17.,STRCNT    ;SET GROUP COUNT
2116    007270  012737  000204  001032          MOV     #132.,CHRCNT    ;NO.  CHARS PER LINE
2117    007276  163737  001036  001032          SUB     LINCNT,CHRCNT   ;SUBTRACT NO. OF CHARS ON LINE
2118    007304  001425                          BEQ     RT3             ;BRANCH IF NO SPACES ON THIS LINE
2119    007306  005777  171466          RT2:    TST     @LPS            ;TEST FOR ERROR
2120    007312  100006                          BPL     RT2A            ;CONTINUE IF NO ERROR
2121    007314                                  $ERROR  \N
2122    007314  012737  000046  001046  ERR46:  MOV     #46,    ERCOUNT         ;SET UP ERROR COUNT 46
2123                    000047                  N=N+1
```

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2124  007322  004537  010236                    JSR     %5,STAER        ;REPORT ERROR SET
2125  007326  000000                            HALT                    ;HALT ON ERROR
2126  007330  012777  000040  171444  RT2A:     MOV     #40,@LPB        ;LOAD BUFFER
2127  007336  005237  001052                    INC     STRCNT          ;INCREMENT GROUP COUNT
2128  007342  001003                            BNE     RT2AA           ;BRANCH IF NOT DONE GROUP
2129  007344  012737  177757  001052            MOV     #-17.,STRCNT    ;RESET GROUP COUNT
2130  007352  005337  001032          RT2AA:    DEC     CHRCNT          ;DECREMENT SPACE COUNT
2131  007356  001353                            BNE     RT2             ;BRANCH IF NOT DONE SPACES
2132  007360  005777  171414          RT3:      TST     @LPS            ;TEST FOR ERROR
2133  007364  100006                            BPL     RT3A            ;CONTINUE IF NO ERROR
2134  007366                                    $ERROR  \N
2135  007366  012737  000047  001046  ERR47:    MOV     #47,    ERCOUNT         ;SET UP ERROR COUNT 47
2136           000050                           N=N+1
2137  007374  004537  010236                    JSR     %5,STAER        ;REPORT ERROR SET
2138  007400  000000                            HALT                    ;HALT ON ERROR
2139  007402  013777  001034  171372  RT3A:     MOV     CHRGEN,@LPB     ;LOAD BUFFER
2140  007410  005237  001034                    INC     CHRGEN          ;NEXT CHAR
2141  007414  005237  001052                    INC     STRCNT          ;INCREMENT GROUP COUNT
2142  007420  001006                            BNE     RT3B            ;BRANCH IF NOT DONE GROUP
2143  007422  012737  177757  001052            MOV     #-17.,STRCNT    ;RESET GROUP COUNT
2144  007430  162737  000021  001034            SUB     #17.,CHRGEN     ;GET FIRST GROUP CHAR
2145  007436  005337  001040          RT3B:     DEC     CYCCNT          ;DECREMENT CHAR COUNT
2146  007442  001346                            BNE     RT3             ;CONTINUE
2147  007444  012777  000012  171330            MOV     #12,@LPB        ;SEND LF
2148  007452                                    $WAIT
2149  007452  105777  171322                    TSTB    @LPS            ;TEST READY
2150  007456  100375                            BPL     .-4             ;WAIT FOR READY
2151  007460  005237  001036                    INC     LINCNT          ;INCREMENT LINE COUNT
2152  007464  022737  000205  001036            CMP     #133.,LINCNT    ;DONE?
2153  007472  003265                            BGT     RT1             ;BRANCH IF NOT DONE
2154  007474  032777  010000  171302            BIT     #BIT12,@SWR     ;LOOP ON TEST?
2155  007502  001256                            BNE     RT1R            ;LOOP
2156
2157                                    ;TEST 12
2158                                    ;HAMMER ALIGNMENT
2159
2160  007504  004437  010022          HAMALN:   JSR     %4,TYPINT
2161  007510                                    $PRINT  \M
2162  007510  013737  012406  011716            MOV     TNO14,MES1S             ;SET TEST NUMBER FOR MESSAGE
2163  007516  004437  007752                    JSR     %4,PRINT                ;PRINT TEST NUMBER
2164           000015                           M=M+1
2165  007522  012737  177701  001036            MOV     #-63.,LINCNT    ;SET UP FOR 63 LINES
2166  007530  012737  177574  001032  HAM1X:    MOV     #-132.,CHRCNT   ;SET CHAR COUNT
2167  007536  005777  171236          HAM2:     TST     @LPS            ;CHECK FOR ERROR
2168  007542  100006                            BPL     XHAM1           ;BRANCH IF NO ERROR
2169  007544                                    $ERROR  \N
2170  007544  012737  000050  001046  ERR50:    MOV     #50,    ERCOUNT         ;SET UP ERROR COUNT 50
2171           007551                           N=N+1
2172  007552  004737  010236                    JSR     %5,STAER        ;REPORT ERROR OCCURRED
2173  007556  000000                            HALT                    ;HALT ON ERROR
2174  007560                          XHAM1:    $WAIT
2175  007560  105777  171214                    TSTB    @LPS            ;TEST READY
2176  007564  100375                            BPL     .-4             ;WAIT FOR READY
2177  007566  100375                            BPL     .-4             ;WAIT FOR READY
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2178  007570  012777  000105  171204  XHAMIX: MOV     #105,@LPB       ;TRANSMIT E TO PRINTER
2179  007576  005237  001032                  INC     CHRCNT          ;+1 CHAR COUNT
2180  007602  001355                          BNE     HAM2            ;TRANSMIT ANOTHER CHAR.
2181  007604  012777  000012  171170          MOV     #12,@LPB        ;TRANSMIT LINE FEED
2182  007612                                  $WAIT
2183  007612  105777  171162                  TSTB    @LPS            ;TEST READY
2184  007616  100375                          BPL     .-4             ;WAIT FOR READY
2185  007620  005237  001036                  INC     LINCNT          ;+1 TO COUNT
2186  007624  001341                          BNE     HAMIX           ;GO DO NEXT LINE
2187  007626  032777  010000  171150          BIT     #BIT12,@SWR     ;CHECK TO LOOP ON TEST
2188  007634  001323                          BNE     HAMALN          ;LOOP ON TEST
2189
2190  007636  032777  040000  171140          BIT     #BIT14,@SWR     ;DAVFU AVAILABLE?
2191  007644  001402                          BEQ     HAMX            ;NO,  RECYCLE PRINTING TESTS
2192  007646  000137  012416                  JMP     DAVFU           ;YES,  DO DAVFU PRINTING TESTS
2193  007652                          HAMX:
2194  007652  013700  000042                  MOV     @#42,R0
2195  007656  001405                          BEQ     DOAGN
2196  007660  000005                          RESET
2197  007662                          LOGICAL:
2198  007662  004710                          JSR     PC,(R0)
2199  007664  000240                          NOP
2200  007666  000240                          NOP
2201  007670  000240                          NOP
2202  007672                          DOAGN:
2203  007672  000137  004060                  JMP     TEST2           ;RESTART
2204
2205                                  ;MISC. ROUTINES
2206
2207
2208
2209
2210
2211                                  ;ROUTINE TO INITIALIZE PRINTER
2212                                  ;ENTER FROM JSR %5, PRTINT
2213
2214  007676  005777  171076          PRTINT: TST     @LPS            ;TEST FOR ERROR
2215  007702  100403                          BMI     PRTINO          ;BRANCH IF ERROR
2216  007704  105777  171070                  TSTB    @LPS            ;TEST FOR READY
2217  007710  100403                          BMI     RDYOK           ;READY SET OK
2218  007712  062705  000002          PRTINO: ADD     #2,%5           ;SET UP FOR ERROR REPORT
2219  007716  000205                          RTS     %5              ;REPORT READY NOT SET
2220  007720  012777  000014  171054  RDYOK:  MOV     #14,@LPB        ;ISSUE FORM FEED
2221  007726  105777  171046                  TSTB    @LPS            ;TEST FOR READY NOT SET
2222  007732  100003                          BPL     NTRDY           ;READY NOT SET OK
2223  007734  062705  000002                  ADD     #2,%5           ;SET UP FOR REPORT
2224  007740  000205                          RTS     %5              ;EXIT AND REPORT
2225  007742                          NTRDY:  $WAIT
2226  007742  105777  171032                  TSTB    @LPS            ;TEST READY
2227  007746  100375                          BPL     .-4             ;WAIT FOR READY
2228  007750  000205                          RTS     %5              ;READY SET EXIT
2229
2230
2231
```

```
                                        ;ROUTINE TO OUTPUT ASCII MESSAGES ON THE LINE PRINTER
                                        
007752  012737  011700  010020  PRNNT:   MOV     #MES14,PRTMSG   ;PRINT TEST NUMBER
007760  005777  171014                   TST     @LPS            ;TEST FOR ERROR
007764  100006                           BPL     RINT            ;BRANCH IF OK
007766                                   $ERROR  \N
007766  012737  000051  001046  ERRS1:   MOV     #51,    ERCOUNT         ;SET UP ERROR COUNT 51
        000052                           N=N+1
007774  004537  010236                   JSR     %5,STAER        ;REPORT ERROR SET
010000  000000                           HALT                    ;HALT ON ERROR
010002  012737  177514  001016  RINT:    MOV     #177514,TPS     ;SET VECTORS -
010010  012737  177516  001012           MOV     #177516,TPB     ;TO PRINT ON LINE PRINTER
010016  104000                           EMT     +0              ;PRINT
010020  011700                   PRTMSG: MES14                   ;MESSAGE
010022  012737  177564  001016  TYPINT: MOV     #177564,TPS     ;RESET VECTORS
010030  012737  177566  001012           MOV     #177566,TPB     ;FOR TTY
010036  000204                           RTS     %4              ;RETURN
                                        
                                        ;SUBROUTINE TO OUTPUT ASCII MESSAGES ON TELETYPE PRINTER
                                        
010040  011600                   TYP:    MOV     @%6,%0          ;GET ADDR. THAT CONTAINS MESS.
010042  062716  000002                   ADD     #2,@%6          ;SET UP EXIT
010046  011000                           MOV     @%0,%0          ;ADDRESS OF MESSAGE IN R0
010050  112037  010152           TYPA:   MOVB    (0)+,TYPDAT     ;GET CHARACTER
010054  001001                           BNE     TYPC            ;BRANCH IF NOT DONE
010056  000002                           RTI                     ;EXIT
010060  122737  000045  010152  TYPC:    CMPB    #45,TYPDAT      ;CHECK FOR "%"
010066  001416                           BEQ     TYPF            ;BRANCH IF "%"
010070  122737  000043  010152           CMPB    #43,TYPDAT      ;CHECK FOR "#"
010076  001417                           BEQ     TYPG            ;BRANCH IF "#"
010100  004737  010106                   JSR     %7,TYPD         ;TYPE CHARACTER IN TYPDAT
010104  000761                           BR      TYPA            ;NEXT CHAR IN MESSAGE
010106  113777  010152  170676  TYPD:    MOVB    TYPDAT,@TPB     ;OUTPUT CHARACTER TO PRINTER
010114  105777  170676          TYPDD:   TSTB    @TPS
010120  100375                           BPL     .-4
010122  000207                           RTS     %7              ;CHAR. TYPED EXIT
010124  112737  000012  010152  TYPF:    MOVB    #12,TYPDAT      ;OUTPUT LF
010132  004737  010106                   JSR     %7,TYPD         ;GO TYPE CHAR.
010136  112737  000015  010152  TYPG:    MOVB    #15,TYPDAT      ;OUTPUT CR
010144  004737  010106                   JSR     %7,TYPD         ;GO TYPE CHAR.
010150  000737                           BR      TYPA
010152  000000                   TYPDAT: 0
                                        
                                        
                                        ;ROUTINE TO CONVERT OCTAL TO ASCII
                                        
                                        ;ENTER ROUTINE AS FOLLOWS
                                        ;       JSR     %5,CONV
                                        ;XXXXXX=ADDRESS OF NUMBER TO BE CONVERTED
                                        ;XXXXXX=ADDRESS OF ASCII MESSAGE
                                        ;XXXXXX=NUMBER OF OCTAL NO.'S TO BE CONVERTED
                                        
010154  013537  010234           CONV:   MOV     @(5)+,ACNVX     ;ADDRSS OF NO. TO BE CONVERTED
010160  012501                           MOV     (5)+,%1         ;ADDRESS OF MESSAGE
```

```
2286  010162  012502                        MOV     (5)+,%2         ;NUMBER OF ASCII CHARACTERS
2287  010164  060201                        ADD     %2,%1           ;FIRST CHAR ADDRESS
2288  010166  013703  010234        ACVN:   MOV     ACNVX,%3        ;STORE NUMBER
2289  010172  042703  177770                BIC     #177770,%3      ;ISOLATE LEAST SIGNIFICANT BIT
2290  010176  062703  000060                ADD     #60,%3          ;SET UP ASCII CHARACTER
2291  010202  110341                        MOVB    %3,-(1)         ;STORE CHARACTER
2292  010204  000241                        CLC                     ;GET NEXT SIGNIFICANT BIT ...
2293  010206  006037  010234                ROR     ACNVX
2294  010212  000241                        CLC
2295  010214  006037  010234                ROR     ACNVX
2296  010220  000241                        CLC
2297  010222  006037  010234                ROR     ACNVX
2298  010226  005302                        DEC     %2              ;-1 FROM ASCII CHAR. CNT
2299  010230  001356                        BNE     ACVN            ;CONVERT NEXT CHARACTER
2300  010232  000205                        RTS     %5              ;EXIT! CONVERSION DONE
2301
2302  010234  000000        ACNVX:  0                               ;WORK REGISTER
2303
2304                        ;ROUTINE TO REPORT ERROR COUNT
2305
2306  010236  004537  010154        STAER:  JSR     %5,CONV         ;CONVERT OCTAL TO ASCII
2307  010242  001046                        ERCOUNT
2308  010244  010266                        HED1
2309  010246  000003                        3
2310  010250  104000                        EMT     +0              ;TYPE ERROR MESSAGE
2311  010252  010266                        HED1
2312  010254  005777  170524                TST     @SWR            ;TEST FOR HALT ON ERROR
2313  010260  100401                        BMI     .+4             ;BRANCH IF NO HALT WANTED
2314  010262  000000                        HALT                    ;HALT ON ERROR
2315  010264  000205                        RTS     %5              ;RETURN
2316
2317

      010266  020040  020040  051105  HED1:   .ASCIZ  /    ERROR COUNT%/
      010307     105  051122  051117  MESA:   .ASCIZ  /ERROR SET OK - CLEAR & TURN ON LINE%/
      010354  051105  047522  020122  MESB:   .ASCIZ  /ERROR SET OK - CLEAR AND TRY NEXT CHANNEL%/
      010427     120  044522  052116  MESC:   .ASCII  /PRINT SPEED CHECK USING MANUAL TIMING%/
      010475     120  052125  051440          .ASCII  /PUT SWITCH 0 UP TO START TIMING%/
      010535     120  052125  051440          .ASCIZ  /PUT SWITCH 0 DOWN AT END OF 1 MINUTE%/
      010603     123  040524  052122  MESDD:  .ASCIZ  /STARTING DAVFU PRINTING TESTS%/
      010642  046045  030120  020065  MES1:   .ASCIZ  /%LPOS LINE PRINTER TEST%/
      010673     122  051505  040524  MES2:   .ASCIZ  /RESTART ADDRESS 600%/
      010720  047520  042527  020122  MES3:   .ASCIZ  /POWER ON - TURN ON LINE%/
      010751     117  020116  044514  MES4:   .ASCIZ  /ON LINE OK - TRY TORN PAPER SWITCH%/
      011015     122  040505  054504  MES5:   .ASCIZ  /READY SET OK - TRY DRUM GATE SWITCH%/
      011062  051105  047522  020122  MES6:   .ASCIZ  /ERROR SET OK - TURN ON LINE%/
              011120                  .EVEN
      011120  047[illegible]2          MES7A:  .ASCII  /RE/
      011122  04[illegible]23  020124  047524  MES7:   .ASCII  /SET TOP OF FORM SWITCH TO   /
      011156  020040  020040  044440  MES8:   .ASCIZ  /     INCHES%/
              011174                  .EVEN
      011174  026455  026455  026455  MES9:   .ASCII  /------------------------------------     THIS LINE SHOULD BE /
      011271     040  020040  020040  MES10:  .ASCIZ  /     INCHES FROM THE LAST LINE     ----------------------------------/
      011402  005012                  MES11A: .ASCII  <12><12>
      011404  051120  047111  020124  MES11:  .ASCII  /PRINT SPEED IS APPROXIMATELY  /
```

```
011442  020040  020040  046040  MES12:  .ASCIZ  /     LINES PER MINUTEX/
011471     055  026455  026455  MES13:  .ASCII  /-----------------------------------------------/
011553     055  026455  026455          .ASCII  /-----------------------------------------------/
011635     055  026455  026455          .ASCIZ  /---------------------------------#/
           011700                       .EVEN
011700  005012  042524  052123  MES14:  .ASCII  <12><12>/TEST NUMBER /
011716  020040  005012  000012  MES15:  .ASCIZ  /  /<12><12><12>
                                .EVEN
011724  044124  051511  046040  MES16:  .ASCIZ  /THIS LINE SHOULD BE PRINTED#/
011761     040  020040  020040  MES17:  .ASCIZ  /                                   ALL ON ONE LINE --- IF SLEWED 0 LINESX/
                                .EVEN
012064  026455  026455  026455  MES18:  .ASCII  /-----------------------------------      THERE SHOULD BE  /
012156  020040  020040  020040  MES19:  .ASCIZ  /      BLANK LINES BEFORE THIS LINE     -------------------------------
                                .EVEN
012272  052040  051505  044524  MES20:  .ASCII  / TESTING CHANNEL SLEWING USING CHANNEL NO.  /
012346  020040     000          MES20A: .ASCIZ  /  /
           012352               .EVEN
012352  030504                  TNOAV1: .ASCII  /01/            ;TEST NUMBERS FOR DAVFU TESTS
012354  031104                  TNOAV2: .ASCII  /02/
012356  031504                  TNOAV3: .ASCII  /03/
012360  020061                  TNO1:   .ASCII  /1 /
012362  020062                  TNO2:   .ASCII  /2 /
012364  020063                  TNO3:   .ASCII  /3 /
012366  020064                  TNO4:   .ASCII  /4 /
012370  020065                  TNO5:   .ASCII  /5 /
012372  020066                  TNO6:   .ASCII  /6 /
012374  020067                  TNO7:   .ASCII  /7 /
012376  020070                  TNO10:  .ASCII  /8 /
012400  020071                  TNO11:  .ASCII  /9 /
012402  030061                  TNO12:  .ASCII  /10/
012404  030461                  TNO13:  .ASCII  /11/
012406  031061                  TNO14:  .ASCII  /12/
012410  031461                  TNO15:  .ASCII  /13/
012412  032061                  TNO16:  .ASCII  /14/
012414  032461                  TNO17:  .ASCII  /15/
                                .EVEN


                                ;DAVFU PRINTING TESTS IF DAVFU IS AVAILABLE -- SET SWITCH 14


                                ;TESTS D1 AND D2
                                ;CHECK DAVFU LINE COUNT SLEWING

012416  004437  010022          DAVFU:  JSR     %4,TYPINT       ;INITIALIZE
012422  013737  014446  012160          MOV     SP,SP,MES19+2
012430  104000                  .       EMT     +0              ;TYPE MESSAGE
012432  010603                          MESDO                   ;STARTING DAVFU TESTS
012434  012737  000220  013130          MOV     #220,DAVI1      ;SET DAVFU INSTRUCTIONS
012442  012737  000221  013132          MOV     #221,DAVI2
012450  013737  012352  011716          MOV     TNOAV1,MES15    ;SET TEST NUMBER FOR MESSAGE
012456  004437  007752                  JSR     %4,PRINT        ;PRINT TEST NUMBER
012462  012737  013062  001034  DAVD:   MOV     #DAVTAB,CHRGEN  ;SET TABLE POINTER
012470  005777  166304          DAVDD:  TST     @LPS            ;TEST FOR ERROR
```

```
2334  012474  100010                          BPL     DAV1            ;BRANCH IF NO ERROR
2335  012476                                  $ERROR  \N
2336  012476  012737  000052  001046  ERR52:  MOV     #52,    ERCOUNT         ;SET UP ERROR COUNT 52
2337          000053                          N=N+1
2338  012504  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
2339  012510  000000                          HALT                    ;HALT ON ERROR
2340  012512  000137  012462                  JMP     DAVO            ;RESTART TEST
2341  012516  017777  166312  166256  DAV1:   MOV     @CHRGEN,@LPB    ;LOAD DAVFU
2342  012524  062737  000002  001034          ADD     #2,CHRGEN       ;INCREMENT TABLE POINTER
2343  012532  005777  166276                  TST     @CHRGEN         ;TEST IF DONE LOAD
2344  012536  001405                          BEQ     D5              ;CONTINUE IF DONE
2345  012540                                  $WAIT                   ;WAIT
2346  012540  105777  166234                  TSTB    @LPS            ;TEST READY
2347  012544  100375                          BPL     .-4             ;WAIT FOR READY
2350  012546  000137  012470                  JMP     DAVOO
2351  012552  012737  000002  001040  D5:     MOV     #2,CYCCNT       ;SET CYCLE COUNT
2352  012560  012737  011724  010020  D0:     MOV     #MES16,PRTMSG   ;SET MESSAGE ADDRESS
2353  012566  004437  010002                  JSR     %4,RINT         ;PRINT MESSAGE
2354  012572  005777  166202                  TST     @LPS            ;TEST FOR ERROR
2355  012576  100006                          BPL     D1              ;CONTINUE IF NO ERROR
2356  012600                                  $ERROR  \N
2357  012600  012737  000053  001046  ERR53:  MOV     #53,    ERCOUNT         ;SET UP ERROR COUNT 53
2360          000054                          N=N+1
2361  012606  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
2362  012612  000000                          HALT                    ;HALT ON ERROR
2363  012614  013777  013130  166160  D1:     MOV     DAVI1,@LPB      ;SEND DAVFU INSTRUCTION,  SKIP 0 LINES
2364  012622                                  $WAIT
2365  012622  105777  166152                  TSTB    @LPS            ;TEST READY
2366  012626  100375                          BPL     .-4             ;WAIT FOR READY
2367  012630  012737  011761  010020          MOV     #MES17,PRTMSG   ;SET PRINTER MESSAGE ADDRESS
2370  012636  004437  010002                  JSR     %4,RINT         ;PRINT MESSAGE
2371  012642  012737  012064  010020          MOV     #MES18,PRTMSG   ;SET MESSAGE ADDRESS
2372  012650  013737  013132  001034          MOV     DAVI2,CHRGEN    ;FIRST DAVFU INSTRUCTION
2373  012656  012737  012360  001050          MOV     #TN01,STRCHR    ;SET TABLE POINTER
2374  012664  012737  000017  001032          MOV     #15.,CHRCNT     ;SET TABLE COUNT
2375  012672  005777  166102          D2:     TST     @LPS            ;TEST FOR ERROR
2376  012676  100006                          BPL     D3              ;CONTINUE IF NO ERRORS
2377  012700                                  $ERROR  \N
2400  012700  012737  000054  001046  ERR54:  MOV     #54,    ERCOUNT         ;SET UP ERROR COUNT 54
2401          000055                          N=N+1
2402  012706  004437  010236                  JSR     %4,STAER        ;REPORT ERROR SET
2403  012712  000000                          HALT                    ;HALT ON ERROR
2404  012714  013777  001034  166060  D3:     MOV     CHRGEN,@LPB     ;SEND DAVFU INSTR.
2405  012722                                  $WAIT                   ;WAIT
2406  012722  105777  166052                  TSTB    @LPS            ;TEST READY
2407  012726  100375                          BPL     .-4             ;WAIT FOR READY
2410  012730  017737  166114  012156          MOV     @STRCHR,MES19   ;SET PRINTER MESSAGE
2411  012736  004437  010002                  JSR     %4,RINT         ;PRINT MESSAGE
2412  012742  005337  001032                  DEC     CHRCNT          ;DEC TABLE COUNT
2413  012746  001407                          BEQ     D4              ;EXIT TEST IF DONE
2414  012750  005237  001034                  INC     CHRGEN          ;NEXT DAVFU INSTR.
2415  012754  062737  000002  001050          ADD     #2,STRCHR       ;INC TABLE POINTER
2416  012762  000137  012672                  JMP     D2              ;CONTINUE
2417  012766  005337  001040          D4:     DEC     CYCCNT          ;DEC CYCLE COUNT
```

```
2398  012772  001415                          BEQ     DEXD            ;EXIT IF DONE
2399  012774  062737  000140  013130          ADD     #140,DAVI1      ;CHANGE DAVFU INSTR.
2400  013002  062737  000140  013132          ADD     #140,DAVI2      ;CHANGE DAVFU INSTR.
2401  013010  013737  012354  011716          MOV     TNDAV2,MES15    ;SET TEST NUMBER FOR MESSAGE
2402  013016  004437  007752                  JSR     %4,PRNNT        ;PRINT TEST NUMBER
2403  013022  000137  012560                  JMP     DO              ;RETEST LINE COUNT SLEWING
2404  013026  012737  000220  013130  DEXD:   MOV     #220,DAVI1      ;RESET DAVFU INSRT.
2405  013034  012737  000221  013132          MOV     #221,DAVI2      ;RESET DAVFU INSTR.
2406  013042  032777  010000  165734          BIT     #BIT12,@SWR     ;LOOP ON TEST?
2407  013050  001002                          BNE     1$              ;LOOP
2408  013052  000137  013134                  JMP     DAV2            ;NEXT TEST
2409  013056  000137  012416          1$:     JMP     DAVFU           ;LOOP
2410
2411
2412  013062  000356                  DAVTAB: 356                     ;DAVFU LOAD TABLE
2413  013064  000001                          1
2414  013066  000002                          2
2415  013070  000003                          3
2416  013072  000004                          4
2417  013074  000005                          5
2418  013076  000006                          6
2419  013100  000007                          7
2420  013102  000010                          10
2421  013104  000011                          11
2422  013106  000012                          12
2423  013110  000013                          13
2424  013112  000014                          14
2425  013114  000015                          15
2426  013116  000016                          16
2427  013120  000017                          17
2428  013122  000020                          20
2429  013124  000357                          357
2430  013126  000000                          0
2431
2432
2433  013130  000220                  DAVI1:  220
2434  013132  000221                  DAVI2:  221
2435
2436                                  ;TEST D3
2437                                  ;CHECK DAVFU CHANNEL SLEW COMMANDS
2438
2439  013134  004437  010022          DAV2:   JSR     %4,TYPINT       ;INITIALIZE
2440  013140  013737  014446  012160          MOV     SPSP,MES19+2
2441  013146  013737  012356  011716          MOV     TNDAV3,MES15    ;SAT TEST NUMBER FOR MESSAGE
2442  013154  004437  007752                  JSR     %4,PRNNT        ;PRINT TEST NUMBER D3
2443  013160  012737  014430  013712          MOV     #MTAB,MTABP     ;SET MESSAGE TABLE POINTER
2444  013166  012737  014376  013706          MOV     #ITAB,ITABP     ;SET INSTRUCTION TABLE POINTER
2445  013174  017737  000536  001050          MOV     @ITABP,STRCHR   ;SAT FIRST INSTRUCTION
2446  013202  012737  012360  013714          MOV     #TM01,MTABP     ;SET HEADER MESSAGE TABLE POINTER
2447  013210  012737  014360  013710          MOV     #ICTAB,ICTABP   ;SET INSTR COUNT TABLE POINTER
2448  013216  017737  000466  001052          MOV     @ICTABP,STRCNT  ;GET FIRST INSTR COUNT
2449  013224  012737  013716  013704  LOAD:   MOV     #DTAB,DTABP     ;SET DATA TABLE POINTER
2450  013232  017737  000446  001034          MOV     @DTABP,CHRGEN   ;SET FIRST DATA PAIR
2451  013240  005777  165534                  TST     @LPS            ;TEST FOR ERROR
```

```
2442  013244  100007                          BPL     DL1             ;BRANCH IF NO ERROR
2443  013246                                  $ERROR  \N
2444  013246  012737  000055  001046  ERR55:  MOV     #55,    ERCOUNT         ;SET UP ERROR COUNT 55
2445          000056                          N=N+1
2446  013254  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
2447  013260  000000                          HALT                    ;HALT ON ERROR
2448  013262  000760                          BR      LOAD            ;RESTART LOAD
2449  013264  012737  000002  001032  DL1:    MOV     #2,CHRCNT       ;SET PAIR COUNT
2450  013272  013777  001034  165502  DL2:    MOV     CHRGEN,@LPB     ;LOAD DAVFU
2451  013300                                  $WAIT                   ;WAIT
2452  013300  105777  165474                  TSTB    @LPS            ;TEST READY
2453  013304  100375                          BPL     .-4             ;WAIT FOR READY
2454  013306  005777  165466                  TST     @LPS            ;TEST FOR ERROR
2455  013312  100010                          BPL     DL6             ;BRANCH IF NO ERROR
2456  013314                                  $ERROR  \N
2457  013314  012737  000056  001046  ERR56:  MOV     #56,    ERCOUNT         ;SET UP ERROR COUNT 56
2458          000057                          N=N+1
2459  013322  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
2460  013326  000000                          HALT                    ;HALT ON ERROR
2461  013330  000137  013224                  JMP     LOAD            ;RESTART LOAD
2462  013334  022737  000356  001034  DL6:    CMP     #356,CHRGEN     ;LOAD COMMAND?
2463  013342  001407                          BEQ     DL6A            ;YES, SEND ONLY ONCE
2464  013344  022737  000357  001034          CMP     #357,CHRGEN     ;LOAD COMMAND?
2465  013352  001403                          BEQ     DL6A            ;YES,  SEND ONLY ONCE
2466  013354  005337  001032                  DEC     CHRCNT          ;DEC PAIR COUNT
2467  013360  001344                          BNE     DL2             ;FINISH PAIR IF NOT DONE
2468  013362  062737  000002  013704  DL6A:   ADD     #2,DTABP        ;INC DATA TABLE POINTER
2469  013370  017737  000310  001034          MOV     @DTABP,CHRGEN   ;SET NEXT DATA PAIR
2470  013376  022737  077777  001034          CMP     #77777,CHRGEN   ;DONE LOAD?
2471  013404  001327                          BNE     DL1
2472
2473                                  ;START OF CHANNEL SLEW TESTS
2474
2475  013406                          DL8:
2476  013406  013777  001050  165366          MOV     STRCHR,@LPB     ;SEND DAVFU INSTRUCTION
2477  013414                                  $WAIT
2478  013414  105777  165360                  TSTB    @LPS            ;TEST READY
2479  013420  100375                          BPL     .-4             ;WAIT FOR READY
2480  013422  105777  165352                  TSTB    @LPS            ;TEST READY
2481  013426  100375                          BPL     .-4             ;WAIT FOR READY
2482  013430                          DL8A:
2483  013430  017737  000260  012346          MOV     @HTABP,MES20A   ;SET HEADER MSSG ADDRESS
2484  013436  012737  012272  010020          MOV     #MES20,PRTMSG   ;SET HEADER MSG ADDRESS
2485  013444  004437  010002                  JSR     %4,RINT         ;PRINT HEADER MESSAGE
2486  013450  013777  001050  165324  DL9:    MOV     STRCHR,@LPB     ;SEND DAVFU INSTRUCTION
2487  013456                                  $WAIT                   ;WAIT
2488  013456  105777  165316                  TSTB    @LPS            ;TEST READY
2489  013462  100375                          BPL     .-4             ;WAIT FOR READY
2490  013464  005777  165310                  TST     @LPS            ;TEST FOR ERROR
2491  013470  100010                          BPL     DL10            ;BRANCH IF OK
2492  013472                                  $ERROR  \N
2493  013472  012737  000057  001046  ERR57:  MOV     #57,    ERCOUNT         ;SET UP ERROR COUNT 57
2494          000060                          N=N+1
2495  013500  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
```

```
2496  013504  000000                          HALT                    ;HALT ON ERROR
2497  013506  000137  013224                  JMP     LOAD            ;RELOAD DAVFU
2498  013512  017737  000174  012156  DL10:   MOV     @MTABP,MES19    ;SET MESSAGE
2499  013520  027727  000164  000001          CMP     @ICTABP,#1      ;CHECK IF MAX LINE SLEW
2500  013526  001004                          BNE     DL10A           ;NOT, CONTINUE
2501  013530  013737  014444  012160          MOV     FS,MES19+2      ;SET MESSAGE
2502  013536  000403                          BR      DL10B           ;CONTINUE
2503  013540  013737  014446  012160  DL10A:  MOV     SPSP,MES19+2    ;SET MESSAGE
2504  013546  012737  012064  010020  DL10B:  MOV     #MES18,PRTMSG   ;SET MSG ADDRESS
2505  013554  004437  010002                  JSR     %4,RINT         ;PRINT MESSAGE
2506  013560  005337  001052                  DEC     STRCNT          ;DEC INSTR COUNT
2507  013564  001331                          BNE     DL9             ;FINISH TESTING THIS CHANNEL
2508  013566  062737  000002  013712          ADD     #2,MTABP        ;INC MSG TABLE POINTER
2509  013574  062737  000002  013714          ADD     #2,HTABP        ;INC HEADER MSG TABLE POINTER
2510  013602  062737  000002  013710          ADD     #2,ICTABP       ;INC INSTR COUNT TABLE POINTER
2511  013610  005777  000074                  TST     @ICTABP         ;CHECK INSTR COUNT
2512  013614  001006                          BNE     DL12
2513  013616  012737  014360  013710          MOV     #ICTAB,ICTABP   ;RESET TABLE POINTER
2514  013624  012737  014430  013712          MOV     #MTAB,MTABP     ;RESET MSG TABLE POINTER
2515  013632  017737  000052  001052  DL12:   MOV     @ICTABP,STRCNT  ;GET INSTR COUNT
2516  013640  062737  000002  013706          ADD     #2,ITABP        ;INC INSTR TABLE POINTER
2517  013646  017737  000034  001050          MOV     @ITABP,STRCHR   ;GET INSTRUCTION
2518  013654  001254                          BNE     DL8             ;CONTINUE IF NOT DONE TEST
2519  013656  013737  014446  012160          MOV     SPSP,MES13+2    ;RESET MESSAGE
2520  013664  032777  010000  165112          BIT     #BIT12,@SWR     ;LOOP ON TEST?
2521  013672  001402                          BEQ     DLEX
2522  013674  000137  013134                  JMP     DAV2            ;LOOP ON TEST
2523  013700  000137  004060          DLEX:   JMP     TEST2           ;RECYCLE PRINTING TESTS
2524
2525  013704  000000          DTABP:  0               ;DATA TABLE POINTER
2526  013706  000000          ITABP:  0               ;INSTRUCTION TABLE POINTER
2527  013710  000000          ICTABP: 0               ;INSTR COUNT TABLE POINTER
2528  013712  000000          MTABP:  0               ;MESSAGE TABLE POINTER
2529  013714  000000          HTABP:  0               ;HEADER MESSAGE TABLE POINTER
2530
2531                          ;DATA TABLE FOR DAVFU LOAD
2532
2533  013716  000356          DTAB:   356             ;START LOAD
2534  013720  000077                  77              ;HEADER MESSAGES
2535  013722  000000                  0
2536  013724  000001                  1
2537  013726  000002                  2
2538  013730  000005                  5
2539  013732  000000                  0
2540  013734  000003                  3
2541  013736  000010                  10
2542  013740  000005                  5
2543  013742  000002                  2
2544  013744  000001                  1
2545  013746  000000                  0
2546  013750  000007                  7
2547  013752  000000                  0
2548  013754  000011                  11
2549  013756  000002                  2
```

```
2550  013760  000005                                5
2551  013762  000000                                0
2552  013764  000003                                3
2553  013766  000000                                0
2554  013770  000005                                5
2555  013772  000012                               12
2556  013774  000001                                1
2557  013776  000000                                0
2558  014000  000007                                7
2559  014002  000020                               20
2560  014004  000001                                1
2561  014006  000002                                2
2562  014010  000015                               15
2563  014012  000000                                0
2564  014014  000003                                3
2565  014016  000000                                0
2566  014020  000005                                5
2567  014022  000002                                2
2568  014024  000001                                1
2569  014026  000010                               10
2570  014030  000007                                7
2571  014032  000000                                0
2572  014034  000001                                1
2573  014036  000002                                2
2574  014040  000005                                5
2575  014042  000000                                0
2576  014044  000013                               13
2577  014046  000000                                0
2578  014050  000005                                5
2579  014052  000002                                2
2580  014054  000001                                1
2581  014056  000000                                0
2582  014060  000007                                7
2583  014062  000010                               10
2584  014064  000021                               21
2585  014066  000002                                2
2586  014070  000005                                5
2587  014072  000000                                0
2588  014074  000003                                3
2589  014076  000000                                0
2590  014100  000015                               15
2591  014102  000002                                2
2592  014104  000001                                1
2593  014106  000000                                0
2594  014110  000007                                7
2595  014112  000000                                0
2596  014114  000001                                1
2597  014116  000012                               12
2598  014120  000005                                5
2599  014122  000000                                0
2600  014124  000003                                3
2601  014126  000000                                0
2602  014130  000005                                5
2603  014132  000002                                2
```

```
2604  014134  000011                          11
2605  014136  000000                          0
2606  014140  000007                          7
2607  014142  000000                          0
2608  014144  000001                          1
2609  014146  000002                          2
2610  014150  000005                          5
2611  014152  000010                          10
2612  014154  000003                          3
2613  014156  000000                          0
2614  014160  000005                          5
2615  014162  000002                          2
2616  014164  000001                          1
2617  014166  000000                          0
2618  014170  000007                          7
2619  014172  000000                          0
2620  014174  000001                          1
2621  014176  000002                          2
2622  014200  000005                          5
2623  014202  000000                          0
2624  014204  000003                          3
2625  014206  000010                          10
2626  014210  000005                          5
2627  014212  000002                          2
2628  014214  000001                          1
2629  014216  000000                          0
2630  014220  000007                          7
2631  014222  000000                          0
2632  014224  000011                          11
2633  014226  000002                          2
2634  014230  000025                          25
2635  014232  000000                          0
2636  014234  000003                          3
2637  014236  000000                          0
2638  014240  000005                          5
2639  014242  000012                          12
2640  014244  000001                          1
2641  014246  000000                          0
2642  014250  000007                          7
2643  014252  000000                          0
2644  014254  000001                          1
2645  014256  000002                          2
2646  014260  000015                          15
2647  014262  000000                          0
2648  014264  000003                          3
2649  014266  000000                          0
2650  014270  000005                          5
2651  014272  000002                          2
2652  014274  000001                          1
2653  014276  000010                          10
2654  014300  000007                          7
2655  014302  000000                          0
2656  014304  000001                          1
2657  014306  000002                          2
```

```
        014310  000005                  5
        014312  000020                  20
        014314  000013                  13
        014316  000000                  0
        014320  000005                  5
        014322  000002                  2
        014324  000001                  1
        014326  000000                  0
        014330  000007                  7
        014332  000010                  10
        014334  000001                  1
        014336  000002                  2
        014340  000005                  5
        014342  000000                  0
        014344  000003                  3
        014346  000000                  0
        014350  000001                  1
        014352  000000                  0
        014354  000357                  357             ;STOP LOAD
        014356  077777                  77777           ;STOP !!!!!

                                ;INSTRUCTION COUNT TABLE - FOR DAVFU CHANNEL SLEW INSTRUCTIONS

        014360  000105          ICTAB:  105
        014362  000056                  56
        014364  000042                  42
        014366  000023                  23
        014370  000005                  5
        014372  000001                  1
        014374  000000                  0                       ;END OF TABLE

                                ;INSTRUCTION TABLE - DAVFU CHANNEL SLEW INSTRUCTIONS

        014376  000200          ITAB:   200                     ;CHANNEL 1
        014400  000201                  201                     ;CHANNEL 2
        014402  000202                  202                     ;CHANNEL 3
        014404  000203                  203                     ;CHANNEL 4
        014406  000204                  204                     ;CHANNEL 5
        014410  000205                  205                     ;CHANNEL 6
        014412  000206                  206                     ;CHANNEL 7
        014414  000207                  207                     ;CHANNEL 8
        014416  000210                  210                     ;CHANNEL 9
        014420  000211                  211                     ;CHANNEL 10
        014422  000212                  212                     ;CHANNEL 11
        014424  000213                  213                     ;CHANNEL 12
        014426  000000                  0                       ;END OF TABLE

                                ;MESSAGE TABLE FOR BLANK LINE COUNTS IN MESSAGE

        014430  030440          MTAB:   .ASCII  / 1/
        014432  031040                  .ASCII  / 2/
        014434  031440                  .ASCII  / 3/
        014436  033040                  .ASCII  / 6/
        014440  032062                  .ASCII  /24/
```

```
2712  014442  032061                          .ASCII  /14/
2713  014444  020063                  FS:     .ASCII  /3 /
2714  014446  020040                  SPSP:   .ASCII  / /
2715
2716                                  ;SCOPE LOOP ROUTINE
2717
2718                                  ;SET CHARACTER IN SWITCH REGISTER -D.
2719
2720  014450  004437  010022          SCOPE:  JSR     X4,TYPINT
2721  014454  017737  164324  001044          MOV     @SWR,SAVE       ;FETCH SWITCHES
2722  014462  012737  177574  001032          MOV     #-132.,CHRCNT   ;SET CHAR COUNT
2723  014470  042737  177400  001044          BIC     #177400,SAVE    ;MASK CHARACTER
2724  014476                          LDLPX:  $WAIT
2725  014476  105777  164276                  TSTB    @LPS            ;TEST READY
2726  014502  100375                          BPL     .-4             ;WAIT FOR READY
2727  014504  005777  164270                  TST     @LPS            ;TEST FOR ERROR
2728  014510  100006                          BPL     LPSCOPE         ;BRANCH IF NO ERROR
2729  014512                                  $ERROR  \N
2730  014512  012737  000060  001046  ERR60:  MOV     #60,    ERCOUNT         ;SET UP ERROR COUNT 60
2731          000061                          N=N+1
2732  014520  004537  010236                  JSR     X5,STAER        ;REPORT ERROR SET
2733  014524  000000                          HALT                    ;HALT ON ERROR
2734  014526  013777  001044  164246  LPSCOPE:MOV     SAVE,@LPB       ;LOAD PRINTER BUFFER
2735  014534  032777  004000  164242          BIT     #BIT11,@SWR     ;SEND ONLY ONE CHAR?
2736  014542  001402                          BEQ     LSCO            ;NO,  BRANCH
2737  014544  000000                          HALT                    ;HALT - WAIT FOR OPERATOR
2738  014546  000740                          BR      SCOPE           ;NEXT CHAR
2739  014550  000177  000024          LSCO:   JMP     @LOSCOP         ;SEND LF?
2740  014554  005237  001032          LSCA:   INC     CHRCNT          ;INCREMENT CHAR COUNT
2741  014560  001346                          BNE     LDLPX           ;CONTINUE IF NOT DONE LINE
2742  014562  012777  000012  164212          MOV     #12,@LPB        ;SEND LF
2743  014570                                  $WAIT
2744  014570  105777  164204                  TSTB    @LPS            ;TEST READY
2745  014574  100375                          BPL     .-4             ;WAIT FOR READY
2746  014576  000724                          BR      SCOPE           ;CONTINUE
2747
2748
2749  014600  014554                  LOSCOP: LSCA
2750
2751
2752
2753          000001                          .END
```

F05


```
ACNVX    010234        2284*  2288   2293*  2295*  2297*  2302#
ACVN     010166        2288#  2299
BIT0   = 000001         842#  1279   1334
BIT1   = 000002         841#
BIT10  = 002000         832#
BIT11  = 004000         831#  2735
BIT12  = 010000         830#  1644   1712   1762   1818   1871   1916   1971   2008   2058   2106   2154   2187
                       2396   2520
BIT13  = 020000         829#  1305   1671   1711   1832   1928   1983   2021
BIT14  = 040000         828#   869   1442   2190
BIT15  = 100000         827#
BIT2   = 000004         840#
BIT3   = 000010         839#
BIT4   = 000020         838#
BIT5   = 000040         837#
BIT6   = 000100         836#
BIT7   = 000200         835#
BIT8   = 000400         834#
BIT9   = 001000         833#
CHRCHK   004642         914   1719#  1763
CHRCNT   001032        1003#  1313*  1323*  1550*  1551*  1615*  1635*  1641*  1658*  1668*  1727*  1739*  1759*
                       1779*  1781   1797*  1805   1812*  1837*  1847*  1885*  1896*  1937*  1948*  1989*  1998*
                       2072*  2074   2090*  2116*  2117*  2130*  2166*  2179*  2368*  2382*  2449*  2466*  2722*
                       2740*
CHRE     005036        1726   1736   1753#
CHRGEN   001034        1004#  1316*  1317*  1318   1320*  1322   1490*  1499   1500*  1501   1532*  1541   1542*
                       1543   1659*  1667   1670*  1673   1676   1693*  1691   1692*  1693   1695   1697   1699
                       1703*  1704   1783*  1785*  1786   1811*  1838*  1846   1850*  1865*  1886*  1895   1939*
                       1947   1950*  1953   1955*  1957*  1988*  1997   2004*  2032*  2033*  2034   2047   2074*
                       2075   2077*  2079*  2080*  2081   2089   2094*  2096*  2113*  2139   2140*  2144*  2332*
                       2341   2342*  2343   2366*  2376   2384*  2440*  2450   2462   2464   2469*  2470
CHRS     005034        1748   1752#
CLCKAV   002164        1261#
CNTR     002614        1299*  1339#  1347*
CONV     010154        2284#  2306
CONVRT   002630         877   1335   1348   1354#
CR       004702        1727#  1747
CR0      004710        1728#  1740
CR1      004732        1729   1735#
CR2      004736        1735#  1752
CR3      004752        1736#  1750   1761
CR5      005040        1742   1754#
CR7      005014        1748#  1753
CSBR     001022         957#  1299*
CYCCNT   001040        1006#  1315*  1325*  1614*  1642*  1656*  1710*  1725*  1741*  1758*  1780*  1799*  1814*
                       1938*  1951*  1958*  2030*  2031*  2049   2073*  2092*  2097*  2114*  2145*  2349*  2387*
DAVAV    003240        1433   1438#
DAVFU    012416         895   2192   2224#  2399
DAVI1    013130        [illegible]  2359   2329*  2344*  2423#
DAVI2    013132        [illegible]  2366   2330*  2395*  2424#
DAVTAB   013062        2332   2402#
DAV0     012462        2332#  2340
DAV00    012470        2333#  2348
DAV1     012516        2334   2341#
```

```
DAV2    013134            896    2398    2429#   2522
DEXD    013026           2398    2394#
DIA     002616           1278#   1290#   1300#   1340#   1354#
DISPLA  001006            951#   1026#
DISPRE  000174            891#   1026
DLEX    013700           2521    2523#
DL1     013264           2442    2449#   2471
DL10    013512           2491    2498#
DL10A   013540           2500    2503#
DL10B   013546           2502    2504#
DL12    013632           2512    2515#
DL2     013272           2450#   2467
DL6     013334           2455    2462#
DL6A    013362           2463    2465    2468#
DL8     013[illegible]6  2475#   2518
DL8A    013430           2482#
DL9     013450           2496#   2507
DOARGN  007672           2195    2202#
DTAB    013716           2439    2533#
DTABP   013704           2439#   2440    2468#   2469    2525#
D0      012560           2350#   2393
D1      012614           2353    2359#
D2      012672           2369#   2[illegible]6
D3      012714           2370    2[illegible]6#
D4      012766           2383    2387#
D5      012552           2344    2349#
ERCOUN  001046           1009#   1042#   1049#   1062#   1073#   1080#   1091#   1108#   1119#   1131#   1138#   1147#   1162#
                         1169#   1174#   1184#   1195#   1206#   1229#   1236#   1244#   1398#   1422#   1494#   1510#   1536#
                         1556#   1606#   1620#   1663#   1687#   1731#   1790#   1842#   1891#   1943#   1993#   2042#   2085#
                         2122#   2135#   2170#   2238#   2307    2336#   2355#   2372#   2444#   2457#   2493#   2730#
ERR0    001164           1042#
ERR1    001206           1049#
ERR10   001466           1131#
ERR11   001510           1138#
ERR12   001540           1147#
ERR13   001576           1162#
ERR14   001620           1169#
ERR15   001634           1174#
ERR16   001666           1184#
ERR17   001720           1195#
ERR2    001262           1062#
ERR20   001752           1236#
ERR21   002044           1229#
ERR22   002066           1236#
ERR23   002120           1244#
ERR24   003042           1398#
ERR25   003146           1422#
ERR26   003444           1494#
ERR27   003526           1510#
ERR3    001322           1073#
ERR30   003622           1536#
ERR31   003724           1556#
ERR32   004072           1606#
ERR33   004150           1620#
```

```
ERR34   004356          1663#
ERR35   004474          1687#
ERR36   004716          1731#
ERR37   005214          1790#
ERR4    001324          1080#
ERR40   005462          1842#
ERR41   005720          1891#
ERR42   006172          1943#
ERR43   006440          1993#
ERR44   006704          2042#
ERR45   007122          2085#
ERR46   007314          2122#
ERR47   007366          2135#
ERR5    001354          1091#
ERR50   007544          2170#
ERR51   007766          2238#
ERR52   012476          2336#
ERR53   012600          2355#
ERR54   012700          2372#
ERR55   013246          2444#
ERR56   013314          2457#
ERR57   013472          2493#
ERR6    001406          1108#
ERR60   014512          2730#
ERR7    001432          1119#
FFSET   003350          1403    1472#
FFTAB   003272          1402    1447#
FS      014444          2501    2713#
FTABE   003346          1432    1469#
HAMALN  007504           922    2160#   2188
HAMX    007652          2191    2193#
HAMIX   007530          2166#   2186
HAM2    007536          2167#   2180
HED1    010266          2308    2311    2317#
HSPRT   006046           918    1923#   1972
HS0     006142          1937#   1968    1970
HS00    006126          1932    1935#
HS00A   006112          1929    1933#
HS1     006164          1940#   1954    1956    1959
HS2     006206          1941    1947#
HS3     006254          1952    1957#
HS4     006272          1949    1960#
HS6     006342          1965    1971#
HTABP   013714          2436#   2483    2509#   2529#
ICTAB   014360          2437    2513    2681#
ICTABP  013710          2437#   2438    2499    2510#   2511    2513#   2515    2527#
INDAT   003424           893    1443    1489#   1498    1514
INDATT  003460          1490    1521#
INDATO  003464          1492    1499#
INDAT1  003546          1508    1515#
INDO    003436          1491#   1506
IND1    003520          1502    1507#
INT1C   002010          1157    1217#
INT1D   002134          1224    1251#
```

DZLPKD.P11 CROSS REFERENCE TABLE

```
ITAB    014376          2434    2691#
ITABP   013706          2434#   2435    2516#   2517    2526#
KW11L   002344           903    1267    1296#
KW11P   002302           904    1272    1286#
LDCH    004510          1685    1691#   1700    1705
LDLPX   014476          2724#   2741
LEGCHR  001054          1012#   1307#   1310#   1318    1930#   1933#   1953    2024#   2028#   2036
LFT     007024          2071#
LFTTR   007006           921    2060#   2107
LFTO    007032          2072#   2104
LFT1    007054          2075#   2078
LFT2    007074          2076    2079#
LFT3    007114          2082#   2095    2098
LFT4    007136          2083    2089#
LFT5    007166          2093    2096#
LFT6    007204          2091    2099#   2105
LINCNT  001036          1005#   1273#   1286#   1296#   1317    1329#   1357    1359#   1365    1367#   1372    1402#   1416
                        1431#   1432    1434    1724#   1760#   1778#   1807#   1809    1898#   1899#   1900#   1905#   1936#
                        1964#   1985#   1987#   2005#   2023#   2027#   2035    2055#   2056    2071#   2072    2103#   2112#
                        2114    2117    2151#   2152    2165#   2185#
LKS     001026           959#   1264    1300    1301#
LKSRV   002620           874    1347#
LOAD    013224          2439#   2448    2461    2497
LOGICA  007662           867    2197#
LOSCOP  014600           927#    932#   2739    2749#
LPB     001002           945#   1057#   1058#   1127#   1322#   1330#   1426#   1499#   1541#   1549#   1634#   1637#   1667#
                        1679#   1691#   1706#   1738#   1743#   1754#   1786#   1801#   1816#   1846#   1853#   1895#   1901#
                        1940    1947#   1960#   1997#   2000#   2046#   2051#   2089#   2099#   2126#   2139#   2147#   2178#
                        2181#   2220#   2341#   2359#   2376#   2450#   2476#   2486#   2734#   2742#
LPS     001000           940#   1039    1046    1059    1070    1077    1088    1105    1116    1128    1135    1142    1159
                        1166    1177#   1179#   1187#   1189#   1198#   1200#   1209#   1211#   1226    1233    1241#   1252#
                        1332    1419    1428    1491    1504    1507    1533    1546    1553    1617    1639    1660    1681
                        1684    1708    1728    1745    1756    1787    1803    1839    1855    1888    1903    1962    1990
                        2002    2039    2053    2082    2101    2119    2132    2149    2167    2175    2183    2214    2216
                        2221    2226    2235    2333    2346    2352    2361    2369    2378    2441    2452    2454    2478
                        2480    2488    2490    2725    2727    2744
LPSCOP  014526          2728    2734#
LPS7    006520          2008#
LP1     001502          1129    1135#   1145
LP2     001524          1136    1142#
LP2B    004164          1618    1624#
LP2E    004372          1661    1667#
LP2H    004462          1657    1683#
LP3     001612          1160    1166#
LP3X    001634          1167    1173#
LP4     002060          1227    1235#
LP5     002102          1234    1240#
LSCA    014554           927    2740#   2749
LSCO    014550          2736    2739#
M       = 000015         963#   1610    1613#   1652    1655#   1720    1723#   1774    1777#   1827    1830#   1880    1883#
                        1924    1927#   1979    1982#   2017    2020#   2067    2070#   2161    2164#
MESA    010307          1516    1569    2317#
MESB    010354          1565    2317#
MESC    010427          1277    2317#
```

DZLPKD.P11 CROSS REFERENCE TABLE

```
MESDD   010603           2317#   2327
MES1    010642           1032    2317#
MES10   011271           1405    2317#
MES11   011404           1376    2317#
MES11A  011402           1377    2317#
MES12   011442           1356    2317#
MES13   011471           1418    2317#
MES14   011700           2234    2245    2317#
MES15   011716           1611*   1653*   1721*   1775*   1828*   1881*   1925*   1980*   2018*   2068*   2162*   2317#   2330*
                         2391*   2431*
MES16   011724           2317#   2350
MES17   011761           2317#   2363
MES18   012064           2317#   2365    2504
MES19   012156           2317#   2325*   2380*   2430*   2498*   2501*   2503*   2519*
MES2    010673           1034    2317#
MES20   012272           2317#   2484
MES20A  012346           2317#   2483*
MES3    010720           1036    2317#
MES4    010751           1054    2317#
MES5    011015           1085    2317#
MES6    011062           1067    1096    2317#
MES7    011122           1414    2317#
MES7A   011120           1440    2317#
MES8    011156           1404    1438*   2317#
MES9    011174           1436    2317#
MINCNT  002612           1289    1299    1338#
MLF     005650            917    1879#   1917
MLFA    005674           1885#   1908
MLFD    005712           1888#   1897
MLF1    005734           1889    1895#
MLF2    005770           1901#   1906
MLF4    006036           1887    1916#
MTA8    014430           2433    2514    2707#
MTA8P   013712           2433*   2498    2508*   2514*   2528#
N       =  000061         962#   1041    1043#   1048    1050#   1061    1063#   1072    1074#   1079    1081#   1090    1092#
                         1107    1109#   1118    1120#   1130    1132#   1137    1139#   1146    1148#   1161    1163#   1168
                         1170#   1173    1175#   1183    1185#   1194    1196#   1205    1207#   1228    1230#   1235    1237#
                         1243    1245#   1397    1399#   1421    1423#   1493    1495#   1509    1511#   1535    1537#   1555
                         1557#   1605    1607#   1619    1621#   1662    1664#   1686    1688#   1730    1732#   1789    1791#
                         1841    1843#   1890    1892#   1942    1944#   1992    1994#   2041    2043#   2084    2086#   2121
                         2123#   2134    2136#   2169    2171#   2237    2239#   2335    2337#   2354    2356#   2371    2373#
                         2443    2445#   2456    2458#   2492    2494#   2729    2731#
NODAT   003574            894    1519    1530#   1540
NODATA  003676           1544    1549#
NODATD  003640           1534    1541#
NODAT1  003744           1554    1561#
NODAT2  003770           1563    1568#
NODAT3  004000           1532    1573#
NODAT4  004056           1543    1596#
NODD    003614           1533#   1548
NODDA   003606           1532#   1560    1567
NOP     =  000240         961#
NTRDY   007742           2222    2225#
NUMCHR  001056           1013#   1308*   1311*   1320    1931*   1934*   1955    2025*   2029*   2038
```

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OVR     005132          1779#   1810
OVREXT  005356          1808    1818#
OVRPRT  005106           915    1773#   1819
OVRO    005140          1780#   1806
OVR1    005200          1786#   1795    1800
OVR2    005206          1784    1787#   1815
OVR3    005230          1788    1794#
OVR4    005172          1785#   1796
OVR5    005246          1799#
OVR6    005262          1802#   1817
OVR8    005344          1798    1816#
PATTB   003010          1314    1383#
PC      =%000007         625#   2198*
PLKS    001024           958#   1269    1290    1291*
PRINT   007752          1612    1654    1722    1776    1829    1882    1926    1981    2019    2069    2163    2234#   2331
                        2392    2432
PRTA    005602          1849    1865#
PRTCTL  005366           916    1826#   1872
PRTINT  007676          1395    1603    2214#
PRTINO  007712          2215    2218#
PRTMSG  010020          1377#   1418#   1436#   2234#   2245#   2350#   2363#   2365#   2484#   2504#
PRTO    005412          1832#   1864    1868    1870
PRT1    005432          1833    1836#
PRT2    005440          1835    1837#
PRT3    005454          1839#   1848    1852    1866
PRT4    005476          1840    1846#
PRT6    005614          1858    1867#
PRT7    005626          1860    1869#
PRT8    005640          1862    1871#
PSW     001010           952#   1176#   1186#   1197#   1208#   1240#   1253#
RCHRSW  004212          1625    1630#
RDYOK   007720          2217    2220#
RINT    010002          1378    1430    2236    2242#   2351    2364    2381    2485    2505
ROTATE  006530           920    2016#   2059
ROTO    006602          2022    2027#
ROT1    006624          2026    2030#   2057
ROT2    006630          2031#   2050
ROT3    006640          2033#   2048
ROT4    006676          2037    2039#
ROT5    006720          2040    2046#
RTTR    007240          2112#   2155
RT1     007246          2113#   2153
RT2     007306          2119#   2131
RT2A    007330          2120    2126#
RT2AA   007352          2128    2130#
RT3     007360          2118    2132#   2146
RT3A    007402          2133    2139#
RT3B    007436          2142    2145#
R0      =%000000         816#   2194*   2198
R1      =%000001         817#
R2      =%000002         818#
R3      =%000003         819#
R4      =%000004         820#
R5      =%000005         821#
```

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R6      =%000006            822#    824
R7      =%000007            823#    825
SAVE      001044           1008#   1626*  1633*  1634   1737*  1738   1749*  2721*  2723*  2734
SCHPSW    004210           1616    1629#  1632
SCOPE     014450            928     932    933   2720#  2738   2746
SEGCNT    001030           1002#   1834*  1836*  1851*
SETUP     001050            887    1017#
SLEWCK    002230            905    1379   1394#
SLW       003056           1396    1402#
SLW0      003070           1404#   1435
SLW1      003100           1406#   1411
SLW1A     003140           1417    1419#
SLW11     003124           1416#   1437
SLW2      003162           1420    1426#
SNGCHR    006352            919    1978#  2009
SP      =%000006            824#   1019*  1020*  1028   1029   1030
SPSP      014446           2325    2430   2503   2519   2714#
STAER     010236           1044    1051   1064   1075   1082   1093   1110   1121   1133   1140   1149   1164   1171
                           1218    1231   1238   1246   1400   1424   1496   1512   1538   1558   1608   1622   1665
                           1689    1733   1792   1844   1893   1945   1995   2044   2087   2124   2137   2172   2240
                           2306#   2338   2357   2374   2446   2459   2495   2732
STARA     002460           1315#   1328
STARED    002556           1324    1329#
STARO     002402           1281    1292   1305#  1336
STAROA    002430           1306    1310#
STAROB    002444           1309    1312#
STAR1     002522           1319    1322#  1326
STP1      001156           1039#   1045
STP2      001200           1040    1046#  1052
STP3      001222           1047    1053#
STP4      001230           1056#   1065
STP5      001266           1060    1066#
STP5A     001274           1070#   1076
STP5B     001316           1071    1077#  1063
STP5C     001340           1078    1084#
STP6      001346           1088#   1094
STP7      001370           1089    1095#
STRCHR    001050           1010#   1314*  1316   1327*  1531*  1549   1561*  1562   1616*  1624   1625*  1632*  1726*
                           1735    1736*  1748*  1831*  1838   1857   1859   1861   1863*  1867*  1869*  1884*  1896
                           1898    1907*  1935*  1939   1957   1966*  1967   1969*  2034*  2035*  2036   2038*  2046
                           2081*   2096   2367*  2380   2385*  2435*  2476   2486   2517*
STRCNT    001052           1011#   1781*  1782*  1794*  1813*  2115*  2127*  2129*  2141*  2143*  2438*  2506*  2515*
SWR       001004            950#   1022   1025*  1279   1305   1334   1442   1644   1671   1701   1712   1762   1818
                           1832    1871   1916   1928   1971   1983   2008   2021   2058   2106   2154   2187   2190
                           2312    2396   2520   2721   2735
SWREG     000176            882#   1025
SWTIME    002240            902    1270   1273#
S1        006432           1990#   1999
S2        006410           1984    1987#
S2A       006424           1989#   2006
S4X2      006470           2000#   2007
TABSTR    006020           1884    1910#
TEST1     001376           1104#   1111
TEST1A    001422           1106    1115#  1122
```

```
TEST1B  001446            1117    1126#   1134    1141    1150
TEST1C  001554            1143    1157#   1165    1172    1219
TEST1D  002022            1212    1224#   1232    1239    1247
TEST2   004060             912    1445    1570    1602#   1645    2203    2523
TEST3   004304             913    1651#   1713
TKB     001014             954#
TKS     001020             956#
TNOAV1  012352            2317#   2330
TNOAV2  012354            2317#   2391
TNOAV3  012356            2317#   2431
TNO1    012360            2317#   2367    2436
TNO10   012376            1925    2317#
TNO11   012400            1980    2317#
TNO12   012402            2018    2317#
TNO13   012404            1438    2068    2317#
TNO14   012406            2162    2317#
TNO15   012410            2317#
TNO16   012412            2317#
TNO17   012414            2317#
TNO2    012362            1611    2317#
TNO3    012364            1653    2317#
TNO4    012366            1721    2317#
TNO5    012370            1775    2317#
TNO6    012372            1828    2317#
TNO7    012374            1881    2317#
TPB     001012             953#   2243#   2247#   2264#
TPS     001016             955#   2242#   2246#   2265
TST2RX  004106            1604    1610#
TYP     010040             858    2252#
TYPA    010050            2255#   2263    2272
TYPC    010060            2256    2258#
TYPD    010106            2262    2264#   2269    2271
TYPDAT  010152            1355#   1360#   1362#   1363    1364#   1368#   1370#   1371    1372#   1373#   1374    2255#   2258
                          2260    2264    2268#   2270#   2273#
TYPDO   010114            2265#
TYPF    010124            2259    2268#
TYPG    010136            2261    2270#
TYPINT  010022            1017    1274    1297    1297    1394    1489    1530    1602    1651    1719    1773    1826    1879
                          1923    1978    2016    2066    2160    2246#   2324    2429    2720
T1A     004214            1630    1632#
T2A     004170            1625#   1629
T2B0    004334            1658#   1711
T2B0A   004342            1659#   1674    1677
T2B1    004350            1660#   1675    1678
T2B2    004446            1669    1679#
T2B2B   004434            1672    1676#
T2B3    004466            1684#
T2B4    004516            1692#   1694    1696    1698
T2B5    004610            1702    1706#
T3A     004142            1617#   1636
T5A     004[illegible]0   1627    1634#   1643
WORK    001[illegible]42  1007#   1126*   1144*
XHAM1   007[illegible]0   2168    2174#
XHAM1X  007570            2178#
```

```
XS1X    006454          1991    1997#
.     = 014602           848#     854     856#    862#    866#    868#    872#    880#    884#    890#    899#    909#    925#
                         930#     936#   1333    1429    1505    1547    1640    1682    1709    1746    1757    1804    1856
                        1904    1914#   1963    1986    2003    2054    2102    2150    2176    2177    2184    2227    2266
                        2313    2317#   2347    2362    2379    2453    2479    2481    2489    2726    2745
```

DZLPKD.P11 CROSS REFERENCE TABLE

SERROR	969#	1041	1048	1061	1072	1079	1090	1107	1118	1130	1137	1146	1161	1168	1173
	1183	1194	1205	1218	1235	1243	1397	1421	1493	1509	1535	1555	1605	1619	1642
	1686	1730	1759	1841	1890	1942	1952	2041	2084	2121	2134	2169	2237	2335	2354
	2371	2443	2456	2492	2729										
SPRINT	979#	1610	1652	1720	1774	1827	1880	1924	1979	2017	2067	2161			
SWAIT	990#	1331	1427	1503	1545	1638	1680	1707	1744	1755	1802	1854	1902	1961	2001
	2052	2100	2148	2174	2182	2225	2345	2360	2377	2451	2477	2487	2724	2743	

DZLPKD.P11 CROSS REFERENCE TABLE

```
           2495   2495   2505   2720   2732
MOV         855    911    927    932   1019   1020   1021   1025   1026   1029   1030   1042   1049   1057   1058
           1052   1073   1080   1091   1108   1119   1127   1131   1138   1147   1157   1158   1162   1169   1174
           1175   1184   1186   1195   1197   1206   1208   1224   1225   1229   1236   1240   1244   1254   1255
           1261   1262   1278   1288   1289   1290   1291   1298   1299   1300   1301   1307   1308   1310   1311
           1313   1314   1315   1316   1322   1330   1356   1372   1377   1393   1402   1403   1404   1405   1418
           1422   1426   1436   1438   1430   1494   1499   1510   1531   1532   1536   1541   1549   1556   1606
           1611   1614   1615   1616   1620   1625   1626   1632   1633   1634   1637   1641   1653   1656   1658
           1659   1663   1667   1679   1687   1691   1706   1721   1724   1725   1726   1727   1731   1736   1737
           1738   1743   1748   1749   1754   1758   1759   1775   1778   1779   1780   1781   1783   1795   1786
           1790   1801   1811   1812   1816   1828   1831   1834   1836   1837   1838   1842   1846   1853   1865
           [illegible] 1869 1891 1834 1875   1891   1895   1901   1925   1930   1931   1933   1934   1935   1936
           1937   1939   1939   1943   1947   1957   1958   1960   1980   1985   1987   1988   1989   1993   1997
           2000   2018   2023   2024   2025   2027   2028   2029   2034   2042   2046   2051   2068   2071   2072
           2073   2074   2081   2085   2089   2096   2097   2099   2112   2113   2114   2115   2116   2122   2126
           2129   2135   2139   2143   2147   2162   2165   2166   2170   2178   2181   2194   2220   2234   2238
           2242   2243   2246   2247   2252   2254   2284   2285   2286   2288   2325   2328   2329   2330   2332
           2336   2341   2349   2350   2355   2359   2363   2365   2366   2367   2368   2372   2376   2380   2391
           2394   2395   2430   2431   2433   2434   2435   2436   2437   2438   2439   2440   2444   2449   2450
           2457   2469   2476   2483   2484   2486   2493   2498   2501   2503   2504   2513   2514   2515   2517
           2519   2721   2722   2730   2734   2742
MOVB       1363   1371   1374   1406   1407   1836   1898   2255   2264   2268   2270   2291
NEG        2079
NOP        1178   1188   1199   1210   1242   2199   2200   2201
RESET      1018   1104   1115   2196
RSR        2293   2295   2297
RTI        1261   1349   2257
RTS        2219   2224   2228   2248   2267   2300   2315
SEC        1263   1268
SUB        1320   1359   1367   1955   1966   2038   2077   2117   2144
TST        1022   1039   1059   1070   1098   1105   1135   1159   1226   1416   1419   1434   1491   1501   1507
           1533   1553   1617   1660   1684   1728   1787   1805   1839   1888   1940   1990   2039   2092   2119
           2132   2167   2214   2235   2312   2333   2343   2352   2369   2441   2454   2490   2511   2727
TSTB       1046   1077   1116   1128   1142   1166   1233   1264   1269   1332   1409   1410   1428   1504   1546
           1639   1681   1708   1745   1756   1903   1855   1903   1962   2002   2053   2101   2149   2175   2183
           2216   2221   2226   2265   2346   2361   2378   2452   2478   2480   2488   2725   2744
.ASCII     2317   2707   2708   2709   2710   2711   2712   2713   2714
.ASCIZ     1472   1473   1474   1475   1476   1477   1478   1479   1480   1481   1482   1910   2317
.ENABL      844    845
.END       2753
.EVEN      1495   1914   1918   2317
.LIST       967    977    983   2317
.MACR       969    979    980
.NLIST     2317
.PAGE       797
.REPT         1    850
.TITLE      797
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ERRORS DETECTED: 0

*,DZLPKD.PRT<DZLPKD.P11/CRF/SOL

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 RUN-TIME: 11 19 3 SECONDS
 CORE USED:  14K
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FD6