IDENTIFICATION

PRODUCT CODE: MAINDEC-08-DHLQA-B-D

PRODUCT NAME: LQP-8 PRINTER DIAGNOSTIC

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MAINTAINER: DIAGNOSTIC GROUP

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TABLE OF CONTENTS

1.0 ABSTRACT

2.0 REQUIREMENTS
2.1 HARDWARE
2.2 STORAGE
2.3 PREREQUISITE SOFTWARE

3.0 RESTRICTIONS

4.0 STANDARD TEST PROCEDURE
4.1 LOADING THE PROGRAM
4.2 PROGRAM INITILIZATION
4.2.1 INITIALIZATION FOR A NON-ACTIVE CONSOLE PACKAGE
4.2.2 INITIALIZATION FOR AN ACTIVE CONSOLE PACKAGE
4.3 CHANGING DEVICE CODES
4.3.1 CHANGING DEVICE CODES ON A NON-ACTIVE CONSOLE PACKAGE
4.3.2 CHANGING DEVICE CODES ON AN ACTIVE CONSOLE PACKAGE
4.4 INTERNAL LOGIC/DATA TEST DESCRIPTION
4.4.1 RUN INTERNAL LOGIC/DATA TEST ON A NON-ACTIVE CONSOLE PACKAGE
4.4.2 RUN INTERNAL LOGIC/DATA TEST ON AN ACTIVE CONSOLE PACKAGE
4.5 DYNAMIC PRINTER TEST DESCRIPTION
4.5.1 RUN DYNAMIC PRINTER TEST ON A NON-ACTIVE CONSOLE PACKAGE
4.5.2 RUN DYNAMIC PRINTER TEST ON AN ACTIVE CONSOLE PACKAGE
4.6 RUN SPECIAL DYNAMIC PRINTER TESTS
4.6.1 REQUIREMENTS
4.6.2 PROCEDURES
4.7 OPERATION OF CONSOLE PACKAGE
4.7.1 CONTROL CHARACTERS
4.7.2 SELECTING TEST NUMBER
4.7.3 CHANGING PSUEDO SWITCH REGISTER

5.0 ERRORS
5.1 LOGIC ERRORS
5.1.1 LOGIC ERRORS ON A NON-ACTIVE CONSOLE
5.1.2 LOGIC ERRORS ON AN ACTIVE CONSOLE
5.2 STATUS ERRORS
5.2.1 STATUS ERRORS ON A NON-ACTIVE CONSOLE
5.2.2 STATUS ERRORS ON AN ACTIVE CONSOLE
5.3 DATA ERRORS
5.3.1 DATA ERRORS ON A NON-ACTIVE CONSOLE
5.3.2 DATA ERRORS ON AN ACTIVE CONSOLE

6.0 SWITCH REGISTER SETTINGS
6.1 NORMAL OPERATION SWITCHES
6.2 ERROR RELATED SWITCHES

7.0 REVISIONS

8.0 ADDITIONAL INFORMATION
8.1 STARTING ADDRESSES
8.2 SPECIAL ADDRESSES

9.0 LISTING

1.0 ABSTRACT

THE LQP-8 PRINTER DIAGNOSTIC WILL TEST ALL THE LOGIC ON THE LQP-8 PARALLEL INTERFACE MODULE (M8366) THAT CAN BE TESTED VIA PROGRAM INSTRUCTION. IN ORDER TO TEST BOTH THE INTERFACE LOGIC AND PRINTER LOGIC COMPLETELY, BOTH THE LOGIC AND DYNAMIC TESTS MUST BE RUN.

THIS DIAGNOSTIC CAN ALSO BE USED ON THE VT78 SYSTEM TO TEST THE PARALLEL INTERFACE AND PRINTER LOGIC.

A CONSOLE PACKAGE WITH SOFTWARE CONTROLLED SWITCH REGISTER HAS BEEN INCORPORATED INTO THIS DIAGNOSTIC TO ALLOW THE PROGRAM TO RUN WITH OR WITHOUT A HARDWARE SWITCH REGISTER, TO INHIBIT ALL HALTS WITHIN THE PROGRAM, AND TO HAVE COMMUNICATIONS WITH THE DIAGNOSTIC VIA A TERMINAL. IF THE CONSOLE SWITCH REGISTER PACKAGE IS NOT ACTIVE, THEN THE PROGRAM WILL RUN WITH OR WITHOUT THE HARDWARE SWITCH REGISTER. ALL ERRORS AND END OF PASS INDICATIONS WILL RESULT IN A HALT.

THE INFORMATION NECESSARY TO INTERPRET ERROR HALTS OR MESSAGES IS CONTAINED IN SECTION 5 UNDER ERRORS.

2.0 REQUIREMENTS

2.1 HARDWARE

THE FOLLOWING HARDWARE IS REQUIRED FOR EXECUTION OF THIS PROGRAM:

PROCESSOR:	PDP-8A, 8E, 8F, 8M; VT78
MEMORY:	MINIMUM OF 4K R/W MEMORY IN FIELD 0
OPTIONS:	LQP-8 PARALLEL INTERFACE (M8366) CONSOLE SERIAL INTERFACE WITH TERMINAL (OPTIONAL)
SPECIAL:	DIABLO HYTYPE II PRINTER

2.2 STORAGE

THE PROGRAM MUST BE LOADED INTO FIELD 0 CONTAINING AT LEAST 4K OF READ/WRITE MEMORY. THE PROGRAM OCCUPIES LOCATIONS 0000 TO 7577.

2.3 PREREQUISITE SOFTWARE

ALL OF THE BASIC PDP-8A, E, F, M OR VT78 CPU AND MEMORY TESTS MUST HAVE BEEN RUN SUCCESSFULLY.

3.0 RESTRICTIONS

A. RUNNING OF THE INTERNAL LOGIC/DATA TEST REQUIRES THAT THE LQ PRINTER BE PLACED OFF LINE BY

PRESSING THE SWITCH LABLED "PAUSE", OR BY REMOVING THE MAINTENANCE COVER LOCATED AT THE FRONT OF THE PRINTER. ON SOME OLDER PRINTERS, PRESSING "PAUSE" MAY NOT DROP "PRINTER READY", BIT 0, WHICH WILL CAUSE A STATUS ERROR. IN THIS CASE, REMOVE THE MAINTENANCE COVER.

B. PRESSING A KEY ON THE CONSOLE TERMINAL WITH CONSOLE PACKAGE NON-ACTIVE WILL HAVE NO EFFECT ON THE PROGRAM. PRESSING A NON-CONTROL KEY, WITH ACTIVE CONSOLE, DURING EXECUTION OF THE PROGRAM WILL RESULT IN A PROGRAM STALL, THE CHARACTER BEING ECHOED, AND THE PROGRAM BEING RESUMED.

C. RUNNING OF THE DYNAMIC PRINTER TESTS REQUIRES THAT THE LQ PRINTER BE PLACED ON LINE BY REPLACING THE MAINTENANCE COVER AND/OR PRESSING THE SWITCH LABLED "PAUSE".

4.0 STANDARD TEST PROCEDURE

TO FULLY TEST THE LQ PRINTER, CONNECTING CABLE, AND INTERFACE LOGIC, THE FOLLOWING SECTIONS MUST BE RUN COMPLETELY:

PARAGRAPH 4.4 INTERNAL LOGIC/DATA TEST
PARAGRAPH 4.5 DYNAMIC PRINTER TEST
PARAGRAPH 4.6 SPECIAL DYNAMIC PRINTER TESTS

4.1 LOADING THE PROGRAM

PROCESSOR = PDP-8A, E, F, M:
LOAD THE PROGRAM INTO FIELD 0 USING THE STANDARD BINARY LOADER TECHNIQUE.

PROCESSOR = VT78:
FOR VT78 SYSTEMS THIS DIAGNOSTIC IS PROVIDED ALONG WITH A SYSTEM MONITOR ON FLOPPY MEDIA. TO LOAD THE SYSTEM MONITOR SIMPLY INSERT THE FLOPPY DISKETTE CONTAINING THE DIAGNOSTIC INTO EITHER DRIVE RXA0 OR RXA1 AND PRESS THE VT78 START BUTTON. THE SYSTEM WILL RESPOND ON THE VIDEO DISPLAY WITH A START MESSAGE , FOLLOWED BY A PROMPT CHARACTER. TO CALL AND START THE DIAGNOSTIC TYPE 'R DHLQAB' FOLLOWED BY THE RETURN KEY. THE SYSTEM WILL RESPOND WITH A DISPLAY OF THE PROGRAM NAME AND CURRENT PSEUDO SWITCH REGISTER SETTING AND WAIT FOR USER SELECTION (SEE SECTION 6.0). THIS DIAGNOSTIC ON THE FLOPPY DISKETTE HAS BEEN PRE-INITIALIZED FOR USE ON A VT78 SYSTEM (LOC 22 BIT 2 = 1). ALSO STARTING THE DIAGNOSTIC BY ISSUEING 'R DHLQAB' WILL EXECUTE THE DYNAMIC PRINTER TEST AND NOT THE INTERNAL LOGIC/DATA TEST. THE VT78 CPU DIAGNOSTIC CHECKS OUT THE INTERNAL INTERFACE LOGIC.

4.2 PROGRAM INITIALIZATION

THE PROGRAM, WHEN LOADED, IS INITIALIZED TO RUN AS FOLLOWS:

A. NO HARDWARE SWITCH REGISTER (USES LOCATION 0020 AS PSUEDO SWITCH REGISTER)

B. 4K OF READ/WRITE MEMORY - THE MINIMUM REQUIREMENT
C. CONSOLE PACKAGE INACTIVE (PAPER TAPE MEDIA)
D. CONSOLE PACKAGE ACTIVE (DISK MEDIA)

IF IT IS DESIRED TO CHANGE THE PROGRAM INITIALIZATION FROM THE ABOVE, GO TO THE APPROPRIATE PARAGRAPH LISTED BELOW. OTHERWISE, GO TO PARAGRAPH 4.3 - CHANGING DEVICE CODES.

4.2.1 INITIALIZATION FOR A NON-ACTIVE CONSOLE PACKAGE

A. TO USE HARDWARE SWITCH REGISTER, LOAD ADDRESS TO 0021 IN FIELD 0, AND DEPOSIT 4000. THIS IS HARDWARE CONFIGURATION WORD ONE, AND SETTING BIT 0 TO A ONE (1) TELLS THE PROGRAM TO USE THE HARDWARE SWITCH REGISTER.

B. TO USE PSUEDO SWITCH REGISTER, LOAD ADDRESS TO 0021 IN FIELD 0, AND DEPOSIT 0000. LOAD ADDRESS TO 0020 AND DEPOSIT THE DESIRED SWITCH REGISTER CONTENTS.

```
LOC 0020 FIELD 0  PSUEDO SWITCH REGISTER
LOC 0021 FIELD 0  HARDWARE CONFIG. WORD ONE
LOC 0022 FIELD 0  HARDWARD CONFIG. WORD TWO
```

C. TO DEACTIVATE THE CONSOLE PACKAGE, LOAD ADDRESS TO 0022 AND DEPOSIT 0000.

4.2.2 INITIALIZATION FOR AN ACTIVE CONSOLE PACKAGE

A. TO USE HARDWARE SWITCH REGISTER, FOLLOW INSTRUCTIONS IN SECTION 4.2.1 A.

B. TO USE PSUEDO SWITCH REGISTER, FOLLOW INSTRUCTIONS IN SECTION 4.2.1 B.

C. TO ACTIVATE THE CONSOLE PACKAGE, LOAD ADDRESS TO 0022 AND DEPOSIT 0400.

4.3 CHANGING DEVICE CODES

THE PROGRAM, WHEN LOADED, IS INITIALIZED FOR DEVICE CODE 650X FOR THE LQ PRINTER. IF IT IS DESIRED TO CHANGE THIS DEVICE CODE, FOLLOW THE INSTRUCTIONS IN THE APPROPRIATE PARAGRAPH BELOW FOR A NON-ACTIVE OR AN ACTIVE CONSOLE PACKAGE. IF NO CHANGE IN DEVICE CODE IS REQUIRED, GO TO PARAGRAPH 4.4 - RUN INTERNAL LOGIC/DATA TEST.

4.3.1 CHANGING DEVICE CODE ON A NON-ACTIVE CONSOLE PACKAGE

USING PSUEDO SWITCH REGISTER;

A. LOAD THE DESIRED DEVICE CODE INTO BITS 3-8 OF LOCATION 0020 (THE PSUEDO SWITCH REGISTER).

B. LOAD ADDRESS TO 202, PRESS "CLEAR" THEN "CONT" ON A PDP-8E, F, OR M. PRESS "INIT" THEN "RUN" ON A PDP-8A.

C. PROGRAM WILL HALT WITH OLD DEVICE CODE IN AC BITS 3-8.

D. PRESS "CONT". PROGRAM WILL HALT, AFTER CHANGING IOT DEVICE CODES, WITH THE NEW DEVICE CODE IN AC BITS 3-8.

E. PRESSING "CONT" WILL CAUSE THE PROGRAM TO START THE LOGIC TEST OR THE PROGRAM MAY NOW BE STARTED AT ONE OF THE OTHER STARTING ADDRESSES.

USING HARDWARE SWITCH REGISTER:

A. LOCATION 0021 OF FIELD 0 MUST CONTAIN 4XXX.
B. LOAD ADDRESS TO 202.
C. SET SWITCH REGISTER BITS 3-8 TO DESIRED DEVICE CODE.
D. PRESS "CLEAR" THEN "CONT" ON A PDP-8E, F, M, OR PRESS "INIT" THEN "RUN" ON A PDP-8A.
E. PROGRAM WILL HALT WITH OLD DEVICE CODE IN AC BITS 3-8.
F. PRESS "CONT". PROGRAM WILL HALT, AFTER CHANGING IOT DEVICE CODES, WITH THE NEW DEVICE CODE IN AC BITS 3-8.
G. PRESSING "CONT" WILL CAUSE THE PROGRAM TO START THE LOGIC TEST OR THE PROGRAM MAY NOW BE STARTED AT ONE OF THE OTHER STARTING ADDRESSES.

4.3.2 CHANGING DEVICE CODES ON AN ACTIVE CONSOLE PACKAGE

USING PSUEDO SWITCH REGISTER:

A. LOAD THE DESIRED DEVICE CODE INTO BITS 3-8 OF LOCATION 0020 (THE PSUEDO SWITCH REGISTER).
B. START THE PROGRAM AT ADDRESS 202.
C. THE PROGRAM WILL CHANGE THE IOT DEVICE CODES, PRINT THE MESSAGE "DSC = 00X0" (WHERE "XX" EQUALS THE NEW DEVICE CODE) AND ASK THE SWITCH REGISTER EQUALS QUESTION (SR=).

USING HARDWARE SWITCH REGISTER:

A. LOCATION 0021 OF FIELD 0 MUST CONTAIN 4XXX.
B. LOAD THE DESIRED DEVICE CODE INTO BITS 3-8 OF THE SWITCH REGISTER.
C. START THE PROGRAM AT ADDRESS 202.
D. THE PROGRAM WILL CHANGE THE IOT DEVICE CODES, PRINT THE MESSAGE "DSC=0XX0" (WHERE "XX" EQUALS THE NEW DEVICE CODE) AND ASK THE SWITCH REGISTER EQUALS QUESTION (SR=).

4.4 INTERNAL LOGIC/DATA TEST DESCRIPTION

THE LOGIC TEST CONSISTS OF THE FOLLOWING TESTS:

DATA BUFFER TESTS:

IOT 2	MOVE PAPER
TEST 1	LOAD ALL ONES AND ALL ZEROS
TEST 2	LOAD ALTERNATING ONES AND ZEROS

```
TEST 3          FLOATING ONE BIT CHECK
TEST 4          FLOATING ZERO BIT CHECK
TEST 5          BINARY COUNT, EVERY NUMBER

IOT 3           MOVE CARRIAGE
--- -           ---- --------

TEST 6          LOAD ALL ONES AND ALL ZEROS
TEST 7          LOAD ALTERNATING ONES AND ZEROS
TEST 10         FLOATING ONE BIT CHECK
TEST 11         FLOATING ZERO BIT CHECK
TEST 12         BINARY COUNT, EVERY NUMBER

IOT 4           PRINT CHARACTER
--- -           ----- ---------

TEST 13         LOAD ALL ONES AND ALL ZEROS
TEST 14         LOAD ALTERNATING ONES AND ZEROS
TEST 15         FLOATING ONE BIT CHECK
TEST 16         FLOATING ZERO BIT CHECK
TEST 17         BINARY COUNT, EVERY NUMBER

ACCUMULATOR TEST
----------- ----

TEST 20         CHECK THAT CAF INSTRUCTION CLEARS DATA BUFFER
TEST 21         CLEAR AC USING IOT2
TEST 22         CLEAR AC USING IOT3
TEST 23         CLEAR AC USING IOT4
TEST 24         CHECK THAT AC IS NOT CHANGED BY IOT0
TEST 25         CHECK THAT AC IS NOT CHANGED BY IOT7
TEST 26         CLEAR AC USING IOT6

DONE FLAG TESTS
---- ---- -----

TEST 27         SET DONE USING IOT6 CLEAR DONE IOT5
TEST 30         SET DONE USING IOT6 CLEAR DONE IOT2
TEST 31         SET DONE USING IOT6 CLEAR DONE IOT3
TEST 32         SET DONE USING IOT6 CLEAR DONE IOT4
TEST 33         SET DONE USING IOT6 CLEAR DONE IOT7
TEST 34         SET DONE USING IOT6 CLEAR DONE USING CAF

STATUS REGISTER TESTS
------ ------ -----

TEST 35         LOAD ALL ONES AND ALL ZEROS BITS 5, 8, 9, 10, 11
TEST 36         BIT  5  CHECK
TEST 37         BIT  8  CHECK

TEST 40         BIT  9  CHECK
TEST 41         BIT 10  CHECK
TEST 42         BIT 11  CHECK
TEST 43         CLEAR STATUS REGISTER USING CAF INSTRUCTION

SKIP AND INTERRUPT TESTS
---- --- -- ------- -----

TEST 44         CHECK SKIP AND INTERRUPT ENABLE

4.4.1  RUN INTERNAL LOGIC/DATA TEST ON A NON-ACTIVE CONSOLE PACKAGE
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A. PLACE PRINTER OFF LINE BY REMOVING MAINTENANCE COVER
B. SEE SECTION 6.0 FOR SWITCH REGISTER SETTINGS.
C. START THE PROGRAM AT ADDRESS 200.
D. THE LOGIC TEST WILL LOOP CONTINUOUSLY.
E. PRESSING "CONT" WILL RESTART THE LOGIC TEST.

4.4.2 RUN INTERNAL LOGIC/DATA TEST ON AN ACTIVE CONSOLE PACKAGE

A. PLACE PRINTER OFF LINE BY REMOVING MAINTENANCE COVER.
B. SEE SECTION 6.0 FOR SWITCH REGISTER SETTINGS.
C. START THE PROGRAM AT ADDRESS 200.
D. THE LOGIC TEST WILL LOOP 4096 TIMES AND PRINT "END OF LOGIC TEST" AND "PASS COUNT XXXX", WHERE "XXXX" IS A 4-DIGIT OCTAL NUMBER.

NOTE: IF AN ATTEMPT IS MADE TO RUN THE LOGIC TEST WITH THE PRINTER "ON LINE" (READY), A STATUS ERROR WILL RESULT.

4.5 DYNAMIC PRINTER TEST DESCRIPTION

THE STANDARD DYNAMIC PRINTER TESTS CONSIST OF:

TEST 45 HORIZONTAL SPACING TEST /BIT CHECK
TEST 46 VERTICAL SPACING TEST /BIT CHECK
TEST 47 CARRIAGE POSITIONING TEST
TEST 50 ONE LINE OF EACH CHARACTER, 96 LINES, BI-DIRECTIONAL PRINTING
TEST 51 SWIRL PATTERN, 96 LINES
TEST 52 RIBBON LIFT AND DROP WITH OVERPRINT
TEST 53 RANDOM CHARACTER LINE PAIRS
TEST 54 NON-PRINTING CHARACTER CODES TEST
TEST 55 PRINT WHEEL VIBRATION TEST

THE SPECIAL DYNAMIC PRINTER TESTS CONSIST OF:

TEST 56 OPERATOR GENERATED PRINT LINE
TEST 57 RAISE AND LOWER RIBBON
TEST 60 FRICTION FEED TEST 10 BY 10 RANDOM MATRIX

A. TEST 45 HORIZONTAL SPACING TEST

THIS TEST BEGINS BY RESTORING THE PRINTER AND OVERPRINTING A DOT. THE PRINTER LINE FEEDS AND CARRIAGE RETURNS, PRINTS A DOT AND THEN MOVES THE CARRIAGE TO THE RIGHT BY THE MAGNITUDE OF BIT 11 = 1/120 INCH, AND PRINTS ANOTHER DOT. THIS PROCESS CONTINUES UNTIL ALL BITS ARE TESTED. BITS 1-11 ARE TESTED FOR PROPER MAGNITUDE AND BIT 0 IS TESTED DURING A CARRIAGE RETURN.

THE PRINT PATTERN SHOULD APPEAR AS FOLLOWS:

DATA BUFFER BITS	CARRIAGE MOVEMENT MAGNITUDE
BITS 1-11 = 0	OVERPRINT (NO MOVEMENT)

BIT 11=1	1/120 INCH
BIT 10=1	1/60 INCH
BIT 9=1	1/30 INCH
BIT 8=1	1/15 INCH
BIT 7=1	2/15 INCH
BIT 6=1	4/15 INCH
BIT 5=1	8/15 INCH
BIT 4=1	1 AND 1/15 INCH
BIT 3=1	2 AND 2/15 INCHES
BIT 2=1	4 AND 4/15 INCHES
BIT 1=1	8 AND 8/15 INCHES

B. TEST 46 VERTICAL SPACING TEST

THIS TEST BEGINS BY RESTORING THE PRINTER AND OVERPRINTING A TWO (2) INCH LINE OF UNDERSCORES. THE PRINTER IS THEN RESTORED AGAIN AND THE PAPER IS ADVANCED BY THE MAGNITUDE OF BIT 10 = 1/48 INCH. A NEW TWO (2) INCH LINE OF UNDERSCORES IS NOW PRINTED. THIS PROCESS CONTINUES UNTIL ALL OF BITS 1-10 ARE TESTED. TO TEST BIT 0 FOR BI-DIRECTIONAL PAPER MOVEMENT, OPTIONAL TEST 60, THE FRICTION FEED TEST MUST BE RUN.

THE PRINT PATTERN SHOULD APPEAR AS FOLLOWS:

DATA BUFFER BITS	PAPER MOVEMENT MAGNITUDE
BITS 1-10 = 0	OVERPRINT (NO MOVEMENT)
BIT 10=1	1/48 INCH
BIT 9=1	1/24 INCH
BIT 8=1	1/12 INCH
BIT 7=1	1/6 INCH
BIT 6=1	1/3 INCH
BIT 5=1	2/3 INCH
BIT 4=1	1 AND 1/3 INCH
BIT 3=1	2 AND 2/3 INCHES
BIT 2=1	5 AND 1/3 INCHES
BIT 1=1	10 AND 2/3 INCHES

C. TEST 47 CARRIAGE POSITIONING TEST

THIS TEST BEGINS BY RESTORING THE PRINTER AND PRINTING THE LETTER "I". THE CARRIAGE THEN MOVES THE FULL WIDTH OF THE PAGE (13.1 INCHES) TO THE RIGHT MARGIN AND PRINTS THE LETTER "I". THE CARRIAGE THEN MOVES LEFT ACROSS THE PAGE TO A POSITION 1/60 INCH TO THE RIGHT OF THE FIRST "I", AND PRINTS AN "I". THE CARRIAGE NOW MOVES RIGHT TO A POSITION 1/60

INCH TO THE LEFT OF THE RIGHTMOST "I" AND PRINTS AN "I". THIS NARROWING OF CARRIAGE SWING CONTINUES ON THE SAME LINE UNTIL A COMPLETE LINE OF "I"'S SPACED 1/60 INCH APART IS DONE. THERE SHOULD BE NO OVERPRINT OF THE VERTICAL PORTION OF THE LETTER "I".

THE PATTERN APPEARS AS FOLLOWS:

IIII

D. TEST 50 ONE LINE OF EACH CHARACTER, 96 LINES, BI-DIRECTIONAL PRINTING.

THIS TEST BEGINS BY RESTORING THE PRINTER AND SENDING ASCII CODE 040 TO THE PRINTER (SEE MAINTENANCE MANUAL FOR CHARACTER PRINTED). AN ENTIRE LINE OF EACH OF THE 96 POSSIBLE CHARACTERS IS PRINTED FOR ASCII CODES 040 THROUGH 177. THE FIRST LINE IS PRINTED FROM LEFT TO RIGHT, THE SECOND LINE IS PRINTED FROM RIGHT TO LEFT, AND SO ON. ALL ODD NUMBERED LINES WILL BE PRINTED FROM LEFT TO RIGHT, ALL EVEN NUMBERED LINES WILL BE PRINTED FROM RIGHT TO LEFT.

NOTE: SINCE BITS 4-10 OF THE DATA BUFFER ARE USED FOR CHARACTER PRINTING THE ASCII CODE IS SHIFTED LEFT ONE (1) POSITION BY THE PROGRAM BEFORE BEING SENT TO THE PRINTER, THUS, ASCII CODE 040 BECOMES 100. IN ADDITION, ALL UNUSED BITS OF THE DATA BUFFER ARE SET TO THE ONE (1) CONDITION FOR MAXIMUM CROSS TALK WORSE CASE TESTING. THEREFORE THE ACTUAL CODE SENT TO THE PRINTER FOR ASCII CODE 040 WOULD BE 7501, (UNUSED BITS 0-3 AND BIT 11 ARE ALL SET TO THE ONE (1) STATE).

E. TEST 51 SWIRL PATTERN, 96 LINES

THIS TEST BEGINS BY RESTORING THE PRINTER AND PRINTING A LINE STARTING WITH ASCII CODE 040 FOR THE FIRST CHARACTER, CODE 041 FOR THE SECOND CHARACTER, ETC. THE NEXT LINE BEGINS WITH ASCII CODE 041, ETC. REFER TO MAINTENANCE MANUAL FOR CHARACTER PRINTED FOR EACH ASCII CODE.

NOTE: ALL 96 ASCII CODES 040-177 ARE PRINTING CHARACTERS. ASCII CODE 040 IS NOT A BLANK. REFER TO MAINTENANCE MANUAL FOR CORRECT CHARACTERS.

F. TEST 52 RIBBON LIFT AND DROP WITH OVERPRINT

THIS TEST BEGINS BY RESTORING THE PRINTER AND PRINTING A CAPITAL "M" WITH THE RIBBON LIFTED. THE PRINTER CARRIAGE MOVES RIGHT ONE PRINT POSITION AND A CAPITAL "M" IS AGAIN STRUCK WITH THE RIBBON DROPPED. THE NEXT "M" IS PRINTED WITH THE RIBBON UP, ETC. EVERY EVEN NUMBERED "M" IS STRUCK WITH THE RIBBON DOWN. EVERY ODD NUMBERED "M" IS STRUCK WITH THE RIBBON UP. THE SAME LINE IS THEN OVERPRINTED FROM RIGHT TO LEFT. THE PATTERN CONTINUES FOR FIVE(5) LINES.

THE PATTERN SHOULD APPEAR AS FOLLOWS:

M M M M M M M M M ... ETC.

NOTE: FOR BEST RESULTS, USE A MYLAR (SINGLE SIDED) RIBBON AND CLEAN PRINT WHEEL. OTHERWISE THE PRINT WHEEL WILL RETAIN INK (CLOTH RIBBON) AND THE "M"'S STRUCK WITH RIBBON DROPPED WILL APPEAR ONLY SLIGHTLY LIGHTER THAN THOSE STRUCK WITH RIBBON UP.

G. TEST 53 RANDOM CHARACTER LINE PAIRS

THIS TEST PRINTS PAIRS OF RANDOMLY GENERATED LINES. EACH LINE OF A PAIR SHOULD BE IDENTICAL TO THE OTHER LINE OF THE PAIR. 24 PAIRS OF LINES WILL BE PRINTED, EACH PAIR SEPARATED BY A BLANK LINE.

H. TEST 54 NON-PRINTING CHARACTER CODES TEST

THIS TEST SENDS ASCII CODES 00 THROUGH 37 TO THE PRINTER. THE CHARACTER PRINTED SHOULD BE "W" FOR ALL PRINT LINES, SINCE THIS IS THE "HOME" POSITION OF THE PRINT WHEEL. 10 LINES OF THE CHARACTER "W" SHOULD BE PRINTED.

I. TEST 55 PRINT WHEEL VIBRATION TEST

THIS TEST PRINTS 10 LINES CONSISTING OF "ACA:ACA:". THESE CHARACTERS ARE ADJACENT POSITIONS ON THE PRINT WHEEL WITH LETTER "A" BETWEEN "C" AND ":". THE PRINTING OF THIS PATTERN WILL RESULT IN A VERY RAPID VIBRATION OF THE PRINT WHEEL.

J. TEST 56 OPERATOR GENERATED PRINT LINE

THIS TEST ALLOWS THE OPERATOR TO TYPE IN A CHARACTER STRING OF UP TO 132 CHARACTERS AND CAUSE THIS TEXT STRING TO BE PRINTED ON THE LQ PRINTER BY TERMINATING THE CHARACTER STRING WITH A CARRIAGE RETURN. THE LQ PRINTER WILL REPEAT THIS CHARACTER STRING UNTIL ANOTHER CHARACTER IS TYPED FOLLOWING THE CARRIAGE RETURN.

K. TEST 57 RAISE AND LOWER RIBBON

THIS TEST IS DESIGNED FOR TROUBLESHOOTING THE RIBBON LIFT MECHANISM. THE PRINTER IS RESTORED AND THEN THE RIBBON LIFTS AND DROPS AT A RATE DETERMINED BY A DELAY SUBROUTINE.

L. TEST 60 FRICTION FEED TEST 10 BY 10 RANDOM MATRIX

THIS TEST VERIFIES THE FRICTION FEED, BI-DIRECTIONAL PAPER MOVEMENT CAPABILITIES OF THE PRINTER. A CHARACTER MATRIX, 10 BY 10 CHARACTERS (9X9 INCHES) IS PRINTED WITH ONE (1) INCH SPACING BETWEEN CHARACTERS. THE PRINT POSITIONS ARE SELECTED RANDOMLY. THE MATRIX MAY ALSO BE PRINTED AS DOTS BY SETTING LOCATION "CSWTCH" TO ALL ZEROS.

4.5.1 RUN DYNAMIC PRINTER TEST ON A NON-ACTIVE CONSOLE PACKAGE

A. LOAD ADDRESS TO 201.
B. SELECT ANY SWITCH REGISTER OPTIONS (SEE SECTION 6.0).
C. PRESS "CLEAR" THEN "CONT" ON A PDP-8E, F, M OR "INIT" THEN "RUN" ON A PDP-8A.
D. THE PROGRAM WILL CYCLE THROUGH TESTS 45 THROUGH 55 CONTINUOUSLY UNLESS HALT AT END OF PASS IS SELECTED (SEE SECTION 6.0).

4.5.2 RUN DYNAMIC PRINTER TEST ON AN ACTIVE CONSOLE PACKAGE

A. SELECT ANY SWITCH REGISTER OPTIONS (SEE SECTION 6.0).
B. START THE PROGRAM AT ADDRESS 201.
C. THE PROGRAM WILL CYCLE THROUGH TESTS 45 THROUGH 55 CONTINUOUSLY UNLESS HALT AT END OF PASS IS SELECTED (SEE SECTION 6.0).
D. REFER TO SECTION 4.7 FOR CONSOLE PACKAGE OPERATION.

4.6 RUN SPECIAL DYNAMIC PRINTER TESTS

4.6.1 REQUIREMENTS

A. TEST 56 REQUIRES A CONSOLE AND THAT CONSOLE PACKAGE BE ACTIVE (SEE SECTION 4.7).
B. TEST 60 REQUIRES THAT THE FORMS TRACTOR BE REMOVED AND THE PAPER FED FROM THE REAR OF THE PLATEN (REFER TO MAINTENANCE MANUAL).

4.6.2 PROCEDURES

A. TEST 56 OPERATOR GENERATED PRINT LINE

WITH CONSOLE PACKAGE ACTIVE AND TERMINAL ON-LINE, THE OPERATOR MAY INPUT UP TO 132 CHARACTERS, WHICH WILL BE ECHOED ON THE TERMINAL WHEN A CARRIAGE RETURN IS TYPED, THE ENTIRE CHARACTER STRING WILL BE OUTPUT TO THE LQ PRINTER CONTINUOUSLY UNTIL ANOTHER CHARACTER IS TYPED ON THE CONSOLE TERMINAL. THE PROGRAM WILL THEN ACCEPT A NEW CHARACTER STRING TERMINATED BY A CARRIAGE RETURN.

TO RUN:

1. START THE PROGRAM AT ADDRESS 203.
2. TYPE CONTROL-G.
3. PROGRAM PRINTS "SR= " AND WAITS FOR KEYBOARD INPUT OF NEW PSUEDO SWITCH REGISTER CONTENTS.
4. TYPE "56" FOLLOWED BY CARRIAGE RETURN.
5. THIS WILL CAUSE THE PROGRAM TO BEGIN TEST 56.
6. THE PROGRAM IS NOW WAITING FOR INPUT OF THE CHARACTER STRING TO BE PRINTED ON THE LQP-8 PRINTER.
7. TYPING CONTROL-T FOLLOWED BY CONTROL-G WILL AGAIN ASK THE "SR= " QUESTION AND A NEW TEST NUMBER MAY NOW BE INPUT IN PSUEDO SWITCH REGISTER BITS 6-11.

NOTE: THE TESTS IN THIS PROGRAM ARE NUMBERED IN OCTAL FORMAT. TYPING OF AN INVALID TEST NUMBER WILL RESULT IN PROGRAM TRANSFER TO TEST 1 OF LOGIC TESTS. VALID TEST NUMBERS ARE 1 THROUGH 60 (OCTAL).

B. TEST 57 RAISE AND LOWER RIBBON

THIS TEST WILL RAISE AND LOWER THE RIBBON ON THE LQP-8 PRINTER AT A RATE DETERMINED BY THE OCTAL NUMBER FOLLOWING

A CALL TO A DELAY SUBROUTINE (SEE PROGRAM LISTING TST57) THIS TEST IS DESIGNED FOR TROUBLESHOOTING OF THE RIBBON LIFT MECHANISM.

TO RUN:

CONSOLE NON-ACTIVE:

1. SET HARDWARE OR PSUEDO SWITCH REGISTER EQUAL TO 0057.
2. START THE PROGRAM AT ADDRESS 203.
3. TEST WILL LOOP CONTINUOUSLY.

CONSOLE ACTIVE:

1. START THE PROGRAM AT ADDRESS 203.
2. TYPE CONTROL-G.
3. PROGRAM PRINTS "SR= " AND WAITS FOR KEYBOARD INPUT OF NEW PSUEDO SWITCH REGISTER CONTENTS.
4. TYPE "57" FOLLOWED BY CARRIAGE RETURN.
5. THIS WILL CAUSE THE PROGRAM TO BEGIN TEST 57.
6. TYPING CONTROL-T FOLLOWED BY CONTROL-G WILL AGAIN ASK THE "SR= " QUESTION, AND A NEW TEST NUMBER MAY NOW BE INPUT IN PSUEDO SWITCH REGISTER BITS 6-11.

NOTE: THE TESTS IN THIS PROGRAM ARE NUMBERED IN OCTAL FORMAT, TYPING OF AN INVALID TEST NUMBER WILL RESULT IN PROGRAM TRANSFER TO TEST 1 OF LOGIC TESTS. VALID TEST NUMBERS ARE 1 THROUGH 60 (OCTAL).

C. TEST 60 FRICTION FEED TEST

THIS TEST PRINTS 1 10 BY 10 CHARACTER OR DOT MATRIX. THE SPACING BETWEEN CHARACTERS IS SET TO ONE(1) INCH. THIS SPACING MAY BE CHANGED BY CHANGING THE CONTENTS OF LOCATION "LININ" FOR LINE SPACING AND LOCATION "COLIN" FOR COLUMN SPACING (REFER TO PROGRAM LISTING OF TST60).

NOTE: THE FORMS TRACTOR MUST BE REMOVED AND THE PAPER FED FROM REAR OF PLATEN (REFER TO MAINTENANCE MANUAL).

THE PRINT PATTERN SHOULD APPEAR AS FOLLOWS:

```
A B C D E F G H I J
B C D E F G H I J K
C D E F G H I J K L
D E F G H I J K L M

E F G H I J K L M N
F G H I J K L M N O
G H I J K L M N O P
H I J K L M N O P Q
I J K L M N O P Q R
J K L M N O P Q R S
```

FOR BEST RESULTS THE ENTIRE PATTERN SHOULD BE PRINTED ON ONE (1) PAGE, ADJUST THE PAPER FOR TOP OF FORM ABOUT ONE INCH ABOVE PRINT WHEEL.

TO CHANGE THE PATTERN FROM CHARACTERS TO DOTS, SET
LOCATION CSWTCH (REFER TO PROGRAM LISTING OF TST60)
TO ALL ZEROS.

REFER TO SECTION 4.5 L. FOR FURTHER TEST DESCRIPTION.

TO RUN:

CONSOLE NON-ACTIVE:

1. SET HARDWARE OR PSUEDO SWITCH REGISTER EQUAL TO 0060.
2. START THE PROGRAM AT ADDRESS 203.
3. TEST WILL LOOP CONTINUOUSLY.

CONSOLE ACTIVE:

1. START THE PROGRAM AT ADDRESS 203.
2. TYPE CONTROL-G.
3. PROGRAM PRINTS "SR= " ON CONSOLE AND WAITS FOR KEYBOARD INPUT OF NEW PSUEDO SWITCH REGISTER CONTENTS.
4. TYPE "60" FOLLOWED BY CARRIAGE RETURN.
5. THIS WILL CAUSE THE PROGRAM TO BEGIN TEST 60.
6. TYPING CONTROL-T FOLLOWED BY CONTROL-G WILL AGAIN ASK THE "SR= " QUESTION, AND A NEW TEST NUMBER MAY NOW BE INPUT IN PSUEDO SWITCH REGISTER BITS 6-11.

NOTE: THE TESTS IN THIS PROGRAM ARE NUMBERED IN OCTAL FORMAT. TYPING OF AN INVALID TEST NUMBER WILL RESULT IN PROGRAM TRANSFER TO TEST 1 OF LOGIC TESTS. VALID TEST NUMBERS ARE 1 THROUGH 60 (OCTAL).

4.7 OPERATION OF CONSOLE PACKAGE

THE CONSOLE PACKAGE USES THREE LOCATIONS ON PAGE 0 FIELD 0 FOR SPECIAL FUNCTIONS. THESE LOCATIONS ARE:

LOC 20	PSUEDO SWITCH REGISTER
LOC 21	HARDWARE CONFIGURATION WORD ONE
LOC 22	HARDWARE CONFIGURATION WORD TWO

SEE SECTION 6 FOR SWITCH REGISTER SETTINGS.

LOCATION 21

BIT 0 = 0	USE PSUEDO SWITCH REGISTER
BIT 0 = 1	USE HARDWARE SWITCH REGISTER

LOCATION 22

BIT 3 = 0	CONSOLE PACKAGE INACTIVE
BIT 3 = 1	CONSOLE PACKAGE ACTIVE

4.7.1 CONTROL CHARACTERS

CTRL/C	RETURN TO OPERATING SYSTEM MONITOR.

CTRL/G	ALLOWS CHANGING OF SOFTWARE PSUEDO SWITCH REGISTER. RESTARTS PROGRAM IF FOLLOWED BY A LINE FEED. CONTINUES PROGRAM IF FOLLOWED BY CARRIAGE RETURN.
CTRL/S	STOP PROGRAM AND WAIT FOR A CONTROL CHARACTER.
CTRL/Q	CONTINUE PROGRAM FROM CTRL/S.
CTRL/K	RESTORE LQ PRINTER AND RESTART CURRENT TEST.
CTRL/T	PROGRAM WAITS FOR A CTRL/G, ASKS "SR= " QUESTION, DESIRED TEST NUMBER IS NOW ENTERED INTO PSUEDO SWITCH REGISTER BITS 6-11.

4.7.2 SELECTING TEST USING PSUEDO SWITCH REGISTER

STARTING THE PROGRAM AT LOCATION 203 IS EQUIVALENT TO TYPING CTRL/T WHILE THE PROGRAM IS RUNNING. THE PROGRAM WAITS FOR THE USER TO TYPE CTRL/G AND ENTER THE DESIRED TEST NUMBER IN PSUEDO SWITCH REGISTER BITS 6-11.

EXAMPLE:

A. TYPE CTRL/T WHILE PROGRAM IS RUNNING OR START PROGRAM AT ADDRESS 203.
B. TYPE CTRL/G PROGRAM ASKS "SR= " QUESTION.
C. USER TYPES 0045 FOLLOWED BY CARRIAGE RETURN.
D. PROGRAM WILL NOW BEGIN TEST 45.

NOTE: TESTS ARE NUMBERED IN OCTAL TO PERMIT USE OF PSUEDO SWITCH REGISTER FOR TEST SELECTION.

4.7.3 CHANGING PSUEDO SWITCH REGISTER

A. WHILE PROGRAM IS RUNNING, USER TYPES CTRL/G ON CONSOLE TERMINAL.

B. PROGRAM RESPONDS BY PRINTING "^G SR=XXXX" WHERE XXXX IS THE CURRENT PSUEDO SWITCH REGISTER CONTENTS.

C. USER NOW TYPES UP TO FOUR(4) OCTAL DIGITS WHICH WILL BE ENTERED FROM RIGHT TO LEFT INTO THE PSUEDO SWITCH REGISTER. IF A CHARACTER OTHER THAN 0 THRU 7 IS TYPED, THE PROGRAM WILL REASK THE "SR= " QUESTION.

D. AFTER TYPING NEW PSUEDO SWITCH REGISTER CONTENTS, USER TYPES CARRIAGE RETURN TO CONTINUE THE PROGRAM OR LINE FEED TO RESTART THE CURRENT SECTION OF TESTS. SEE SECTION 6 FOR SWITCH REGISTER OPTIONS.

5.0 ERRORS

IF THE PROGRAM DETECTS AN ERROR EITHER IN DATA OR STATUS OF THE LQ PRINTER A NUMBER OF OPTIONS ARE AVAILABLE TO THE USER:

A. INHIBIT ERROR HALT
B. LOOP ON ERROR
C. LOOP ON TEST
D. INHIBIT ERROR TYPEOUT

REFER TO SECTION 6 FOR SWITCH SETTINGS TO SELECT THE DESIRED OPTIONS.

5.1 LOGIC ERRORS

DURING THE RUNNING OF THE LOGIC TESTS, IF THE PROGRAM DETECTS A FAULT IN THE INTERFACE LOGIC THE PROGRAM WILL EITHER HALT IF CONSOLE IS NOT ACTIVE OR PRINT AN ERROR MESSAGE IF CONSOLE IS ACTIVE.

5.1.1 LOGIC ERRORS ON A NON-ACTIVE CONSOLE

A. PROGRAM WILL HALT WITH THE CONTENTS OF THE PROGRAM COUNTER AT THE TIME OF ERROR IN THE ACCUMULATOR.

B. PRESSING "CONTINUE" WILL RESTORE THE AC TO ITS VALUE AT THE TIME OF THE ERROR AND PROGRAM WILL HALT AGAIN.

C. PRESSING "CONTINUE" AGAIN WILL CAUSE THE PROGRAM TO RESUME AND EITHER RESTART FAILING TEST OR CONTINUE FROM THE ERROR, DEPENDING ON SWITCH SETTINGS. (SEE SECTION 6).

5.1.2 LOGIC ERRORS ON AN ACTIVE CONSOLE

A. PROGRAM WILL PRINT THE FOLLOWING ERROR MESSAGE:

```
DH,QA FAILED

PC=XXXX  AC=XXXX  MQ=XXXX  FL=XXXX
WAITING
```

B. THE PROGRAM IS NOW WAITING FOR CTRL/G TO BE TYPED BY USER TO ALLOW SETTING OF PSUEDO SWITCH REGISTER OPTIONS (SEE SECTION 6).

5.2 STATUS ERRORS

THE FOLLOWING STATUS REGISTER BITS ARE OF INTEREST TO THE PROGRAM:

```
BIT 0  PRINTER READY (POWER ON)
BIT 1  CHARACTER READY
BIT 2  CARRIAGE READY
BIT 3  PAPER READY
BIT 6  CHECK ERROR
```

DURING PRINTER OPERATION (DYNAMIC TESTS) THE PROGRAM WAITS FOR THE APPROPRIATE READY BIT TO EQUAL A ONE (1) PRIOR TO ISSUING THE CORRESPONDING IOT. IF THE READY BIT DOES NOT RETURN WITHIN FIVE (5) SECONDS, THE PROGRAM CONSIDERS THIS TO

BE A STATUS ERROR. IF A CHECK ERROR OCCURS THE PROGRAM WILL DETECT THIS AND GO TO THE STATUS ERROR HANDLING ROUTINE.

5.2.1 STATUS ERRORS ON A NON-ACTIVE CONSOLE

A. PROGRAM WILL HALT WITH PC AT TIME OF ERROR IN THE AC.
B. PRESSING "CONTINUE" WILL CAUSE THE PROGRAM TO PLACE EXPECTED STATUS IN AC AND HALT.
C. PRESSING "CONTINUE" WILL CAUSE PROGRAM TO PLACE ACTUAL STATUS IN AC AND HALT.
D. PRESSING "CONTINUE" AGAIN WILL CAUSE THE PROGRAM TO RESUME AND EITHER RESTART THE FAILING TEST OR CONTINUE FROM ERROR DEPENDING ON SWITCH REGISTER SETTINGS (SEE SECTION 6).

5.2.2 STATUS ERRORS ON AN ACTIVE CONSOLE

A. PROGRAM WILL PRINT THE FOLLOWING ERROR MESSAGE:

```
LQP-8 STATUS ERROR

PC = XXXX
EXPECTED = XXXX   ACTUAL = XXXX
WAITING
```

B. THE PROGRAM IS NOW WAITING FOR CTRL/G TO BE TYPED BY USER TO ALLOW SETTING OF PSUEDO SWITCH REGISTER OPTIONS (SEE SECTION 6).

5.3 DATA ERRORS

5.3.1 DATA ERRORS ON A NON-ACTIVE CONSOLE

A. PROGRAM WILL HALT WITH PC AT TIME OF ERROR IN THE AC.
B. PRESSING "CONTINUE" WILL CAUSE THE PROGRAM TO PLACE THE DATA SENT IN THE AC AND HALT.
C. PRESSING "CONTINUE" WILL CAUSE THE PROGRAM TO PLACE THE DATA READ BACK IN THE AC AND HALT.
D. PRESSING "CONTINUE" AGAIN WILL CAUSE THE PROGRAM TO RESUME AND EITHER RESTART THE FAILING TEST OR CONTINUE FROM THE ERROR DEPENDING ON SWITCH REGISTER SETTINGS (SEE SECTION 6).

5.3.2 DATA ERRORS ON AN ACTIVE CONSOLE

A. THE PROGRAM WILL PRINT THE FOLLOWING ERROR MESSAGE:

```
LQP-8 DATA ERROR

PC = XXXX  SENT: XXXX  RECEIVED: XXXX
WAITING
```

B. THE PROGRAM IS NOW WAITING FOR CTRL/G TO BE TYPED BY THE USER TO ALLOW SETTING OF PSEUDO SWITCH REGISTER OPTIONS (SEE SECTION 6).

6.0 SWITCH REGISTER SETTINGS

6.1 NORMAL OPERATION

ALL SWITCHES = 0

6.2 ERROR RELATED SWITCHES

SR0 = 1 INHIBIT ERROR HALT
SR1 = 1 LOOP ON ERROR
SR2 = 1 LOOP ON TEST
SR3 = 1 HALT ON COMPLETION OF A PROGRAM PASS
SR4 = 1 INHIBIT ERROR TYPEOUT

7.0 REVISIONS

REVISION B - MODIFICATIONS TO RUN ON VT78 SYSTEMS.

8.0 ADDITIONAL INFORMATION

8.1 STARTING ADDRESSES

LOC 200 LOGIC TESTS
LOC 201 PRINTER TESTS
LOC 202 CHANGE DEVICE CODE
LOC 203 SELECT TEST USING SWITCH REGISTER

8.2 SPECIAL ADDRESSES

THE PROGRAM USES THREE LOCATIONS TO DETERMINE CHARACTER SPACING, LINE SPACING, AND NUMBER OF CHARACTERS PER LINE. THE PROGRAM IS INITIALLY SET TO 132 CHARACTERS PER LINE, 10 CHARACTERS PER INCH, AND 6 LINES PER INCH. THESE LOCATIONS ARE:

SYMBOLIC NAME	ADDRESS	VALUE	
SPACE	125	0014	12/120 CHARACTER SPACING
LF	126	0020	8/48 LINE SPACING
LINE	127	0204	132 CHARACTERS PER LINE

NOTE: SET LOCATION "LINE" TO 0110 IF 8 INCH WIDE PAPER IS BEING USED. THIS IS EQUIVALENT TO 72 CHARACTERS PER LINE.

THESE VALUES CORRESPOND WITH A 10 PITCH CHARACTER WHEEL. TO SET THESE VALUES FOR A 12 PITCH CHARACTER WHEEL CHANGE THESE VALUES TO THE FOLLOWING:

SPACE	125	0012	10/120 CHARACTER SPACING
LF	126	0016	6/48 LINE SPACING
LINE	127	0236	158 CHARACTERS PER LINE

NOTE: SET LOCATION "LINE" TO 0126 IF 8 INCH WIDE PAPER IS BEING USED. THIS IS EQUIVALENT TO 86 CHARACTERS PER LINE.

A. TST47 RMOST LOC 1534 VALUE 3044

SET THIS LOCATION TO 1700 IF USING 8 INCH PAPER.

B. TST60 CSWTCH LOC 3111 VALUE 7777

SET THIS LOCATION TO 0000 FOR DOTS INSTEAD OF AN ALPHABETICAL PATTERN.

C. TWO SPECIAL ROUTINES EXIST IN THIS PROGRAM, WHICH ARE NOT EXECUTED DURING THE NORMAL TEST SEQUENCE. THEY ARE FOR USE ONLY BY PERSONS QUALIFIED TO MAKE MECHANICAL ADJUSTMENTS ON THE LQP8 PRINTER.

1. RESTORE LOOP

THIS IS A ROUTINE TO ISSUE CONTINOUS RESTORE INSTRUCTIONS TO THE LQP8 PRINTER. START THE PROGRAM AT THE LOCATION LABLED "RESTLP", WHICH IS LOCATED IMMEDIATELY FOLLOWING TEST 60. THIS LOOP WILL RUN CONTINOUSLY UNTIL A CONTROL CHARACTER IS TYPED BY THE OPERATOR.

2. RAISE OR LOWER RIBBON

THIS IS A ROUTINE TO RAISE OR LOWER THE RIBBON OF THE LQP8 PRINTER, TO ALLOW ADJUSTMENT OF RIBBON HEIGHT. START THE PROGRAM AT THE LOCATION LABLED "RIBBON", WHICH IS LOCATED IMMEDIATELY FOLLOWING TEST 60, (SEE PROGRAM LISTING). EACH TIME A KEY IS TYPED ON THE OPERATOR'S TERMINAL, THE RIBBON WILL EITHER RAISE OR LOWER (DEPENDING ON ITS PREVIOUS CONDITION). TYPING A VALID CONTROL CHARACTER (SEE SECTION 4.7)

WILL TERMINATE THIS ROUTINE.

9.0 LISTING

```
                        /LQP-8 PRINTER DIAGNOSTIC
                        /
                0000    *0
0000    0000    LOC0,   0
0001    5402    ADDRS1, JMP I   ADDRS2
0002    4000    ADDRS2, INTSVC          /GO TO INTERRUPT SERVICE ROUTINE
0003    4015    ADDRS3, RESTRT
                        /
                        /
                0010    *10
0010    0000    INDX10, 0
0011    0000    INDX11, 0
0012    0000    INDX12, 0
0013    0000    INDX13, 0
0014    0000    INDX14, 0
                0020    *20
                        /
                        /
0020    0000    PSWR,   0               /PSUEDO SWITCH REGISTER
0021    0000    OP1SEL, 0000            /HARDWARE CONFIGURATION WORD ONE
0022    0400    OP2SEL, 0400            /HARDWARE CONFIGURATION WORD TWO

        4423    LQSK=   JMS I .         /SKIP ON DONE FLAG    IOT0
0023    3200            LQSKRT
        4424    LQRB=   JMS I .         /READ DATA BUFFER INTO AC    IOT1
0024    3205            LQRBRT
        4425    LQMP=   JMS I .         /LOAD DATA BUFFER, MOVE PAPER, CLR AC,  IOT2
0025    3214            LQMPRT
        4426    LQMC=   JMS I .         /LOAD DATA BUFFER, MOVE CARRIAGE  IOT3
0026    3223            LQMCRT
        4427    LQPC=   JMS I .         /LOAD DATA BUFFER, PRINT CHAR IN AC4-10  IOT4
0027    3232            LQPCRT
        4430    LQRS=   JMS I .         /READ STATUS REG, CLR DONE   IOT5
0030    3237            LQRSRT
        4431    LQLS=   JMS I .         /LOAD STATUS REG, SET DONE   IOT6
0031    3246            LQLSRT
        4432    LQRE=   JMS I .         /RESTORE CARRIAGE, CHECK RECOVERY   IOT7
0032    3260            LQRERT
        4433    BGNTST= JMS I .         /INITIALIZE AND SET UP FOR TEST
0033    3400            TSTBGN
        4434    ERROR=  JMS I .         /COMMON ERROR HANDLER
0034    3600            ERRORS
        4435    LOADDB= JMS I .         /ROUTINE TO LOAD DATA BUFFER
0035    3265            DBLOAD
        4436    INTST=  JMS I .         /ROUTINE TO INITIALIZE FOR TEST WITH PRINTER
0036    3324            TSTIN           /OFF LINE
        4437    DATERR= JMS I .         /ROUTINE TO HANDLE DATA ERRORS

0037    3430            ERRDAT
        4440    ENDTST= JMS I .         /ROUTINE TO HANDLE SCOPE LOOPIING AT TEST END
0040    3342            TSTEND          /IF ERROR ENCOUNTERED
        4441    WAIT=   JMS I .         /WAIT FOR INDIVIDUAL READY BITS ACTIVE
0041    4033            AWAIT
        4442    SWAIT=  JMS I .         /WAIT FOR ALL READY BITS ACTIVE
0042    4063            WAITS
        4443    DELAY=  JMS I .         /VARIABLE DELAY ROUTINE
```



```
0043    5244            ADELAY
        4444    ECHO=   JMS I .         /ROUTINE TO ECHO CHARACTER TYPED ON CONSOLE
0044    4673            XECHO
        4445    CTLCHK= JMS I .         /ROUTINE TO CHECK FOR A VALID CONTROL CHARACTER
0045    4630            CHKCTL
        4446    RDYCHK= JMS I .         /CHECK READY BITS
0046    3312            CHKRDY
        4447    SAVEAC= JMS I .         /ROUTINE TO SAVE CONTENTS OF AC AND LINK
0047    4200            ACSAVE
        4450    RSTRAC= JMS I .         /ROUTINE TO RESTORE CONTENTS OF AC AND LINK
0050    4205            ACRSTR
        4451    STATER= JMS I .         /STATUS ERROR HANDLER
0051    4213            ERSTAT
        4452    KBCHK= JMS I .          /ROUTINE TO CHECK FOR KEYBOARD INTERVENTION
0052    4610            CHKKB
        4453    ROTCHR= JMS I .         /ROUTINE TO SHIFT 7 BIT ASCII ONE PLACE LEFT
0053    4526            CHRROT
        4454    LINEND= JMS I .         /CHECK FOR END OF LINE
0054    4534            ENDLIN
        4455    MOVCAR= JMS I .         /MOVE CARRIAGE SUBROUTINE
0055    4400            CARMOV
        4456    MOVCR=  JMS I .         /MOVE CARRIAGE TO ABSOLUTE COORDINATE
0056    4441            CRMOV
        4457    MOVPAR= JMS I .         /MOVE PAPER SUBROUTINE
0057    4316            PARMOV
        4460    LSTLIN= JMS I .         /CHECK FOR LAST LINE
0060    4546            LINLST
        4461    XCRLF=  JMS I .         /EXECUTE CARRIAGE RETURN, LINE FEED
0061    4471            CRLFRT
        4462    RSPACE= JMS I .         /SPACE ONE PRINT POSITION TO THE RIGHT
0062    4557            SPACER
        4463    LSPACE= JMS I .         /SPACE ONE PRINT POSITION TO THE LEFT
0063    4600            SPACEL
        4464    PRINT=  JMS I .         /ROUTINE TO PRINT ONE CHARACTER ON LP
0064    4507            XPRINT
        4465    LAS=    JMS I .         /ROUTINE TO HANDLE LAS INSTRUCTION
0065    5274            LASRT
        4466    CBACTV= JMS I .         /ROUTINE TO CHECK FOR ACTIVE CONSOLE
0066    4306            ACTVCB
        4467    MESAGE= JMS I .         /MESSAGE ROUTINE
0067    4702            MESPRT
        4470    REGPRT= JMS I .         /ROUTINE TO PRINT THE CONTENTS OF A REGISTER
0070    5016            PRTREG
        4471    MANCNG= JMS I .         /ROUTINE TO CHANGE DEVICE SELECT CODES
0071    5477            CNGMAN
        4472    RANDOM= JMS I .
0072    4112            XRAND
        4473    SAVGEN= JMS I .
0073    4126            XSAVGN
        4474    RESGEN= JMS I .
0074    4135            XRESGN
        4475    VT78CK=JMS I .
0075    0247            CKVT78
0076    0117    STMASK, 117             /STATUS REGISTER USED BIT MASK
0077    0000    SVAC,   0
```

```
                0100  0000    SAVAC,  0
                0101  0000    SAVLNK, 0
                0102  0000    SAVMQ,  0
                0103  0000    SAVFLG, 0
                0104  0003    K003,   0003
                0105  0007    K007,   0007
                0106  0021    K021,   0021
                0107  0023    K023,   0023
                0110  6000    K6000,  6000
                0111  5252    C5252,  5252
                0112  2525    C2525,  2525
                0113  0000    XDATA,  0               /SAVE AREA FOR EXPECTED DATA
                0114  0000    SVSTAT, 0               /SAVE STATUS READ
                0115  0000    LINCNT, 0               /SAVE LINE COUNT
                0116  0000    INTFLG, 0               /SAVE INTERRUPT CONDITION
                0117  0000    XSTAT,  0               /SAVE AREA FOR EXPECTED STATUS
                0120  0000    SAVMV,  0               /SAVE AREA FOR MOVE CARRIAGE MAGNITUDE
                0121  0000    SAVMOV, 0               /SAVE CARRIAGE MOVE MAGNITUDE
                0122  0000    SAVDAT, 0               /SAVE AREA FOR EXPECTED STATUS
                0123  0000    SAVPR,  0               /SAVE AREA FOR PAPER MOVEMENT MAGNITUDE
                0124  0000    CHAR,   0               /SAVE AREA FOR CHARACTER TO PRINT
                0125  0000    CHARRT, 0               /SAVE AREA FOR CHARACTER SHIFTED LEFT ONE PLACE
                0126  0000    CARDIR, 0               /SAVE AREA FOR CARRIAGE DIRECTION
                0127  0014    SPACE,  14              /SAVE AREA FOR CHARACTER SPACING
                0130  0020    LF,     20              /SAVE AREA FOR LINE FEED MAGNITUDE
                0131  0204    LINE,   204             /132 CHARACTERS PER LINE
                0132  0000    LINES,  0               /NUMBER OF LINES TO PRINT
                0133  0000    WSTAT,  0               /WANTED STATUS SAVE AREA
                0134  0000    FIRST,  0               /FIRST CHARACTER OF A TEST
                0135  0000    FSTCHR, 0               /FIRST CHARACTER OF A PATTERN
                0136  0000    CHRCNT, 0               /SAVE CHARACTER COUNT
                0137  0000    KBSAV,  0               /SAVE KEYBOARD CHARACTER
                0140  0000    SAVPOS, 0               /SAVE CARRIAGE POSITION
                0141  0000    MOVMAG, 0               /SAVE CARRIAGE MOVEMENT MAGNITUDE
                0142  0500    DSCNOW, 0500            /CURRENT DEVICE SELECT CODE
                      6007    CAF=6007
                      6102    SPL=6102
                      7501    MQA=7501
                      7421    MQL=7421
                      6030    KCF=6030
                      6004    GTF=6004
                      6005    RTF=6005

                      7002    BSW=7002
                      6035    KIE=6035
                              /
                              /
                                              /STATUS REGISTER BITS
                              /
                      4000    LQRDY=4000              /BIT 0  PRINTER READY
                      2000    LQCHR=2000              /BIT 1  CHARACTER READY
                      1000    LQCAR=1000              /BIT 2  CARRIAGE READY
                      0400    LQPAR=0400              /BIT 3  PAPER READY
                      3400    LQDON=3400              /BITS 1,2,3  ALL OPERATIONS DONE
                      0100    LPLFT=0100              /BIT 5  SELECT LEFT PLATEN
```



```
                      0040    LQCHK=0040              /BIT 6  CHECK ERROR CONDITION
                      0020    LQOUT=0020              /BIT 7  OUT OF PAPER
                      0004    LQRED=0004              /BIT 9  PRINT RED
                      0002    LQBLK=0002              /BIT 10  PRINT BLACK
                      0001    LQIEN=0001              /BIT 11  INTERRUPT ENABLE
                      7400    ALRDY=7400              /BITS 0,1,2,3,  ALL READY BITS SET
                              /
                              /LQP-8 IOT'S NOT USED IN SUBROUTINE
                      6500    XLQSK=6500              /SKIP ON DONE FLAG
                      6501    XLQRB=6501              /READ DATA BUFFER
                      6502    XLQMP=6502              /MOVE PAPER
                      6503    XLQMC=6503              /MOVE CARRIAGE
                      6504    XLQPC=6504              /PRINT CHARACTER
                      6505    XLQRS=6505              /READ STATUS
                      6506    XLQLS=6506              /LOAD STATUS
                      6507    XLQRE=6507              /RESTORE
                              /
                              /DATA BUFFER CONSTANTS
                              /
                      4000    PRRET=4000              /PAPER RETRACT  BIT 0 = ONE
                      0000    PRADV=0                 /PAPER ADVANCE  BIT 0 = ZERO
                      4000    CARLFT=4000             /MOVE CARRIAGE LEFT  BIT 0 = ONE
                      0000    CARRGT=0                /MOVE CARRIAGE RIGHT  BIT 0 = ZERO
                              /
                      0200    *200
                              /
                              /
                0200  4204            JMS START       /GO TO BEGINNING OF LOGIC TESTS
                0201  4204            JMS START       /GO TO BEGINNING OF PRINTER TESTS
                0202  4204            JMS START       /GO TO DSC MODIFICATION ROUTINE
                0203  4204            JMS START       /GO TO SELECTED TEST
                              /
                              /
                0204  0000    START,  0
                0205  7340            CLA CLL CMA
                0206  1204            TAD START
                0207  3230            DCA SAVADD
                0210  6030            KCF             /CLEAR KYBD FLAG
                0211  4466            C8ACTV          /CHECK FOR ACTIVE CONSOLE
                0212  7410            SKP             /SKIP IF CONSOLE IS ACTIVE
                0213  5216            JMP .+3         /CONSOLE NOT ACTIVE, SKIP MESSAGE
                0214  4467            MESAGE
                0215  6160            MANDEC
                0216  3777'           DCA PASS        /CLEAR PASS COUNT
                0217  1376            TAD (-200
                0220  1230            TAD SAVADD
                0221  1375            TAD (STARTB
                0222  3231            DCA GOADD
                0223  1631            TAD I GOADD
                0224  3232            DCA RSTART
                0225  4475            VT78CK          /VT78/ SYSTEM UNDER TEST = VT78 ?
                0226  4237            JMS INSOW       /VT78/ YES = INSERT OVERWRITES FOR VT78 TESTING
                0227  5632            JMP I RSTART
                              /
                0230  0000    SAVADD, 0
```

```
                0931  0000    GOADD,  0
                0932  0000    RSTART, 0               /RESTART ADDRESS
                0933  0400    START8, TST1
                0934  1400            TST45
                0935  5456            IOTCNG
                0936  5623            TSELCT
                                /
                                /
                                /VT78/ ROUTINE TO INSERT OVERWRITES FOR TESTING ON VT78 SYSTEM.

                0937  0000    INSOW,  0               /VT78/
                0940  1374            TAD (003        /VT78/
                0941  3076            DCA STMASK      /VT78/ OVERWRITE STATUS REG MASK
                0942  1373            TAD (NOP        /VT78/ OVERWRITES TO ACCOUNT FOR DATA BUFFER INVERSION IN VT78
                0943  3772'           DCA V78OW1      /VT78/
                0944  1371            TAD (IAC        /VT78/
                0945  3770'           DCA V78OW2      /VT78/
                0946  5637            JMP I INSOW     /VT78/

                                /
                                /VT78/ ROUTINE TO CHECK IF SYSTEM UNDER TEST IS A VT78

                0947  0000    CKVT78, 0               /VT78/
                0950  1022            TAD OP2SEL      /VT78/ SYS UNDER TEST = VT78 ? (LOC 22 BIT 2 = 1)
                0951  7006            RTL             /VT78/
                0952  7710            SPA CLA         /VT78/
                0953  5647            JMP I CKVT78    /VT78/ YES - RETURN TO CALL+1
                0954  2247            ISZ CKVT78      /VT78/
                0955  5647            JMP I CKVT78    /VT78/  NO - RETURN TO CALL+2

                0370  3301
                0371  7001
                0372  3270
                0373  7000
                0374  0003
                0375  0233
                0376  7600
                0377  1365
                      0400    *400
                                /
                                /ROUTINE TO LOAD ALL ONES AND ZEROS USING IOT2
                                /
                0400  4436    TST1,   INTST           /INIT AND SET UP FOR SCOPE LOOP
                0401  7340            CLA CLL CMA     /SET UP TO LOAD ALL ONES
                0402  4435            LOADDB          /LOAD DATA BUFFER AND CHECK FOR DATA ERRORS
                0403  4425            LOMP
                0404  4437            DATERR          /DATA ERROR

                0405  7300            CLA CLL         /SET UP TO LOAD ALL ZEROS
                0406  4435            LOADDB
                0407  4425            LOMP
                0410  4437            DATERR          /DATA ERROR
                0411  4440            ENDTST          /CHECK FOR TEST LOOPING ON ERROR
                                /
                                /ROUTINE TO LOAD ALTERNATING ONES AND ZEROS USING IOT2
                                /
```



```
                0412  4436    TST2,   INTST
                0413  1111            TAD C5252       /LOAD 5252
                0414  4435            LOADDB
                0415  4425            LOMP
                0416  4437            DATERR          /DATA ERROR
                0417  1112            TAD C2525       /LOAD 2525
                0420  4435            LOADDB
                0421  4425            LOMP
                0422  4437            DATERR          /DATA ERROR
                0423  4440            ENDTST
                                /
                                /ROUTINE TO FLOAT A ONE USING IOT2
                                /
                0424  4436    TST3,   INTST
                0425  7301            CLA CLL IAC     /AC=0001
                0426  4435            LOADDB
                0427  4425            LOMP
                0430  4437            DATERR          /DATA ERROR
                0431  1077            TAD SVAC
                0432  7100            CLL
                0433  7004            RAL
                0434  7420            SNL
                0435  5226            JMP .-7         /LOOP UNTIL ALL BITS CHECKED
                0436  4440            ENDTST
                                /
                                /ROUTINE TO FLOAT A ZERO USING IOT2
                                /
                0437  4436    TST4,   INTST
                0440  7344            CLA CLL CMA RAL         /AC=7776  L=1
                0441  4435            LOADDB
                0442  4425            LOMP
                0443  4437            DATERR          /DATA ERROR
                0444  1077            TAD SVAC
                0445  7120            STL
                0446  7004            RAL
                0447  7430            SZL
                0450  5241            JMP .-7         /LOOP UNTIL ALL BITS CHECKED
                0451  4440            ENDTST
                                /
                                /ROUTINE TO LOAD EVERY NUMBER USING IOT2
                                /
                0452  4436    TST5,   INTST
                0453  7301            CLA CLL IAC
                0454  4435            LOADDB
                0455  4425            LOMP
                0456  4437            DATERR
                0457  1077            TAD SVAC
                0460  7001            IAC
                0461  7420            SNL
                0462  5254            JMP .-6
                0463  4440            ENDTST
                                /
                                /ROUTINE TO LOAD ALL ONES AND ZEROS USING IOT3
                                /
                0464  4436    TST6,   INTST
```

```
   330   0465  7340          CLA CLL CMA     /AC=7777
   331   0466  4435          LOADDB
   332   0467  4426          LQMC
   333   0470  4437          DATERR          /DATA ERROR
   334   0471  7300          CLA CLL         /SET UP TO LOAD ALL ZEROS
   335   0472  4435          LOADDB
   336   0473  4426          LQMC
   337   0474  4437          DATERR          /DATA ERROR
   338   0475  4440          ENDTST          /CHECK FOR TEST LOOPING ON ERROR
   339                 /
   340                 /ROUTINE TO LOAD ALTERNATING ONES AND ZEROS USING IOT3
   341                 /
   342   0476  4436    TST7,  INTST
   343   0477  1111          TAD C5252       /LOAD 5252
   344   0500  4435          LOADDB
   345   0501  4426          LQMC
   346   0502  4437          DATERR
   347   0503  1112          TAD C2525
   348   0504  4435          LOADDB
   349   0505  4426          LQMC
   350   0506  4437          DATERR          /DATA ERROR
   351   0507  4440          ENDTST
   352                 /
   353                 /ROUTINE TO FLOAT A ONE USING IOT3
   354                 /
   355   0510  4436    TST10, INTST
   356   0511  7301          CLA CLL IAC     /AC=0001
   357   0512  4435          LOADDB
   358   0513  4426          LQMC
   359   0514  4437          DATERR          /DATA ERROR
   360   0515  1077          TAD SVAC
   361   0516  7100          CLL
   362   0517  7004          RAL
   363   0520  7420          SNL
   364   0521  5312          JMP .-7         /LOOP UNTIL ALL BITS CHECKED
   365   0522  4440          ENDTST
   366                 /
   367                 /ROUTINE TO FLOAT A ZERO USING IOT3
   368                 /
   369   0523  4436    TST11, INTST
   370   0524  7344          CLA CLL CMA RAL         /AC=7776  L=1
   371   0525  4435          LOADDB
   372   0526  4426          LQMC
   373   0527  4437          DATERR
   374   0530  1077          TAD SVAC
   375   0531  7120          STL
   376   0532  7004          RAL

   377   0533  7430          SZL
   378   0534  5325          JMP .-7         /LOOP UNTIL ALL BITS CHECKED
   379   0535  4440          ENDTST
   380                 /
   381                 /ROUTINE TO LOAD EVERY NUMBER USING IOT3
   382                 /
   383   0536  4436    TST12, INTST
   384   0537  7301          CLA CLL IAC     /AC= 0001
```



```
   385   0540  4435          LOADDB
   386   0541  4426          LQMC
   387   0542  4437          DATERR
   388   0543  1077          TAD SVAC
   389   0544  7001          IAC
   390   0545  7420          SNL
   391   0546  5340          JMP .-6
   392   0547  4440          ENDTST
   393                 /
   394                 /ROUTINE TO LOAD ALL ONES AND ZEROS USING IOT4
   395                 /
   396   0550  4436    TST13, INTST           /INIT AND SET UP FOR SCOPE LOOP
   397   0551  7340          CLA CLL CMA     /SET UP TO LOAD ALL ONES
   398   0552  4435          LOADDB
   399   0553  4427          LQPC
   400   0554  4437          DATERR          /DATA ERROR
   401   0555  7300          CLA CLL         /SET UP TO LOAD ALL ZEROS
   402   0556  4435          LOADDB
   403   0557  4427          LQPC
   404   0560  4437          DATERR          /DATA ERROR
   405   0561  4440          ENDTST          /CHECK FOR TEST LOOPING ON ERROR
   406   0562  5777'         JMP TST14
   407                 /
   408   0577  0600
               0600    PAGE
   409                 /
   410
   411                 /ROUTINE TO LOAD ALTERNATING ONES AND ZEROS USING IOT4
   412                 /
   413   0600  4436    TST14, INTST
   414   0601  1111          TAD C5252       /LOAD 5252
   415   0602  4435          LOADDB
   416   0603  4427          LQPC
   417   0604  4437          DATERR          /DATA ERROR
   418   0605  1112          TAD C2525       /LOAD 2525
   419   0606  4435          LOADDB
   420   0607  4427          LQPC
   421   0610  4437          DATERR          /DATA ERROR
   422   0611  4440          ENDTST
   423                 /
   424                 /ROUTINE TO FLOAT A ONE USING IOT4
   425                 /
   426   0612  4436    TST15, INTST
   427   0613  7301          CLA CLL IAC
   428   0614  4435          LOADDB
   429   0615  4427          LQPC
   430   0616  4437          DATERR          /DATA ERROR
   431   0617  1077          TAD SVAC
   432   0620  7100          CLL
   433   0621  7004          RAL
   434   0622  7420          SNL
   435   0623  5214          JMP .-7         /LOOP UNTIL ALL BITS CHECKED
   436   0624  4440          ENDTST
   437                 /
   438                 /ROUTINE TO FLOAT A ZERO USING IOT4
```

```
                        /
0625  4436    TST16,  INTST
0626  7344            CLA CLL CMA RAL         /AC=7776  L=1
0627  4435            LOADDB
0630  4427            LQPC
0631  4437            DATERR
0632  1077            TAD SVAC
0633  7120            STL
0634  7004            RAL
0635  7430            SZL
0636  5227            JMP .-7         /LOOP UNTIL ALL BITS CHECKED
0637  4440            ENDTST
                        /
                        /ROUTINE TO LOAD EVERY NUMBER USING IOT4
                        /
0640  4436    TST17,  INTST
0641  7301            CLA CLL IAC
0642  4435            LOADDB
0643  4427            LQPC
0644  4437            DATERR
0645  1077            TAD SVAC
0646  7001            IAC
0647  7420            SNL
0650  5242            JMP .-6         /LOOP UNTIL EVERY NUMBER TRIED
0651  4440            ENDTST
0652  4475            VT78CK          /VT78/ SYSTEM UNDER TEST = VT78 ?
0653  5266            JMP TST21       /VT78/ YES - SKIP TEST 20, IN VT78 CAF
                                      /VT78/       DOES NOT CLEAR PRINTER DATA BUFFER.
                        /
                        /ROUTINE TO TEST THAT CAF INSTRUCTION CLEARS DATA BUFFER
                        /
0654  4436    TST20,  INTST
0655  7340            CLA CLL CMA     /AC=7777
0656  4435            LOADDB          /SET UP ROUTINE FOR DATA CHECK
0657  4425            LQMP            /LOAD DATA BUFFER WITH IOT2
0660  4437            DATERR          /DATA ERROR
0661  6007            CAF             /INIT BUS, SHOULD CLEAR DATA BUFFER
0662  4424            LQRB
0663  7440            SZA
0664  4434            ERROR           /DATA BUFFER NOT CLEARED BY CAF INSTRUCTION
0665  4440            ENDTST
                        /
                        /ROUTINE TO CHECK THAT AC IS CLEARED BY IOT2
                        /
0666  4436    TST21,  INTST
0667  7340            CLA CLL CMA     /AC=7777
0670  4425            LQMP            /LOAD DATA BUFFER WITH IOT2

0671  7440            SZA
0672  4434            ERROR           /AC NOT CLEARED BY IOT2
0673  4440            ENDTST
                        /
                        /ROUTINE TO CHECK THAT AC IS CLEARED BY IOT3
                        /
0674  4436    TST22,  INTST
0675  7340            CLA CLL CMA     /AC=7777
```



```
0676  4426            LQMC            /LOAD DATA BUFFER WITH IOT3
0677  7440            SZA
0700  4434            ERROR           /AC NOT CLEARED BY IOT3
0701  4440            ENDTST
                        /
                        /ROUTINE TO CHECK THAT AC IS CLEARED BY IOT4
                        /
0702  4436    TST23,  INTST
0703  7340            CLA CLL CMA     /AC=7777
0704  4427            LQPC            /LOAD DATA BUFFER WITH IOT4
0705  7440            SZA
0706  4434            ERROR           /AC NOT CLEARED BY IOT4
0707  4440            ENDTST
                        /
                        /ROUTINE TO INSURE THAT AC IS NOT CHANGED BY IOT 0
                        /
0710  4436    TST24,  INTST
0711  7340            CLA CLL CMA     /AC = 7777
0712  4423            LQSK            /ISSUE IOT 0
0713  7000            NOP
0714  7001            IAC             /ADD ONE
0715  7440            SZA             /AC SHOULD = 0
0716  4434            ERROR           /AC CHANGED BY IOT 0
0717  7300            CLA CLL         /AC = 0
0720  4423            LQSK            /ISSUE IOT 0
0721  7000            NOP
0722  7440            SZA             /AC STILL 0
0723  4434            ERROR           /AC CHANGED BY IOT 0
0724  4440            ENDTST
                        /
                        /ROUTINE TO INSURE THAT AC IS NOT CHANGED BY IOT 7
                        /
0725  4436    TST25,  INTST
0726  7340            CLA CLL CMA     /AC = 7777
0727  4432            LQRE            /ISSUE IOT 7
0730  7001            IAC             /ADD ONE
0731  7440            SZA             /AC SHOULD = 0
0732  4434            ERROR           /AC CHANGED BY IOT7
0733  7300            CLA CLL         /AC = 0
0734  4432            LQRE            /IOT 7
0735  7440            SZA             /AC STILL = 0
0736  4434            ERROR           /NO, AC CHANGED BY IOT7
0737  4440            ENDTST
                        /
                        /ROUTINE TO CHECK THAT AC IS CLEARED BY IOT 6
                        /
0740  4436    TST26,  INTST
0741  7340            CLA CLL CMA     /AC = 7777
0742  4431            LQLS            /LOAD STATUS REGISTER IOT 6
0743  7440            SZA             /AC SHOULD = 0
0744  4434            ERROR           /AC NOT CLEARED BY IOT 6
0745  4440            ENDTST
                        /
                        /ROUTINE TO CHECK THAT DONE FLAG IS SET BY IOT6
                        /AND CLEARED BY IOT5
```

```
                        /
0746  4436    TST27,  INTST
0747  7300            CLA CLL
0750  4431            LQLS            /SET DONE IOT6
0751  4423            LQSK            /SKIP ON DONE FLAG
0752  4434            ERROR           /IOT 6 DID NOT SET DONE FLAG OR SKIP HIGH
0753  4430            LQRS            /READ STATUS CLEAR DONE IOT 5
0754  4423            LQSK            /SKIP IF DONE FLAG STILL SET
0755  5357            JMP .+2         /FLAG CLEARED
0756  4434            ERROR           /FLAG NOT CLEARED BY IOT 6 OR SKIP STUCK LOW
0757  4440            ENDTST
                        /
                        /ROUTINE TO CHECK THAT DONE FLAG IS SET BY IOT 6
                        /AND CLEARED BY IOT 2
                        /
0760  4436    TST30,  INTST
0761  7300            CLA CLL
0762  4431            LQLS            /SET DONE IOT 6
0763  4423            LQSK            /SKIP ON DONE FLAG
0764  4434            ERROR           /IOT 6 DID NOT SET DONE FLAG OR SKIP STUCK HIGH
0765  4425            LQMP            /IOT 2, SHOULD CLEAR DONE
0766  4423            LQSK            /SKIP IF DONE FLAG STILL SET
0767  5371            JMP .+2         /FLAG CLEARED
0770  4434            ERROR           /FLAG NOT CLEARED BY IOT 2 OR SKIP STUCK LOW
0771  4440            ENDTST
0772  5777'           JMP TST31
                        /
0777  1000
      1000      PAGE
                        /
                        /ROUTINE TO CHECK THAT DONE FLAG IS SET BY IOT 6
                        /AND CLEARED BY IOT 3
                        /
1000  4436    TST31,  INTST
1001  7300            CLA CLL
1002  4431            LQLS            /SET DONE FLAG IOT 6
1003  4423            LQSK            /SKIP ON DONE FLAG SET
1004  4434            ERROR           /DONE FLAG NOT SET BY IOT 6
1005  4426            LQMC            /CLEAR DONE FLAG IOT 3
1006  4423            LQSK            /SKIP IF DONE FLAG STILL SET
1007  5211            JMP .+2         /DONE FLAG CLEARED OK
1010  4434            ERROR           /DONE FLAG NOT CLEARED BY IOT 3
1011  4440            ENDTST          /OR SKIP STUCK LOW
                        /
                        /ROUTINE TO CHECK THAT DONE FLAG IS SET BY IOT 6
                        /AND CLEARED BY IOT 4
                        /
1012  4436    TST32,  INTST
1013  7300            CLA CLL
1014  4431            LQLS            /SET DONE FLAG IOT 6
1015  4423            LQSK            /SKIP ON DONE FLAG SET
1016  4434            ERROR           /DONE FLAG NOT SET BY IOT 6
1017  4427            LQPC            /CLEAR DONE FLAG IOT 4
1020  4423            LQSK            /SKIP IF DONE FLAG STILL SET
```



```
1021  5223            JMP .+2         /DONE FLAG CLEARED OK
1022  4434            ERROR           /DONE FLAG NOT CLEARED BY IOT 4 OR
1023  4440            ENDTST          /SKIP STUCK LOW
                        /
                        /ROUTINE TO CHECK THAT DONE FLAG IS SET BY IOT 6
                        /AND CLEARED BY IOT 7
                        /
1024  4436    TST33,  INTST
1025  7300            CLA CLL
1026  4431            LQLS            /SET DONE FLAG IOT 6
1027  4423            LQSK            /SKIP ON DONE FLAG SET
1030  4434            ERROR           /DONE FLAG NOT SET BY IOT 6
1031  4432            LQRE            /CLEAR DONE FLAG IOT 7
1032  4423            LQSK            /CHECK DONE FLAG FOR CLEARED CONDITION
1033  5235            JMP .+2         /DONE FLAG CLEARED OK
1034  4434            ERROR           /DONE FLAG NOT CLEARED BY IOT 7 OR SKIP
1035  4440            ENDTST          /STUCK LOW
                        /
                        /ROUTINE TO CHECK THAT DONE FLAG IS SET BY IOT 6
                        /AND CLEARED BY CAF INSTRUCTION
                        /
1036  4436    TST34,  INTST
1037  7300            CLA CLL
1040  4431            LQLS            /SET DONE FLAG IOT 6
1041  4423            LQSK            /SKIP ON DONE FLAG SET
1042  4434            ERROR           /DONE FLAG NOT SET BY IOT 6
1043  6007            CAF             /CLEAR DONE FLAG WITH CAF INSTRUCTION
1044  4423            LQSK            /CHECK DONE FLAG FOR CLEARED CONDITION
1045  5247            JMP .+2         /DONE FLAG CLEARED OK
1046  4434            ERROR           /DONE FLAG NOT CLEARED BY CAF OR SKIP STUCK LOW
1047  4440            ENDTST
                        /
                        /
                        /
                        /ROUTINE TO CHECK READ-WRITE BITS OF STATUS REGISTER
                        /ALL ONES AND ALL ZEROS
                        /
1050  4436    TST35,  INTST
1051  7300            CLA CLL
1052  4431            LQLS            /LOAD ZEROS INTO STATUS REGISTER
1053  4430            LQRS            /READ STATUS
1054  0076            AND STMASK      /MASK BITS 5,8,9,10,11 (ONLY BITS 10 & 11 ON VT78)
1055  7440            SZA             /SKIP IF BITS 5,8,9,10,11 ALL ZERO (ONLY BITS 10 & 11 ON VT78)
1056  4451            STATER          /ONE OR MORE READ-WRITE BITS NOT CLEARED
1057  7340            CLA CLL CMA     /AC = 7777
1060  4431            LQLS            /LOAD ONES INTO STATUS REGISTER
1061  4430            LQRS            /READ STATUS
1062  0076            AND STMASK      /MASK BITS 5,8,9,10,11 (ONLY BITS 10 & 11 ON VT78)
1063  1377            TAD (7661       /ADD TWO'S COMPLEMENT
1064  7440            SZA             /SKIP IF ALL BITS SET
1065  4451            STATER          /ONE OR MORE OF BITS 5,8,9,10,11 NOT SET (10 & 11 ON VT78)
1066  4440            ENDTST          /IN STATUS REGISTER
1067  4475            VT78CK          /VT78/ SYSTEM UNDER TEST = VT78 ?
1070  5776'           JMP TST41       /VT78/ YES - SKIP TESTS 36,37 AND 40, IN VT78
                                      /VT78/       STATUS BITS 5,8,AND 9 DO NOT EXIST.
```

```
                        /
                        /
                        /ROUTINE TO CHECK BIT 5 OF STATUS REGISTER
                        /
1071  4436    TST36,    INTST
1072  7300              CLA CLL
1073  1375              TAD (7677       /ALL ONES EXCEPT BIT 5
1074  4431              LQLS            /LOAD STATUS
1075  4430              LQRS            /READ STATUS
1076  0374              AND (100        /TEST BIT 5
1077  1373              TAD (7700
1100  7440              SZA             /SKIP IF BIT 5 IS SET
1101  5303              JMP .+2         /BIT 5 CLEARED OK
1102  4451              STATER          /BIT 5 NOT CLEARED AFTER LOAD STATUS
1103  7300              CLA CLL
1104  1374              TAD (100        /ALL ZEROS EXCEPT BIT 5
1105  4431              LQLS            /LOAD STATUS
1106  4430              LQRS            /READ STATUS
1107  0374              AND (100        /TEST BIT 5
1110  1373              TAD (7700
1111  7440              SZA             /SKIP IF BIT 5 IS SET
1112  4451              STATER          /BIT 5 NOT SET AFTER LOAD STATUS
1113  4440              ENDTST
                        /
                        /ROUTINE TO CHECK BIT 8 OF STATUS REGISTER
                        /
1114  4436    TST37,    INTST
1115  7300              CLA CLL
1116  1372              TAD (7767       /ALL ONES EXCEPT BIT 8
1117  4431              LQLS            /LOAD STATUS
1120  4430              LQRS            /READ STATUS
1121  0371              AND (10         /TEST BIT 8
1122  1370              TAD (7770
1123  7440              SZA             /SKIP IF BIT 8 IS SET
1124  5326              JMP .+2         /BIT 8 CLEARED OK
1125  4451              STATER          /BIT 8 NOT CLEARED AFTER LOAD STATUS
1126  7300              CLA CLL
1127  1371              TAD (10         /ALL ZEROS EXCEPT BIT 8
1130  4431              LQLS            /LOAD STATUS
1131  4430              LQRS            /READ STATUS
1132  0371              AND (10         /TEST BIT 8
1133  1370              TAD (7770
1134  7440              SZA             /SKIP IF BIT 8 IS SET
1135  4451              STATER          /BIT 8 NOT SET AFTER LOAD STATUS
1136  4440              ENDTST
                        /
                        /ROUTINE TO CHECK BIT 9 OF STATUS REGISTER

                        /
1137  4436    TST40,    INTST
1140  7300              CLA CLL
1141  1367              TAD (7773       /ALL ONES EXCEPT BIT 9
1142  4431              LQLS            /LOAD STATUS
1143  4430              LQRS            /READ STATUS
1144  0366              AND (4          /TEST BIT 9
1145  1365              TAD (7774
```



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1146  7640              SZA CLA         /SKIP IF BIT 9 IS SET
1147  5351              JMP .+2         /BIT 9 CLEARED OK
1150  4451              STATER          /BIT 9 NOT CLEARED AFTER LOAD STATUS
1151  7300              CLA CLL
1152  1366              TAD (4          /ALL ZEROS EXCEPT BIT 9
1153  4431              LQLS            /LOAD STATUS
1154  4430              LQRS            /READ STATUS
1155  0366              AND (4          /TEST BIT 9
1156  1365              TAD (7774
1157  7640              SZA CLA         /SKIP IF BIT 9 IS SET
1160  4451              STATER          /BIT 9 NOT SET AFTER LOAD STATUS
1161  4440              ENDTST
1162  5776'             JMP TST41
                        /
1165  7774
1166  0004
1167  7773
1170  7770
1171  0010
1172  7767
1173  7700
1174  0100
1175  7677
1176  1200
1177  7661
      1200    PAGE
                        /
                        /ROUTINE TO CHECK BIT 10 OF STATUS REGISTER
                        /
1200  4436    TST41,    INTST
1201  7300              CLA CLL
1202  1377              TAD (7775       /ALL ONES EXCEPT BIT 10
1203  4431              LQLS            /LOAD STATUS
1204  4430              LQRS            /READ STATUS
1205  0376              AND (2          /TEST BIT 10
1206  1375              TAD (7776
1207  7640              SZA CLA         /SKIP IF BIT 10 IS SET
1210  5212              JMP .+2
1211  4451              STATER          /BIT 10 NOT CLEARED AFTER LOAD STATUS
1212  7300              CLA CLL
1213  1376              TAD (2          /ALL ZEROS EXCEPT BIT 10
1214  4431              LQLS            /LOAD STATUS
1215  4430              LQRS            /READ STATUS
1216  0376              AND (2          /TEST BIT 10
1217  1375              TAD (7776
1220  7640              SZA CLA         /SKIP IF BIT 10 IS SET
1221  4451              STATER          /BIT 10 NOT SET AFTER LOAD STATUS
1222  4440              ENDTST
                        /

                        /ROUTINE TO CHECK BIT 11 OF STATUS REGISTER
                        /
1223  4436    TST42,    INTST
1224  7300              CLA CLL
1225  1375              TAD (7776       /ALL ONES EXCEPT BIT 11
```

```
   767  1226  4431          LQLS            /LOAD STATUS
   768  1227  4430          LQRS            /READ STATUS
   769  1230  0374          AND (1          /TEST BIT 11
   770  1231  1373          TAD (7777
   771  1232  7640          SZA CLA         /SKIP IF BIT 11 NOT CLEARED
   772  1233  5235          JMP .+2         /BIT 11 CLEARED OK
   773  1234  4451          STATER          /BIT 11 NOT CLEARED AFTER LOAD STATUS
   774  1235  7300          CLA CLL
   775  1236  1374          TAD (1          /SET BIT 11
   776  1237  4431          LQLS            /LOAD STATUS
   777  1240  4430          LQRS            /READ STATUS
   778  1241  0374          AND (1          /MASK BIT 11
   779  1242  1373          TAD (7777
   780  1243  7640          SZA CLA         /SKIP IF SET
   781  1244  4451          STATER          /BIT 11 NOT SET AFTER LOAD STATUS
   782  1245  4440          ENDTST
   783                /
   784                /ROUTINE TO CHECK THAT STATUS REGISTER IS CLEARED BY CAF
   785                /
   786  1246  4436  TST43,   INTST
   787  1247  7340          CLA CLL CMA     /AC = 7777
   788  1250  4431          LQLS            /LOAD STATUS
   789  1251  4430          LQRS            /READ STATUS
   790  1252  0076          AND STMASK      /MASK BITS 5,8,9,10,11 (ONLY 10 & 11 FOR VT78)
   791  1253  1372          TAD (7661       /ADD TWO'S COMPLEMENT
   792  1254  7640          SZA CLA         /SKIP IF BITS 5,8,9,10,11 ALL SET (ONLY 10 & 11 ON VT78)
   793  1255  4451          STATER          /ONE OR MORE OF BITS 5,8,9,10,11 NOT SET (10 & 11 ON VT78)
   794  1256  6007          CAF             /CLEAR STATUS REGISTER
   795  1257  4430          LQRS            /READ STATUS
   796  1260  0076          AND STMASK      /TEST BITS 5,8,9,10,11 (ONLY 10 & 11 ON VT78)
   797  1261  7640          SZA CLA         /SKIP IF ALL CLEARED
   798  1262  4451          STATER          /ONE OR MORE OF BITS 5,8,9,10,11 NOT CLEARED BY CAF
   799                                      /       (10 & 11 ON VT78)
   800  1263  4440          ENDTST
   801                /
   802                /ROUTINE TO CHECK THAT INTERRUPT ENABLE (BIT 11)
   803                /OF STATUS REGISTER WILL GENERATE INTERRUPT REQUEST
   804                /
   805  1264  4436  TST44,   INTST
   806  1265  7300          CLA CLL
   807  1266  4431          LQLS            /SET DONE FLAG
   808  1267  4423          LQSK            /SKIP ON DONE FLAG
   809  1270  4434          ERROR           /DONE FLAG NOT SET BY LOAD STATUS IOT 6
   810  1271  6001          ION             /INTERRUPT ON
   811  1272  7000          NOP             /WAIT FOR INTERRUPT
   812  1273  6002          IOF             /INTERRUPT OFF
   813  1274  7300          CLA CLL

   814  1275  1116          TAD INTFLG      /GET PROGRAM INTERRUPT FLAG
   815  1276  7640          SZA CLA         /SKIP IF NO INTERRUPT
   816  1277  4434          ERROR           /DONE FLAG CAUSED INTERRUPT WITH
   817                                      /INTERRUPT ENABLE CLEARED
   818  1300  7300          CLA CLL
   819  1301  3116          DCA INTFLG              /CLEAR INTERRUPT FLAG
   820  1302  4423          LQSK            /DONE FLAG STILL SET?
   821  1303  4434          ERROR           /DONE FLAG NOT SET
```



```
   822  1304  7300          CLA CLL
   823  1305  6001          ION
   824  1306  7201          CLA IAC         /BIT 11 = INTERRUPT ENABLE
   825  1307  4431          LQLS            /SET INTERRUPT ENABLE
   826  1310  7000          NOP             /WAIT FOR INTERRUPT
   827  1311  6002          IOF
   828  1312  7300          CLA CLL
   829  1313  1116          TAD INTFLG      /GET PROGRAM INTERRUPT FLAG
   830  1314  7650          SNA CLA         /SKIP IF INTERRUPT FLAG SET
   831  1315  4434          ERROR           /INTERRUPT ENABLE FAILED TO CAUSE INTERRUPT
   832  1316  7300          CLA CLL
   833  1317  3116          DCA INTFLG      /CLEAR INTERRUPT FLAG
   834  1320  4430          LQRS            /CLEAR DONE FLAG
   835  1321  4423          LQSK            /SKIP IF DONE FLAG STILL SET
   836  1322  7410          SKP             /DONE FLAG CLEARED
   837  1323  4434          ERROR           /DONE FLAG NOT CLEARED BY LQRS IOT 5
   838  1324  6001          ION             /INTERRUPT ON
   839  1325  7000          NOP             /WAIT FOR INTERRUPT
   840  1326  6002          IOF             /INTERRUPT OFF
   841  1327  7300          CLA CLL
   842  1330  1116          TAD INTFLG      /GET PROGRAM INTERRUPT FLAG
   843  1331  7440          SZA             /SKIP IF CLEAR
   844  1332  4434          ERROR           /PROGRAM INTERRUPTED WITH DONE FLAG
   845                                      /CLEARED AND INTERRUPT ENABLE SET
   846  1333  2366          ISZ LOOPC       /INCREMENT LOOP COUNTER
   847  1334  5771'         JMP TST1        /CONTINUE LOGIC TESTS
   848  1335  4466          C8ACTV          /CHECK FOR ACTIVE CONSOLE
   849  1336  7410          SKP             /SKIP IF CONSOLE ACTIVE
   850  1337  5347          JMP .+10        /CONSOLE NOT ACTIVE, DO NOT PRINT
   851  1340  4467          MESAGE          /PRINT END OF PASS MESSAGE
   852  1341  6125          ENDLOG          /MESSAGE ADDRESS
   853  1342  4467          MESAGE
   854  1343  6137          PASCNT          /PRINT PASS COUNT
   855  1344  2365          ISZ PASS        /INCREMENT PASS COUNT
   856  1345  1365          TAD PASS        /GET PASS COUNT
   857  1346  4470          REGPRT          /PRINT PASS COUNT
   858  1347  4465          LAS             /GET SWITCHES
   859  1350  0371          AND (400        /TEST SR3, HALT AT COMPLETION OF PASS
   860  1351  7650          SNA CLA         /SKIP IF SR3=1
   861  1352  5771'         JMP TST1        /SR3=0  CONTINUE TEST
   862  1353  4466          C8ACTV          /CHECK FOR ACTIVE CONSOLE
   863  1354  7410          SKP             /CONSOLE ACTIVE, DO NOT HALT
   864  1355  7402          HLT             /CONSOLE NOT ACTIVE
   865  1356  4466          C8ACTV          /CHECK FOR ACTIVE CONSOLE
   866  1357  7410          SKP             /SKIP IF CONSOLE IS ACTIVE
   867  1360  5771'         JMP TST1        /CONTINUE WITH LOGIC TEST
   868  1361  4467          MESAGE          /PRINT "WAITING" MESSAGE
   869  1362  6000          WAITNG          /MESSAGE POINTER
   870  1363  4445          CTLCHK          /WAIT FOR CONTROL CHARACTER
   871  1364  5363          JMP .-1
   872                /
   873  1365  0000  PASS,    0               /PASS COUNT
   874  1366  0000  LOOPC,   0               /LOOP COUNT
   875                /
   876                /
```

```
 877    1371  0400
 878    1372  7661
 879    1373  7777
 880    1374  0001
 881    1375  7776
 882    1376  0002
 883    1377  7775
              1400      PAGE
 884                    /
 885                    /************************************************************
 886                    /
 887                    /       BEGINNING OF DYNAMIC TESTS
 888                    /
 889                    /************************************************************
 890                    /
 891                    /
 892                    /ROUTINE TO CHECK INDIVIDUAL BITS OF DATA BUFFER
 893                    /FOR CORRECT CARRIAGE POSITIONING
 894                    /
 895    1400  3777'    TST45,  DCA PCOUNT      /CLEAR PASS COUNT
 896    1401  4433            BGNTST
 897    1402  1376            TAD (56         /ASCII CODE FOR PERIOD
 898    1403  3124            DCA CHAR        /SAVE IT
 899    1404  3231            DCA POS45       /CLEAR PRINT POSITION COORDINATE
 900    1405  7305            CLA CLL IAC RAL /SET BIT 10
 901    1406  4431            LQLS            /LIFT RIBBON
 902    1407  4464            PRINT           /PRINT A PERIOD
 903    1410  4464            PRINT           /OVERPRINT A PERIOD
 904    1411  2231            ISZ POS45       /SET BIT 11 OF NEW PRINT POSITION
 905    1412  4461            XCRLF           /CARRIAGE RETURN, LINE FEED
 906    1413  4452    PLP45,  KBCHK           /CHECK FOR KEYBOARD INTERVENTION
 907    1414  4464            PRINT           /PRINT AT LEFTMOST POSITION
 908    1415  1231            TAD POS45       /GET NEW PRINT POSITION
 909    1416  4456            MOVCR           /MOVE CARRIAGE TO NEW PRINT POSITION
 910    1417  4464            PRINT           /PRINT AT NEW PRINT POSITION
 911    1420  4461            XCRLF           /GO BACK TO LEFTMOST POSTION AND LINE FEED
 912    1421  1231            TAD POS45       /GET PRINT POSITION
 913    1422  7104            CLL RAL         /ROTATE LEFT TO TEST NEXT BIT OF DATA BUFFER
 914    1423  3231            DCA POS45       /SAVE UPDATED PRINT POSITION
 915    1424  1231            TAD POS45       /GET NEW PRINT POSITION
 916    1425  7700            SMA CLA         /SKIP IF ALL BITS TESTED
 917    1426  5213            JMP PLP45       /CONTINUE PRINTING
 918    1427  4440            ENDTST          /CHECK FOR TEST LOOP
 919    1430  5232            JMP TST46       /GO TO NEXT TEST
 920    1431  0000    POS45,  0               /STORAGE AREA FOR PRINT POSITION
 921                    /
 922                    /
 923                    /ROUTINE TO CHECK INDIVIDUAL BITS OF DATA BUFFER FOR CORRECT
 924                    /PAPER POSITIONING
 925                    /
 926    1432  4433    TST46,  BGNTST
 927    1433  1375            TAD (137        /ASCII CODE FOR UNDERLINE
 928    1434  3124            DCA CHAR        /SAVE IT
 929    1435  7001            IAC             /SET BIT 11
 930    1436  3256            DCA MAG46       /SETUP PAPER MOVEMENT MAGNITUDE
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 931    1437  7305            CLA CLL IAC RAL /SET BIT 10
 932    1440  4431            LQLS            /LIFT RIBBON
 933    1441  1374            TAD (24         /GET LINE LENGTH = 20 CHARACTERS
 934    1442  3275            DCA LIN46       /SAVE IT
 935    1443  3136    PLP46A, DCA CHRCNT      /CLEAR CHARACTER COUNT
 936    1444  4452    PLP46B, KBCHK           /CHECK FOR KEYBOARD INTERVENTION
 937    1445  4462            RSPACE          /MOVE CARRIAGE ONE SPACE RIGHT
 938    1446  4464            PRINT           /PRINT A CHARACTER
 939    1447  1136            TAD CHRCNT      /GET CHARACTER COUNT
 940    1450  7041            CIA             /NEGATE IT
 941    1451  1275            TAD LIN46       /ADD NUMBER OF CHARACTERS PER LINE
 942    1452  7640            SZA CLA         /SKIP IF END OF LINE
 943    1453  5244            JMP PLP46B      /NOT END OF LINE, CONTINUE PRINTING
 944    1454  4457            MOVPAR          /MOVE PAPER
 945    1455  0000            PRADV           /PAPER DIRECTION = ADVANCE
 946    1456  0000    MAG46,  0               /PAPER MOVEMENT MAGNITUDE
 947    1457  1256            TAD MAG46       /GET PAPER MOVEMENT MAGNITUDE
 948    1460  7104            CLL RAL         /ROTATE TO TEST NEXT BIT OF DATA BUFFER
 949    1461  3256            DCA MAG46       /SAVE NEW PAPER MOVEMENT MAGNITUDE
 950    1462  4442            SWAIT           /WAIT FOR READY BITS
 951    1463  4451            STATER          /READY BIT STATUS ERROR
 952    1464  4432            LQRE            /RESTORE PRINTER
 953    1465  4442            SWAIT           /WAIT FOR READY BITS
 954    1466  4451            STATER          /READY BIT STATUS ERROR
 955    1467  7300            CLA CLL
 956    1470  1256            TAD MAG46       /GET PAPER MOVEMENT MAGNITUDE
 957    1471  7640            SZA CLA         /SKIP IF ALL BITS TESTED
 958    1472  5243            JMP PLP46A      /CONTINUE PRINTING
 959    1473  4440            ENDTST          /CHECK FOR TEST LOOP
 960    1474  5276            JMP TST47       /GO TO NEXT TEST
 961    1475  0000    LIN46,  0               /STORAGE AREA FOR LINE LENGTH
 962                    /
 963                    /
 964                    /ROUTINE TO PRINT THE LETTER I ON ONE LINE WITH 1/60 INCH SPACING
 965                    /BETWEEN EACH LETTER, CARRIAGE MOVING ACROSS PAGE FOR EACH NEW
 966                    /PRINT POSITION
 967                    /
 968    1476  4433    TST47,  BGNTST
 969    1477  1373            TAD (111        /GET CHARACTER TO PRINT "I"
 970    1500  3124            DCA CHAR        /SAVE IT
 971    1501  3332            DCA LSTART      /CLEAR LEFT COORDINATE
 972    1502  1334            TAD RMOST       /GET RIGHTMOST COORDINATE
 973    1503  3333            DCA LEND        /SAVE IT
 974    1504  7305            CLA CLL IAC RAL /SET BIT 10
 975    1505  4431            LQLS            /LIFT RIBBON
 976    1506  1332    PLP47,  TAD LSTART      /GET LEFT COORDINATE
 977    1507  4456            MOVCR           /MOVE CARRIAGE TO NEW POSITION
 978    1510  4464            PRINT           /PRINT CHARACTER
 979    1511  4452            KBCHK           /CHECK FOR KEYBOARD INTERVENTION
 980    1512  1332            TAD LSTART      /GET LEFT COORDINATE
 981    1513  7041            CIA             /NEGATE IT
 982    1514  1333            TAD LEND        /ADD RIGHT COORDINATE
 983    1515  7650            SNA CLA         /SKIP IF NOT EQUAL
 984    1516  5330            JMP TST47A      /CHECK FOR TEST LOOP
 985    1517  1333            TAD LEND        /GET RIGHT COORDINATE
```

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  986    1520  4456          MOVCR           /MOVE CARRIAGE
  987    1521  4464          PRINT           /PRINT CHARACTER
  988    1522  2332          ISZ LSTART
  989    1523  2332          ISZ LSTART      /ADD 1/60 INCH TO LINE START POSITION
  990    1524  7344          CLA CLL CMA RAL /AC = MINUS TWO
  991    1525  1333          TAD LEND        /SUBTRACT 1/60 INCH FROM LINE END
  992    1526  3333          DCA LEND        /UPDATE LEFT COORDINATE
  993    1527  5306          JMP PLP47
  994    1530  4440  TST47A, ENDTST          /CHECK FOR TEST LOOP
  995    1531  5772'         JMP TST50
  996    1532  0000  LSTART, 0
  997    1533  0000  LEND,   0
  998    1534  3044  RMOST,  3044            /RIGHTMOST COORDINATE
  999                 /
 1000                 /
 1001                 /
 1002    1572  1600
 1003    1573  0111
 1004    1574  0024
 1005    1575  0137
 1006    1576  0056
 1007    1577  2465
               1600  PAGE
 1008                 /
 1009                 /ROUTINE TO PRINT ONE LINE OF EACH CHARACTER
 1010                 /
 1011    1600  4433  TST50,  BGNTST
 1012    1601  1377          TAD (40         /GET FIRST CHARACTER
 1013    1602  3124          DCA CHAR        /SAVE IT
 1014    1603  1376          TAD (140        /GET NUMBER OF LINES TO PRINT (96)
 1015    1604  3132          DCA LINES       /SAVE IT
 1016    1605  3245          DCA DSWTCH      /CLEAR CARRIAGE DIRECTION SWITCH
 1017    1606  7305          CLA CLL IAC RAL /SET BIT 10
 1018    1607  4431          LQLS            /LIFT PRINTER RIBBON
 1019    1610  4452  PLP50,  KBCHK           /CHECK FOR KEYBOARD INTERVENTION
 1020    1611  4464          PRINT           /PRINT CHARACTER IN LOCATION CHARPT
 1021    1612  4454          LINEND          /CHECK FOR END OF LINE
 1022    1613  5231          JMP NE50A       /NOT END OF LINE, CONTINUE PRINTING
 1023    1614  2115          ISZ LINCNT      /INCREMENT LINE COUNT
 1024    1615  7000          NOP             /DON'T SKIP IF LINCNT OVERFLOWS
 1025    1616  1130          TAD LF          /GET LINE FEED MAGNITUDE
 1026    1617  3222          DCA .+3         /SAVE FOR LINE FEED
 1027    1620  4457          MOVPAR          /CALL MOVE PAPER SUBROUTINE
 1028    1621  0000    .     0000            /DIRECTION EQUAL ADVANCE PAPER
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 1029    1622  0000          0000            /MODIFIED LINE FEED MAGNITUDE
 1030    1623  4460          LSTLIN          /CHECK FOR LAST LINE TO PRINT
 1031    1624  5240          JMP NE50B       /NOT LAST LINE CONTINUE PRINTING
 1032    1625  4442          SWAIT           /WAIT FOR LAST CHARACTER TO BE PRINTED
 1033    1626  4451          STATER          /ONE OR MORE READY BITS NOT READY
 1034    1627  4440          ENDTST          /CHECK FOR TEST LOOP
 1035    1630  5775'         JMP TST51       /GO TO NEXT TEST
 1036                 /
 1037    1631  1245  NE50A,  TAD DSWTCH      /GET CARRIAGE DIRECTION SWITCH
 1038    1632  7650          SNA CLA         /SKIP IF DIRECTION IS LEFT
 1039    1633  4462          RSPACE          /DIRECTION IS RIGHT ONE SPACE
 1040    1634  1245          TAD DSWTCH      /GET CARRIAGE DIRECTION SWITCH
 1041    1635  7640          SZA CLA         /SKIP IF DIRECTION IS RIGHT
 1042    1636  4463          LSPACE          /DIRECTION IS LEFT ONE SPACE
 1043    1637  5210          JMP PLP50       /CONTINUE PRINTING
 1044    1640  2124  NE50B,  ISZ CHAR        /INCREMENT TO NEXT CHARACTER
 1045    1641  1245          TAD DSWTCH      /GET CARRIAGE DIRECTION SWITCH
 1046    1642  7040          CMA             /COMPLEMENT IT
 1047    1643  3245          DCA DSWTCH      /SAVE NEW SWITCH
 1048    1644  5210          JMP PLP50       /CONTINUE PRINTING
 1049                 /
 1050    1645  0000  DSWTCH, 0               /CARRIAGE DIRECTION SWITCH
 1051    1775  2000
 1052    1776  0140
 1053    1777  0040
               2000  PAGE
 1054                 /
 1055                 /
 1056                 /SWIRL PATTERN OF ALL CHARACTERS IN ALL PRINT POSITIONS
 1057                 /
 1058                 /
 1059    2000  4433  TST51,  BGNTST          /IOF,CHK KYBD,SETUP TEST LOOP,INIT MODULE
 1060    2001  1377          TAD (40         /GET FIRST CHARACTER
 1061    2002  3135          DCA FSTCHR      /SAVE IT
 1062    2003  1377          TAD (40         /GET FIRST CHARACTER
 1063    2004  3134          DCA FIRST       /SAVE FIRST CHARACTER OF TEST
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1064    2005  1376            TAD (140        /GET NUMBER OF LINES TO PRINT (96)
1065    2006  3132            DCA LINES       /SAVE IT
1066    2007  7305            CLA CLL IAC RAL /SET BIT 10
1067    2010  4431            LQLS            /LIFT PRINTER RIBBON
1068    2011  1135    PLP51A, TAD FSTCHR      /GET FIRST CHARACTER
1069    2012  3124            DCA CHAR        /SAVE IT TO BEGIN PATTERN
1070    2013  4452    PLP51B, KBCHK           /CHECK FOR KEYBOARD INTERVENTION
1071    2014  4464            PRINT           /PRINT CHARACTER IN LOCATION CHARRT
1072    2015  4454            LINEND          /CHECK FOR END OF LINE
1073    2016  5226            JMP NE51A       /NOT END OF LINE, CONTINUE PRINTING
1074    2017  2115            ISZ LINCNT      /INCREMENT LINE COUNT
1075    2020  7000            NOP             /DUMMY IF LINE COUNT OVERFLOWS
1076    2021  4461            XCRLF           /EXECUTE CARRIAGE RETURN AND LINE FEED
1077    2022  4460            LSTLIN          /CHECK FOR LAST LINE TO PRINT
1078    2023  5243            JMP NE51B       /NOT LAST LINE, CONTINUE PRINTING
1079    2024  4440            ENDTST          /CHECK FOR TEST LOOP
1080    2025  5245            JMP TST52       /GO TO NEXT TEST
1081                    /
1082    2026  7300    NE51A,  CLA CLL
1083    2027  2124            ISZ CHAR        /INCREMENT TO NEXT CHARACTER
1084    2030  1375            TAD (200        /CHECK FOR LAST CHARACTER
1085    2031  7041            CIA             /FORM TWO'S COMPLEMENT
1086    2032  1124            TAD CHAR        /ADD CURRENT CHARACTER
1087    2033  7650            SNA CLA         /SKIP IF NOT LAST CHARACTER
1088    2034  5237            JMP .+3         /LAST CHARACTER
1089    2035  4462            RSPACE          /MOVE CARRIAGE TO NEXT PRINT POSITION
1090    2036  5213            JMP PLP51B      /CONTINUE PRINTING
1091    2037  4462            RSPACE          /MOVE CARRIAGE TO NEXT PRINT POSITION
1092    2040  1134            TAD FIRST       /GET FIRST CHARACTER
1093    2041  3124            DCA CHAR        /SET UP TO BEGIN AGAIN
1094    2042  5213            JMP PLP51B      /CONTINUE PRINTING
1095                    /
1096    2043  2135    NE51B,  ISZ FSTCHR      /INCREMENT STARTING CHARACTER
1097    2044  5211            JMP PLP51A      /PRINT NEXT LINE
1098                    /
1099                    /
1100                    /
1101                    /ROUTINE TO PRINT FIVE LINES OF CAPITAL "M" WITH
1102                    /OVERPRINT AND BI-DIRECTIONAL PRINTING, AND RIBBON LIFT
1103                    /AND DROP EVERY OTHER CHARACTER
1104                    /
1105                    /
1106                    /
1107    2045  4433    TST52,  BGNTST
1108    2046  1374            TAD (115        /GET ASCII CHARACTER "M"
1109    2047  3124            DCA CHAR        /SAVE IT
1110    2050  1373            TAD (12         /5 LINES TO PRINT

1111    2051  3132            DCA LINES       /SAVE IT
1112    2052  3334            DCA RIBN52      /CLEAR RIBBON SWITCH
1113    2053  4443    PLP52A, DELAY
1114    2054  7777            7777            /THIS LOCATION MAY BE MODIFIED TO SLOW PRINT PATTERN
1115    2055  7305            CLA CLL IAC RAL /SET BIT 10
1116    2056  4431            LQLS            /LIFT RIBBON
1117    2057  4452    PLP52B, KBCHK           /CHECK FOR KEYBOARD INTERVENTION
1118    2060  4464            PRINT           /PRINT ONE CHARACTER
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1119    2061  4454            LINENO          /CHECK FOR END OF LINE
1120    2062  5303            JMP NE52A       /NOT END OF LINE, CONTINUE
1121    2063  2115            ISZ LINCNT      /INCREMENT LINE COUNT
1122    2064  7000            NOP             /DUMMY IN CASE LINE COUNT OVERFLOWS
1123    2065  4443    PLP52C, DELAY
1124    2066  7777            7777            /THIS LOCATION MAY BE MODIFIED TO SLOW PRINT SPEED
1125    2067  7300            CLA CLL
1126    2070  4431            LQLS            /DROP RIBBON
1127    2071  4452    PLP52D, KBCHK           /CHECK FOR KEYBOARD INTERVENTION
1128    2072  4464            PRINT           /PRINT ONE CHARACTER
1129    2073  4454            LINEND          /CHECK FOR END OF LINE
1130    2074  5316            JMP NE52B       /NOT END OF LINE, CONTINUE
1131    2075  2115            ISZ LINCNT      /INCREMENT LINE COUNT
1132    2076  7000            NOP             /DUMMY IN CASE LINE COUNT OVERFLOWS
1133    2077  4460            LSTLIN          /CHECK FOR LAST LINE OF TEST
1134    2100  5332            JMP NE52C       /NOT LAST LINE, CONTINUE
1135    2101  4440            ENDTST          /CHECK FOR TEST LOOP
1136    2102  5772'           JMP TST53       /GO TO NEXT TEST
1137                    /
1138    2103  4462    NE52A,  RSPACE          /SPACE ONE PRINT POSITION RIGHT
1139    2104  1334            TAD RIBN52      /GET RIBBON SWITCH
1140    2105  7040            CMA             /COMPLEMENT IT
1141    2106  3334            DCA RIBN52      /SAVE NEW RIBBON SWITCH
1142    2107  1334            TAD RIBN52      /GET NEW RIBBON SWITCH
1143    2110  7650            SNA CLA         /SKIP IF RIBBON IS UP
1144    2111  5253            JMP PLP52A      /CONTINUE WITH RIBBON UP
1145    2112  4443            DELAY
1146    2113  7777            7777            /THIS LOCATION MAY BE MODIFIED TO SLOW PRINT SPEED
1147    2114  4431            LQLS            /LOWER RIBBON
1148    2115  5257            JMP PLP52B      /CONTINUE WITH RIBBON DOWN
1149                    /
1150    2116  4463    NE52B,  LSPACE          /SPACE ONE PRINT POSITION LEFT
1151    2117  1334            TAD RIBN52      /GET RIBBON SWITCH
1152    2120  7040            CMA             /COMPLEMENT IT
1153    2121  3334            DCA RIBN52      /SAVE NEW RIBBON SWITCH
1154    2122  1334            TAD RIBN52      /GET NEW RIBBON SWITCH
1155    2123  7640            SZA CLA         /SKIP IF RIBBON DOWN
1156    2124  5265            JMP PLP52C      /CONTINUE WITH RIBBON DOWN
1157    2125  4443            DELAY
1158    2126  7777            7777            /THIS LOCATION MAY BE MODIFIED TO SLOW PRINT SPEED
1159    2127  7305            CLA CLL IAC RAL /SET BIT 10
1160    2130  4431            LQLS            /RAISE RIBBON
1161    2131  5271            JMP PLP52D      /CONTINUE WITH RIBBON UP
1162                    /
1163    2132  4461    NE52C,  XCRLF           /EXECUTE CARRIAGE RETURN, LINE FEED
1164    2133  5253            JMP PLP52A      /CONTINUE WITH NEXT LINE
1165    2134  0000    RIBN52, 0               /RIBBON SWITCH
1166                    /
1167                    /
1168    2172  2200
1169    2173  0012
1170    2174  0115
1171    2175  0200
1172    2176  0140
1173    2177  0040
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SEQ 0043

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                2200    PAGE
1174                    /
1175                    /ROUTINE TO GENERATE PAIRS OF LINES CONSISTING OF
1176                    /RANDOM CHARACTERS, EACH PAIR OF LINES SHOULD BE
1177                    /IDENTICAL
1178                    /
1179    2200  4433      TST53,  BGNTST
1180    2201  1377              TAD (30         /24 PAIRS OF RANDOM CHARACTER LINES
1181    2202  3132              DCA LINES       /SAVE NUMBER OF LINES TO PRINT
1182    2203  7305              CLA CLL IAC RAL /SET BIT 10
1183    2204  4431              LQLS            /LIFT RIBBON
1184    2205  1376              TAD (1234       /GET PRIME
1185    2206  3775'             DCA RAN1        /SAVE IT
1186    2207  1374              TAD (5670       /GET SECOND PRIME
1187    2210  3773'             DCA RAN2        /SAVE IT
1188    2211  4473              SAVGEN          /SAVE PRIMES
1189    2212  4452      PLP53A, KBCHK           /CHECK FOR OPERATOR INTERVENTION
1190    2213  4472              RANDOM          /GENERATE A RANDOM CHARACTER
1191    2214  3124              DCA CHAR        /SAVE IT
1192    2215  1124              TAD CHAR        /GET CHARACTER
1193    2216  0372              AND (177        /MASK ASCII BITS
1194    2217  1371              TAD (-40        /IS IT A PRINTING CHARACTER CODE?
1195    2220  7710              SPA CLA         /SKIP IF YES
1196    2221  5212              JMP PLP53A      /GET A NEW CODE
1197    2222  4464              PRINT           /PRINT THE CHARACTER
1198    2223  4454              LINEND          /CHECK FOR END OF LINE
1199    2224  5251              JMP NE53A       /MOVE THE CARRIAGE
1200    2225  4474              RESGEN          /RESTORE THE PRIMES
1201    2226  4461              XCRLF           /DO A CR AND LF
1202    2227  4452      PLP53B, KBCHK           /CHECK FOR OPERATOR INTERVENTION
1203    2230  4472              RANDOM          /GET A RANDOM CHARACTER
1204    2231  3124              DCA CHAR        /SAVE IT
1205    2232  1124              TAD CHAR        /GET IT
1206    2233  0372              AND (177        /MASK ASCII BITS
1207    2234  1371              TAD (-40        /IS IT A PRINTING CHARACTER CODE
1208    2235  7710              SPA CLA         /SKIP IF YES
1209    2236  5227              JMP PLP53B      /GET A NEW RANDOM NUMBER
1210    2237  4464              PRINT           /PRINT THE CHARACTER
1211    2240  4454              LINEND          /CHECK FOR END OF LINE
1212    2241  5253              JMP NE53B       /MOVE CARRIAGE
1213    2242  4461              XCRLF           /DO A CR AND LF
1214    2243  4461              XCRLF
1215    2244  2115              ISZ LINCNT      /INCREMENT LINE COUNT
1216    2245  4460              LSTLIN          /CHECK FOR LAST LINE TO PRINT
1217    2246  5211              JMP PLP53A-1    /START NEXT PAIR OF RANDOM LINES
1218    2247  4440              ENDTST          /CHECK FOR TEST LOOP
1219    2250  5255              JMP TST54       /GO TO NEXT TEST

1220                    /
1221    2251  4462      NE53A,  RSPACE          /SPACE CARRIAGE
1222    2252  5212              JMP PLP53A
1223                    /
1224    2253  4462      NE53B,  RSPACE          /SPACE CARRIAGE
1225    2254  5227              JMP PLP53B
1226                    /
1227                    /
```


SEQ 0044

```
1228                    /NON-PRINTING CHARACTER CODES TEST
1229                    /SHOULD PRINT CHARACTER AT HOME POSITION ON
1230                    /PRINT WHEEL IN ALL CASES
1231                    /
1232    2255  4433      TST54,  BGNTST          /INIT FOR TEST
1233    2256  7300              CLA CLL
1234    2257  3124              DCA CHAR        /CLEAR CHARACTER CODE
1235    2260  7005              IAC RAL         /SET BIT 10
1236    2261  4431              LQLS            /LIFT RIBBON
1237    2262  1370              TAD (12         /10 LINES TO PRINT
1238    2263  3132              DCA LINES       /SAVE IT
1239    2264  4452      PLP54,  KBCHK           /CHECK FOR OPERATOR INTERVENTION
1240    2265  4464              PRINT           /PRINT CHARACTER
1241    2266  4454              LINEND          /CHECK FOR END OF LINE
1242    2267  5277              JMP NE54A       /GET READY FOR NEXT CHARACTER
1243    2270  2115              ISZ LINCNT      /INCREMENT LINE COUNT
1244    2271  7000              NOP             /NO SKIP
1245    2272  4461              XCRLF           /DO A CR AND LF
1246    2273  4460              LSTLIN          /CHECK FOR LAST LINE
1247    2274  5264              JMP PLP54       /START NEXT LINE
1248    2275  4440              ENDTST          /CHECK FOR TEST LOOP
1249    2276  5767'             JMP TST55       /GO TO NEXT TEST
1250                    /
1251    2277  7300      NE54A,  CLA CLL
1252    2300  2124              ISZ CHAR        /INCREMENT CHARACTER CODE
1253    2301  1124              TAD CHAR        /GET CHARACTER
1254    2302  0366              AND (37         /MASK TO NON-PRINTING CODE
1255    2303  3124              DCA CHAR        /SAVE CHARACTER
1256    2304  4462              RSPACE          /SPACE CARRIAGE RIGHT
1257    2305  5264              JMP PLP54       /CONTINUE TEST
1258                    /
1259                    /
1260                    /
1261    2306  0037
1262    2307  2400
1263    2310  0012
1264    2311  7740
1265    2312  0177
1266    2313  4145
1267    2314  5670
1268    2315  4144
1269    2316  1234
1270    2317  0030
                2400    PAGE
1271                    /
1272                    /
1273                    /ROUTINE TO PRINT "ACA:" FOR RAPID PRINT WHEEL VIBRATION
1274                    /
1275    2400  4433      TST55,  BGNTST          /INIT FOR TEST
1276    2401  1377              TAD (12         /10 LINES TO PRINT
1277    2402  3132              DCA LINES       /SAVE IT
1278    2403  7005              IAC RAL         /SET BIT 10
1279    2404  4431              LQLS            /LIFT RIBBON
1280    2405  1376      PLP55,  TAD (101        /CODE FOR "A"
1281    2406  3124              DCA CHAR        /SAVE CHARACTER
```

```
1282  2407  4452          KBCHK           /CHECK FOR OPERATOR INTERVENTION
1283  2410  4464          PRINT           /PRINT "A"
1284  2411  4454          LINEND          /CHECK FOR END OF LINE
1285  2412  7410          SKP             /SKIP IF NOT END OF LINE
1286  2413  5251          JMP ELIN55      /SET UP FOR NEXT LINE
1287  2414  4462          RSPACE          /SPACE CARRIAGE
1288  2415  7300          CLA CLL
1289  2416  1375          TAD (103        /GET CODE FOR "C"
1290  2417  3124          DCA CHAR        /SAVE IT
1291  2420  4452          KBCHK           /CHECK FOR OPERATOR INTERVENTION
1292  2421  4464          PRINT           /PRINT "C"
1293  2422  4454          LINEND          /CHECK FOR END OF LINE
1294  2423  7410          SKP             /SKIP IF NOT END OF LINE
1295  2424  5251          JMP ELIN55      /SET UP FOR NEXT LINE
1296  2425  4462          RSPACE          /SPACE CARRIAGE
1297  2426  7300          CLA CLL
1298  2427  1376          TAD (101        /GET CODE FOR "A"
1299  2430  3124          DCA CHAR        /SAVE IT
1300  2431  4452          KBCHK           /CHECK FOR OPERATOR INTERVENTION
1301  2432  4464          PRINT           /PRINT THE "A"
1302  2433  4454          LINEND          /CHECK FOR END OF LINE
1303  2434  7410          SKP             /SKIP IF NOT END OF LINE
1304  2435  5251          JMP ELIN55      /SET UP FOR NEXT LINE
1305  2436  4462          RSPACE          /SPACE CARRIAGE
1306  2437  7300          CLA CLL
1307  2440  1374          TAD (72         /GET CODE FOR ":"
1308  2441  3124          DCA CHAR        /SAVE IT
1309  2442  4452          KBCHK           /CHECK FOR OPERATOR INTERVENTION
1310  2443  4464          PRINT           /PRINT THE ":"
1311  2444  4454          LINEND          /CHECK FOR END OF LINE
1312  2445  7410          SKP             /SKIP IF NOT END OF LINE
1313  2446  5251          JMP ELIN55      /SET UP FOR NEXT LINE
1314  2447  4462          RSPACE          /SPACE CARRIAGE
1315  2450  5205          JMP PLP55       /CONTINUE THIS LINE
1316                      /
1317  2451  2115    ELIN55, ISZ LINCNT    /INCREMENT LINE COUNT
1318  2452  7000          NOP             /NO SKIP
1319  2453  4461          XCRLF           /DO A CR AND LF
1320  2454  4460          LSTLIN          /CHECK FOR LAST LINE
1321  2455  5205          JMP PLP55       /CONTINUE TEST
1322  2456  4440          ENDTST          /CHECK FOR TEST LOOP
1323  2457  4467          MESAGE          /PRINT PASS COUNT MESSAGE
1324  2460  6137          PASCNT          /MESSAGE POINTER
1325  2461  2265          ISZ PCOUNT      /INCREMENT PASS COUNT
1326  2462  1265          TAD PCOUNT      /GET PASS COUNT
1327  2463  4470          REGPRT          /PRINT PASS COUNT
1328  2464  5773'         JMP TST45+1     /LOOP ON PRINTER TESTS

1329                      /
1330                      /
1331  2465  0000    PCOUNT, 0             /PASS COUNT
1332                      /
1333                      /ROUTINE TO ACCEPT UP TO ONE LQ PRINT LINE OF CHARACTERS FROM
1334                      /OPERATOR'S TERMINAL AND SEND THEM OUT REPEATEDLY TO LQ PRINTER.
1335                      /THE PRINTING OF THESE CHARACTERS WILL BEGIN AUTOMATICALLY IF
1336                      /THE NUMBER OF CHARACTERS INPUT BY THE OPERATOR EQUALS ONE
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1337                      /PRINT LINE IN LENGTH, THE OPERATOR MAY ALSO INITIATE THE
1338                      /PRINTING SEQUENCE BY TYPING CARRIAGE RETURN, WHEN ANY
1339                      /CHARACTER IS TYPED ON THE OPERATOR'S CONSOLE, THE LQ PRINTING
1340                      /WILL CEASE UNTIL A CARRIAGE RETURN IS TYPED OR THE LINE LENGTH
1341                      /IS REACHED.
1342                      /
1343  2466  4433    TST56,  BGNTST
1344  2467  1372          TAD (BUFF-1     /GET ADDRESS OF CHARACTER BUFFER
1345  2470  3011          DCA INDX11      /SET UP ADDRESS POINTER
1346  2471  3353          DCA CNT56A      /CLEAR LOCATION COUNTER
1347  2472  3411    CLR56A, DCA I INDX11  /CLEAR A CHARACTER BUFFER LOCATION
1348  2473  2353          ISZ CNT56A      /INCREMENT LOCATION COUNTER
1349  2474  1131          TAD LINE        /GET LINE LENGTH
1350  2475  7041          CIA             /NEGATE IT
1351  2476  1353          TAD CNT56A      /INCREMENT LOCATION COUNTER
1352  2477  7640          SZA CLA         /SKIP IF EQUAL
1353  2500  5272          JMP CLR56A      /CONTINUE CLEARING BUFFER
1354  2501  3353          DCA CNT56A      /CLEAR LOCATION COUNTER
1355  2502  1372          TAD (BUFF-1     /GET ADDRESS OF CHARACTER BUFFER
1356  2503  3011          DCA INDX11      /SET UP ADDRESS POINTER
1357  2504  6031    LOP56A, KSF           /WAIT FOR OPERATOR INTERVENTION
1358  2505  5304          JMP .-1
1359  2506  4452          KBCHK
1360  2507  7300          CLA CLL
1361  2510  1137          TAD KBSAV       /GET NEGATED CHARACTER
1362  2511  1371          TAD (15         /WAS IT CARRIAGE RETURN?
1363  2512  7640          SZA CLA         /SKIP IF YES
1364  2513  7410          SKP             /SKIP IF NO
1365  2514  5326          JMP CLR56B      /GO SET UP FOR LQ PRINTING
1366  2515  1137          TAD KBSAV       /GET NEGATED CHARACTER
1367  2516  7041          CIA             /MAKE IT POSITIVE
1368  2517  3411          DCA I INDX11    /SAVE IT IN BUFFER
1369  2520  2353          ISZ CNT56A      /INCREMENT LOCATION COUNTER
1370  2521  1131          TAD LINE        /GET LINE LENGTH
1371  2522  7041          CIA             /NEGATE IT
1372  2523  1353          TAD CNT56A      /ADD LOCATION COUNTER
1373  2524  7640          SZA CLA         /SKIP IF EQUAL
1374  2525  5304          JMP LOP56A      /CONTINUE STORING CHARACTERS
1375  2526  3354    CLR56B, DCA CNT56B    /CLEAR CHARACTER DUMP COUNTER
1376  2527  1372          TAD (BUFF-1     /GET ADDRESS OF CHARACTER BUFFER
1377  2530  3011          DCA INDX11      /SET UP ADDRESS POINTER
1378  2531  7305          CLA CLL IAC RAL /SET BIT 10
1379  2532  4431          LQLS            /LIFT RIBBON
1380  2533  4461          XCRLF           /EXECUTE CARRIAGE RETURN, LINE FEED ON LQ
1381  2534  1411    LOP56B, TAD I INDX11  /GET A CHARACTER FROM BUFFER
1382  2535  3124          DCA CHAR        /SET UP FOR LQ PRINT
1383  2536  6031          KSF             /TEST KEYBOARD FLAG
1384  2537  7410          SKP             /SKIP IF NOT SET
1385  2540  5266          JMP TST56       /BEGIN AGAIN
1386  2541  4464          PRINT           /PRINT ON LQ
1387  2542  2354          ISZ CNT56B      /INCREMENT CHARACTER DUMP COUNTER
1388  2543  1354          TAD CNT56B
1389  2544  7041          CIA
1390  2545  1353          TAD CNT56A
1391  2546  7640          SZA CLA
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1392    2547  7410            SKP             /SKIP IF NOT EQUAL
1393    2550  5326            JMP CLR56B      /START NEXT LINE
1394    2551  4462            RSPACE          /SPACE ONE POSITION TO THE RIGHT
1395    2552  5334            JMP LOP56B      /CONTINUE PRINTING ON CURRENT LINE
1396    2553  0000    CNT56A, 0               /STORAGE FOR BUFFER LOCATION COUNTER
1397    2554  0000    CNT56B, 0
1398                    /
1399                    /ROUTINE TO RAISE AND LOWER RIBBON
1400                    /
1401    2555  4433    TST57,  BGNTST
1402    2556  7305            CLA CLL IAC RAL /SET BIT 10
1403    2557  4431            LQLS            /LIFT RIBBON
1404    2560  4443            DELAY           /DELAY
1405    2561  7777            7777
1406    2562  7300            CLA CLL
1407    2563  4431            LQLS            /LOWER RIBBON
1408    2564  4443            DELAY
1409    2565  7777            7777
1410    2566  4452            KBCHK           /CHECK FOR OPERATOR INTERVENTION
1411    2567  5356            JMP TST57+1     /LOOP ON TEST
1412                    /
1413                    /
1414                    /
1415    2571  0015
1416    2572  6777
1417    2573  1401
1418    2574  0072
1419    2575  0103
1420    2576  0101
1421    2577  0012
              2600    PAGE
1422                    /
1423                    /ROUTINE TO PRINT A 10 BY 10 DOT MATRIX
1424                    /NOTE: THIS IS A TEST OF THE FRICTION FEED MECHANISM
1425                    /AND THEREFORE THE PAPER IN THE LQ PRINTER MUST
1426                    /BE FED FROM THE BACK OF THE PRINTER AND THE
1427                    /TRACTOR FEED MECHANISM MUST BE REMOVED
1428                    /
1429    2600  4433    TST60,  BGNTST
1430    2601  7305            CLA CLL IAC RAL /SET BIT 10
1431    2602  4431            LQLS            /LIFT RIBBON
1432    2603  1377            TAD (1234
1433    2604  3776*           DCA RAN1        /RESTORE RANDOM NUMBER PRIME
1434    2605  1375            TAD (5670
1435    2606  3774*           DCA RAN2        /RESTORE RANDOM NUMBER PRIME
1436    2607  1373            TAD (-144
1437    2610  3326            DCA CNT60A      /PREPARE TO CLEAR A 100 LOC BUFFER

1438    2611  3330            DCA NUM60A      /CLEAR WORK AREA
1439    2612  3331            DCA NUM60B      /CLEAR WORK AREA
1440    2613  3317            DCA LIN60A      /CLEAR WORK AREA
1441    2614  3322            DCA COL60A      /CLEAR WORK AREA
1442    2615  1373            TAD (-144
1443    2616  3325            DCA DOTCNT      /PREPARE TO PRINT A 100 DOT MATRIX
1444    2617  1372            TAD (-12
1445    2620  3327            DCA CNT60B
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1446    2621  1371            TAD (BUFF-1     /GET BUFFER ADDRESS
1447    2622  3010            DCA INDX10      /SAVE IT FOR CLEARING
1448    2623  3410            DCA I INDX10    /CLEAR A BUFFER LOCATION
1449    2624  2326            ISZ CNT60A      /INCREMENT COUNTER
1450    2625  5223            JMP .-2         /CONTINUE CLEARING
1451    2626  1370            TAD (BUFF1-1    /GET SECOND BUFFER ADDRESS
1452    2627  3010            DCA INDX10
1453    2630  1372            TAD (-12
1454    2631  3326            DCA CNT60A      /PREPARE TO LOAD SECOND BUFFER
1455    2632  3410    LP60B,  DCA I INDX10    /LOAD A BUFFER LOCATION
1456    2633  2330            ISZ NUM60A      /INCREMENT NUMBER TO LOAD
1457    2634  1330            TAD NUM60A
1458    2635  1331            TAD NUM60B      /CALCULATE NEXT NUMBER
1459    2636  2326            ISZ CNT60A      /INCREMENT COUNTER
1460    2637  5232            JMP LP60B       /CONTINUE LOADING BUFFER
1461    2640  7300            CLA CLL
1462    2641  1331            TAD NUM60B
1463    2642  1367            TAD (100        /CALCULATE NEXT NUMBER
1464    2643  3331            DCA NUM60B      /SAVE IT
1465    2644  3330            DCA NUM60A      /CLEAR INCREMENTAL COUNTER
1466    2645  1372            TAD (-12
1467    2646  3326            DCA CNT60A      /SET UP COUNTER FOR NEXT LOOP
1468    2647  1330            TAD NUM60A      /GET COLUMN COUNTER
1469    2650  1331            TAD NUM60B      /ADD LINE COUNTER
1470    2651  2327            ISZ CNT60B      /INCREMENT LOOP COUNTER
1471    2652  5232            JMP LP60B       /CONTINUE LOADING BUFFER
1472    2653  4472    LP60C,  RANDOM          /GET A RANDOM NUMBER
1473    2654  0366            AND (177        /MASK TO 7 BITS
1474    2655  3314            DCA RANAD1      /SAVE IT
1475    2656  1314            TAD RANAD1
1476    2657  1373            TAD (-144       /TEST FOR BUFFER ADDRESS
1477    2660  7700            SMA CLA         /SKIP IF WITHIN BUFFER
1478    2661  5253            JMP LP60C       /GET A NEW RANDOM NUMBER
1479    2662  1314            TAD RANAD1
1480    2663  1365            TAD (BUFF
1481    2664  3315            DCA RANAD2
1482    2665  1715            TAD I RANAD2    /GET RANDOM ADDRESS USED INDICATOR
1483    2666  7640            SZA CLA         /SKIP IF THIS LOCATION NOT USED
1484    2667  5253            JMP LP60C       /GET A NEW ADDRESS
1485    2670  2715            ISZ I RANAD2    /REMEMBER THIS LOCATION USED
1486    2671  1314            TAD RANAD1      /GET RANDOM NUMBER
1487    2672  1364            TAD (BUFF1      /CALCULATE ADDRESS IN SECOND BUFFER
1488    2673  3316            DCA RANAD3      /SAVE IT
1489    2674  1716            TAD I RANAD3    /GET LINE AND COLUMN INFORMATION
1490    2675  0363            AND (7700       /MASK FIRST 6 BITS
1491    2676  7002            BSW             /SWAP INTO OTHER BYTE
1492    2677  3320            DCA LIN60B      /SAVE LINE #  0-11
1493    2700  1716            TAD I RANAD3    /GET LINE AND COLUMN INFORMATION
1494    2701  0362            AND (77         /MASK SECOND 6 BITS
1495    2702  3323            DCA COL60B      /SAVE COLUMN #  0-11
1496    2703  1317            TAD LIN60A
1497    2704  7041            CIA             /NEGATE IT
1498    2705  1320            TAD LIN60B      /ADD NEW LINE NUMBER
1499    2706  3321            DCA LIN60C      /SAVE RELATIVE LINE NUMBER
1500    2707  1322            TAD COL60A      /GET OLD COLUMN NUMBER
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1501    2710  7041          CIA             /NEGATE IT
1502    2711  1323          TAD COL60B      /ADD NEW COLUMN NUMBER
1503    2712  3324          DCA COL60C      /SAVE RELATIVE COLUMN NUMBER
1504    2713  5761'         JMP CAL60
1505                  /
1506                  /
1507    2714  0000    RANAD1, 0             /RANDOM ADDRESS WORK AREA #1
1508    2715  0000    RANAD2, 0             /RANDOM ADDRESS WORK AREA #2
1509    2716  0000    RANAD3, 0             /RANDOM ADDRESS WORK AREA #3
1510    2717  0000    LIN60A, 0             /LINE NUMBER WORK AREA #1
1511    2720  0000    LIN60B, 0             /LINE NUMBER WORK AREA #2
1512    2721  0000    LIN60C, 0             /LINE NUMBER WORK AREA #3
1513    2722  0000    COL60A, 0             /COLUMN NUMBER WORK AREA #1
1514    2723  0000    COL60B, 0             /COLUMN NUMBER WORK AREA #2
1515    2724  0000    COL60C, 0             /COLUMN NUMBER WORK AREA #3
1516    2725  0000    DOTCNT, 0             /DOT MATRIX COUNTER
1517    2726  0000    CNT60A, 0             /COUNTER #1
1518    2727  0000    CNT60B, 0             /COUNTER #2
1519    2730  0000    NUM60A, 0             /NUMBER WORK AREA #1
1520    2731  0000    NUM60B, 0             /NUMBER WORK AREA #2
1521                  /
1522                  /
1523                  /
1524    2761  3000
1525    2762  0077
1526    2763  7700
1527    2764  7145
1528    2765  7000
1529    2766  0177
1530    2767  0100
1531    2770  7144
1532    2771  6777
1533    2772  7766
1534    2773  7634
1535    2774  4145
1536    2775  5670
1537    2776  4144
1538    2777  1234
              3000    PAGE
1539                  /
1540                  /
1541    3000  1777'   CAL60,  TAD LIN60C      /GET RELATIVE LINE NUMBER
1542    3001  7450          SNA             /SKIP IF NEGATIVE OR POSITIVE
1543    3002  5215          JMP ZMOVEA      /GO TO MOVE ZERO ROUTINE
1544    3003  7510          SPA             /SKIP IF POSITIVE
1545    3004  5217          JMP RETA
1546    3005  7041    FEEDA,  CIA           /NUMBER IS POSITIVE,NEGATE IT

1547    3006  3777'         DCA LIN60C      /SAVE IT
1548    3007  1312          TAD LININ       /ADD INCREMENTS OF ONE INCH
1549    3010  2777'         ISZ LIN60C      /INCREMENT NUMBER OF INCHES
1550    3011  5207          JMP .-2         /CONTINUE INCREMENTING
1551    3012  3256          DCA MAG60A      /SAVE PAPER MOVEMENT MAGNITUDE
1552    3013  3255          DCA DIR60A      /SAVE PAPER MOVEMENT DIRECTION
1553    3014  5226          JMP COLCAL      /GO TO COLUMN CALCULATE ROUTINE
1554    3015  3256    ZMOVEA, DCA MAG60A    /CLEAR PAPER MOVEMENT MAGNITUDE
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1555    3016  5226          JMP COLCAL      /GO TO COLUMN CALCULATE ROUTINE
1556    3017  3777'   RETA,   DCA LIN60C
1557    3020  1312          TAD LININ       /ADD INCREMENTS OF INCHES
1558    3021  2777'         ISZ LIN60C      /INCREMENT INCH COUNTER
1559    3022  5220          JMP .-2         /CONTINUE ADDING INCHES
1560    3023  3256          DCA MAG60A      /SAVE PAPER MOVEMENT MAGNITUDE
1561    3024  7313          CLA CLL IAC RTR /SET BIT 0
1562    3025  3255          DCA DIR60A      /SAVE PAPER MOVEMENT DIRECTION
1563    3026  1776'   COLCAL, TAD COL60C    /GET RELATIVE COLUMN POSITION
1564    3027  7450          SNA             /SKIP IF NEGATIVE OR POSITIVE
1565    3030  5243          JMP ZMOVEB      /GO TO ZERO CARRIAGE MOVEMENT ROUTINE
1566    3031  7510          SPA             /SKIP IF POSITIVE
1567    3032  5245          JMP LMOVEB      /GO TO CARRIAGE LEFT ROUTINE
1568    3033  7041    RMOVEB, CIA
1569    3034  3776'         DCA COL60C
1570    3035  1313          TAD COLIN       /ADD INCREMENT OF ONE INCH
1571    3036  2776'         ISZ COL60C      /INCREMENT INCH COUNTER
1572    3037  5235          JMP .-2         /CONTINUE ADDING INCHES
1573    3040  3261          DCA MAG60B      /SAVE CARRIAGE MOVEMENT MAGNITUDE
1574    3041  3260          DCA DIR60B      /SAVE CARRIAGE MOVEMENT DIRECTION=RIGHT
1575    3042  5254          JMP MOV60       /GO MOVE PAPER AND CARRIAGE
1576    3043  3261    ZMOVEB, DCA MAG60B    /ZERO CARRIAGE MOVEMENT
1577    3044  5254          JMP MOV60       /GO MOVE PAPER
1578    3045  3776'   LMOVEB, DCA COL60C
1579    3046  1313          TAD COLIN       /ADD INCREMENT OF ONE INCH
1580    3047  2776'         ISZ COL60C      /INCREMENT INCH COUNTER
1581    3050  5246          JMP .-2         /CONTINUE ADDING INCHES
1582    3051  3261          DCA MAG60B      /SAVE CARRIAGE MOVEMENT MAGNITUDE
1583    3052  7313          CLA CLL IAC RTR /SET BIT ZERO FOR LEFT DIRECTION
1584    3053  3260          DCA DIR60B
1585                  /
1586    3054  4457    MOV60,  MOVPAR        /MOVE PAPER
1587    3055  0000    DIR60A, 0             /PAPER DIRECTION
1588    3056  0000    MAG60A, 0             /PAPER MOVEMENT MAGNITUDE
1589    3057  4455          MOVCAR          /MOVE CARRIAGE
1590    3060  0000    DIR60B, 0             /CARRIAGE DIRECTION
1591    3061  0000    MAG60B, 0             /CARRIAGE MOVEMENT MAGNITUDE
1592    3062  4452          KBCHK           /CHECK FOR OPERATOR INTERVENTION
1593    3063  7300          CLA CLL
1594    3064  1775'         TAD LIN60B      /GET NEW LINE NUMBER
1595    3065  3774'         DCA LIN60A      /SAVE IT AS OLD LINE NUMBER
1596    3066  1773'         TAD COL60B      /GET NEW COLUMN NUMBER
1597    3067  3772'         DCA COL60A      /SAVE IT AS OLD COLUMN NUMBER
1598    3070  1311          TAD CSWTCH      /GET CHARACTER PRINT SWITCH
1599    3071  7650          SNA CLA         /SKIP IF NOT ZERO
1600    3072  5276          JMP .+4         /PRINT A DOT MATRIX
1601    3073  1775'         TAD LIN60B      /GET NEW LINE NUMBER
1602    3074  1773'         TAD COL60B      /ADD NEW COLUMN NUMBER
1603    3075  1371          TAD (301-56
1604    3076  1370          TAD (56
1605    3077  3124          DCA CHAR        /SAVE CHARACTER TO PRINT
1606    3100  4464          PRINT           /PRINT CHARACTER AT CURRENT COORDINATES
1607    3101  2767'         ISZ DOTCNT      /INCREMENT CHARACTER COUNT
1608    3102  5766'         JMP LP60C       /GET NEXT CHARACTER COORDINATE
1609    3103  4457          MOVPAR          /MOVE PAPER
```

```
1610    3104  0000            0
1611    3105  1100            1100            /6 INCHES
1612    3106  4442            SWAIT           /WAIT FOR READY BITS
1613    3107  4451            STATER          /ALL READY BITS NOT UP
1614    3110  5765'           JMP TST60       /LOOP ON TEST
1615                  /
1616    3111  7777    CSWTCH, 7777            /CHARACTER SWITCH  0000=DOTS  XXX1=ALPHABETICAL
1617    3112  0140    LININ,  0140
1618    3113  0170    COLIN,  0170
1619                  /
1620
1621                  /
1622                  /
1623                  /ROUTINE TO SEND OUT CONTINOUS RESTORE SIGNALS
1624                  /UNTIL A CONTROL CHARACTER IS TYPED BY OPERATOR
1625                  /
1626                  /
1627    3114  4432    RESTLP, LQRE            /RESTORE PRINTER
1628    3115  4452            KBCHK           /CHECK FOR OPERATOR INTERVENTION
1629    3116  5314            JMP     .-2     /CONTINUE SENDING RESTORE
1630                  /
1631                  /
1632                  /
1633                  /ROUTINE TO RAISE OR LOWER RIBBON MECHANISM
1634                  /
1635                  /
1636                  /TYPE ANY KEY ON OPERATOR'S TERMINAL TO CHANGE POSITION
1637                  /OF RIBBON (UP OR DOWN). TYPE A CONTROL CHARACTER TO
1638                  /EXIT FROM THIS ROUTINE.
1639                  /
1640                  /
1641    3117  7305    RIBBON, CLA CLL IAC RAL /SET BIT 10
1642    3120  4431            LQLS            /RAISE RIBBON
1643    3121  6030            KCF             /CLEAR KEYBOARD FLAG
1644    3122  6031            KSF             /WAIT FOR KEYBOARD FLAG
1645    3123  5322            JMP     .-1
1646    3124  4452            KBCHK           /CHECK FOR CONTROL CHARACTER
1647    3125  7300            CLA CLL
1648    3126  4431            LQLS            /LOWER RIBBON
1649    3127  6031            KSF
1650    3130  5327            JMP     .-1     /WAIT FOR KEYBOARD FLAG
1651    3131  4452            KBCHK           /CHECK FOR CONTROL CHARACTER
1652    3132  5317            JMP     RIBBON  /GO RAISE RIBBON AGAIN
1653                  /
1654    3165  2600
1655    3166  2653
1656    3167  2725

1657    3170  0056
1658    3171  0223
1659    3172  2722
1660    3173  2723
1661    3174  2717
1662    3175  2720
1663    3176  2724
1664    3177  2721
```



```
              3200    PAGE
1665                  /
1666                  /
1667                  /
1668                  /
1669                  /**************************************************
1670                  /
1671                  /       BEGINNING OF SUBROUTINES
1672                  /
1673                  /**************************************************
1674                  /
1675                  /
1676                  /LQP8 IOT SUBROUTINES
1677                  /
1678                  /THIS ROUTINE WILL SKIP THE NEXT INSTRUCTION IF DONE FLAG IS SET
1679                  /
1680    3200  0000    LQSKRT, 0
1681    3201  6500    IOT0,   XLQSK           /SKIP ON DONE FLAG
1682    3202  5600            JMP I   LQSKRT  /DID NOT SKIP, GO TO ERROR ROUTINE
1683    3203  2200            ISZ LQSKRT      /SKIP SUCCESSFUL
1684    3204  5600            JMP I   LQSKRT  /NORMAL RETURN
1685                  /
1686                  /THIS ROUTINE WILL READ THE CONTENTS OF THE DATA BUFFER INTO AC
1687                  /
1688    3205  0000    LQRBRT, 0
1689    3206  6501    IOT1,   XLQRB           /READ DATA BUFFER
1690    3207  7410            SKP
1691    3210  4434            ERROR           /READ DATA SKIPPED
1692    3211  3122            DCA SAVDAT      /SAVE DATA BUFFER
1693    3212  1122            TAD SAVDAT      /GET DATA BUFFER
1694    3213  5605            JMP I   LQRBRT  /NORMAL RETURN
1695                  /
1696                  /THIS ROUTINE WILL ADVANCE OR RETRACT THE PAPER AND EXIT WITH AC CLEARED
1697                  /
1698    3214  0000    LQMPRT, 0
1699    3215  3123            DCA SAVPR       /SAVE PAPER MOTION MAGNITUDE
1700    3216  1123            TAD SAVPR       /GET MAGNITUDE
1701    3217  6502    IOT2,   XLQMP           /MOVE PAPER
1702    3220  5614            JMP I LQMPRT    /NORMAL RETURN
1703    3221  4434            ERROR           /MOVE PAPER SKIPPED
1704    3222  5614            JMP I   LQMPRT  /ERROR RETURN
1705                  /
1706                  /THIS ROUTINE WILL MOVE THE CARRIAGE LEFT OR RIGHT AND EXIT WITH AC CLR
1707                  /
1708    3223  0000    LQMCRT, 0
1709    3224  3120            DCA SAVMV       /SAVE MOVE MAGNITUDE
1710    3225  1120            TAD SAVMV       /GET MAGNITUDE
1711    3226  6503    IOT3,   XLQMC           /MOVE CARRIAGE
1712    3227  5623            JMP I   LQMCRT  /NORMAL RETURN
1713    3230  4434            ERROR           /MOVE CARRIAGE SKIPPED
1714    3231  5623            JMP I   LQMCRT  /ERROR RETURN
1715                  /
1716                  /
1717                  /
1718                  /THIS ROUTINE WILL PRINT THE CHARACTER IN AC BITS 4-10 AND EXIT WITH AC CLR
```

```
1719                    /
1720    3232  0000      LQPCRT, 0
1721    3233  6504      IOT4,   XLQPC           /PRINT CHARACTER
1722    3234  5632              JMP I   LQPCRT  /NORMAL RETURN
1723    3235  4434              ERROR           /PRINT IOT SKIPPED
1724    3236  5632              JMP I   LQPCRT  /ERROR RETURN
1725                    /
1726                    /THIS ROUTINE WILL READ THE STATUS REGISTER INTO AC
1727                    /
1728    3237  0000      LQRSRT, 0
1729    3240  6505      IOT5,   XLQRS           /READ STATUS REGISTER
1730    3241  7410              SKP
1731    3242  4434              ERROR           /READ STATUS SKIPPED
1732    3243  3114              DCA SVSTAT      /SAVE STATUS
1733    3244  1114              TAD SVSTAT      /GET STATUS
1734    3245  5637              JMP I   LQRSRT  /NORMAL RETURN
1735                    /
1736                    /THIS ROUTINE LOADS STATUS REGISTER FROM AC
1737                    /
1738    3246  0000      LQLSRT, 0
1739    3247  3114              DCA SVSTAT      /SAVE STATUS TO SEND
1740    3250  1114              TAD SVSTAT      /GET STATUS TO SEND
1741    3251  0377              AND (117        /MASK BITS 5,8,9,10,11 (READ,WRITE BITS)
1742    3252  3117              DCA XSTAT       /SAVE EXPECTED STATUS
1743    3253  1114              TAD SVSTAT      /GET STATUS TO SEND
1744    3254  6506      IOT6,   XLQLS           /LOAD STATUS REGISTER
1745    3255  5646              JMP I   LQLSRT  /NORMAL RETURN
1746    3256  4434              ERROR           /LOAD STATUS SKIPPED
1747    3257  5646              JMP I   LQLSRT  /ERROR RETURN
1748                    /
1749                    /THIS ROUTINE RESTORES CARRIAGE TO HOME POSITION
1750                    /
1751    3260  0000      LQRERT, 0
1752    3261  6507      IOT7,   XLQRE           /RESTORE CARRIAGE TO HOME POSITION
1753    3262  5660              JMP I   LQRERT  /NORMAL RETURN
1754    3263  4434              ERROR           /RESTORE SKIPPED
1755    3264  5660              JMP I   LQRERT  /ERROR RETURN
1756                    /
1757
1758                    /ROUTINE TO LOAD DATA BUFFER
1759                    /CALL IS LOADDB FOLLOWED BY IOT 2,3,OR 4
1760                    /RETURNS TO CALL PLUS TWO IF DATA ERROR, CALL PLUS THREE IF DATA OK
1761                    /NOTE: ON THE VT78, DATA READ FROM DATA BUFFER IS THE COMPLEMENT OF DATA WRITTEN
1762
1763    3265  0000      DBLOAD, 0               /ROUTINE TO LOAD AND CHECK DATA BUFFER
1764    3266  3077              DCA SVAC        /SAVE NUMBER TO LOAD
1765    3267  1077              TAD SVAC

1766    3270  7041      V78OW1, CIA/NOP         /VT78/ CREATE COMPLEMENT TO CHECK ANSWER; NOP ON VT78
1767    3271  3311              DCA COMP1       /SAVE COMPLIMENT
1768    3272  1665              TAD I DBLOAD    /GET IOT CALL INSTRUCTION
1769    3273  3275              DCA XCT1        /STORE IOT FOR EXECUTION
1770    3274  1077              TAD SVAC        /GET NUMBER TO LOAD IN DATA BUFFER
1771    3275  0000      XCT1,   0               /MODIFIED JMS TO IOT SUBROUTINE
1772    3276  7440              SZA             /SKIP IF AC CLEARED
1773    3277  4434              ERROR           /AC NOT CLEARED BY IOT
```



```
1774    3300  4424              LQRB            /READ DATA BUFFER
1775    3301  7000      V78OW2, NOP/IAC         /VT78/ IAC FOR VT78
1776    3302  3122              DCA SAVDAT      /SAVE DATA
1777    3303  1122              TAD SAVDAT      /GET DATA
1778    3304  1311              TAD COMP1       /ADD ONE'S COMPLIMENT OF EXPECTED DATA
1779    3305  7450              SNA             /SKIP IF DATA READ NOT EQUAL TO DATA EXPECTED
1780    3306  2265              ISZ DBLOAD      /BUMP RETURN ADDRESS POINTER IF OK
1781    3307  2265              ISZ DBLOAD      /BUMP RETURN ADDRESS
1782    3310  5665              JMP I DBLOAD
1783    3311  0000      COMP1,  0
1784                    /
1785                    /
1786                    /ROUTINE TO CHECK READY BITS
1787                    /
1788    3312  0000      CHKRDY, 0
1789    3313  4430              LQRS            /READ STATUS IOT5
1790    3314  3114              DCA SVSTAT      /SAVE STATUS
1791    3315  1114              TAD SVSTAT      /GET STATUS
1792    3316  0376              AND (40         /TEST FOR CHECK ERROR
1793    3317  7640              SZA CLA         /SKIP IF NO CHECK ERROR
1794    3320  4451              STATER          /CHECK CONDITION ON LQ PRINTER
1795    3321  1114              TAD SVSTAT
1796    3322  0375              AND     (7400   /MASK BITS 0,1,2,3
1797    3323  5712              JMP I   CHKRDY  /RETURN
1798                    /
1799                    /
1800                    /ROUTINE TO INITIALIZE LQP8 MODULE FOR STATIC TESTS
1801                    /
1802    3324  0000      TSTIN,  0               /CALLED BY "INTST"
1803    3325  4452              KBCHK           /CHECK FOR OPERATOR INTERVENTION
1804    3326  6002              IOF
1805    3327  6007              CAF             /CLEAR ALL FLAGS
1806    3330  4432              LQRE            /VT78/ CAF IN VT78 DOES NOT ACTIVATE RESTORE STROBE
1807    3331  3117              DCA XSTAT       /SAVE EXPECTED STATUS
1808    3332  4446              RDYCHK          /CHECK READY BITS FOR CLEAR CONDITION
1809    3333  7440              SZA             /SKIP IF ALL CLEAR
1810
1811    3334  4451              STATER          /ONE OR MORE READY BITS SET
1812    3335  7340              CLA CLL CMA     /SUBTRACT ONE FROM JMS FOR TST LOOP
1813    3336  1324              TAD TSTIN       /GET TEST LOOP ADDRESS
1814    3337  3350              DCA TSTLOP      /SAVE TEST LOOP ADDRESS
1815    3340  3116              DCA INTFLG      /CLEAR SOFTWARE INTERRUPT FLAG
1816    3341  5724              JMP I   TSTIN
1817                    /
1818                    /
1819                    /ROUTINE TO INITIATE TEST LOOPING
1820                    /
1821    3342  0000      TSTEND, 0
1822    3343  4465              LAS             /CHECK SWITCH REGISTER
1823    3344  7006              RTL             /FOR BIT 2 = 1 TEST LOOP
1824    3345  7700              SMA CLA         /SKIP IF YES
1825    3346  5742              JMP I   TSTEND  /CONTINUE TO NEXT TEST
1826    3347  5750              JMP I   TSTLOP  /LOOP ON CURRENT TEST
1827    3350  0000      TSTLOP, 0
1828                    /
```

```
                        /ROUTINE TO PERFORM RESTORE OPERATION
                        /
3351  0000  RESTOR, 0
3352  6002           IOF
3353  7300           CLA CLL
3354  3140           DCA SAVPOS      /CLEAR POSITION POINTER
3355  4432           LQRE            /RESTORE
3356  1375           TAD (7400
3357  3133           DCA WSTAT       /SAVE WANTED STATUS
3360  4442           SWAIT           /WAIT FOR ALL READY BITS SET
3361  4451           STATER          /ALL READY BITS NOT UP
3362  7300           CLA CLL
3363  5751           JMP I   RESTOR
                     /
3375  7400
3376  0040
3377  0117
      3400     PAGE
                     /
                     /
                     /ROUTINE TO SET UP TEST, INITIALIZE MODULE
                     /SET UP SCOPE LOOPS
                     /CALLED BY BGNTST FOLLOWED BY 0 IF SUBTEST LOOP
                     /FOLLOWED BY SUBTEST LOOP ADDRESS
                     /
3400  0000  TSTBGN, 0
3401  6002           IOF             /INTERRUPT OFF
3402  7340           CLA CLL CMA     /SUBTRACT ONE FROM JMS FOR TEST LOOP
3403  1200           TAD TSTBGN      /GET TEST LOOP ADDRESS
3404  3777'          DCA TSTLOP      /SAVE TEST LOOP ADDRESS
3405  3116           DCA INTFLG      /CLEAR SOFTWARE PROGRAM INT FLAG
3406  4452           KBCHK           /CHECK FOR OPERATOR INTERVENTION
3407  3115           DCA LINCNT      /CLEAR LINE COUNTER
3410  3136           DCA CHRCNT      /CLEAR CHARACTER COUNTER
3411  3140           DCA SAVPOS      /CLEAR POSITION POINTER
3412  1600           TAD I TSTBGN    /CHECK FOR SUBTEST LOOP
3413  7640           SZA CLA         /IS THERE A SUBTEST LOOP
3414  5221           JMP INIT        /NO, INIT MODULE
3415  2200           ISZ TSTBGN      /BUMP JMS TO LOOP ADDRESS
3416  1600           TAD I TSTBGN    /GET LOOP ADDRESS
3417  3227           DCA ERRLOP      /SAVE IT FOR SCOPE LOOPING
3420  2200           ISZ TSTBGN      /BUMP JMS TO RETURN ADDRESS
3421  6007   INIT,   CAF             /CLEAR ALL FLAGS
3422  4432           LQRE            /VT78/ CAF DOES NOT ACTIVATE RESTORE STROBE IN VT78
3423  4442           SWAIT           /WAIT FOR ALL READY BITS
3424  4451           STATER          /PRINTER NOT READY

3425  4461           XCRLF           /EXECUTE A CARRIAGE RETURN AND LINE FEED
3426  5600           JMP I   TSTBGN  /GO TO TEST
3427  0000   ERRLOP, 0
                     /
                     /
                     /DATA ERROR HANDLER
                     /
3430  0000   ERRDAT, 0
```



```
3431  1777'          TAD TSTLOP      /GET TEST LOOP ADDRESS
3432  3256           DCA TLOOP1      /SAVE IT
3433  4466           CSACTV          /CHECK FOR ACTIVE CONSOLE
3434  5257           JMP DATPRT      /CONSOLE ACTIVE
3435  4465           LAS             /CONSOLE NOT ACTIVE, GET SWITCHES
3436  7510           SPA             /SKIP IF BIT 0=0
3437  5251           JMP ERD1        /GO CHECK FOR ERROR LOOP
3440  7340           CLA CLL CMA
3441  1230           TAD ERRDAT      /GET FAILING PC
3442  7402           HLT             /ERROR PC IN AC
3443  7300           CLA CLL
3444  1077           TAD SVAC        /GET AC AT TIME OF ERROR
3445  7402           HLT             /AC AT TIME OF ERROR IN AC
3446  7300           CLA CLL
3447  1122           TAD SAVDAT      /GET DATA READ BACK
3450  7402           HLT             /DATA READ BACK IN AC
3451  4465   ERD1,   LAS             /GET SWITCHES
3452  7004           RAL             /ROTATE FOR BIT 1 CHECK
3453  7710           SPA CLA         /SKIP IF BIT 1=0
3454  5656           JMP I TLOOP1    /LOOP ON TEST
3455  5630           JMP I ERRDAT    /CONTINUE TEST
                     /
3456  0000   TLOOP1, 0
3457  4465   DATPRT, LAS             /GET SWITCHES
3460  0376           AND (200        /MASK BIT 4, INHIBIT ERROR MESSAGE
3461  7640           SZA CLA         /SKIP IF BIT 4=0
3462  5304           JMP ERD2        /GO TO WAIT ROUTINE
3463  4467           MESAGE          /PRINT DATA ERROR MESSAGE
3464  6071           LDATER          /MESSAGE POINTER
3465  4467           MESAGE          /PRINT PC= MESSAGE
3466  6024           PCEQL           /MESSAGE POINTER
3467  7340           CLA CLL CMA
3470  1230           TAD ERRDAT      /GET FAILING PC
3471  4470           REGPRT          /PRINT FAILING PC
3472  4467           MESAGE          /PRINT SENT MESSAGE
3473  6103           SENT            /MESSAGE POINTER
3474  7300           CLA CLL
3475  1077           TAD SVAC        /GET DATA SENT
3476  4470           REGPRT          /PRINT DATA SENT
3477  4467           MESAGE          /PRINT RECEIVED MESSAGE
3500  6107           RCVD            /MESSAGE POINTER
3501  7300           CLA CLL
3502  1122           TAD SAVDAT      /GET DATA READ BACK
3503  4470           REGPRT          /PRINT DATA READ BACK
3504  4465   ERD2,   LAS             /GET SWITCHES
3505  7710           SPA CLA         /SKIP IF BIT 0=0
3506  5251           JMP ERD1        /GO CHECK FOR TEST LOOP
3507  4467           MESAGE          /PRINT WAITING MESSAGE
3510  6000           WAITNG          /MESSAGE POINTER
3511  6030   ERD3,   KCF             /CLEAR KYBD FLAG
3512  6031           KSF             /TEST KYBD FLAG
3513  5312           JMP .-1         /CONTINUE WAITING
3514  7300           CLA CLL
3515  6034           KRS             /READ KEYBOARD BUFFER, DO NOT CLEAR FLAG
3516  0375           AND (177        /MASK TO 7 BITS
```

```
1938    3617  1374          TAD (-7         /CHECK FOR CONTROL-G
1939    3620  7640          SZA CLA         /SKIP IF CONTROL-G
1940    3621  5311          JMP ERD3        /CONTINUE WAITING FOR CONTROL-G
1941    3622  4452          KBCHK           /HANDLE A CONTROL-G
1942    3623  5251          JMP ERD1        /GO CHECK FOR ERROR LOOP
1943                /
1944                /
1945                /
1946    3624  7771
1947    3625  0177
1948    3626  0200
1949    3627  3350
              3600    PAGE
1950                /
1951
1952                /ERROR ROUTINE
1953                /CALLED BY ERROR
1954    3600  0000    ERRORS, 0
1955    3601  3077          DCA SVAC        /SAVE AC
1956    3602  7501          MQA             /GET MQ
1957    3603  3102          DCA SAVMQ       /SAVE IT
1958    3604  6004          GTF             /GET THE FLAGS
1959    3605  3103          DCA SAVFLG      /SAVE THEM
1960    3606  4466          CRACTV          /CHECK FOR ACTIVE CONSOLE
1961    3607  5236          JMP ERRPRT      /GO TO PRINT ROUTINE
1962    3610  4465          LAS             /GET SWITCHES, CONSOLE NOT ACTIVE
1963    3611  7710          SPA CLA         /SKIP IF BIT 0=0
1964    3612  5225          JMP ERRS1       /GO CHECK FOR ERROR LOOP
1965    3613  1102          TAD SAVMQ       /GET MQ
1966    3614  7421          MQL             /RESTORE MQ
1967    3615  1103          TAD SAVFLG      /GET FLAGS
1968    3616  6005          RTF             /RESTORE FLAGS
1969    3617  7340          CLA CLL CMA
1970    3620  1200          TAD ERRORS      /GET FAILING PC
1971    3621  7402          HLT             /FAILING PC IN AC
1972    3622  7300          CLA CLL
1973    3623  1077          TAD SVAC        /GET AC AT TIME OF ERROR
1974    3624  7402          HLT             /AC AT TIME OF ERROR IN AC
1975    3625  7300    ERRS1,  CLA CLL
1976    3626  1777'         TAD TSTLOP      /GET TEST LOOP ADDRESS
1977    3627  3235          DCA TLOOP2      /SAVE IT
1978    3630  4465          LAS             /GET SWITCHES
1979    3631  7004          RAL             /ROTATE TO CHECK BIT 1
1980    3632  7710          SPA CLA         /SKIP IF BIT 1=0
1981    3633  5635          JMP I TLOOP2
1982    3634  5600          JMP I ERRORS
1983    3635  0000    TLOOP2, 0

1984    3636  4465    ERRPRT, LAS             /GET SWITCHES
1985    3637  0376          AND (200        /TEST BIT 4
1986    3640  7640          SZA CLA         /SKIP IF BIT 4=0
1987    3641  5265          JMP ERRS2       /BIT 4=1, INHIBIT ERROR TYPEOUT
1988    3642  4467          MESAGE          /PRINT ERROR MESSAGE
1989    3643  6115          FAIL            /MESSAGE POINTER
1990    3644  4467          MESAGE          /PRINT PC= MESSAGE
1991    3645  6024          PCEQL           /MESSAGE POINTER
```



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1992    3646  7340          CLA CLL CMA
1993    3647  1200          TAD ERRORS      /GET FAILING PC
1994    3650  4470          REGPRT          /PRINT FAILING PC
1995    3651  4467          MESAGE          /PRINT AC= MESSAGE
1996    3652  6030          ACEQL           /MESSAGE POINTER
1997    3653  1077          TAD SVAC        /GET AC AT TIME OF ERROR
1998    3654  4470          REGPRT          /PRINT CONTENTS OF AC AT TIME OF ERROR
1999    3655  4467          MESAGE          /PRINT MQ= MESSAGE
2000    3656  6035          MQEQL           /MESSAGE POINTER
2001    3657  1102          TAD SAVMQ       /GET MQ AT TIME OF ERROR
2002    3660  4470          REGPRT          /PRINT MQ AT TIME OF ERROR
2003    3661  4467          MESAGE          /PRINT FL= MESSAGE
2004    3662  6042          FLEQL           /MESSAGE POINTER
2005    3663  1103          TAD SAVFLG      /GET FLAGS
2006    3664  4470          REGPRT          /PRINT FLAGS
2007    3665  4465    ERRS2,  LAS             /GET SWITCHES
2008    3666  7710          SPA CLA         /SKIP IF BIT 0=0
2009    3667  5225          JMP ERRS1       /GO CHECK FOR ERROR LOOP
2010    3670  4467          MESAGE          /PRINT WAITING MESSAGE
2011    3671  6000          WAITNG          /MESSAGE POINTER
2012    3672  6030    ERRS3,  KCF             /CLEAR KYBD FLAG
2013    3673  6031          KSF             /TEST KYBD FLAG
2014    3674  5273          JMP .-1         /CONTINUE WAITING FOR KYBD FLAG
2015    3675  7300          CLA CLL
2016    3676  6034          KRS             /READ KYBD BUFFER, DO NOT CLEAR FLAG
2017    3677  0375          AND (177        /MASK TO 7 BITS
2018    3700  1374          TAD (-7         /CHECK FOR CTRL-G
2019    3701  7640          SZA CLA         /SKIP IF CTRL-G
2020    3702  5272          JMP ERRS3
2021    3703  4452          KBCHK           /HANDLE CTRL-G
2022    3704  5225          JMP ERRS1       /GO CHECK FOR ERROR LOOP
2023                /
2024                /
2025    3774  7771
2026    3775  0177
2027    3776  0200
2028    3777  3350
              4000    PAGE
2029                /
2030                /
2031                /
2032                /INTERRUPT SERVICE ROUTINE
2033                /
2034    4000  4447    INTSVC, SAVEAC          /SAVE AC AND LINK
2035    4001  6102          SPL             /SKIP ON POWER LOW
2036    4002  5224          JMP FLAGS       /NOT POWER LOW CHECK FLAGS
2037    4003  7501          MQA             /GET MQ
2038    4004  3213          DCA MQ          /SAVE IT
2039    4005  1000          TAD 0           /GET PC
2040    4006  3214          DCA PC          /SAVE IT
2041    4007  1212          TAD STRTIN      /GET RESTART INSTRUCTION
2042    4010  3000          DCA 0           /SAVE IT
2043    4011  7402          HLT             /HALT
2044    4012  5403    STRTIN, JMP I ADDRS3    /GO TO RESTART ROUTINE
2045    4013  0000    MQ,     0               /MQ STORAGE AREA
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2046  4014  0000  PC,     0                 /PC STORAGE AREA
2047  4015  1213  RESTRT, TAD MQ             /GET MQ
2048  4016  7421        MQL                 /RESTORE IT
2049  4017  1777'       TAD TSTLOP
2050  4020  3223        DCA RESADD
2051  4021  4450        RSTRAC
2052  4022  5623        JMP I RESADD
2053  4023  0000  RESADD, 0
2054                    /
2055  4024  4452  FLAGS,  KBCHK             /CHECK FOR KEYBOARD INTERVENTION
2056  4025  4423        LQSK                /TEST LQ FLAG
2057  4026  5231        JMP .+3             /NO LQ FLAG
2058  4027  7340        CLA CLL CMA         /AC=7777
2059  4030  3116        DCA INTFLG          /SET SOFTWARE INTERRUPT FLAG
2060  4031  4450        RSTRAC              /RESTORE AC ANC LINK
2061  4032  5400        JMP I LOCO          /RETURN TO PROGRAM
2062                    /
2063                    /
2064                    /
2065
2066                    /
2067                    /ROUTINE TO WAIT FOR INDIVIDUAL READY BITS, TEST MASK STORED
2068                    /IN LOCATION WSTAT
2069                    /RETURN CALL +1 IF STATUS ERROR, CALL +2 IF APPROPRIATE READY
2070                    /BIT IS SET
2071                    /
2072  4033  0000  AWAIT,  0
2073  4034  4447        SAVEAC              /SAVE AC AND LINK
2074  4035  3261        DCA COUNT           /CLEAR ISZ COUNTER
2075  4036  1376        TAD (-30            /24 LOOPS
2076  4037  3262        DCA COUNT1          /SET UP LOOP COUNTER
2077  4040  3116        DCA INTFLG          /CLEAR INTERRUPT FLAG
2078  4041  1133        TAD WSTAT           /GET WANTED STATUS
2079  4042  1375        TAD (4002           /ADD PRINTER READY AND RIBBON UP
2080  4043  3117        DCA XSTAT           /SAVE IT
2081  4044  4446  WLOOP,  RDYCHK           /GET READY BIT STATUS
2082  4045  0133        AND WSTAT           /TEST WANTED STATUS BITS
2083  4046  7440        SZA                 /SKIP IF NOT READY
2084  4047  5255        JMP WATOUT          /EXIT FROM WAIT LOOP
2085  4050  2261        ISZ COUNT           /INCREMENT ISZ COUNTER
2086  4051  5244        JMP WLOOP           /CONTINUE WAITING
2087  4052  2262        ISZ COUNT1          /INCREMENT LOOP COUNTER
2088  4053  5244        JMP WLOOP           /CONTINUE WAITING
2089  4054  5633        JMP I AWAIT         /STATUS NOT READY, ERROR RETURN
2090  4055  7300  WATOUT, CLA CLL
2091  4056  4450        RSTRAC              /RESTORE AC AND LINK
2092  4057  2233        ISZ AWAIT           /BUMP RETURN POINTER

2093  4060  5633        JMP I   AWAIT
2094  4061  0000  COUNT,  0
2095  4062  0000  COUNT1, 0
2096                    /
2097                    /
2098                    /
2099                    /ROUTINE TO WAIT FOR ALL READY BITS SET, TEST MASK STORED
2100                    /IN LOCATION WSTAT
```



```
2101                    /RETURN CALL +1 IF STATUS ERROR, CALL +2 IF APPROPRIATE READY
2102                    /BITS ARE SET
2103                    /
2104  4063  0000  WAITS,  0
2105  4064  4447        SAVEAC              /SAVE AC AND LINK
2106  4065  3310        DCA COUNT2          /CLEAR ISZ COUNTER
2107  4066  1376        TAD (-30            /24 LOOPS
2108  4067  3311        DCA COUNT3          /SET UP LOOP COUNTER
2109  4070  3116        DCA INTFLG          /CLEAR INTERRUPT FLAG
2110  4071  1374        TAD (7400           /GET WANTED STATUS
2111  4072  3117        DCA XSTAT           /SAVE IT FOR EXPECTED STATUS
2112  4073  4446  SLOOP,  RDYCHK           /GET READY BIT STATUS
2113  4074  1373        TAD (400            /ADD TWO'S COMPLEMENT OF ALL READY
2114  4075  7450        SNA                 /SKIP IF NOT ALL READY
2115  4076  5304        JMP EXIT            /EXIT FROM WAIT LOOP
2116  4077  2310        ISZ COUNT2          /INCREMENT ISZ COUNTER
2117  4100  5273        JMP SLOOP           /CONTINUE WAITING
```

SEQ 0061

```
2118    4101  2311          ISZ COUNT3      /INCREMENT LOOP COUNTER
2119    4102  5273          JMP SLOOP       /CONTINUE WAITING
2120    4103  5663          JMP I WAITS     /STATUS NOT READY, ERROR RETURN
2121    4104  7300    EXIT, CLA CLL
```


SEQ 0062

```
2122    4105  4450          RSTRAC          /RESTORE AC AND LINK
2123    4106  2263          ISZ WAITS       /BUMP RETURN POINTER
2124    4107  5663          JMP I WAITS     /RETURN, ALL READY BITS SET
2125    4110  0000    COUNT2, 0
2126    4111  0000    COUNT3, 0
2127                  /
2128                  /
2129                  /
2130                  /
2131                  /GENERATE RANDOM NUMBER, EXIT WITH NUMBER IN AC
2132                  /
2133    4112  0000    XRAND,  0               /CALL BY "RANDOM"
2134    4113  7301          CLA CLL IAC
2135    4114  1344          TAD     RAN1
2136    4115  1345          TAD     RAN2
2137    4116  7106          CLL RTL
2138    4117  3344          DCA     RAN1
2139    4120  1345          TAD     RAN2
2140    4121  7012          RTR
2141    4122  1344          TAD     RAN1
2142    4123  3345          DCA     RAN2
2143    4124  1345          TAD     RAN2
2144    4125  5712          JMP I   XRAND
2145                  /
2146                  /
2147                  /SAVE RANDOM GENERATOR PRIMES
2148                  /
2149    4126  0000    XSAVGN, 0               /CALL BY "SAVGEN"
2150    4127  7200          CLA
2151    4130  1344          TAD     RAN1
2152    4131  3346          DCA     SAV1
2153    4132  1345          TAD     RAN2
2154    4133  3347          DCA     SAV2
2155    4134  5726          JMP I   XSAVGN
2156                  /
2157                  /RESTORE RANDOM GENERATOR PRIMES
2158                  /
2159    4135  0000    XRESGN, 0               /CALL BY "RESGEN"
2160    4136  7200          CLA
2161    4137  1346          TAD     SAV1
2162    4140  3344          DCA     RAN1
2163    4141  1347          TAD     SAV2
2164    4142  3345          DCA     RAN2
2165    4143  5735          JMP I   XRESGN
2166                  /
2167    4144  1234    RAN1,   1234
2168    4145  5670    RAN2,   5670
2169    4146  0000    SAV1,   0
2170    4147  0000    SAV2,   0
2171                  /
2172                  /
2173    4173  0400
2174    4174  7400
2175    4175  4002
2176    4176  7750
```

```
                    4200    PAGE
                            /
                            /ROUTINE TO SAVE AC AND LINK AND EXIT WITH BOTH AC AND LINK CLEARED
                            /
4200  0000    ACSAVE, 0
4201  3100            DCA SAVAC       /SAVE AC
4202  7010            RAR             /GET LINK
4203  3101            DCA SAVLNK      /SAVE LINK
4204  5600            JMP I   ACSAVE
                            /
                            /ROUTINE TO RESTORE AC AND LINK
                            /
4205  0000    ACRSTR, 0
4206  7300            CLA CLL
4207  1101            TAD SAVLNK      /GET LINK
4210  7004            RAL
4211  1100            TAD SAVAC       /GET AC
4212  5605            JMP I   ACRSTR
                            /
                            /STATUS ERROR HANDLER
                            /
4213  0000    ERSTAT, 0
4214  4466            C8ACTV          /CHECK FOR ACTIVE CONSOLE
4215  5243            JMP STPRNT      /CONSOLE IS ACTIVE, GO PRINT INFO
4216  4465            LAS             /CONSOLE NOT ACTIVE, GET SWITCHES
4217  7710            SPA CLA         /SKIP IF BIT 0=0, ERROR HALT
4220  5232            JMP ERS1        /GO CHECK FOR ERROR LOOP
4221  7340            CLA CLL CMA
4222  1213            TAD ERSTAT      /GET FAILING PC
4223  7402            HLT             /FAILING PC IN AC
4224  7300            CLA CLL
4225  1117            TAD XSTAT       /GET EXPECTED STATUS
4226  7402            HLT             /EXPECTED STATUS IN AC
4227  7300            CLA CLL
4230  1114            TAD SVSTAT      /GET ACTUAL STATUS
4231  7402            HLT             /ACTUAL STATUS IN AC
4232  7300    ERS1,   CLA CLL
4233  1777'           TAD TSTLOP      /GET TEST LOOP ADDRESS
4234  3242            DCA TLOOP3      /SAVE IT
4235  4465            LAS             /GET SWITCHES
4236  7004            RAL             /ROTATE FOR BIT 1 CHECK
4237  7710            SPA CLA         /SKIP IF BIT 1=0
4240  5642            JMP I TLOOP3    /LOOP ON TEST
4241  5613            JMP I ERSTAT    /CONTINUE TEST
4242  0000    TLOOP3, 0
                            /

4243  4465    STPRNT, LAS             /GET SWITCHES
4244  0376            AND (200        /TEST BIT 4, INHIBIT ERRROR TYPEOUT
4245  7640            SZA CLA         /SKIP IF BIT 4=0
4246  5266            JMP ERS2        /GO CHECK FOR ERROR HALT
4247  4467            MESAGE          /PRINT A MESSAGE
4250  6005            LSTERR          /STATUS ERROR MESSAGE
4251  4467            MESAGE
4252  6024            PCEQL
```



```
4253  7340            CLA CLL CMA
4254  1213            TAD ERSTAT
4255  4470            REGPRT          /PRINT FAILING PC
4256  4467            MESAGE
4257  6054            EXPECT          /EXPECTED
4260  1117            TAD XSTAT       /GET EXPECTED STATUS
4261  4470            REGPRT          /PRINT IT
4262  4467            MESAGE
4263  6062            ACTUAL          /ACTUAL STATUS
4264  1114            TAD SVSTAT      /GET ACTUAL STATUS
4265  4470            REGPRT          /PRINT IT
                            /
4266  4465    ERS2,   LAS             /GET SWITCHES
4267  7710            SPA CLA         /SKIP IF BIT 0=0, ERROR HALT
4270  5232            JMP ERS1        /GO CHECK FOR ERROR LOOP
4271  4467            MESAGE          /PRINT "WAITING" MESSAGE
4272  6000            WAITNG          /MESSAGE POINTER
4273  6030    ERS3,   KCF             /CLEAR KYBD FLAG
4274  6031            KSF             /TEST KYBD FLAG
4275  5274            JMP .-1         /WAIT FOR OPERATOR INTERVENTION
4276  7300            CLA CLL
4277  6034            KRS             /READ KYBD, DO NOT CLEAR FLAG
4300  0375            AND (177        /MASK TO 7 BITS
4301  1374            TAD (-7         /TEST FOR CTRL-G
4302  7640            SZA CLA         /SKIP IF CTRL-G
4303  5273            JMP ERS3        /CONTINUE WAITING FOR CTRL-G
4304  4452            KBCHK           /HANDLE CTRL-G
4305  5232            JMP ERS1        /GO CHECK FOR ERROR LOOP
                            /
                            /
                            /
                            /ROUTINE TO CHECK FOR ACTIVE CONSOLE
                            /
4306  0000    ACTVC8, 0
4307  7300            CLA CLL
4310  1022            TAD OP2SEL      /GET HARDWARE CONFIGURATION WORD TWO
4311  0373            AND (400        /MASK BIT 3
4312  7640            SZA CLA         /SKIP IF NON ACTIVE CONSOLE
4313  5706            JMP I ACTVC8    /RETURN CALL +1 FOR ACTIVE CONSOLE
4314  2306            ISZ ACTVC8      /BUMP RETURN POINTER
4315  5706            JMP I ACTVC8    /RETURN CALL +2 FOR NON ACTIVE CONSOLE
                            /
                            /MOVE PAPER ROUTINE
                            /
                            /********************
                            /
                            /       CALLED BY:      MOVPAR
                            /                       PRADV   /PAPER DIRECTION
                            /                       XXXX    /PAPER MOVEMENT MAGNITUDE
                            /
                            /********************
                            /
4316  0000    PARMOV, 0
4317  7300            CLA CLL
4320  1373            TAD (0400       /PAPER READY BIT 3, PRINTER READY BIT 0
```

```
2286    4321  3133          DCA WSTAT       /SAVE WANTED STATUS, PAPER READY, BIT 3
2287    4322  1716          TAD I PARMOV    /GET PAPER DIRECTION
2288    4323  2316          ISZ PARMOV      /INCREMENT POINTER TO PAPER MOVE MAGNITUDE
2289    4324  1716          TAD I PARMOV    /ADD PAPER MOVEMENT MAGNITUDE
2290    4325  4441          WAIT            /WAIT FOR PAPER READY
2291    4326  4451          STATER          /PAPER READY DID NOT RETURN
2292    4327  4435          LOADDB          /LOAD DATA BUFFER
2293    4330  4425          LQMP            /MOVE PAPER
2294    4331  4437          DATERR          /DATA ERROR AFTER IOT 2
2295    4332  2316          ISZ PARMOV      /BUMP RETURN POINTER
2296                  /
2297    4333  5716          JMP I PARMOV
2298                  /
2299                  /
2300    4373  0400
2301    4374  7771
2302    4375  0177
2303    4376  0200
2304    4377  3350
              4400  PAGE
2305                  /MOVE CARRIAGE ROUTINE
2306                  /
2307                  /*********************
2308                  /
2309                  /       CALLED BY:      MOVCAR
2310                  /                       CARLFT  /CARRIAGE DIRECTION
2311                  /                       XXXX    /CARRIAGE MOVEMENT MAGNITUDE
2312                  /
2313                  /*********************
2314                  /
2315    4400  0000    CARMOV, 0
2316    4401  7300          CLA CLL
2317    4402  1377          TAD (1000       /CARRIAGE READY BIT 2, PRINTER READY BIT 0
2318    4403  3133          DCA WSTAT       /SAVE WANTED STATUS
2319    4404  1600          TAD I CARMOV    /GET CARRIAGE DIRECTION
2320    4405  3126          DCA CARDIR      /SAVE CARRIAGE DIRECTION
2321    4406  1126          TAD CARDIR      /GET CARRIAGE DIRECTION
2322    4407  7640          SZA CLA         /SKIP IF MOVE RIGHT
2323    4410  5221          JMP MOVLFT      /GO TO CARRIAGE LEFT ROUTINE
2324    4411  2200    MOVRGT, ISZ CARMOV    /INCREMENT POINTER TO MOVE MAGNITUDE
2325    4412  1600          TAD I CARMOV    /GET CARRIAGE MOVE MAGNITUDE
2326    4413  3141          DCA MOVMAG      /SAVE IT
2327    4414  1141          TAD MOVMAG      /GET IT AGAIN
2328    4415  1140          TAD SAVPOS      /ADD CURRENT POSITION
2329    4416  3140          DCA SAVPOS      /UPDATE CARRIAGE POSITION POINTER
2330    4417  1141          TAD MOVMAG      /GET CARRIAGE MOVE MAGNITUDE
2331    4420  5232          JMP MVWAIT      /GO WAIT FOR CARRIAGE READY

2332    4421  2200    MOVLFT, ISZ CARMOV    /INCREMENT POINTER TO MOVE MAGNITUDE
2333    4422  1600          TAD I CARMOV    /GET CARRIAGE MOVE MAGNITUDE
2334    4423  3141          DCA MOVMAG      /SAVE IT
2335    4424  1141          TAD MOVMAG      /GET IT AGAIN
2336    4425  7041          CMA IAC         /FORM NEGATIVE
2337    4426  1140          TAD SAVPOS      /SUBTRACT FROM CURRENT POSITION
2338    4427  3140          DCA SAVPOS      /UPDATE CARRIAGE POSITION POINTER
2339    4430  1126          TAD CARDIR      /GET CARRIAGE DIRECTION
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2340    4431  1141          TAD MOVMAG      /ADD CARRIAGE MOVE MAGNITUDE
2341    4432  4441    MVWAIT, WAIT          /WAIT FOR CARRIAGE READY
2342    4433  4451          STATER          /CARRIAGE READY DID NOT RETURN
2343    4434  4435          LOADDB          /LOAD DATA BUFFER FOR MOVE CARRIAGE
2344    4435  4426          LQMC            /IOT 3 MOVE CARRIAGE
2345    4436  4437          DATERR          /DATA ERROR AFTER IOT 3
2346    4437  2200          ISZ CARMOV      /BUMP RETURN POINTER
2347    4440  5600          JMP I CARMOV    /RETURN
2348                  /
2349                  /
2350                  /ROUTINE TO MOVE CARRIAGE TO ANY DESIRED PRINT POSITION
2351                  /ENTER THIS SUBROUTINE WITH PRINT POSITION COORDINATE
2352                  /IN AC, CALLED BY:  MOVCR
2353                  /
2354                  /
2355    4441  0000    CRMOV,  0
2356    4442  3121          DCA SAVMOV      /SAVE DESIRED POSITION
2357    4443  1140          TAD SAVPOS      /GET CURRENT POSITION
2358    4444  7041          CIA             /NEGATE IT
2359    4445  1121          TAD SAVMOV      /ADD DESIRED POSITION
2360    4446  7700          SMA CLA         /SKIP IF DESIRED POSITION IS LEFT OF
2361                                        /CURRENT POSITION
2362    4447  5257          JMP RITCR       /DESIRED POSITION IS RIGHT OF CURRENT
2363                                        /POSITION
2364    4450  1121    LFTCR,  TAD SAVMOV    /GET DESIRED POSITION
2365    4451  7041          CIA             /NEGATE IT
2366    4452  1140          TAD SAVPOS      /ADD CURRENT POSITION
2367    4453  3267          DCA MAG         /SAVE MOVE MAGNITUDE
2368    4454  1376          TAD (CARLFT     /SET CARRIAGE LEFT BIT 0
2369    4455  3266          DCA DIRECT      /SAVE IT
2370    4456  5265          JMP MOVE        /GO MOVE CARRIAGE
2371    4457  1140    RITCR,  TAD SAVPOS    /GET CURRENT POSITION
2372    4460  7041          CIA             /NEGATE IT
2373    4461  1121          TAD SAVMOV      /ADD CARRIAGE MOVE MAGNITUDE
2374    4462  0375          AND (3777       /MASK MAGNITUDE
2375    4463  3267          DCA MAG         /SAVE IT
2376    4464  3266          DCA DIRECT      /CLEAR BIT 0 FOR MOVE CARRIAGE RIGHT
2377    4465  4455    MOVE,   MOVCAR        /MOVE CARRIAGE
2378    4466  0000    DIRECT, 0             /SAVE AREA FOR CARRIAGE DIRECTION
2379    4467  0000    MAG,    0             /SAVE AREA FOR CARRIAGE MOVEMENT MAGNITUDE
2380    4470  5641          JMP I CRMOV     /RETURN
2381                  /
2382                  /ROUTINE TO EXECUTE A CARRIAGE RETURN, LINE FEED FROM ANY CARRIAGE POSITION
2383                  /
2384    4471  0000    CRLFRT, 0
2385    4472  7300          CLA CLL
2386    4473  1140          TAD SAVPOS      /GET CURRENT POSITION
2387    4474  3277          DCA CARMAG      /SAVE IT FOR CARRIAGE RETURN
2388    4475  4455          MOVCAR          /MOVE CARRIAGE
2389    4476  4000          CARLFT          /DIRECTION = LEFT BIT 0 = 1
2390    4477  0000    CARMAG, 0             /CARRIAGE MOVEMENT MAGNITUDE
2391    4500  7300          CLA CLL
2392    4501  1130          TAD LF          /GET VALUE FOR PAPER FEED
2393    4502  3305          DCA PARMAG      /SAVE IT FOR LINE FEED
2394    4503  4457          MOVPAR          /MOVE PAPER
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2395    4504  0000          PRADV           /DIRECTION = ADVANCE  BIT 0 = 0
2396    4505  0000    PARMAG, 0             /PAPER MOVEMENT MAGNITUDE
2397    4506  5671          JMP I CRLFRT
2398                  /
2399                  /ROUTINE TO PRINT A CHARACTER ON LQ PRINTER
2400                  /
2401    4507  0000    XPRINT, 0
2402    4510  7300          CLA CLL
2403    4511  1374          TAD (2000       /CHARACTER READY BIT 1
2404    4512  3133          DCA WSTAT       /SAVE FOR WANTED STATUS
2405    4513  4453          ROTCHR          /ROTATE CHARACTER STORED IN CHAR
2406    4514  1125          TAD CHARRT      /GET ROTATED CHARACTER
2407    4515  1373          TAD (7401       /SET UNUSED BITS FOR CROSS TALK TEST
2408    4516  4441          WAIT            /WAIT FOR CHARACTER READY
2409    4517  4451          STATER          /CHARACTER READY DID NOT RETURN
2410    4520  4435          LOADDB          /LOAD DATA BUFFER WITH CHARACTER TO PRINT
2411                                        /AND PRINT IT
2412    4521  4427          LQPC            /IOT 4  PRINT CHARACTER
2413    4522  4437          DATERR          /DATA ERROR AFTER IOT 4
2414    4523  2136          ISZ CHRCNT      /INCREMENT CHARACTER COUNT
2415    4524  7000          NOP             /IN CASE CHRCNT OVERFLOWS
2416    4525  5707          JMP I XPRINT    /RETURN
2417                  /
2418                  /ROUTINE TO ROTATE ASCII CHARACTER CODE STORED IN LOCATION CHAR
2419                  /AND STORE IT IN LOCATION CHARRT
2420                  /
2421    4526  0000    CHRROT, 0
2422    4527  7300          CLA CLL
2423    4530  1124          TAD CHAR        /GET NORMAL ASCII CHARACTER
2424    4531  7004          RAL             /ROTATE LEFT ONE POSITION
2425    4532  3125          DCA CHARRT      /SAVE SHIFTED ASCII CHARACTER
2426    4533  5726          JMP I CHRROT    /RETURN
2427                  /
2428                  /
2429                  /ROUTINE TO CHECK FOR END OF PRINT LINE
2430                  /RETURN IS CALL PLUS ONE IF NOT END OF LINE
2431                  /RETURN IS CALL PLUS TWO IF END OF LINE
2432                  /
2433    4534  0000    ENDLIN, 0
2434    4535  7300          CLA CLL
2435    4536  1136          TAD CHRCNT      /GET CHARACTER COUNT
2436    4537  7041          CMA IAC         /FORM TWO'S COMPLEMENT
2437    4540  1131          TAD LINE        /ADD NUMBER OF CHARACTERS PER LINE
2438    4541  7640          SZA CLA         /SKIP IF END OF LINE
2439    4542  5734          JMP I ENDLIN    /RETURN IF NOT END OF LINE
2440    4543  3136          DCA CHRCNT      /CLEAR CHARACTER COUNTER
2441    4544  2334          ISZ ENDLIN      /BUMP RETURN POINTER

2442    4545  5734          JMP I ENDLIN    /RETURN CALL PLUS TWO
2443                  /
2444                  /ROUTINE TO CHECK FOR LAST LINE OF A PRINT PATTERN TEST
2445                  /RETURN CALL +1 IF NOT LAST LINE
2446                  /RETURN CALL +2 IF LAST LINE HAS BEEN PRINTED
2447                  /
2448    4546  0000    LINLST, 0
2449    4547  1115          TAD LINCNT      /GET LINE COUNT
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2450    4550  7041          CIA             /FORM TWO'S COMPLEMENT
2451    4551  1132          TAD LINES       /ADD NUMBER OF LINES TO PRINT
2452    4552  7640          SZA CLA         /SKIP IF ENOUGH LINES PRINTED
2453    4553  5746          JMP I LINLST    /RETURN IF NOT ENOUGH LINES PRINTED
2454    4554  3132          DCA LINES       /CLEAR AMOUNT OF LINES
2455    4555  2346          ISZ LINLST      /BUMP RETURN POINTER
2456    4556  5746          JMP I LINLST    /RETURN CALL PLUS TWO
2457                  /
2458                  /ROUTINE TO MOVE CARRIAGE ONE SPACE
2459                  /CALL BY RSPACE
2460                  /
2461    4557  0000    SPACER, 0
2462    4560  7300          CLA CLL
2463    4561  1127          TAD SPACE       /GET SIZE OF CHARACTER SPACING
2464    4562  3365          DCA SPSIZR      /SAVE IT FOR PRINT POSITIONING
2465    4563  4455          MOVCAR          /MOVE CARRIAGE
2466    4564  0000          CARRGT          /DIRECTION = RIGHT
2467    4565  0000    SPSIZR, 0             /SPACE SIZE
2468    4566  5757          JMP I SPACER    /RETURN
2469    4573  7401
2470    4574  2000
2471    4575  3777
2472    4576  4000
2473    4577  1000
              4600    PAGE
2474                  /
2475                  /
2476                  /
2477                  /ROUTINE TO MOVE CARRIAGE ONE SPACE TO THE LEFT
2478                  /CALLED BY LSPACE
2479                  /
2480    4600  0000    SPACEL, 0
2481    4601  7300          CLA CLL
2482    4602  1127          TAD SPACE       /GET SIZE OF CHARACTER SPACING
2483    4603  3206          DCA SPSIZL      /SAVE IT FOR PRINT POSITIONING
2484    4604  4455          MOVCAR          /MOVE CARRIAGE
2485    4605  4000          CARLFT          /DIRECTION = LEFT
2486    4606  0000    SPSIZL, 0             /SPACE SIZE
2487    4607  5600          JMP I SPACEL
2488                  /
2489                  /
2490                  /ROUTINE TO CHECK FOR KEYBOARD INTERVENTION
2491                  /AND TEST FOR CTRL CHARACTER
2492                  /CALLED BY KBCHK
2493                  /
2494    4610  0000    CHKKB,  0
2495    4611  3226          DCA ACSV        /SAVE AC
2496    4612  7010          RAR             /GET LINK
2497    4613  3227          DCA LINKSV      /SAVE IT
2498    4614  4466          C8ACTV          /SKIP IF NON ACTIVE CONSOLE
2499    4615  6031          KSF             /TEST KEYBOARD FLAG
2500    4616  5221          JMP KBOUT       /GO TO PROGRAM RETURN ROUTINE
2501    4617  4445          CTLCHK          /CHECK FOR CONTROL CHARACTER
2502    4620  4444          ECHO            /NOT CONTROL CHAR, SO ECHO IT
2503    4621  7300    KBOUT,  CLA CLL
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2504  4622  1227          TAD LINKSV      /GET LINK
2505  4623  7004          RAL             /RESTORE IT
2506  4624  1226          TAD ACSV        /GET AC
2507  4625  5610          JMP I CHKKB     /RETURN
2508  4626  0000  ACSV,   0               /AC SAVE AREA
2509  4627  0000  LINKSV, 0               /LINK SAVE AREA
2510                      /
2511                      /
2512                      /ROUTINE TO CHECK FOR EACH OF SIX VALID CONTROL CHARACTERS
2513                      /FROM OPERATOR'S CONSOLE, THE SIX (6) VALID CONTROL CHARACTERS ARE:
2514                      /
2515                      /     CTRL/C   RETURN TO OPERATING SYSTEM MONITOR
2516                      /
2517                      /     CTRL/G   ALLOWS CHANGING OF SOFTWARE SWITCH REGISTER
2518                      /              RESTARTS DIAGNOSTIC IF FOLLOWED BY LINE FEED
2519                      /              CONTINUES DIAGNOSTIC FROM INTERRUPTION POINT IF
2520                      /              FOLLOWED BY CARRIAGE RETURN
2521                      /
2522                      /     CTRL/Q   CONTINUES DIAGNOSTIC
2523                      /
2524                      /     CTRL/S   STOPS DIAGNOSTIC AND WAITS FOR CTRL CHARACTER
2525                      /
2526                      /     CTRL/K   RESTORES PRINTER AND CONTINUES CURRENT TEST
2527                      /
2528                      /     CTRL/T   FOLLOWED BY CTRL-G ALLOWS DESIRED TEST NUMBER
2529                      /              TO BE TYPED INTO PSUEDO SWITCH REGISTER BITS
2530                      /              6-11
2531                      /
2532  4630  0000  CHKCTL, 0
2533  4631  4466          C8ACTV          /CHECK FOR CONSOLE ACTIVE
2534  4632  7410          SKP             /SKIP IF CONSOLE IS ACTIVE
2535  4633  5630          JMP I CHKCTL    /CONSOLE NOT ACTIVE, RETURN
2536  4634  6031          KSF             /TEST TTY FLAG
2537  4635  5630          JMP I CHKCTL    /RETURN IF NOT SET
2538  4636  6036          KRB             /READ KEYBOARD BUFFER
2539  4637  0377          AND (177        /MASK TO 7 BIT ASCII
2540  4640  7041          CIA             /NEGATE IT
2541  4641  3137          DCA KBSAV       /SAVE KEYBOARD CHARACTER
2542  4642  1137          TAD KBSAV       /GET CHARACTER
2543  4643  1104          TAD K003        /IS IT CONTROL-C?
2544  4644  7650          SNA CLA         /SKIP IF NO
2545  4645  5776'         JMP MONITR      /RETURN TO SYSTEM MONITOR
2546  4646  1137          TAD KBSAV       /GET CHARACTER
2547  4647  1105          TAD K007        /IS IT CTRL-G?
2548  4650  7650          SNA CLA         /SKIP IF NO
2549  4651  5775'         JMP C8SWCK      /GO TO SWITCH REGISTER QUESTION
2550  4652  1137          TAD KBSAV       /GET CHARACTER

2551  4653  1106          TAD K021        /IS IT CTRL-Q?
2552  4654  7650          SNA CLA         /SKIP IF NO
2553  4655  5774'         JMP QCONT       /CONTINUE DIAGNOSTIC
2554  4656  1137          TAD KBSAV       /GET CHARACTER
2555  4657  1107          TAD K023        /IS IT CTRL-S?
2556  4660  7650          SNA CLA         /SKIP IF NO
2557  4661  5773'         JMP SSTOP       /STOP TEST
2558  4662  1137          TAD KBSAV       /GET CHARACTER
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2559  4663  1372          TAD (24         /IS IT CTRL-T?
2560  4664  7650          SNA CLA         /SKIP IF NOT
2561  4665  5771'         JMP TECHO       /GO TO TEST SELECT ROUTINE
2562  4666  1137          TAD KBSAV       /GET CHARACTER
2563  4667  1370          TAD (13         /IS IT CTRL-K
2564  4670  7650          SNA CLA         /SKIP IF NO
2565  4671  4767'         JMS RESTOR      /RESTORE PRINTER
2566  4672  5630          JMP I CHKCTL
2567                      /
2568                      /
2569                      /ROUTINE TO ECHO A NON CTRL CHARACTER ON CONSOLE
2570                      /
2571  4673  0000  XECHO,  0
2572  4674  6036          KRB
2573  4675  0377          AND (177        /MASK TO 7 BITS
2574  4676  6046          TLS             /PRINT ON TTY
2575  4677  6041          TSF             /TEST DONE FLAG
2576  4700  5277          JMP .-1         /WAIT FOR DONE FLAG
2577  4701  5673          JMP I XECHO     /RETURN
2578                      /
2579                      /
2580                      /MESSAGE PRINT ROUTINE
2581                      /A "#" CHARACTER CAUSES A CARRIAGE RETURN LINE FEED
2582                      /
2583  4702  0000  MESPRT, 0
2584  4703  7240          CLA CMA
2585  4704  1702          TAD I MESPRT    /GET MESSAGE ADDRESS
2586  4705  3010          DCA INDX10      /SAVE IT IN MESSAGE POINTER
2587  4706  2302          ISZ MESPRT      /INCREMENT RETURN POINTER
2588  4707  1410  MESLP,  TAD I INDX10    /GET TWO 6 BIT PACKED ASCII CHARACTERS
2589  4710  3321          DCA MSRGHT      /SAVE THEM
2590  4711  1321          TAD MSRGHT      /GET THEM
2591  4712  7012          RTR
2592  4713  7012          RTR
2593  4714  7012          RTR
2594  4715  4322          JMS TYPECH      /PRINT FIRST CHARACTER
2595  4716  1321          TAD MSRGHT      /GET SECOND CHARACTER
2596  4717  4322          JMS TYPECH      /PRINT SECOND CHARACTER
2597  4720  5307          JMP MESLP       /CONTINUE PRINTING
2598  4721  0000  MSRGHT, 0
2599  4722  0000  TYPECH, 0
2600  4723  0366          AND (77         /MASK 6 BIT ASCII
2601  4724  7450          SNA             /SKIP IF NOT END OF MESSAGE
2602  4725  5702          JMP I MESPRT    /END OF MESSAGE RETURN
2603  4726  1365          TAD (-43
2604  4727  7450          SNA             /IS IT #
2605  4730  5337          JMP .+7         /YES, DO A CR AND LF
2606  4731  1364          TAD (3
2607  4732  7510          SPA
2608  4733  1363          TAD (100
2609  4734  1362          TAD (240
2610  4735  4761'         JMS PRNT1
2611  4736  5722          JMP I TYPECH
2612  4737  4760'         JMS CRLF
2613  4740  5722          JMP I TYPECH
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2614                    /
2615                    /
2616    4760  5007
2617    4761  5000
2618    4762  0240
2619    4763  0100
2620    4764  0003
2621    4765  7735
2622    4766  0077
2623    4767  3351
2624    4770  0013
2625    4771  5614
2626    4772  0024
2627    4773  5317
2628    4774  5340
2629    4775  5400
2630    4776  5601
2631    4777  0177
              5000      PAGE
2632                    /
2633                    /
2634                    /ROUTINE TO PRINT ONE CHARACTER
2635                    /
2636    5000  0000      PRNT1,  0
2637    5001  6046              TLS
2638    5002  6041              TSF
2639    5003  5202              JMP .-1
2640    5004  6042              TCF
2641    5005  7300              CLA CLL
2642    5006  5600              JMP I PRNT1
2643                    /
2644                    /ROUTINE TO EXECUTE A CARRIAGE RETURN AND LINE FEED
2645                    /
2646    5007  0000      CRLF,   0
2647    5010  7300              CLA CLL
2648    5011  1377              TAD (15
2649    5012  4200              JMS PRNT1
2650    5013  1376              TAD (12
2651    5014  4200              JMS PRNT1
2652    5015  5607              JMP I CRLF
2653                    /
2654                    /
2655                    /
2656                    /
2657                    /ROUTINE TO PRINT CONTENTS OF A REGISTER
2658                    /
2659    5016  0000      PRTREG, 0

2660    5017  3244              DCA REGCON      /SAVE REGISTER CONTENTS
2661    5020  1375              TAD (-4         /SET UP PRINT COUNTER
2662    5021  3243              DCA PRTCNT
2663    5022  7100              CLL
2664    5023  1244              TAD REGCON      /GET REGISTER CONTENTS
2665    5024  7004              RAL
2666    5025  7004    REGLOP, RAL
2667    5026  7006              RTL
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2668    5027  4447              SAVEAC
2669    5030  4450              RSTRAC
2670    5031  0374              AND (7
2671    5032  1373              TAD (60
2672    5033  4200              JMS PRNT1       /PRINT A DIGIT
2673    5034  4450              RSTRAC          /RESTORE AC AND LINK
2674    5035  2243              ISZ PRTCNT      /INCREMENT COUNTER
2675    5036  5225              JMP REGLOP      /CONTINUE PRINTING REGISTER CONTENTS
2676    5037  7300              CLA CLL
2677    5040  1372              TAD (240        /PRINT A SPACE
2678    5041  4200              JMS PRNT1
2679    5042  5616              JMP I PRTREG    /RETURN
2680                    /
2681    5043  0000    PRTCNT, 0
2682    5044  0000    REGCON, 0
2683                    /
2684    5172  0240
2685    5173  0060
2686    5174  0007
2687    5175  7774
2688    5176  0012
2689    5177  0015
              5200      PAGE
2690                    /
2691                    /ROUTINE TO CHECK FOR CARRIAGE RETURN OR LINE FEED TYPED
2692                    /FOLLOWING A CTRL G
2693                    /
2694    5200  0000      KBCRLF, 0
2695    5201  6036              KPB             /READ KYBD BUFFER
2696    5202  0377              AND (177        /MASK TO SEVEN BITS
2697    5203  3236              DCA KBSV        /SAVE CHAR
2698    5204  1236              TAD KBSV        /GET CHAR
2699    5205  1376              TAD (-15        /IS IT CARRIAGE RETURN?
2700    5206  7640              SZA CLA         /SKIP IF CARRIAGE RETURN
2701    5207  7410              SKP
2702    5210  5217              JMP CROUT       /GO TO CONTINUE WITH PROGRAM
2703    5211  1236              TAD KBSV        /GET KYBD CHAR
2704    5212  1375              TAD (-12        /IS IT LINE FEED?
2705    5213  7640              SZA CLA         /SKIP IF LINE FEED
2706    5214  7410              SKP
2707    5215  5225              JMP LFOUT       /GO TO BEGIN OF PROGRAM
2708    5216  5600              JMP I KBCRLF    /NOT CR OR LF, RETURN
2709                    /
2710    5217  1774'   CROUT,  TAD PSWCH
2711    5220  7650              SNA CLA
2712    5221  5224              JMP .+3
2713    5222  1773'             TAD PSRSV1      /GET NEW SWITCH REGISTER
2714    5223  3020              DCA PSWR        /SAVE IN PSUEDO SWITCH REGISTER
2715    5224  5772'             JMP KBOUT       /RETURN AND CONTINUE
2716                    /
2717    5225  1774'   LFOUT,  TAD PSWCH
2718    5226  7650              SNA CLA
2719    5227  5232              JMP .+3
2720    5230  1773'             TAD PSRSV1      /GET NEW SWITCH REGISTER
2721    5231  3020              DCA PSWR        /SAVE IN PSUEDO SWITCH REGISTER
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2722    5232  1771'           TAD RSTART
2723    5233  3235            DCA GOBAK
2724    5234  5635            JMP I GOBAK     /RETURN TO BEGINNING OF TESTS
2725    5235  0000    GOBAK,  0
2726                    /
2727    5236  0000    KBSV,   0               /KYBD CHAR SAVE AREA
2728                    /
2729                    /ROUTINE TO HANDLE SWITCH REGISTER ERROR
2730                    /
2731    5237  7300    SWRERR, CLA CLL
2732    5240  1370            TAD (277        /CODE FOR QUESTION MARK
2733    5241  4767'           JMS PRNT1       /PRINT QUESTION MARK
2734    5242  4766'           JMS CRLF        /CR, LF
2735    5243  5765'           JMP C8SWCK+6    /START SWITCH REGISTER ROUTINE AGAIN
2736                    /
2737                    /
2738                    /
2739                    /ROUTINE TO PERMIT VARIABLE DELAY AS DETERMINED BY OCTAL
2740                    /NUMBER FOLLOWING DELAY CALL
2741                    /
2742    5244  0000    ADELAY, 0
2743    5245  7300            CLA CLL         /1.2 USEC.
2744    5246  1644            TAD I ADELAY    /3.8 USEC.
2745    5247  3271            DCA     DELAYN  /2.6 USEC.
2746    5250  2244            ISZ     ADELAY  /2.6 USEC.
2747    5251  1272    DLOP,   TAD     M23     /2.6 USEC.
2748    5252  3273            DCA     DCOUNT  /2.6 USEC.
2749    5253  2273            ISZ     DCOUNT  /2.6 USEC. X 19 = 29.4 USEC.
2750    5254  5253            JMP     .-1     /2.6 USEC. X 28 = 21.6 USEC.
2751    5255  7000            NOP             /1.2 USEC.
2752    5256  7000            NOP             /1.2 USEC.
2753    5257  7000            NOP             /1.2 USEC.
2754    5260  7000            NOP             /1.2 USEC.
2755    5261  2271            ISZ     DELAYN  /2.6 USEC.
2756    5262  7610            SKP CLA         /1.2 USEC.
2757    5263  5644            JMP I ADELAY    /2.4 USEC.
2758    5264  0644            AND I ADELAY    /3.8 USEC.
2759    5265  0644            AND I ADELAY    /3.8 USEC.
2760    5266  0244            AND     ADELAY  /2.6 USEC.
2761    5267  0244            AND     ADELAY  /2.6 USEC.
2762    5270  5251            JMP     DLOP    /1.2 USEC.
2763                    /
2764    5271  0000    DELAYN, 0
2765    5272  7755    M23,    -23
2766    5273  0000    DCOUNT, 0
2767                    /
2768                    /

2769                    /
2770                    /
2771                    /ROUTINE TO HANDLE LAS INSTRUCTION FROM EITHER HARDWARE OR
2772                    /SOFT SWITCH REGISTER
2773                    /
2774    5274  0000    LASRT,  0
2775    5275  7300            CLA CLL
2776    5276  1021            TAD OP1SEL      /GET HARDWARE CONTROL WORD ONE
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2777    5277  7710            SPA CLA         /SKIP IF BIT 0 = 0
2778    5300  7614            7614            /DO A LAS AND SKIP
2779    5301  1020            TAD PSWR        /GET PSUEDO SWITCH REGISTER
2780    5302  5674            JMP I LASRT
2781                    /
2782                    /
2783                    /ROUTINE TO CHECK FOR OCTAL DIGIT
2784                    /
2785                    /
2786    5303  0000    OCTCHK, 0
2787    5304  1236            TAD KBSV        /GET CHARACTER
2788    5305  1364            TAD (-60        /SUBTRACT 60
2789    5306  7710            SPA CLA         /SKIP IF GREATER THAN ASCII CODE 60
2790    5307  5237            JMP SWRERR      /NOT AN OCTAL NUMBER
2791    5310  1236            TAD KBSV        /GET CHARACTER
2792    5311  7041            CIA             /NEGATE IT
2793    5312  1363            TAD (67         /ADD 70
2794    5313  7710            SPA CLA         /SKIP IF LESS THAN ASCII CODE 70
2795    5314  5237            JMP SWRERR      /NOT AN OCTAL NUMBER
2796    5315  1236            TAD KBSV
2797    5316  5703            JMP I OCTCHK
2798                    /
2799                    /
2800                    /
2801                    /
2802                    /ROUTINE TO HANDLE A CONTROL S
2803                    /
2804    5317  7300    SSTOP,  CLA CLL
2805    5320  4766'           JMS CRLF        /EXECUTE CR AND LF
2806    5321  1362            TAD (336        /PRINT UP ARROW
2807    5322  4767'           JMS PRNT1
2808    5323  1361            TAD (123        /PRINT S
2809    5324  4767'           JMS PRNT1
2810    5325  4467            MESAGE
2811    5326  6024            PCEQL
2812    5327  7340            CLA CLL CMA
2813    5330  1760'           TAD CHKKB
2814    5331  4470            REGPRT
2815    5332  6030            KCF             /CLEAR KEYBOARD FLAG
2816    5333  6031            KSF             /WAIT FOR OPERATOR INTERVENTION
2817    5334  5333            JMP .-1
2818    5335  4445            CTLCHK          /CHECK FOR CONTROL CHARACTER
2819    5336  4444            ECHO            /ECHO CHARACTER
2820    5337  5332            JMP .-5         /CONTINUE WAITING FOR CONTROL CHARACTER
2821                    /
2822    5340  7300    QCONT,  CLA CLL
2823    5341  4766'           JMS CRLF
2824    5342  1362            TAD (336        /PRINT UP ARROW
2825    5343  4767'           JMS PRNT1
2826    5344  1357            TAD (121        /PRINT Q
2827    5345  4767'           JMS PRNT1
2828    5346  6030            KCF             /CLEAR KEYBOARD FLAG
2829    5347  5772'           JMP KBOUT       /RETURN TO PROGRAM
2830                    /
2831    5357  0121
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2832    5360  4610
2833    5361  0123
2834    5362  0336
2835    5363  0067
2836    5364  7720
2837    5365  5406
2838    5366  5007
2839    5367  5000
2840    5370  0277
2841    5371  0232
2842    5372  4621
2843    5373  5453
2844    5374  5455
2845    5375  7766
2846    5376  7763
2847    5377  0177
              5400    PAGE
2848                  /
2849                  /
2850                  /ROUTINE TO HANDLE CONTROL G
2851                  /
2852    5400  6030    CBSWCK, KCF             /CLEAR KEYBOARD FLAG
2853    5401  4777'           JMS CRLF
2854    5402  7300           CLA CLL
2855    5403  1376           TAD (336
2856    5404  4775'          JMS PRNT1       /PRINT UP ARROW
2857    5405  1374           TAD (107
2858    5406  4775'          JMS PRNT1       /PRINT G
2859    5407  4467           MESAGE          /PRINT SR= MESSAGE
2860    5410  6047           SREQL
2861    5411  4465           LAS             /GET SWITCHES
2862    5412  4470           REGPRT          /PRINT THE SWITCH REGISTER
2863    5413  5214           JMP PSUEDO
2864                  /
2865                  /
2866                  /
2867                  /
2868                  /ROUTINE TO CHANGE CONTENTS OF PSUEDO SWITCH REGISTER
2869                  /
2870    5414  7300    PSUEDO, CLA CLL
2871    5415  3253           DCA PSRSV1      /CLEAR SWITCH BUILD AREA
2872    5416  3255           DCA PSWCH       /CLEAR PSUEDO SWR CHANGE SWITCH
2873    5417  1373           TAD (-4         /SET UP LOOP COUNTER
2874    5420  3772'          DCA ROTCNT
2875    5421  6031           KSF
2876    5422  5221           JMP .-1
2877    5423  4445           CTLCHK

2878    5424  4444           ECHO
2879    5425  4771'          JMS KBCRLF      /CHECK FOR CR OR LF
2880    5426  4770'          JMS OCTCHK      /CHECK FOR OCTAL NUMBER
2881    5427  0367           AND (7          /MASK FIRST DIGIT
2882    5430  3253           DCA PSRSV1      /SAVE IT
2883    5431  7240           CLA CMA
2884    5432  3255           DCA PSWCH       /SET PSWR CHANGE SWITCH
2885    5433  6031    PSRLOP, KSF             /CHECK FOR OPERATOR INTERVENTION
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2886    5434  5233           JMP .-1
2887    5435  4445           CTLCHK
2888    5436  4444           ECHO
2889    5437  4771'          JMS KBCRLF      /CHECK FOR CR OR LF
2890    5440  4770'          JMS OCTCHK      /CHECK FOR OCTAL NUMBER
2891    5441  0367           AND (7          /MASK NEXT DIGIT
2892    5442  3254           DCA PSRSV2
2893    5443  1253           TAD PSRSV1
2894    5444  7006           RTL
2895    5445  7004           RAL
2896    5446  1254           TAD PSRSV2
2897    5447  3253           DCA PSRSV1      /SAVE NEW SWITCH REGISTER
2898    5450  2772'          ISZ ROTCNT      /INCREMENT ROTATE COUNTER
2899    5451  5233           JMP PSRLOP      /CONTINUE BUILDING NEW SWR
2900    5452  5766'          JMP SWRERR      /TOO MANY DIGITS TYPED
2901                  /
2902    5453  0000    PSRSV1, 0
2903    5454  0000    PSRSV2, 0
2904    5455  0000    PSWCH,  0       /PSWR CHANGE SWITCH
2905                  /
2906                  /
2907                  /ROUTINE TO ALLOW CHANGING OF DEVICE SELECT CODES
2908                  /
2909    5456  4466    IOTCNG, CBACTV          /CHECK FOR ACTIVE CONSOLE
2910    5457  5270           JMP IOTMES      /CONSOLE ACTIVE
2911    5460  7300           CLA CLL         /CONSOLE NOT ACTIVE
2912    5461  1142           TAD DSCNOW      /GET OLD DEVICE CODE
2913    5462  7402           HLT             /OLD DEVICE CODE IN AC 3-8
2914    5463  4465           LAS             /GET NEW DEVICE CODE
2915    5464  4471           MANCNG          /CHANGE IOT DEVICE CODES
2916    5465  1142           TAD DSCNOW      /GET NEW DEVICE CODE
2917    5466  7402           HLT             /NEW DEVICE CODE IN AC 3-8
2918    5467  5765'          JMP TST1        /GO TO LOGIC TESTS
2919    5470  4465    IOTMES, LAS             /GET NEW DEVICE CODE
2920    5471  4471           MANCNG          /CHANGE IOT DEVICE CODES
2921    5472  4467           MESAGE          /PRINT MESSAGE
2922    5473  6020           DSCEQL          /DSC=
2923    5474  1142           TAD DSCNOW      /GET NEW DEVICE CODE
2924    5475  4470           REGPRT          /PRINT NEW DEVICE CODE
2925    5476  5765'          JMP TST1        /GO TO LOGIC TEST
2926                  /
2927                  /
2928    5477  0000    CNGMAN, 0
2929    5500  0364           AND (0770
2930    5501  3142           DCA DSCNOW      /SAVE NEW DSC
2931    5502  1142           TAD DSCNOW      /GET IT
2932    5503  1110           TAD K6000       /ADD IOT OP CODE
2933    5504  3335           DCA IOTSTR      /SAVE IT
2934    5505  1335           TAD IOTSTR
2935    5506  3736           DCA I ITAB0     /SAVE IOT0
2936    5507  2335           ISZ IOTSTR      /INCREMENT FOR IOT1
2937    5510  1335           TAD IOTSTR
2938    5511  3737           DCA I ITAB1     /SAVE IOT1
2939    5512  2335           ISZ IOTSTR      /INCREMENT FOR IOT2
2940    5513  1335           TAD IOTSTR
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2941    5514  3740            DCA I ITAB2     /SAVE IOT2
2942    5515  2335            ISZ IOTSTR      /INCREMENT FOR IOT3
2943    5516  1335            TAD IOTSTR
2944    5517  3741            DCA I ITAB3     /SAVE IOT3
2945    5520  2335            ISZ IOTSTR      /INCREMENT FOR IOT4
2946    5521  1335            TAD IOTSTR
2947    5522  3742            DCA I ITAB4     /SAVE IOT4
2948    5523  2335            ISZ IOTSTR      /INCREMENT FOR IOT5
2949    5524  1335            TAD IOTSTR
2950    5525  3743            DCA I ITAB5     /SAVE IOT5
2951    5526  2335            ISZ IOTSTR      /INCREMENT FOR IOT6
2952    5527  1335            TAD IOTSTR
2953    5530  3744            DCA I ITAB6     /SAVE IOT6
2954    5531  2335            ISZ IOTSTR      /INCREMENT FOR IOT7
2955    5532  1335            TAD IOTSTR
2956    5533  3745            DCA I ITAB7     /SAVE IOT7
2957    5534  5677            JMP I CNGMAN    /RETURN
2958                  /
2959    5535  0000    IOTSTR, 0
2960                  /
2961    5536  3201    ITAB0,  IOT0
2962    5537  3206    ITAB1,  IOT1
2963    5540  3217    ITAB2,  IOT2
2964    5541  3226    ITAB3,  IOT3
2965    5542  3233    ITAB4,  IOT4
2966    5543  3240    ITAB5,  IOT5
2967    5544  3254    ITAB6,  IOT6
2968    5545  3261    ITAB7,  IOT7
2969                  /
2970    5564  0770
2971    5565  0400
2972    5566  5237
2973    5567  0007
2974    5570  5303
2975    5571  5200
2976    5572  5600
2977    5573  7774
2978    5574  0107
2979    5575  5000
2980    5576  0336
2981    5577  5007
              5600    PAGE
2982                  /
2983    5600  0000    ROTCNT, 0
2984                  /
2985                  /
2986    5601  7300    MONITR, CLA CLL

2987    5602  4777'           JMS CRLF
2988    5603  1376            TAD (336
2989    5604  4775'           JMS PRNT1
2990    5605  1374            TAD (103
2991    5606  4775'           JMS PRNT1
2992    5607  4467            MESAGE
2993    5610  6146            MONRET
2994    5611  5612            JMP I .+1
```



```
2995    5612  7600            7600
2996    5613  7402            HLT
2997                  /
2998                  /
2999                  /
3000                  /
3001                  /ROUTINE TO ECHO A CTRL-T
3002                  /
3003    5614  4777'   TECHO,  JMS CRLF
3004    5615  7300            CLA CLL
3005    5616  1376            TAD (336        /GET UPARROW CODE
3006    5617  4775'           JMS PRNT1
3007    5620  1373            TAD (124        /GET T
3008    5621  4775'           JMS PRNT1
3009    5622  5223            JMP TSELCT
3010                  /
3011                  /ROUTINE TO SELECT A TEST USING PSUEDO SWITCH REGISTER
3012                  /THIS ROUTINE WAITS FOR A CTRL-G, ASKS SR= QUESTION,
3013                  /ACCEPTS TEST NUMBER IN BITS 6-11 OF PSUEDO SWITCH
3014                  /REGISTER, AND STARTS THE DIAGNOSTIC FROM TEST NUMBER
3015                  /SELECTED.
3016                  /
3017    5623  4466    TSELCT, CBACTV
3018    5624  5230            JMP TPSUDO
3019    5625  4465            LAS
3020    5626  5244            JMP TSET
3021    5627  4444            ECHO
3022    5630  6030    TPSUDO, KCF             /CLEAR KEYBOARD FLAG
3023    5631  6031            KSF             /TEST KYBD FLAG
3024    5632  5231            JMP .-1         /WAIT FOR A CHARACTER
3025    5633  7300            CLA CLL
3026    5634  6034            KRS             /READ KYBD BUFFER, DO NOT CLEAR FLAG
3027    5635  0372            AND (177        /MASK TO 7 BITS
3028    5636  1371            TAD (-7         /IS IT CTRL-G?
3029    5637  7640            SZA CLA         /SKIP IF YES
3030    5640  5227            JMP TPSUDO-1    /NO, CONTINUE WAITING
3031    5641  4452            KBCHK           /HANDLE A CTRL-G
3032    5642  7300            CLA CLL
3033    5643  1020            TAD 20          /GET PSUEDO SWITCH REGISTER
3034    5644  0370    TSET,   AND (77         /MASK BITS 6-11
3035    5645  1367            TAD (STRTAB     /CALCULATE STARTING ADDRESS
3036    5646  3252            DCA TPOINT      /SAVE POINTER
3037    5647  1652            TAD I TPOINT
3038    5650  3253            DCA GOTEST      /SAVE STARTING ADDRESS
3039    5651  5653            JMP I GOTEST    /GO TO THE SELECTED TEST
3040                  /
3041    5652  0000    TPOINT, 0               /TEST TABLE POINTER
3042    5653  0000    GOTEST, 0               /TEST ADDRESS POINTER
3043                  /
3044    5654  0205    STRTAB, START+1         /GO TO BEGINNING OF DIAGNOSTIC
3045    5655  0400            TST1
3046    5656  0412            TST2
3047    5657  0424            TST3
3048    5660  0437            TST4
3049    5661  0452            TST5
```

```
3050    5662  0464            TST6
3051    5663  0476            TST7
3052    5664  0510            TST10
3053    5665  0523            TST11
3054    5666  0536            TST12
3055    5667  0550            TST13
3056    5670  0600            TST14
3057    5671  0612            TST15
3058    5672  0625            TST16
3059    5673  0640            TST17
3060    5674  0654            TST20
3061    5675  0666            TST21
3062    5676  0674            TST22
3063    5677  0702            TST23
3064    5700  0710            TST24
3065    5701  0725            TST25
3066    5702  0740            TST26
3067    5703  0746            TST27
3068    5704  0760            TST30
3069    5705  1000            TST31
3070    5706  1012            TST32
3071    5707  1024            TST33
3072    5710  1036            TST34
3073    5711  1050            TST35
3074    5712  1071            TST36
3075    5713  1114            TST37
3076    5714  1137            TST40
3077    5715  1200            TST41
3078    5716  1223            TST42
3079    5717  1246            TST43
3080    5720  1264            TST44
3081    5721  1400            TST45
3082    5722  1432            TST46
3083    5723  1476            TST47
3084    5724  1600            TST50
3085    5725  2000            TST51
3086    5726  2045            TST52
3087    5727  2200            TST53
3088    5730  2255            TST54
3089    5731  2400            TST55
3090    5732  2466            TST56
3091    5733  2555            TST57
3092    5734  2600            TST60
3093    5735  0205            START+1
3094    5736  0205            START+1
3095    5737  0205            START+1
3096    5740  0205            START+1

3097    5741  0205            START+1
3098    5742  0205            START+1
3099    5743  0205            START+1
3100    5744  0205            START+1
3101    5745  0205            START+1
3102    5746  0205            START+1
3103    5747  0205            START+1
3104    5750  0205            START+1
```



```
3105    5751  0205            START+1
3106    5752  0205            START+1
3107    5753  0205            START+1
3108    5767  5654
3109    5770  0077
3110    5771  7771
3111    5772  0177
3112    5773  0124
3113    5774  0103
3114    5775  5000
3115    5776  0336
3116    5777  5007
              6000      PAGE
3117                    /
3118                    /***********************************
3119                    /
3120                    /  START OF MESSAGES
3121                    /
3122                    /***********************************
3123                    /
3124    6000  4327      WAITNG, TEXT    "#WAITING#"
        6001  0111
        6002  2411
        6003  1607
        6004  4300
3125    6005  4314      LSTERR, TEXT    "#LQP-8 STATUS ERROR#"
        6006  2120
        6007  5570
        6010  4023
        6011  2401
        6012  2425
        6013  2340
        6014  0522
        6015  2217
        6016  2243
        6017  0000
3126    6020  4304      DSCEQL, TEXT    "#DSC= "
        6021  2303
        6022  7540
        6023  0000
3127    6024  4340      PCEQL,  TEXT    "# PC= "
        6025  2003
        6026  7540
        6027  0000
3128    6030  4040      ACEQL,  TEXT    "     AC= "
        6031  4040
        6032  4001
        6033  0375
        6034  4000
3129    6035  4040      MQEQL,  TEXT    "     MQ= "
        6036  4040
        6037  4015
        6040  2175
        6041  4000
3130    6042  4040      FLEQL,  TEXT    "     FL= "
```

```
                6043  4040
                6044  4006
                6045  1475
                6046  4000
3131            6047  4040    SREQL,  TEXT    "     SR= "
                6050  4040
                6051  4023
                6052  2275
                6053  4000
3132            6054  4305    EXPECT, TEXT    "#EXPECTED= "
                6055  3020
                6056  0503
                6057  2405
                6060  0475
                6061  4000
3133            6062  4040    ACTUAL, TEXT    "     ACTUAL= "
                6063  4040
                6064  4001
                6065  0324
                6066  2501
                6067  1475
                6070  4000
3134            6071  4314    LDATER, TEXT    "#LQP-8 DATA ERROR#"
                6072  2120
                6073  5570
                6074  4004
                6075  0124
                6076  0140
                6077  0522
                6100  2217
                6101  2243
                6102  0000
3135            6103  4023    SENT,   TEXT    " SENT: "
                6104  0516
                6105  2472
                6106  4000
3136            6107  4022    RCVD,   TEXT    " RECEIVED: "
                6110  0503
                6111  0511
                6112  2605
                6113  0472
                6114  4000
3137            6115  4304    FAIL,   TEXT    "#DHLQA FAILED#"
                6116  1014
                6117  2101
                6120  4006
                6121  0111

                6122  1405
                6123  0443
                6124  0000
3138            6125  4305    ENDLOG, TEXT    "#END OF LOGIC TEST#"
                6126  1604
                6127  4017
                6130  0640
                6131  1417
```



```
                6132  0711
                6133  0340
                6134  2405
                6135  2324
                6136  4300
3139            6137  4320    PASCNT, TEXT    "#PASS COUNT= "
                6140  0123
                6141  2340
                6142  0317
                6143  2516
                6144  2475
                6145  4000
3140            6146  4322    MONRET, TEXT    "#RETURN TO MONITOR#"
                6147  0524
                6150  2522
                6151  1640
                6152  2417
                6153  4015
                6154  1716
                6155  1124
                6156  1722
                6157  4300
3141            6160  4314    MANDEC, TEXT    "#LQP-8 PRINTER DIAGNOSTIC  MAINDEC-08-DHLQA#"
                6161  2120
                6162  5570
                6163  4020
                6164  2211
                6165  1624
                6166  0522
                6167  4004
                6170  1101
                6171  0716
                6172  1723
                6173  2411
                6174  0340
                6175  4015
                6176  0111
                6177  1604
                6200  0503
                6201  5560
                6202  7055
                6203  0410
                6204  1421
                6205  0143
                6206  0000
3142                        /
3143                        /START OF CHARACTER BUFFER STORAGE AREA
3144                        /
3145                7000    *7000
3146            7000  0000  BUFF,   0
3147                        /
3148            7001  0000  ZBLOCK  144
3149            7145  0000  BUFF1,  0
3150                        /
3151            7146  0000  ZBLOCK  144
```

```
 3152                   /
 3153                   $$$
```



```
0000  11110000  11110000  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  11111111  11111111  11111111  11100000  00000000  00000000  00000000

0200  11111111  11111111  11111111  11111111  11111111  11111100  00000000  00000000
0300  00000000  00000000  00000000  00000000  00000000  00000000  00000000  11111111

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11100000  00000001

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11100001


1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11100111  11111111

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111110  01111111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111000  00000000  00000000  00000000  00111111

1600  11111111  11111111  11111111  11111111  11111100  00000000  00000000  00000000
1700  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000111


2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111000  00000000  00000000  00000000  00111111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111100  00000000  00000000  00000000  00000000  00000000  00000011  11111111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  01111111

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11000000  00000000  00000000  01111111  11111111


3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11100000  00000000  00000000  00000111  11111111

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111111  11110000  00000111

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11110000  00000000  00000000  00000000  00000000  00001111

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111000  00000000  00000000  00000000  00000000  00000000  00000000  00001111
```

```
4000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4100  11111111  11111111  11111111  11111111  11111111  00000000  00000000  00011111

4200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4300  11111111  11111111  11111111  11110000  00000000  00000000  00000000  00011111

4400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4500  11111111  11111111  11111111  11111111  11111111  11111111  11111110  00011111

4600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
4700  11111111  11111111  11111111  11111111  10000000  00000000  11111111  11111111


5000  11111111  11111111  11111111  11111111  11111000  00000000  00000000  00000000
5100  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00111111

5200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5300  11111111  11111111  11111111  11111111  11111111  00000001  11111111  11111111

5400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5500  11111111  11111111  11111111  11111111  11111100  00000000  00001111  11111111

5600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
5700  11111111  11111111  11111111  11111111  11111111  11110000  00000001  11111111


6000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
6100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

6200  11111110  00000000  00000000  00000000  00000000  00000000  00000000  00000000
6300  00000000  00000000  00000000  00000000  00000000  00000000  00000000  00000000

6400
6500

6600
6700


7000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

7200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
7300  11111111  11000000  00000000  00000000  00000000  00000000  00000000  00000000


7400
7500

7600
7700
```



```
ACEOL   6030        CRLF    5007        INDX10  0010        LINCNT  0115
ACRSTR  4205        CRLFRT  4471        INDX11  0011        LINE    0131
ACSAVE  4200        CRMOV   4441        INDX12  0012        LINEND  4454
ACSV    4626        CROUT   5217        INDX13  0013        LINES   0132
ACTUAL  6062        CSWTCH  3111        INDX14  0014        LININ   3112
ACTVC8  4306        CTLCHK  4445        INIT    3421        LINKSV  4627
ADDRS1  0001        DATERR  4437        INSOW   0237        LINLST  4546
ADDRS2  0002        DATPRT  3457        INTFLG  0116        LMOVEB  3045
ADDRS3  0003        DBLOAD  3265        INTST   4436        LOADDB  4435
ADELAY  5244        DCOUNT  5273        INTSVC  4000        LOCO    0000
ALRDY   7400        DELAY   4443        IOT0    3201        LOOPC   1366
AWAIT   4033        DELAYN  5271        IOT1    3206        LQP56A  2504
BGNTST  4433        DIR60A  3055        IOT2    3217        LQP56B  2534
BSW     7002        DIR60B  3060        IOT3    3226        LP60B   2632
BUFF    7000        DIRECT  4466        IOT4    3233        LP60C   2653
BUFF1   7145        DLOP    5251        IOT5    3240        LPLFT   0100
C2525   0112        DOTCNT  2725        IOT6    3254        LQBLK   0002
C5282   0111        DSCEQL  6020        IOT7    3261        LQCAR   1000
CBACTV  4466        DSCNOW  0142        IOTCNG  5456        LQCHK   0040
CBSWCK  5400        DSWTCH  1645        IOTMES  5470        LQCHR   2000
CAF     6007        ECHO    4444        IOTSTR  5535        LQDON   3400
CAL60   3000        ELIN55  2451        ITAB0   5536        LQIEN   0001
CARDIR  0126        ENDLIN  4534        ITAB1   5537        LQLS    4431
CARLFT  4000        ENDLOG  6125        ITAB2   5540        LQLSRT  3246
CARMAG  4477        ENDTST  4440        ITAB3   5541        LQMC    4426
CARMOV  4400        ERD1    3451        ITAB4   5542        LQMCRT  3223
CARRGT  0000        ERD2    3504        ITAB5   5543        LQMP    4425
CHAR    0124        ERD3    3511        ITAB6   5544        LQMPRT  3214
CHARRT  0125        ERRDAT  3430        ITAB7   5545        LQOUT   0020
CHKCTL  4630        ERRLOP  3427        K003    0104        LQPAR   0400
CHKKB   4610        ERROR   4434        K007    0105        LQPC    4427
CHKRDY  3312        ERRORS  3600        K021    0106        LQPCRT  3232
CHRCNT  0136        ERRPRT  3636        K023    0107        LQRB    4424
CHRROT  4526        ERRS1   3625        K6000   0110        LQRBRT  3205
CKVT78  0247        ERRS2   3665        KBCHK   4452        LQRDY   4000
CLR56A  2472        ERRS3   3672        KBCRLF  5200        LQRE    4432
CLR56B  2526        ERS1    4232        KBOUT   4621        LQRED   0004
CNGWAN  5477        ERS2    4266        KBSAV   0137        LQRERT  3260
CNT56A  2553        ERS3    4273        KBSV    5236        LQRS    4430
CNT56B  2554        ERSTAT  4213        KCF     6030        LQRSRT  3237
CNT60A  2726        EXIT    4104        KIE     6035        LQSK    4423
CNT60B  2727        EXPECT  6054        LAS     4465        LQSKRT  3200
COL60A  2722        FAIL    6115        LASRT   5274        LSPACE  4463
COL60B  2723        FEEDA   3005        LDATER  6071        LSTART  1532
COL60C  2724        FIRST   0134        LEND    1533        LSTERR  6005
COLCAL  3026        FLAGS   4024        LF      0130        LSTLIN  4460
COLTN   3113        FLEQL   6042        LFOUT   5225        M23     5272
COMP1   3311        FSTCHR  0135        LFTCR   4450        MAG     4467
COUNT   4061        GOADD   0231        LIN46   1475        MAG46   1456
COUNT1  4062        GOBAK   5235        LIN60A  2717        MAG60A  3056
COUNT2  4110        GOTEST  5653        LIN60B  2720        MAG60B  3061
COUNT3  4111        GTF     6004        LIN60C  2721        MANCNG  4471
```

```
MANDEC  6160    PLP52D  2071    SAVEAC  4447    TST24   0710
MESAGE  4467    PLP53A  2212    SAVFLG  0103    TST25   0725
MESLP   4707    PLP53B  2227    SAVGEN  4473    TST26   0740
MESPRT  4702    PLP54   2264    SAVLNK  0101    TST27   0746
MUNTTR  5601    PLP55   2405    SAVMOV  0121    TST3    0424
MONRET  6146    POS45   1431    SAVMQ   0102    TST30   0760
MOV60   3054    PRADV   0000    SAVMV   0120    TST31   1000
MOVCAR  4455    PRINT   4464    SAVPOS  0140    TST32   1012
MOVCR   4456    PRNT1   5000    SAVPR   0123    TST33   1024
MOVE    4465    PRRET   4000    SENT    6103    TST34   1036
MOVLFT  4421    PRTCNT  5043    SLOOP   4073    TST35   1050
MOVMAG  0141    PRTREG  5016    SPACE   0127    TST36   1071
MOVPAR  4457    PSRLOP  5433    SPACEL  4600    TST37   1114
MOVRGT  4411    PSRSV1  5453    SPACER  4557    TST4    0437
MQ      4013    PSRSV2  5454    SPL     6102    TST40   1137
MQA     7501    PSUEDO  5414    SPSIZL  4606    TST41   1200
MQEQL   6035    PSWCH   5455    SPSIZR  4565    TST42   1223
MQL     7421    PSWR    0020    SREGL   6047    TST43   1246
MSRCHT  4721    QCONT   5340    SSTOP   5317    TST44   1264
MVWAIT  4432    RAN1    4144    START   0204    TST45   1400
NE50A   1631    RAN2    4145    STARTB  0233    TST46   1432
NE50B   1640    RANAD1  2714    STATER  4451    TST47   1476
NE51A   2026    RANAD2  2715    STMASK  0076    TST47A  1530
NE51B   2043    RANAD3  2716    STPRNT  4243    TST5    0452
NE52A   2103    RANDOM  4472    STRTAB  5654    TST50   1600
NE52B   2116    RCVD    6107    STRTIN  4012    TST51   2000
NE52C   2132    RDYCHK  4446    SVAC    0077    TST52   2045
NE53A   2251    REGCON  5044    SVSTAT  0114    TST53   2200
NE53B   2253    REGLOP  5025    SWAIT   4442    TST54   2255
NE54A   2277    REGPRT  4470    SWRERR  5237    TST55   2400
NUM60A  2730    RESADD  4023    TECHO   5614    TST56   2466
NUM60B  2731    RESGEN  4474    TLOOP1  3456    TST57   2555
OCTCHK  5303    RESTLP  3114    TLOOP2  3635    TST6    0464
OP1SEL  0021    RESTOR  3351    TLOOP3  4242    TST60   2600
OP2SEL  0022    RESTRT  4015    TPOINT  5652    TST7    0476
PARMAG  4505    RETA    3017    TPSUDO  5630    TSTBGN  3400
PARMOV  4316    RIBBON  3117    TSELCT  5623    TSTEND  3342
PASCNT  6137    RIBN52  2134    TSET    5644    TSTIN   3324
PASS    1365    RITCR   4457    TST1    0400    TSTLOP  3350
PC      4014    RMOST   1534    TST10   0510    TYPECH  4722
PCEQL   6024    RMOVEB  3033    TST11   0523    V78OW1  3270
PCOUNT  2465    ROTCHR  4453    TST12   0536    V78OW2  3301
PLP45   1413    ROTCNT  5600    TST13   0550    VT78CK  4475
PLP46A  1443    RSPACE  4462    TST14   0600    WAIT    4441
PLP46B  1444    RSTART  0232    TST15   0612    WAITNG  6000
PLP47   1506    RSTRAC  4450    TST16   0625    WAITS   4063
PLP50   1610    RTF     6005    TST17   0640    WATOUT  4055

PLP51A  2011    SAV1    4146    TST2    0412    WLOOP   4044
PLP51B  2013    SAV2    4147    TST20   0654    WSTAT   0133
PLP52A  2053    SAVAC   0100    TST21   0666    XCRLF   4461
PLP52B  2057    SAVADD  0230    TST22   0674    XCT1    3275
PLP52C  2065    SAVDAT  0122    TST23   0702    XDATA   0113
```



```
XECHO   4673
XLOTS   6506
XLOMC   6503
XLOMP   6502
XLOPC   6504
XLORB   6501
XLORE   6507
XLORS   6505
XLOSK   6500
XPRINT  4507
XRAND   4112
XPESGN  4135
XSAVGN  4126
XSTAT   0117
ZMOVEA  3015
ZMOVEB  3043
```

ERRORS DETECTED: 0

LINKS GENERATED: 88

RUN-TIME: 6 SECONDS

3K CORE USED

ACEQL 1496 3128#
ACRSTR 66 2189# 2194
ACSAVE 64 2181# 2185
ACSV 2495 2506 2508#
ACTUAL 2939 3133#
ACTVC8 94 2264# 2269 2270 2271
ADDRS1 5#
ADDRS2 5 6#
ADDRS3 7# 2044
ADELAY 56 2742# 2744 2746 2757 2758 2759 2760 2761
ALRDY 171#
AWAIT 52 2072# 2089 2092 2093
BGNTST 39# 896 926 968 1011 1059 1107 1179 1232 1275 1343 1401 1429
BSW 1544# 1491
BUFF 1344 1355 1376 1446 1480 3146#
BUFF1 1451 1487 3149#
C2525 121# 280 347 418
C5252 120# 276 343 414
C8ACTV 93# 204 848 862 865 1885 1960 2199 2498 2533 2909 3017
C8SWCK 2549 2735 2852#
CAF 146# 475 629 794 1805 1871
CAL60 1504 1541#
CARDIR 133# 2320 2321 2339
CARLFT 187# 2368 2389 2485
CARMAG 2387 2390#
CARMOV 76 2315# 2319 2324 2325 2332 2333 2346 2347
CARRGT 188# 2466
CHAR 131# 898 928 970 1013 1044 1069 1083 1086 1093 1109 1191 1192 1204
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CHARRI 132# 2406 2425
CHKCTL 60 2532# 2535 2537 2566
CHKKB 70 2494# 2507 2813
CHKRDY 62 1788# 1797
CHRCNT 141# 935 939 1862 2414 2435 2440
CHRPOI 72 2421# 2426
CKVT78 108 243# 247 248 249
CLR56A 1347# 1353
CLR56B 1365 1375# 1393
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CNT60B 1445 1470 1518#
COL60A 1441 1500 1513# 1597
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COL60C 1503 1515# 1563 1569 1571 1578 1580
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COMP1 1767 1778 1783#

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COUNT2 2106 2116 2125#
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ENDLOG 852 3138#
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ERRS3 2012# 2020
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ERS2 2226 2243#
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EXIT 2115 2121#
EXPECT 2935 3132#
FAIL 1989 3137#
FEEDA 1546#
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FLEQL 2004 3130#

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GTF 151# 1958
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INDX11 12# 1345 1347 1356 1368 1377 1381
INDX12 13#
INDX13 14#
INDX14 15#
INIT 1866 1871#
INSOW 217 231# 238
INTFLG 125# 814 819 829 833 842 1815 1859 2059 2077 2109
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INTSVC 6 2034#
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K021 117# 2551
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KBSAV 142# 1361 1366 2541 2542 2546 2550 2554 2558 2562
KBSV 2697 2698 2703 2727# 2787 2791 2796
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LASRT 92 2774# 2780

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LFTCR 2364#
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LINE 136# 1349 1370 2437
LINEND 73# 1021 1072 1119 1129 1198 1211 1241 1284 1293 1302 1311
LINES 137# 1015 1065 1111 1181 1238 1277 2451 2454
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LQCAR 162#
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LQMCRT 30 1708# 1712 1714
LQMP 27# 265 269 278 282 291 305 319 473 485 569 2293
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LQRDY 160#
LQRE 37# 528 533 615 952 1627 1806 1836 1872
LQRED 168#
LQRERT 38 1751# 1753 1755
LQRS 33# 555 643 649 666 675 688 697 710 719 745 754 768 777
789 795 834 1789
LQRSRT 34 1728# 1734

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LSPACE 87# 1042 1150
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LSTERR 2228 3125#
LSTLIN 81# 1030 1077 1133 1216 1246 1320
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MAG 2367 2375 2379#
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MAG60A 1551 1554 1560 1588#
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MANCNG 99# 2915 2920
MANDEC 908 3141#
MESAGE 95# 207 851 853 868 1323 1910 1912 1917 1922 1930 1988 1990 1995
1999 2003 2010 2227 2229 2234 2238 2246 2810 2859 2921 2992
MESLP 2588# 2597
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MOVRGT 2324#
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PASS 209 855 856 873#

PC 2040 2046#
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PLP52B 1117# 1148
PLP52C 1123# 1156
PLP52D 1127# 1161
PLP53A 1189# 1196 1217 1222
PLP53B 1202# 1209 1225
PLP54 1239# 1247 1257
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PRINT 89# 902 903 907 910 938 978 987 1020 1071 1118 1128 1197 1210
1240 1283 1292 1301 1310 1386 1606
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PRTCNT 2662 2674 2681#
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PSUEDO 2863 2870#
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PSWR 19# 2714 2721 2779
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RDYCHK 61# 1808 2081 2112
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RESTLP 1627#
RESTOR 1832# 1842 2565
RESTRT 7 2047#
RETA 1545 1556#
RIBBON 1641# 1652

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SLOOP 2112# 2117 2119
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SPACER 86 2461# 2468
SPL 147# 2035
SPSIZL 2483 2486#
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SSTOP 2557 2804#
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STARTB 212 223#
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SVAC 110# 293 307 321 360 374 388 431 445 459 1764 1765 1770 1894
1920 1955 1973 1997
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SWRERR 2731# 2790 2795 2900
TECHO 2561 3003#

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TLOOP2 1977 1981 1983#
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TPOINT 3036 3037 3041#

TPSUDO 3018 3022# 3030
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TSET 3020 3034#
TST1 223 262# 847 861 867 2918 2925 3045
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TST56 1343# 1385 3090
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TSTBGN 40 1854# 1857 1864 1867 1868 1870 1876

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V78OW2     237    1775#
VT78CK     107#    216     464     655
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WAITNG     869    1931    2011    2247    3124#
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WATOUT    2084    2090#
WLOOP     2081#   2086    2088
WSTAT      138#   1838    2078    2082    2286    2318    2404
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XDATA      122#
XECHO       58    2571#   2577
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XLQSK      174#   1681
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