# LP11/LP05

LINE PRINTER TEST

MD-11-DZLPK-D

EP-DZLPK-D-DL-A



FICHE 1 OF 1

NOV 1976

digital

MADE IN U.S.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 |
| LP05 | 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/LP05 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/LP05 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 |

```
                                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 "LP05 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 DAVFU IS AVAILABLE
AND SWITCH 14 IS SET, THE DAVFU 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.
```

## 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<br>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 FIRST 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.

```
773
774
775
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784
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792
793
794
795
796
```

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 TROUBLE 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/LP05 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  007662                          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
```

```
001026  177546          LKS:    177546

        000240          NOP     =240
        000000          N       =0
        000002          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  CHRGEN: 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          STP5A:  TST     @LPS            ;TEST FOR ERROR
1071  001300  100006                  BPL     STP5B                   ;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      STP5A                   ;LOOP ON ERROR
1077  001316  105777  177456          STP5B:  TSTB    @LPS            ;TEST READY
1078  001322  100406                  BMI     STP5C                   ;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      STP5B                   ;LOOP ON ERROR
1084  001340  104000          STP5C:  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
```

```
1175            000016                          N=N+1
1176  001642    012777  000340  177140          MOV     #340,@PSW       ;LOCKUP PROCESSOR
1177  001650    052777  000100  177122          BIS     #100,@LPS       ;SET PRINTER INTO ENABLE
1178  001656    000240                          NOP                     ;WAIT
1179  001660    042777  000100  177112          BIC     #100,@LPS       ;CLEAR PRINTER INT. ENABLE
1180
1181                                    ;TEST THAT THE PRINTER WILL NOT INTERRUPT AT LEVEL 6
1182
1183  001666                            ERR16:  $ERROR  \N
1184  001666    012737  000016  001046          MOV     #16,    ERCOUNT         ;SET UP ERROR COUNT 16
1185            000017                          N=N+1
1186  001674    012777  000300  177106          MOV     #300,@PSW       ;SET PROCESSOR PRIORITY LEVEL 6
1187  001702    052777  000100  177070          BIS     #100,@LPS       ;SET PRINTER INT ENABLE
1188  001710    000240                          NOP                     ;WAIT
1189  001712    042777  000100  177060          BIC     #100,@LPS       ;CLEAR PRINTER INT. ENABLE
1190
1191                                    ;TEST THAT THE PRINTER WILL NOT INT. AT
1192                                    ;PROCESSOR LEVEL 5
1193
1194  001720                            ERR17:  $ERROR  \N
1195  001720    012737  000017  001046          MOV     #17,    ERCOUNT         ;SET UP ERROR COUNT 17
1196            000020                          N=N+1
1197  001726    012777  000240  177054          MOV     #240,@PSW       ;SET UP PROCESSOR TO LEVEL 5
1198  001734    052777  000100  177036          BIS     #100,@LPS       ;SET PRINTER INT ENABLE
1199  001742    000240                          NOP                     ;WAIT
1200  001744    042777  000100  177026          BIC     #100,@LPS       ;CLEAR INT ENABLE PRINTER OK
1201
1202                                    ;TEST THAT THE PRINTER WILL NOT INT
1203                                    ;WHEN THE PROCESSOR IS AT LEVEL 4
1204
1205  001752                            ERR20:  $ERROR  \N
1206  001752    012737  000020  001046          MOV     #20,    ERCOUNT         ;SET UP ERROR COUNT 20
1207            000021                          N=N+1
1208  001760    012777  000200  177022          MOV     #200,@PSW       ;SET PROCESSOR TO LEVEL 4
1209  001766    052777  000100  177004          BIS     #100,@LPS       ;SET PRINTER INT. ENABLE
1210  001774    000240                          NOP                     ;WAIT
1211  001776    042777  000100  176774          BIC     #100,@LPS       ;CLEAR PRINTER INT ENABLE
1212  002004    000137  002022                  JMP     TEST1D          ;PRINTER OK CONTINUE
1213
1214                                    ;INTERRUPT HANDLE FOR TEST1C
1215                                    ;RESTORE STACK AND REPORT ERROR
1216
1217  002010    022626                  INT1C:  CMP     (6)+,(6)+       ;RESTORE STACK
1218  002012    004537  010236                  JSR     %5,STAER        ;REPORT ERROR
1219  002016    000137  001554                  JMP     TEST1C          ;RE-ENTER TEST1C
1220
1221                                    ;TEST THE ABILITY OF THE PRINTER TO INTERRUPT
1222                                    ;AT PRIORITY LEVEL 4
1223
1224  002022    012737  002134  000200  TEST1D: MOV     #INT1D,200      ;SET UP INTERRUPT VECTOR
1225  002030    012737  000340  000202          MOV     #340,202        ;LOCK UP PRIORITIES
1226  002036    005777  176736                  TST     @LPS            ;IS THERE A PRINTER ERROR
1227  002042    100006                          BPL     LP4             ;NO! CONTINUE
1228  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     STARD           ;START PRINTING
1282
```

```
1283
1284                                    ;START FOR KW11-P.....
1285
1286  002302  005037  001036            KW11P:  CLR     LINCNT          ;CLEAR LINE COUNT
1287  002306  004437  010022                    JSR     %4,TYPINT
1288  002312  012706  001000                    MOV     #1000,%6        ;RESET STACK
1289  002316  013777  002612  176476            MOV     MINCNT,@CSBR    ;SET CLOCK COUNT
1290  002324  013737  001024  002616            MOV     PLKS,DIA        ;STORE PLKS ADDRESS
1291  002332  012777  000105  176464            MOV     #105,@PLKS      ;START CLOCK
1292  002340  000137  002402                    JMP     STARD           ;START PRINTING
1293
1294                                    ;START FOR KW11-L.....
1295
1296  002344  005037  001036            KW11L:  CLR     LINCNT          ;CLEAR LINE COUNT
1297  002350  004437  010022                    JSR     %4,TYPINT
1298  002354  012706  001000                    MOV     #1000,%6        ;RESET STACK
1299  002360  013737  002612  002614            MOV     MINCNT,CNTR     ;SET CLOCK COUNT
1300  002366  013737  001026  002616            MOV     LKS,DIA         ;STORE LKS ADDRESS
1301  002374  012777  000100  176424            MOV     #100,@LKS       ;ENABLE CLOCK INTERRUPT
1302
1303                                    ;PRINTING ROUTINE.....
1304
1305  002402  032777  020000  176374  STARD:   BIT     #BIT13,@SWR     ;CHECK CHAR SET
1306  002410  001007                            BNE     STARDA          ;BRANCH IF 96
1307  002412  012737  000140  001054            MOV     #140,LEGCHR     ;LEGAL CHECK
1308  002420  012737  000100  001056            MOV     #100,NUMCHR     ;#CHARS
1309  002426  000406                            BR      STARDB          ;CONTINUE
1310  002430  012737  000200  001054  STARDA:   MOV     #200,LEGCHR     ;LEGAL CHECK
1311  002436  012737  000140  001056            MOV     #140,NUMCHR     ;#CHARS
1312  002444                            STARDB:
1313  002444  012737  000204  001032            MOV     #132.,CHRCNT    ;SET CHAR COUNT
1314  002452  012737  003010  001050            MOV     #PATTB,STRCHR   ;INITIALIZE TABLE POINTER
1315  002460  012737  000021  001040  STARA:    MOV     #17.,CYCCNT     ;SET GROUP COUNT
1316  002466  017737  176356  001034            MOV     @STRCHR,CHRGEN  ;GET CHAR FROM TABLE
1317  002474  063737  001036  001034            ADD     LINCNT,CHRGEN   ;ADD LINE COUNT
1318  002502  023737  001054  001034  1$:       CMP     LEGCHR,CHRGEN   ;LEGAL CHAR?
1319  002510  003004                            BGT     STAR1           ;YES,  BRANCH
1320  002512  163737  001056  001034            SUB     NUMCHR,CHRGEN   ;NO,  MAKE LEGAL
1321  002520  000770                            BR      1$              ;RECHECK CHAR
1322  002522  013777  001034  176252  STAR1:    MOV     CHRGEN,@LPB     ;LOAD BUFFER
1323  002530  005337  001032                    DEC     CHRCNT          ;DECREMENT CHAR COUNT
1324  002534  001410                            BEQ     STARED          ;BRANCH IF DONE LINE
1325  002536  005337  001040                    DEC     CYCCNT          ;DECREMENT CYCCLE COUNT
1326  002542  001367                            BNE     STAR1           ;CONTINUE IF NOT DONE GROUP
1327  002544  062737  000002  001050            ADD     #2,STRCHR       ;ADD 2 TO TABLE POINTER
1328  002552  000137  002460                    JMP     STARA           ;CONTINUE
1329  002556  005237  001036  STARED:  INC     LINCNT          ;INCREMENT LINE COUNT
1330  002562  012777  000012  176212            MOV     #12,@LPB        ;SEND LF
1331  002570                            $WAIT
1332  002570  105777  176204                    TSTB    @LPS            ;TEST READY
1333  002574  100375                            BPL     .-4             ;WAIT FOR READY
1334  002576  032777  000001  176200            BIT     #BIT0,@SWR      ;STOP PRINT?
1335  002604  001411                            BEQ     CONVRT          ;YES,  BRANCH
1336  002606  000137  002402                    JMP     STARD           ;CONTINUE
```

```
                                ;NOTE -- PLACE 5670 (8)   IN MINCNT FOR 50 HZ. LINE FREQUENCY !!!
                                ;LINE CLOCK SERVICE ROUTINE FOR KW11-L
002620  005337  002614    LKSRV:  DEC     CNTR            ;DECREMENT COUNTER
002624  001401                    BEQ     CONVRT          ;EXIT IF 1 MINUTE
002626  000002                    RTI                     ;RETURN
                                ;ROUNTINE TO PRINT NUMBER OF LINES PRINTED IN 1 MINUTE
002630  042777  000100  177760  CONVRT: BIC     #100,@DIA       ;DISABLE CLOCK INTERRUPT IF CLOCK AVAILABLE
002636  005037  010152          CLR     TYPDAT          ;CLEAR DIGIT COUNT
002642  012703  011442          MOV     #MES12,%3       ;SET MESSAGE POINTER
002646  022737  000144  001036  1$:     CMP     #100.,LINCNT    ;GREATER THAN 100?
002654  003006                  BGT     2$              ;NO,  PRINT HUNDRED'S DIGIT
002656  162737  000144  001036          SUB     #100.,LINCNT    ;YES,  SUBTRACT 100
002664  005237  010152          INC     TYPDAT          ;INCREMENT HUNDRED'S DIGIT
002670  000766                  BR      1$              ;CONTINUE CONVERSION
002672  062737  000060  010152  2$:     ADD     #60,TYPDAT      ;MAKE ASCII
002700  113723  010152          MOVB    TYPDAT,(%3)+    ;STORE DIGIT
002704  005037  010152          CLR     TYPDAT          ;CLEAR DIGIT COUNTER
002710  022737  000012  001036  3$:     CMP     #10.,LINCNT     ;GREATER THEN 10?
002716  003006                  BGT     4$              ;NO,  PRINT DIGIT
002720  162737  000012  001036          SUB     #10.,LINCNT     ;YES,  SUBTRACT 10
002726  005237  010152          INC     TYPDAT          ;INCREMENT TEN'S DIGIT
002732  000766                  BR      3$              ;CONTINUE CONVERSION
002734  062737  000060  010152  4$:     ADD     #60,TYPDAT      ;MAKE ASCII
002742  113723  010152          MOVB    TYPDAT,(%3)+    ;STORE DIGIT
002746  013737  001036  010152          MOV     LINCNT,TYPDAT   ;GET ONE'S DIGIT
002754  062737  000060  010152          ADD     #60,TYPDAT      ;MAKE ASCII
002762  113723  010152          MOVB    TYPDAT,(%3)+    ;STORE DIGIT
002766  104000                  EMT     +0              ;TYPE MESSAGE
002770  011404                  MES11                   ;TYPE PRINT SPEED
002772  012737  011402  010020          MOV     #MES11A,PRTMSG  ;SET PRINTER MESSAGE ADDRESS
003000  004437  010002          JSR     %4,RINT         ;PRINT PRINTER SPEED ON LINE PRINTER
003004  000137  003030          JMP     SLEWCK          ;NEXT TEST

003010  000040          PATTB:  40
003012  000117                  117
003014  000076                  76
003016  000055                  55
003020  000134                  134
003022  000113                  113
003024  000072                  72
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                  FTABE:    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     %4,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     INDAT0          ;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     %5,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     %5,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:  JSR     %4,TYPINT
1531  003600  012737  000200  001050          MOV     #200,STRCHR     ;SET PAPER INSTRUCTION
1532  003606  012737  004000  001034  NODOA:  MOV     #NODAT3,CHRGEN  ;SET TABLE POINTER FOR LOAD
1533  003614  005777  175160          NODO:   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     %5,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  022737  004060  001034          CMP     #NODAT4+2,CHRGEN        ;DONE LOAD?
1544  003662  001405                          BEQ     NODATA          ;BRANCH IF DONE
1545  003664                                  $WAIT
1546  003664  105777  175110                  TSTB    @LPS            ;TEST READY
1547  003670  100375                          BPL     .-4             ;WAIT FOR READY
1548  003672  000137  003614                  JMP     NODO
1549  003676  013777  001050  175076  NODATA: MOV     STRCHR,@LPB     ;SEND DATA
1550  003704  005037  001032                  CLR     CHRCNT          ;DELAY
1551  003710  005237  001032          1$:     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     %5,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     %4,TYPINT
1603  004064  004537  007676          JSR     %5,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
```

```
                    000033                          N=N+1
004100  004537  010236                              JSR     %5,STAER        ;REPORT PRINTER NOT READY
004104  000000                                      HALT                    ;HALT ON ERROR
004106                                  TST2AX:     $PRINT  \M
004106  013737  012362  011716                      MOV     TN02,MES15              ;SET TEST NUMBER FOR MESSAGE
004114  004437  007752                              JSR     %4,PRINT                ;PRINT TEST NUMBER
                    000003                          M=M+1
004120  012737  177740  001040                      MOV     #-32.,CYCCNT    ;SET UP LINE COUNT FOR 32 LINES
004126  012737  177574  001032                      MOV     #-132.,CHRCNT   ;SET CHAR COUNT TO 132
004134  013737  004210  001050                      MOV     SCHRSW,STRCHR   ;SET CHAR. SWITCH TO U
004142  005777  174632                      T3A:    TST     @LPS            ;TEST FOR ERROR
004146  100006                                      BPL     LP2B            ;NO ERROR CONTINUE
004150                                              $ERROR  \N
004150  012737  000033  001046              ERR33:  MOV     #33,    ERCOUNT         ;SET UP ERROR COUNT 33
                    000034                          N=N+1
004156  004537  010236                              JSR     %5,STAER        ;REPORT ERROR SET
004162  000000                                      HALT                    ;HALT ON ERROR
004164  000177  174660                      LP2B:   JMP     @STRCHR         ;LOAD CHAR
004170  013737  004212  001050              T2A:    MOV     RCHRSW,STRCHR   ;RESET CHAR. SWITCH
004176  012737  000125  001044                      MOV     #125,SAVE       ;STORE CHAR
004204  000137  004230                              JMP     T5A             ;LOAD CHAR

004210  004170                              SCHRSW: T2A
004212  004214                              RCHRSW: T1A

004214  013737  004210  001050              T1A:    MOV     SCHRSW,STRCHR   ;SET CHAR. SWITCH TO U
004222  012737  000052  001044                      MOV     #52,SAVE        ;STORE CHAR
004230  013777  001044  174544              T5A:    MOV     SAVE,@LPB       ;LOAD BUFFER
004236  005237  001032                              INC     CHRCNT          ;INC CHARACTER COUNT
004242  001337                                      BNE     T3A             ;CONTINUE
004244  012777  000012  174530                      MOV     #12,@LPB        ;SEND LF
004252                                              $WAIT
004252  105777  174522                              TSTB    @LPS            ;TEST READY
004256  100375                                      BPL     .-4             ;WAIT FOR READY
004260  012737  177574  001032                      MOV     #-132.,CHRCNT   ;RESET CHAR COUNT
004266  005237  001040                              INC     CYCCNT          ;INC CYCLE COUNT
004272  001356                                      BNE     T5A             ;CONTINUE IF NOT DONE
004274  032777  010000  174502                      BIT     #BIT12,@SWR     ;LOOP ON TEST?
004302  001266                                      BNE     TEST2           ;LOOP

                                        ;TEST 3
                                        ;TEST CHARACTER COMPARATOR WITH ALTERNATE LINES OF
                                        ;ALL CHARACTERS AND ILLEGAL CHARACTERS

004304  004437  010022                  TEST3:  JSR     %4,TYPINT
004310                                          $PRINT  \M
004310  013737  012364  011716                      MOV     TN03,MES15              ;SET TEST NUMBER FOR MESSAGE
004316  004437  007752                              JSR     %4,PRINT                ;PRINT TEST NUMBER
                    000004                          M=M+1
004322  012737  177765  001040                      MOV     #-13,CYCCNT     ;SET 21 LINES
004330  000137  004462                              JMP     LP2H            ;SEND ILLEGAL CHARS FIRST TO GIVE BLANK LINE
004334  012737  177574  001032              T2B0:   MOV     #-132.,CHRCNT   ;SET CHAR COUNT FOR 132
004342  012737  000040  001034              T2B0A:  MOV     #40,CHRGEN      ;SET FIRST CHAR.
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     T282B           ;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  T282B:  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                                  $PRINT  \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                                  $ERROR  \N
004716  012737  000036  001046  ERR36:  MOV     #36,    ERCOUNT         ;SET UP ERROR COUNT 36
        000037                          N=N+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                                  $WAIT
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                                  $WAIT
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     TN06,MES15              ;SET TEST NUMBER FOR MESSAGE
1829  005400  004437  007752              JSR     %4,PRINT                ;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     SEGCNT          ;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     PRT0            ;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     PRT0            ;CONTINUE
 1869  005626  012737  000040  001050  PRT7:     MOV     #40,STRCHR      ;SET START CHAR TO SPACE
 1870  005634  000137  005412                    JMP     PRT0            ;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  /27263746354O/
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     TNO10,MES15             ;SET TEST NUMBER FOR MESSAGE
1926  006060  004437  007752                  JSR     %4,PRNNT                ;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  002413                            BLT     HS6             ;EXIT TEST IF DONE
1966  006314  162737  000004  001050            SUB     #4,STRCHR       ;SKIP 4 LINES ON DRUM, FIND START CHAR
1967  006322  022737  000040  001050            CMP     #40,STRCHR      ;START CHAR A LEGAL CHAR?
1968  006330  003704                            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     %4,TYPINT
1979  006356                                    $PRINT  \M
1980  006356  013737  012400  011716            MOV     TN011,MES15             ;SET TEST NUMBER FOR MESSAGE
1981  006364  004437  007752                    JSR     %4,PRNT                 ;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     %5,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  006530  004437  010022          ROTATE: JSR     %4,TYPINT
2017  006534                                  $PRINT  \M
2018  006534  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  006546  032777  020000  172230          BIT     #BIT13,@SWR     ;TEST CHAR SET
2022  006554  001012                          BNE     ROTO            ;SKIP IF 96 CHAR
2023  006556  012737  000137  001036          MOV     #137,LINCNT     ;LAST CHAR
2024  006564  012737  000140  001054          MOV     #140,LEGCHR     ;LEGAL CHK
2025  006572  012737  000100  001056          MOV     #100,NUMCHR     ;#CHARS
2026  006600  000411                          BR      ROT1            ;CONTINUE
2027  006602  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  006624  005037  001040          ROT1:   CLR     CYCCNT          ;CLEAR CYCLE COUNT
2031  006630  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  006652  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  006676  005777  172076          ROT4:   TST     @LPS            ;TEST FOR ERRORS
2040  006702  100006                          BPL     ROT5            ;BRANCH IF NO ERRORS
2041  006704                                  $ERROR  \N
2042  006704  012737  000044  001046  ERR44:  MOV     #44,    ERCOUNT         ;SET UP ERROR COUNT 44
2043          000045                          N=N+1
2044  006712  004537  010236                  JSR     %5,STAER        ;REPORT ERROR
2045  006716  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  LFT0:     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     LFT0            ;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     RTTR            ;LOOP
2156
2157                                    ;TEST 12
2158                                    ;HAMMER ALIGMENT
2159
2160  007504  004437  010022  HAMALN:  JSR     %4,TYPINT
2161  007510                                    $PRINT  \M
2162  007510  013737  012406  011716            MOV     TNO14,MES15             ;SET TEST NUMBER FOR MESSAGE
2163  007516  004437  007752                    JSR     %4,PRNT                 ;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           000051                           N=N+1
2172  007552  004537  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  XHAM1X: 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     HAM1X           ;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     PRTIND          ;BRANCH IF ERROR
2216  007704  105777  171070          TSTB    @LPS            ;TEST FOR READY
2217  007710  100403                  BMI     RDYOK           ;READY SET OK
2218  007712  062705  000002  PRTIND: 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
                                        ;
010000 012737 011700 010020 PRINT:  MOV     #MES14,PRTMSG   ;PRINT TEST NUMBER
010006 005777 171014                TST     @LPS            ;TEST FOR ERROR
010012 100006                       BPL     RINT            ;BRANCH IF OK
                                    $ERROR  \N
010016                              MOV     #51,    ERCOUNT         ;SET UP ERROR COUNT 51
000052                              N=N+1
010022 004537 010236                JSR     %5,STAER        ;REPORT ERROR SET
010026 000000                       HALT                    ;HALT ON ERROR
010030 012737 177514 001016 RINT:   MOV     #177514,TPS     ;SET VECTORS -
010036 012737 177516 001012         MOV     #177516,TPB     ;TO PRINT ON LINE PRINTER
010044 104000                       EMT     +0              ;PRINT
010046 011700               PRTMSG: MES14                   ;MESSAGE
010050 012737 177564 001016 TYPINT: MOV     #177564,TPS     ;RESET VECTORS
010056 012737 177566 001012         MOV     #177566,TPB     ;FOR TTY
010064 000204                       RTS     %4              ;RETURN
                                        ;
                                        ;SUBROUTINE TO OUTPUT ASCII MESSAGES ON TELETYPE PRINTER
                                        ;
010066 011600               TYP:    MOV     @%6,%0          ;GET ADDR. THAT CONTAINS MESS.
010070 062716 000002                ADD     #2,@%6          ;SET UP EXIT
010074 011000                       MOV     @%0,%0          ;ADDRESS OF MESSAGE IN R0
010076 112037 010152        TYPA:   MOVB    (0)+,TYPDAT     ;GET CHARACTER
010102 001001                       BNE     TYPC            ;BRANCH IF NOT DONE
010104 000002                       RTI                     ;EXIT
010106 122737 000045 010152 TYPC:   CMPB    #45,TYPDAT      ;CHECK FOR "%"
010114 001416                       BEQ     TYPF            ;BRANCH IF "%"
010116 122737 000043 010152         CMPB    #43,TYPDAT      ;CHECK FOR "#"
010124 001417                       BEQ     TYPG            ;BRANCH IF "#"
010126 004737 010134                JSR     %7,TYPD         ;TYPE CHARACTER IN TYPDAT
010132 000761                       BR      TYPA            ;NEXT CHAR IN MESSAGE
010134 113777 010152 170676 TYPD:   MOVB    TYPDAT,@TPB     ;OUTPUT CHARACTER TO PRINTER
010142 105777 170676        TYPDO:  TSTB    @TPS
010146 100375                       BPL     .-4
010150 000207                       RTS     %7              ;CHAR. TYPED EXIT
010152 112737 000012 010152 TYPF:   MOVB    #12,TYPDAT      ;OUTPUT LF
010160 004737 010134                JSR     %7,TYPD         ;GO TYPE CHAR.
010164 112737 000015 010152 TYPG:   MOVB    #15,TYPDAT      ;OUTPUT CR
010172 004737 010134                JSR     %7,TYPD         ;GO TYPE CHAR.
010176 000737                       BR      TYPA
010200 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
                                        ;
010202 013537 010234        CONV:   MOV     @(5)+,ACNVX     ;ADDRSS OF NO. TO BE CONVERTED
010210 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  /%LPDS 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  042522                  MES7A:  .ASCII  /RE/
      011122  042523  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 MINUTE%/
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 LINES%/
                            .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               TNDAV1: .ASCII  /D1/            ;TEST NUMBERS FOR DAVFU TESTS
012354 031104               TNDAV2: .ASCII  /D2/
012356 031504               TNDAV3: .ASCII  /D3/
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

2318                        ;DAVFU PRINTING TESTS IF DAVFU IS AVAILABLE -- SET SWITCH 14
2319
2320
2321                        ;TESTS D1 AND D2
2322                        ;CHECK DAVFU LINE COUNT SLEWING
2323
2324 012416 004437 010022  DAVFU:  JSR     %4,TYPINT       ;INITIALIZE
2325 012422 013737 014446 012160   MOV     SP,SP,MES19+2
2326 012430 104000                 EMT     +0              ;TYPE MESSAGE
2327 012432 010603                 MESDD                   ;STARTING DAVFU TESTS
2328 012434 012737 000220 013130   MOV     #220,DAVI1      ;SET DAVFU INSTRUCTIONS
2329 012442 012737 000221 013132   MOV     #221,DAVI2
2330 012450 013737 012352 011716   MOV     TNDAV1,MES15    ;SET TEST NUMBER FOR MESSAGE
2331 012456 004437 007752          JSR     %4,PRINT        ;PRINT TEST NUMBER
2332 012462 012737 013062 001034 DAVO:  MOV     #DAVTAB,CHRGEN  ;SET TABLE POINTER
2333 012470 005777 166304 DAVOO:  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
2348  012546  000137  012470                  JMP     DAVOO
2349  012552  012737  000002  001040  D5:     MOV     #2,CYCCNT       ;SET CYCLE COUNT
2350  012560  012737  011724  010020  D0:     MOV     #MES16,PRTMSG   ;SET MESSAGE ADDRESS
2351  012566  004437  010002                  JSR     %4,RINT         ;PRINT MESSAGE
2352  012572  005777  166202                  TST     @LPS            ;TEST FOR ERROR
2353  012576  100006                          BPL     D1              ;CONTINUE IF NO ERROR
2354  012600                                  $ERROR  \N
2355  012600  012737  000053  001046  ERR53:  MOV     #53,    ERCOUNT         ;SET UP ERROR COUNT 53
2356          000054                          N=N+1
2357  012606  004537  010236                  JSR     %5,STAER        ;REPORT ERROR SET
2358  012612  000000                          HALT                    ;HALT ON ERROR
2359  012614  013777  013130  166160  D1:     MOV     DAVI1,@LPB      ;SEND DAVFU INSTRUCTION,  SKIP 0 LINES
2360  012622                                  $WAIT
2361  012622  105777  166152                  TSTB    @LPS            ;TEST READY
2362  012626  100375                          BPL     .-4             ;WAIT FOR READY
2363  012630  012737  011761  010020          MOV     #MES17,PRTMSG   ;SET PRINTER MESSAGE ADDRESS
2364  012636  004437  010002                  JSR     %4,RINT         ;PRINT MESSAGE
2365  012642  012737  012064  010020          MOV     #MES18,PRTMSG   ;SET MESSAGE ADDRESS
2366  012650  013737  013132  001034          MOV     DAVI2,CHRGEN    ;FIRST DAVFU INSTRUCTION
2367  012656  012737  012360  001050          MOV     #TN01,STRCHR    ;SET TABLE POINTER
2368  012664  012737  000017  001032          MOV     #15.,CHRCNT     ;SET TABLE COUNT
2369  012672  005777  166102          D2:     TST     @LPS            ;TEST FOR ERROR
2370  012676  100006                          BPL     D3              ;CONTINUE IF NO ERRORS
2371  012700                                  $ERROR  \N
2372  012700  012737  000054  001046  ERR54:  MOV     #54,    ERCOUNT         ;SET UP ERROR COUNT 54
2373          000055                          N=N+1
2374  012706  004437  010236                  JSR     %4,STAER        ;REPORT ERROR SET
2375  012712  000000                          HALT                    ;HALT ON ERROR
2376  012714  013777  001034  166060  D3:     MOV     CHRGEN,@LPB     ;SEND DAVFU INSTR.
2377  012722                                  $WAIT                   ;WAIT
2378  012722  105777  166052                  TSTB    @LPS            ;TEST READY
2379  012726  100375                          BPL     .-4             ;WAIT FOR READY
2380  012730  017737  166114  012156          MOV     @STRCHR,MES19   ;SET PRINTER MESSAGE
2381  012736  004437  010002                  JSR     %4,RINT         ;PRINT MESSAGE
2382  012742  005337  001032                  DEC     CHRCNT          ;DEC TABLE COUNT
2383  012746  001407                          BEQ     D4              ;EXIT TEST IF DONE
2384  012750  005237  001034                  INC     CHRGEN          ;NEXT DAVFU INSTR.
2385  012754  062737  000002  001050          ADD     #2,STRCHR       ;INC TABLE POINTER
2386  012762  000137  012672                  JMP     D2              ;CONTINUE
2387  012766  005337  001040          D4:     DEC     CYCCNT          ;DEC CYCLE COUNT
```

```
2388  012772  001415                        BEQ     DEXD            ;EXIT IF DONE
2389  012774  062737  000140  013130        ADD     #140,DAVI1      ;CHANGE DAVFU INSTR.
2390  013002  062737  000140  013132        ADD     #140,DAVI2      ;CHANGE DAVFU INSTR.
2391  013010  013737  012354  011716        MOV     TNDAV2,MES15    ;SET TEST NUMBER FOR MESSAGE
2392  013016  004437  007752                JSR     %4,PRNNT        ;PRINT TEST NUMBER
2393  013022  000137  012560                JMP     DO              ;RETEST LINE COUNT SLEWING
2394  013026  012737  000220  013130  DEXD: MOV     #220,DAVI1      ;RESET DAVFU INSRT.
2395  013034  012737  000221  013132        MOV     #221,DAVI2      ;RESET DAVFU INSTR.
2396  013042  032777  010000  165734        BIT     #BIT12,@SWR     ;LOOP ON TEST?
2397  013050  001002                        BNE     1$              ;LOOP
2398  013052  000137  013134                JMP     DAV2            ;NEXT TEST
2399  013056  000137  012416          1$:   JMP     DAVFU           ;LOOP
2400
2401
2402  013062  000356                DAVTAB: 356                     ;DAVFU LOAD TABLE
2403  013064  000001                        1
2404  013066  000002                        2
2405  013070  000003                        3
2406  013072  000004                        4
2407  013074  000005                        5
2408  013076  000006                        6
2409  013100  000007                        7
2410  013102  000010                        10
2411  013104  000011                        11
2412  013106  000012                        12
2413  013110  000013                        13
2414  013112  000014                        14
2415  013114  000015                        15
2416  013116  000016                        16
2417  013120  000017                        17
2418  013122  000020                        20
2419  013124  000357                        357
2420  013126  000000                        0
2421
2422
2423  013130  000220                DAVI1:  220
2424  013132  000221                DAVI2:  221
2425
2426                                  ;TEST D3
2427                                  ;CHECK DAVFU CHANNEL SLEW COMMANDS
2428
2429  013134  004437  010022        DAV2:   JSR     %4,TYPINT       ;INITIALIZE
2430  013140  013737  014446  012160        MOV     SP$P,MES19+2
2431  013146  013737  012356  011716        MOV     TNDAV3,MES15    ;SAT TEST NUMBER FOR MESSAGE
2432  013154  004437  007752                JSR     %4,PRNNT        ;PRINT TEST NUMBER D3
2433  013160  012737  014430  013712        MOV     #MTAB,MTABP     ;SET MESSAGE TABLE POINTER
2434  013166  012737  014376  013706        MOV     #ITAB,ITABP     ;SET INSTRUCTION TABLE POINTER
2435  013174  017737  000506  001050        MOV     @ITABP,STRCHR   ;SAT FIRST INSTRUCTION
2436  013202  012737  012360  013714        MOV     #TNO1,MTABP     ;SET HEADER MESSAGE TABLE POINTER
2437  013210  012737  014360  013710        MOV     #ICTAB,ICTABP   ;SET INSTR COUNT TABLE POINTER
2438  013216  017737  000466  001052        MOV     @ICTABP,STRCNT  ;GET FIRST INSTR COUNT
2439  013224  012737  013716  013704  LOAD:  MOV     #DTAB,DTABP     ;SET DATA TABLE POINTER
2440  013232  017737  000446  001034        MOV     @DTABP,CHRGEN   ;SET FIRST DATA PAIR
2441  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
```

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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,MES19+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                                                    5
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  000080                                                    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  000003                                                    3
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  000022                                          22
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  000017                                          17
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
```

```
2658  014310  000005                    5
2659  014312  000020                    20
2660  014314  000013                    13
2661  014316  000000                    0
2662  014320  000005                    5
2663  014322  000002                    2
2664  014324  000001                    1
2665  014326  000000                    0
2666  014330  000007                    7
2667  014332  000010                    10
2668  014334  000001                    1
2669  014336  000002                    2
2670  014340  000005                    5
2671  014342  000000                    0
2672  014344  000003                    3
2673  014346  000000                    0
2674  014350  000001                    1
2675  014352  000000                    0
2676  014354  000357                    357             ;STOP LOAD
2677  014356  077777                    77777           ;STOP !!!!!
2678
2679                          ;INSTRUCTION COUNT TABLE - FOR DAVFU CHANNEL SLEW INSTRUCTIONS
2680
2681  014360  000105            ICTAB:  105
2682  014362  000056                    56
2683  014364  000042                    42
2684  014366  000023                    23
2685  014370  000005                    5
2686  014372  000001                    1
2687  014374  000000                    0                       ;END OF TABLE
2688
2689                          ;INSTRUCTION TABLE - DAVFU CHANNEL SLEW INSTRUCTIONS
2690
2691  014376  000200            ITAB:   200                     ;CHANNEL 1
2692  014400  000201                    201                     ;CHANNEL 2
2693  014402  000202                    202                     ;CHANNEL 3
2694  014404  000203                    203                     ;CHANNEL 4
2695  014406  000204                    204                     ;CHANNEL 5
2696  014410  000205                    205                     ;CHANNEL 6
2697  014412  000206                    206                     ;CHANNEL 7
2698  014414  000207                    207                     ;CHANNEL 8
2699  014416  000210                    210                     ;CHANNEL 9
2700  014420  000211                    211                     ;CHANNEL 10
2701  014422  000212                    212                     ;CHANNEL 11
2702  014424  000213                    213                     ;CHANNEL 12
2703  014426  000000                    0                       ;END OF TABLE
2704
2705                          ;MESSAGE TABLE FOR BLANK LINE COUNTS IN MESSAGE
2706
2707  014430  030440            MTAB:   .ASCII  / 1/
2708  014432  031040                    .ASCII  / 2/
2709  014434  031440                    .ASCII  / 3/
2710  014436  033040                    .ASCII  / 6/
2711  014440  032062                    .ASCII  /24/
```

```
                                        .ASCII  /14/
                                FS:     .ASCII  /3 /
                                SPSP:   .ASCII  / /

                                ;SCOPE LOOP ROUTINE

                                ;SET CHARACTER IN SWITCH REGISTER -0.

                                SCOPE:  JSR     %4,TYPINT
                                        MOV     @SWR,SAVE       ;FETCH SWITCHES
                                        MOV     #-132.,CHRCNT   ;SET CHAR COUNT
                                        BIC     #177400,SAVE    ;MASK CHARACTER
                                LDLPX:  $WAIT
                                        TSTB    @LPS            ;TEST READY
                                        BPL     .-4             ;WAIT FOR READY
                                        TST     @LPS            ;TEST FOR ERROR
                                        BPL     LPSCOPE         ;BRANCH IF NO ERROR
                                        $ERROR  \N
                                ERR60:  MOV     #60,    ERCOUNT         ;SET UP ERROR COUNT 60
                                        N=N+1
                                        JSR     %5,STAER        ;REPORT ERROR SET
                                        HALT                    ;HALT ON ERROR
                                LPSCOPE:MOV     SAVE,@LPB       ;LOAD PRINTER BUFFER
                                        BIT     #BIT11,@SWR     ;SEND ONLY ONE CHAR?
                                        BEQ     LSCO            ;NO,  BRANCH
                                        HALT                    ;HALT - WAIT FOR OPERATOR
                                        BR      SCOPE           ;NEXT CHAR
                                LSCO:   JMP     @LOSCOP         ;SEND LF?
                                LSCA:   INC     CHRCNT          ;INCREMENT CHAR COUNT
                                        BNE     LDLPX           ;CONTINUE IF NOT DONE LINE
                                        MOV     #12,@LPB        ;SEND LF
                                        $WAIT
                                        TSTB    @LPS            ;TEST READY
                                        BPL     .-4             ;WAIT FOR READY
                                        BR      SCOPE           ;CONTINUE

                                LOSCOP: LSCA


                                        .END
```

```
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   1701   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   1683*  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          1736*  1752
CR3     004752          1738*  1750   1761
CR5     005040          1742   1754*
CR7     005014          1748*  1753
CSBR    001022           957*  1389*
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   2132   2224*  2399
DAVI1   013130          2328*  2359   2389*  2394*  2423*
DAVI2   013132          2329*  2366   2390*  2395*  2424*
DAVTAB  013062          2332   2402*
DAVO    012462          2332*  2340
DAVOO   012470          2333*  2348
DAV1    012516          2334   2341*
```

```
DAV2    013134          896    2398    2429#   2522
DEXD    013026         2388    2394#
DIA     002616         1278*   1290*   1300*   1340#   1354*
DISPLA  001006          951#   1026*
DISPRE  000174          881#   1026
DLEX    013700         2521    2523#
DLI     013264         2442    2449#   2471
DLIO    013512         2491    2498#
DLIOA   013540         2500    2503#
DLIOB   013546         2502    2504#
DLI2    013632         2512    2515#
DL2     013272         2450#   2467
DL6     013334         2455    2462#
DL6A    013362         2463    2465    2468#
DL8     013406         2475#   2518
DL8A    013430         2482#
DL9     013450         2486#   2507
DOAGN   007672         2195    2202#
DTAB    013716         2439    2533#
DTABP   013704         2439*   2440    2468*   2469    2525#
DO      012560         2350#   2393
D1      012614         2353    2359#
D2      012672         2369#   2386
D3      012714         2370    2376#
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    001252         1062#
ERR20   001752         1206#
ERR21   002044         1229#
ERR22   002066         1236#
ERR23   002120         1244#
ERR24   003042         1398#
ERR25   003146         1422#
ERR26   003444         1494#
ERR27   003526         1510#
ERR3    001302         1073#
ERR30   003622         1536#
ERR31   003724         1556#
ERR32   004072         1606#
ERR33   004150         1620#
```

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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#
HAM1X   007530          2166#   2186
HAM2    007536          2167#   2180
HEDI    010266          2308    2311    2317#
HSPRT   006046           918    1923#   1972
HSO     006142          1937#   1968    1970
HSOO    006126          1932    1935#
HSOOA   006112          1929    1933#
HSI     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  003560          1490    1521#
INDATO  003464          1492    1499#
INDAT1  003546          1508    1515#
INDO    003436          1491#   1506
IND1    003520          1502    1507#
INTIC   002010          1157    1217#
INTID   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
LFT0    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    1233#
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#
```

```
MESDO   010603          2317#   2327
MESI    010642          1032    2317#
MESI0   011271          1405    2317#
MESI1   011404          1376    2317#
MESI1A  011402          1377    2317#
MESI2   011442          1356    2317#
MESI3   011471          1418    2317#
MESI4   011700          2234    2245    2317#
MESI5   011716          1611*   1653*   1721*   1775*   1828*   1881*   1925*   1980*   2018*   2068*   2162*   2317#   2330*
                        2391*   2431*
MESI6   011724          2317#   2350
MESI7   011761          2317#   2363
MESI8   012064          2317#   2365    2504
MESI9   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
MLFO    005712          1888#   1897
MLF1    005734          1889    1895#
MLF2    005770          1901#   1906
MLF4    006036          1887    1916#
MTAB    014430          2433    2514    2707#
MTABP   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#
NODATO  003640          1534    1541#
NODAT1  003744          1554    1561#
NODAT2  003770          1563    1568#
NODAT3  004000          1532    1573#
NODAT4  004056          1543    1596#
NODO    003614          1533#   1548
NODOA   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
OVRD    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         825#   2198*
PLKS    001024           958#   1269    1290    1291*
PRNNT   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#
PRTIND  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
ROTD    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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R7      =X000007            823#    825
SAVE      001044           1008#   1626*  1633*  1634   1737*  1738   1749*  2721*  2723*  2734
SCHRSW    004210           1616    1629#  1632
SCOPE     014450            928     932    933   2720#  2738   2746
SEGCNT    001030           1002#   1834*  1836*  1851*
SETUP     001060            887    1017#
SLEWCK    003030            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      =X000006            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#
STARI     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*  1886
                           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
TESTIA    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#
TP8     001012           953#   2243*   2247*   2264*
TP5     001016           955#   2242*   2246*   2265
TST2AX  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    1287    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
T2BO    004334          1658#   1711
T2BOA   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     004230          1627    1634#   1643
WORK    001042          1007#   1126*   1144*
XHAM1   007560          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
```

```
ADD     1317  1327  1362  1370  1373  1431  1500  1542  1782  1969  2035  2080  2218  2223  2253
        2287  2290  2342  2385  2389  2390  2468  2508  2509  2510  2516
BCS     1265  1270
BEQ     1280  1324  1335  1348  1433  1435  1502  1544  1563  1669  1672  1674  1677  1694  1696
        1698  1705  1742  1796  1798  1808  1810  1833  1849  1858  1860  1862  1887  1949  1952
        1984  2007  2091  2093  2105  2118  2191  2195  2259  2261  2344  2383  2388  2463  2465
        2521  2736
BGT     1319  1358  1366  1795  2057  2076  2104  2153
BIC     1179  1189  1200  1211  1252  1354  1899  2289  2723
BIS     1177  1187  1198  1209  1241  1703
BIT     1279  1305  1334  1442  1644  1671  1701  1704  1712  1762  1809  1818  1832  1871  1916
        1928  1971  1983  2008  2021  2058  2106  2154  2187  2190  2396  2520  2735
BLE     1968
BLT     1700  1848  1965  2006  2037
BMI     1047  1060  1078  1089  1117  1143  1167  1234  1508  1554  2215  2217  2313
BNE     1145  1306  1326  1411  1417  1443  1552  1636  1643  1645  1702  1711  1713  1740  1761
        1763  1800  1806  1819  1852  1872  1897  1906  1917  1929  1954  1972  1999  2009  2022
        2048  2050  2059  2107  2128  2131  2142  2146  2155  2180  2186  2188  2256  2299  2397
        2467  2471  2500  2507  2512  2518  2741
BPL     1040  1071  1106  1129  1136  1160  1227  1333  1420  1429  1492  1505  1534  1547  1618
        1640  1661  1682  1685  1709  1729  1746  1757  1788  1804  1840  1856  1889  1904  1941
        1963  1991  2003  2040  2054  2083  2102  2120  2133  2150  2168  2176  2177  2184  2222
        2227  2236  2266  2334  2347  2353  2362  2370  2379  2442  2453  2455  2479  2481  2489
        2491  2726  2728  2745
BR      1023  1045  1052  1065  1076  1083  1094  1111  1122  1134  1141  1150  1165  1172  1232
        1239  1247  1309  1321  1361  1369  1396  1540  1567  1604  1675  1678  1784  1835  1908
        1932  1956  1959  1970  1986  2026  2078  2095  2098  2263  2272  2448  2502  2738  2746
CLC     2292  2294  2296
CLR     1126  1253  1266  1271  1273  1275  1286  1296  1355  1364  1550  1683  1813  1814  2030
        2032
CMP     1028  1217  1251  1318  1357  1365  1432  1543  1562  1673  1676  1693  1695  1697  1699
        1857  1859  1861  1953  1967  2036  2047  2049  2056  2075  2152  2462  2464  2470  2499
CMPB    1408  2258  2260
DEC     1323  1325  1347  1794  1905  1964  2055  2090  2103  2130  2145  2298  2382  2387  2466
        2506
EMT     1031  1033  1035  1053  1066  1084  1095  1276  1375  1413  1439  1515  1564  1568  2244
        2310  2326
HALT     854  1037  1055  1068  1086  1097  1401  1415  1425  1441  1444  1497  1513  1517  1539
        1559  1566  1609  1623  1666  1690  1734  1793  1845  1894  1946  1996  2045  2088  2125
        2138  2173  2241  2314  2339  2358  2375  2447  2460  2496  2733  2737
INC     1144  1329  1360  1368  1412  1551  1561  1635  1642  1668  1670  1692  1710  1739  1741
        1760  1797  1799  1807  1847  1850  1851  1863  1896  1900  1907  1948  1950  1951  1998
        2004  2005  2031  2033  2092  2094  2127  2140  2141  2151  2179  2185  2384  2740
JMP      887   893   894   895   896   902   903   904   905   912   913   914   915   916   917
         918   919   920   921   922   928   933  1212  1219  1267  1272  1281  1292  1328  1336
        1379  1437  1445  1498  1506  1514  1519  1548  1560  1570  1624  1627  1657  1735  1747
        1750  1815  1817  1864  1866  1868  1870  2192  2203  2340  2348  2386  2393  2398  2399
        2461  2497  2522  2523  2739
JSR     1017  1044  1051  1064  1075  1082  1093  1110  1121  1133  1140  1149  1164  1171  1218
        1231  1238  1246  1274  1287  1297  1378  1394  1395  1400  1424  1430  1489  1496  1512
        1530  1538  1558  1602  1603  1608  1612  1622  1651  1654  1665  1689  1719  1722  1733
        1773  1776  1792  1826  1829  1844  1879  1882  1893  1923  1926  1945  1978  1981  1995
        2016  2019  2044  2066  2069  2087  2124  2137  2160  2163  2172  2198  2240  2262  2269
        2271  2306  2324  2331  2338  2351  2357  2364  2374  2381  2392  2429  2432  2446  2459
```

```
        2485  2495  2505  2720  2732
MOV      886   911   927   932  1019  1020  1021  1025  1026  1029  1030  1042  1049  1057  1058
        1062  1073  1080  1091  1108  1119  1127  1131  1138  1147  1157  1158  1162  1169  1174
        1176  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  1398  1402  1403  1404  1405  1418
        1422  1426  1436  1438  1490  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  1785  1786
        1790  1801  1811  1812  1816  1828  1831  1834  1836  1837  1838  1842  1846  1853  1865
        1867  1869  1881  1884  1885  1891  1895  1901  1925  1930  1931  1933  1934  1935  1936
        1937  1938  1939  1943  1947  1957  1958  1960  1980  1985  1987  1988  1989  1993  1997
        2000  2018  2023  2024  2026  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  1886  1898  2255  2264  2268  2270  2291
NEG     2079
NOP     1178  1188  1199  1210  1242  2199  2200  2201
RESET   1018  1104  1115  2196
ROR     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  1088  1105  1135  1159  1226  1416  1419  1434  1491  1501  1507
        1533  1553  1617  1660  1684  1728  1787  1805  1839  1888  1940  1990  2039  2082  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  1803  1855  1903  1962  2002  2053  2101  2149  2175  2183
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.ASCII  2317  2707  2708  2709  2710  2711  2712  2713  2714
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.ENABL   844   845
.END    2753
.EVEN   1485  1914  1918  2317
.LIST    967   977   988  2317
.MACR    969   979   990
.NLIST  2317
.PAGE    797
.REPT      1   850
.TITLE   797
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ERRORS DETECTED:  0

#,DZLPKD.PRT←DZLPKD.P11/CRF/SOL

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

Spooler runtime 10 Seconds, 47 KCS, 262 disk reads, 3 disk writes, 69 pages