LA180

PRINTER DIAGNOSTIC

MD-11-DZLAE-A

EP DZLAE A DL A

OCT 1976

digital

Made in U.S.A.

FICHE 1 OF 1

IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZLAE-A-D

PRODUCT NAME: LA180 PRINTER DIAGNOSTIC

DATE CREATED: NOVEMBER 1975

MAINTAINER: DIAGNOSTIC GROUP

AUTHOR: ROBERT BAKER

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1.0 ABSTRACT

THE DIAGNOSTICS FOR THE LA180 PRINTER ARE DESIGNED TO EXERCISE ALL AREAS OF THE PRINTER, SIMULATING WORSE CASE CONDITIONS TO DETECT BOTH MECHANICAL AND ELECTRICAL FAULTS. ADDITIONAL FACILITIES WITHIN THE DIAGNOSTIC PROGRAM WILL AID IN ISOLATION OF ANY FAULT CONDITIONS DETECTED.

OPERATION OF THE DIAGNOSTIC PROGRAM WILL BE CONTROLLED FROM THE PROCESSOR SWITCH REGISTER OR FROM AN AVAILABLE CONSOLE DEVICE. THE OPERATOR WILL BE GIVEN AS MUCH CONTROL OVER THE OPERATION OF THE PROGRAM AS POSSIBLE WHILE TRYING TO KEEP THE CONTROL SCHEME SIMPLE.

THIS DIAGNOSTIC PROGRAM WAS DESIGNED TO RUN IN 4K OR LESS OF MEMORY AND BE COMPATIBLE WITH ACT AND XXDP.

2.0 REQUIREMENTS

2.1 EQUIPMENT

THIS DIAGNOSTIC WAS WRITTEN TO RUN ON ALL MODELS OF THE PDP-11 PROCESSOR WITH A LA180 PRINTER USING A STANDARD PARALLEL INTERFACE. THE PROGRAM WILL USE A STANDARD CONSOLE DEVICE, IF AVAILABLE, FOR OPERATOR INSTRUCTIONS AND ERROR REPORTING. IT IS SUGGESTED THAT A CONSOLE DEVICE BE USED WHEN RUNNING THIS DIAGNOSTIC BUT IT IS NOT REQUIRED IF THE CPU HAS A HARDWARE SWITCH REGISTER. IF ANY NON-STANDARD ADDRESSES ARE USED FOR EITHER THE LA180 OR THE CONSOLE DEVICE, CHANGE THE ADDRESSES IN THE COMMON TAG AREA OF THE PROGRAM (STARTING AT LOCATION 1100).

2.2 STORAGE

THIS PROGRAM USES MOST OF 4K OF MEMORY WITHOUT AFFECTING THE AREA USED BY THE ABSOLUTE LOADER.

2.3 PRELIMINARY PROGRAMS

ALL APPLICABLE PDP-11 DIAGNOSTICS SHOULD BE RUN SUCCESSFULLY ON THE PROCESSOR.

3.0 LOADING PROCEDURE & INITIALIZATION

LOAD THE LA180 DIAGNOSTIC PROGRAM FOLLOWING NORMAL PROCEDURES.

IF A HARDWARE SWITCH REGISTER DOES NOT EXIST OR ALL SWITCHES ARE PLACED UP BEFORE STARTING THE DIAGNOSTIC, THE PROGRAM WILL USE THE CONTENTS OF LOCATION 176 AS THE VALUE OF THE SWITCHES. THEREFORE, WHEN USING THE SOFTWARE SWITCH REGISTER BE SURE TO LOAD LOCATION 176 WITH THE DESIRED SWITCH VALUE BEFORE STARTING THE PROGRAM. REFER TO SECTION 5.3 FOR DETAILS ON DYNAMIC SOFTWARE SWITCH REGISTER CONTROL.

REFER TO THE TEST ADDRESS TABLE IN THE PROGRAM LISTING FOR DETAILS ON CHANGING THE PRINTING TEST SEQUENCE OR DELETING TESTS FROM THE DIAGNOSTIC.

4.0 STARTING PROCEDURES

STARTING ADDRESSES:

200 = GENERAL START:
RUN OPERATOR INTERVENTION TESTS THEN ENTER PRINTING TEST SEQUENCE.

600 = RESTART:
ENTER PRINTING TEST SEQUENCE DIRECTLY SKIPPING OPERATOR INTERVENTION TESTS.

604 = GO DIRECTLY TO CONSOLE TERMINAL KEYBOARD CONTROL - SELECT TEST.

STARTING AT 200 WILL RUN THE ENTIRE DIAGNOSTIC PACKAGE. THE PROGRAM WILL FIRST EXECUTE THE OPERATOR INTERVENTION TESTS AND THEN ENTER THE PRINTING TEST SEQUENCE WHERE IT WILL LOOP CONTINUOUSLY. STARTING AT 600 (THE RESTART) WILL SKIP THE OPERATOR INTERVENTION TESTS AND ENTER THE PRINTING TEST SEQUENCE DIRECTLY. STARTING AT 604 WILL CAUSE THE PROGRAM TO GO DIRECTLY TO CONSOLE KEYBOARD CONTROL IF A CONSOLE DEVICE EXISTS, OTHERWISE, THE PROGRAM WILL HALT WAITING FOR A TEST SELECTION FROM THE SWITCH REGISTER. ALSO, BY PLACING THE HALT AND SELECT TEST SWITCH UP (1) BEFORE STARTING THE DIAGNOSTIC, THE DIAGNOSTIC WILL HALT WAITING FOR A TEST SELECTION FROM THE SWITCH REGISTER AFTER INITIALIZATION OF THE PROGRAM.

TO START THE DIAGNOSTIC PROGRAM; SET THE DESIRED STARTING ADDRESS IN THE SWITCH REGISTER AND DEPRESS LOAD ADDRESS, SET THE SWITCH REGISTER OPTIONS AS DESIRED (SEE SECTION 5.1), AND DEPRESS START. THE DIAGNOSTIC PROGRAM WILL NOW RUN IN THE MANNER SELECTED.

5.0 OPERATING PROCEDURES

5.1 SWITCH REGISTER CONTROLS

THE FOLLOWING, BASIC CONTROL FUNCTIONS ARE AVAILABLE THROUGH THE USE OF THE SWITCH REGISTER. IF A HARDWARE SWITCH REGISTER DOES NOT EXIST OR ALL SWITCHES WERE SET UP BEFORE STARTING THE DIAGNOSTIC, THE PROGRAM WILL USE THE CONTENTS OF LOCATION 176 AS THE VALUE OF THE SWITCH REGISTER. REFER TO SECTION 5.3 FOR DETAILS ON SSR CONTROL.

SWITCH	POSITION	FUNCTION
15	1 (UP)	STOP ON ERROR
	0 (DWN)	CONTINUE ON ERROR
14	1 (UP)	LOOP ON TEST
	0 (DWN)	NORMAL OPERATION
13	1 (UP)	INHIBIT ERROR TYPEOUT
	0 (DWN)	NORMAL OPERATION
11		MANUAL TIMING - OVER ALL PRINT SPEED TIMING
10	1 (UP)	BELL ON ERROR
	0 (DWN)	NORMAL OPERATION
09	1 (UP)	SINGLE CHAR - SCOPE ROUTINE
	0 (DWN)	FULL LINES
08	1 (UP)	HALT & SELECT TEST
	0 (DWN)	NORMAL OPERATION
07-00	# COLUMNS AT START UP.	
05-00	TEST SELECTION DURING DIAG.	
06-00	CHAR SELECTION FOR SCOPE ROUTINE	

5.1.1 SWITCH 15 - STOP ON ERROR

WITH THIS SWITCH UP (1), THE PROGRAM WILL HALT OR WAIT FOR A KEYBOARD ON ANY DETECTED ERROR. WHEN DOWN (0), THE PROGRAM WILL CONTINUE ON ERROR IF POSSIBLE.

5.1.2 SWITCH 14 - LOOP ON TEST

WITH THIS SWITCH UP (1), THE PROGRAM WILL CONTINUE TO LOOP ON THE CURRENT TEST UNTIL THIS SWITCH IS PLACED DOWN (0). AFTER RETURNING THIS SWITCH TO THE DOWN (0) POSITION, THE TEST WILL CONTINUE NORMAL OPERATION AT THE COMPLETION OF THE CURRENT TEST. THUS, WHENEVER THIS SWITCH IS DOWN (0), THE PROGRAM WILL CONTINUE NORMAL OPERATION.

5.1.3 SWITCH 13 - INHIBIT ERROR TYPEOUT

WHENEVER THIS SWITCH IS IN THE UP (1) POSITION, ERROR TYPEOUTS WILL NOT OCCUR.

5.1.4 SWITCH 11 - MANUAL TIMING

THIS SWITCH WILL BE USED TO MANUALLY TIME THE OVERALL PRINT SPEED OF THE LA180 PRINTER IF A CLOCK OPTION DOES NOT EXIST.

5.1.5 SWITCH 10 - BELL ON ERROR

PLACING THIS SWITCH UP (1) WILL CAUSE THE CONSOLE (IF AVAILABLE) TO RING A BELL WHENEVER AN ERROR CONDITION IS DETECTED IN THE LA180 PRINTER.

5.1.6 SWITCH 9 - SINGLE CHAR/FULL LINES CHAR

THIS SWITCH WILL BE USED TO SELECT WHETHER TO SEND ONLY A SINGLE CHARACTER OR FULL LINES OF CHARACTERS TO THE LA180 PRINTER DURING TEST 61 ONLY.

5.1.7 SWITCH 8 - HALT & SELECT TEST

THE PROGRAM WILL HALT WHENEVER THIS SWITCH IS PLACED IN THE UP (1) POSITION. AT THAT TIME, SET THE DESIRED TEST NUMBER IN THE PROPER POSITION IN THE PROCESSOR SWITCH REGISTER.

TO START THE NORMAL TEST SEQUENCE WITH THE SELECTED TEST, PLACE THE HALT AND SELECT TEST SWITCH DOWN (0) THEN DEPRESS THE CONTINUE SWITCH.

TO RUN A SELECTED TEST ONCE AND HALT, LEAVE THE HALT AND SELECT TEST SWITCH UP (1) AND DEPRESS CONTINUE. THE PROGRAM WILL EXECUTE ONE COMPLETE PASS OF THE SELECTED TEST, THEN HALT WAITING FOR ANOTHER TEST SELECTION. TO HALT THE PROGRAM DURING EXECUTION OF THE SELECTED TEST, PLACE THE HALT & SELECT TEST SWITCH DOWN (0) AT ANY TIME. THE PROGRAM WILL HALT AT THE COMPLETION OF THE CURRENT OPERATION AND WAIT FOR ANOTHER TEST SELECTION.

5.1.8 SELECTION OF NUMBER OF COLUMNS

THESE SWITCHES WILL BE USED WHEN THE PROGRAM IS FIRST STARTED TO INPUT THE DESIRED, MAXIMUM NUMBER OF COLUMNS THE DIAGNOSTIC IS TO TEST. THE NUMBER SET MUST BE IN OCTAL AND BE EQUAL TO OR GREATER THAN 2 AND LESS THAN OR EQUAL TO 132(10). IF THE SWITCHES ARE NOT SET WITHIN THESE SET LIMITS, THE PROGRAM WILL DEFAULT TO TESTING 132(10) COLUMNS. THUS, LEAVING THESE SWITCHES DOWN (000) THE PROGRAM WILL AUTOMATICALLY TEST THE FULL 132(10) COLUMNS.

5.1.9 TEST SELECTION

THESE SWITCHES WILL BE USED TO SELECT A DESIRED TEST WHENEVER THE HALT AND SELECT TEST SWITCH IS USED TO HALT THE DIAGNOSTIC PROGRAM.

5.2 CONSOLE TERMINAL - KEYBOARD CONTROL

WHENEVER A CONSOLE TERMINAL IS DETERMINED TO BE AVAILABLE BY THE PROGRAM, THE DIAGNOSTIC WILL BE CAPABLE OF BEING CONTROLLED FROM THE KEYBOARD OF THE CONSOLE DEVICE. TYPING A RUBOUT (DEL) ON THE CONSOLE KEYBOARD AT ANY TIME WILL CAUSE THE PROGRAM TO STOP AND PRINT THE FOLLOWING MESSAGE ON THE CONSOLE DEVICE:

SELECT TEST #:

TYPE ANY LEGAL TEST NUMBER FOLLOWED BY ONE OF THE FOLLOWING CONTROL CHARACTERS AND A CARRIAGE RETURN:

CHARACTER	FUNCTION
. (PERIOD)	RUN TEST ONCE & RETURN TO TEST SELECTION
L	LOOP ON SELECTED TEST
S	START SEQUENCE WITH SELECTED TEST

THE L AND S MAY BE EITHER UPPER OR LOWER CASE BUT TEST NUMBERS MUST ALWAYS BE ENTERED AS 2 DIGIT NUMBERS.

TO RESET THE DESIRED MAXIMUM NUMBER OF COLUMNS, TYPE A CONTROL-C (↑C) ON THE CONSOLE TERMINAL KEYBOARD AT ANY TIME, THE FOLLOWING MESSAGE WILL BE TYPED ON THE CONSOLE DEVICE:

COLUMNS =

TYPE IN THE DESIRED NUMBER OF COLUMNS (IN DECIMAL) ON THE CONSOLE KEYBOARD FOLLOWED BY A CARRIAGE-RETURN. IF THE SELECTED NUMBER IS LESS THAN 2 OR GREATER THAN 132(10) THE MESSAGE WILL BE REPEATED AND YOU MUST RENTER THE NUMBER OF COLUMNS. WHEN A CORRECT NUMBER IS ENTERED, THE PROGRAM WILL THEN ASK FOR A TEST SELECTION AS DESCRIBED PREVIOUSLY IN THIS SECTION.

TO CHANGE THE NUMBER OF COLUMNS WHEN WAITING FOR A TEST SELECTION, TYPE A CONTROL-C FOLLOWED BY A CARRIAGE RETURN. WHILE INPUTTING A TEST SELECTION OR COLUMN NUMBER THE RUBOUT (DEL) KEY MAY BE USED TO DELETE INCORRECT ENTRIES. AT ALL TIMES SWITCH REGISTER CONTROL WILL STILL BE EFFECTIVE, EVEN IF USING CONSOLE TERMINAL KEYBOARD CONTROL.

5.3 DYNAMIC SOFTWARE SWITCH REGISTER CONTROL

WHENEVER A CONSOLE TERMINAL IS AVAILABLE AND A HARDWARE SWITCH REGISTER IS NOT AVAILABLE (OR ALL SWITCHES WERE UP WHEN THE PROGRAM WAS STARTED), THE PROGRAM WILL RECOGNIZE THE FOLLOWING DYNAMIC SOFTWARE SWITCH REGISTER CONTROL:

TYPING A CONTROL-G (BEL) AT ANY TIME DURING PROGRAM EXECUTION, EXCEPT WHEN WAITING FOR A TEST OR COLUMN NUMBER SELECTION, WILL CAUSE THE DIAGNOSTIC TO STOP THE CURRENT TEST AND TYPE THE FOLLOWING MESSAGE ON THE CONSOLE DEVICE:

SWR = XXXXXX NEW =

WHERE XXXXXX IS THE CURRENT CONTENTS OF THE SOFTWARE SWITCH REGISTER (SSR) IN OCTAL. THE SOFTWARE CONTROL ROUTINE WILL THEN AWAIT OPERATOR ACTION. THE OPERATOR IS THEN REQUIRED TO TYPE ONE OR MORE OF THE LEGAL CHARACTERS 1) 0-7, 2) LINE FEED <LF>, 3)CARRIAGE RETURN <CR>, OR 4) CONTROL-U (↑U). NO CHECK IS MADE FOR CHARACTER LEGALITY. IF THE INPUT CHARACTER IS NOT A LF, CR, OR ↑U IT IS ASSUMED TO BE AN OCTAL DIGIT AND WILL BE ECHOED AS THE DIGIT THAT IS GOING TO BE STORED IN THE SWITCH SETTING.

TO CHANGE THE CONTENTS OF THE SSR THE OPERATOR SIMPLY TYPES THE NEW DESIRED VALUE IN OCTAL, LEADING ZEROS NEED NOT BE TYPED. AND TERMINATES THE INPUT STRING WITH A <CR> OR <LF> DEPENDING ON THE PROGRAM ACTION DESIRED AS DESCRIBED BELOW. THE INPUT VALUE WILL BE TRUNCATED TO THE LAST 6 DIGITS TYPED. AT LEAST ONE DIGIT MUST BE TYPED PRIOR TO THE TERMINATOR BEFORE A CHANGE TO THE SSR WILL OCCUR.

WHEN THE INPUT STRING IS TERMINATED WITH A <CR> THE DIAGNOSTIC WILL CONTINUE EXECUTION FROM THE POINT AT WHICH IT WAS INTERRUPTED. IF A <CR> IS THE ONLY THING TYPED, THE PROGRAM WILL CONTINUE WITHOUT CHANGING THE SSR. IF A <LF> IS USED TO TERMINATE THE INPUT STRING, THE PROGRAM WILL THEN ASK FOR A TEST SELECTION AS DESCRIBED IN SECTION 5.2.

IF A ↑U IS TYPED AT ANY POINT IN THE INPUT STRING PRIOR TO THE TERMINATOR, THE INPUT VALUE WILL BE DISREGARDED AND THE PROMPT MESSAGE WILL BE REPRINTED.

5.4 ERROR REPORTING

IF A CONSOLE TERMINAL EXISTS AND THE INHIBIT ERROR TYPEOUT SWITCH IS DOWN (0), WHENEVER AN ERRO ERROR IS DETECTED THE FOLLOWING ERROR MESSAGE WILL BE PRINTED ON THE CONSOLE DEVICE:

TEST #XX, PC=XXXXXX, ERROR #XXX, MESSAGE >>>>>>>>>>

THE ERROR MESSAGE INDICATES THE TEST NUMBER, THE LOCATION WHERE THE ERROR OCCURRED, THE ERROR NUMBER, AND THE TYPE OF ERROR THAT OCCURRED. FOR ADDITIONAL INFORMATION ON ANY ERROR CONDITION, REFER TO THE PROGRAM LISTING.

WHENEVER A CONSOLE TERMINAL IS NOT AVAILABLE THE HALT ON ERROR SWITCH SHOULD BE USED. AFTER AN ERROR OCCURS AND THE PROGRAM HALTS, EXAMINE THE CONTENTS OF $ERRPC TO FIND THE ADDRESS WHERE THE ERROR OCCURRED AND $ITEMB TO FIND THE ERROR NUMBER. THE TEST NUMBER WILL BE LOCATED IN EITHER THE HARDWARE OR SOFTWARE DISPLAY DEPENDING ON CPU TYPE. THEN REFER TO THE PROGRAM LISTING TO DETERMINE THE TYPE OF ERROR THAT OCCURRED AND TO FIND ANY ADDITIONAL INFORMATION REGARDING THAT ERROR. IF NEEDED, THE ERROR MESSAGES ARE LOCATED NEAR THE END OF THE PROGRAM LISTING.

6.0 TEST DESCRIPTIONS

6.1 OPERATOR INTERVENTION TESTS

THIS SERIES OF TESTS CONSISTS OF ALL TESTS NORMALLY EXECUTED WHICH COULD POSSIBLE REQUIRE OPERATOR INTERVENTION. THESE TESTS ARE EXECUTED ONLY ONCE EACH WHEN THE DIAGNOSTIC IS FIRST STARTED UP. A DETAILED DESCRIPTION OF EACH TEST FOLLOWS:

5.1.1 TEST 00 - INTERFACE & CONTROL TESTS

THIS TEST IS DESIGNED AS A COMMAND DECODE AND CONTROL INTERFACE TEST AND INCLUDES CHECKOUT OF THE PRINTER INTERRUPT FACILITY. MANUAL INTERVENTION IS REQUIRED TO TEST THE VARIOUS TESTABLE ERROR (NON-READY) CONDITIONS OF THE PRINTER. OPERATOR INSTRUCTIONS WILL BE PRINTED ON THE CONSOLE DEVICE IF AVAILABLE THEN THE PROGRAM WILL WAIT FOR THE OPERATOR TO COMPLETE THE ACTION. DEPRESS THE SPACE BAR ON THE CONSOLE KEYBOARD OR THE CONTINUE SWITCH ON THE CPU IF NO CONSOLE DEVICE IS AVAILABLE TO TEST THE NEXT CONDITION WHEN READY. IF ANY ERROR CONDITION EXISTS OR ANY NON-EXPECTED RESULTS ARE ENCOUNTERED, AN ERROR MESSAGE WILL BE PRINTED ON THE CONSOLE DEVICE IF AVAILABLE. (REFER TO SECTION 5.3 ON ERROR REPORTING.)

POWER SHOULD BE OFF ON THE LA180 BEFORE STARTING THIS TEST. THE PROGRAM WILL FIRST TEST THAT THE ERROR BIT IS SET AND THE PRINTER IS NOT READY WITH POWER OFF. AN INSTRUCTION WILL THEN ASK FOR THE PRINTER POWER TO BE TURNED ON. TURN POWER ON AND MAKE SURE THERE IS PAPER IN THE PRINTER AND THE PRINTER IS OFF LINE. THE DIAGNOSTIC WILL AGAIN CHECK THAT THE ERROR BIT IS SET AND THE PRINTER IS NOT READY. AN INSTRUCTION ON THE CONSOLE DEVIDE WILL NEXT INFORM THE OPERATOR TO TURN THE LA180 ON LINE. THE PROGRAM WILL NOW CHECK THAT THE ERROR BIT IS CLEAR AND THE PRINTER IS READY. THE NEXT PRINTED INSTRUCTION WILL HAVE THE OPERATOR FORCE A PAPER OUT CONDITION BY OPENING THE PAPER FEED TRACTORS AND REMOVING THE PAPER FROM THE PRINTER. THE DIAGNOSTIC WILL CHECK THAT THE ERROR BIT IS SET AND PRINTER IS NOT READY. THE LAST INSTRUCTION WILL ASK TO RESTORE THE PRINTER TO ON-LINE BY RE-INSERTING PAPER AND CLEARING THE ERROR CONDITION. MAKE SURE THE PRINTER IS SET TO ON-LINE BEFORE CONTINUING. THE PROGRAM WILL TEST TO SEE IF THE ERROR BIT IS CLEARED AND THE PRINTER IS READY.

THE LAST HALF OF THIS TEST WILL BE PERFORMED AUTOMATICALLY WITHOUT FURTHER MANUAL INTERVENTION REQUIRED. THE DIAGNOSTIC WILL ISSUE A RESET INSTRUCTION AND SEE THAT THE ERROR BIT IS CLEAR AND THE PRINTER IS READY. A CARRIAGE RETURN WILL BE LOADED TO THE PRINTER TO SEE IF LOADING THE CHARACTER BUFFER WILL CLEAR THE READY BIT. THE TEST WILL THEN CHECK THAT THE ERROR BIT IS CLEAR AND THE PRINTER READY BIT DOES SET WITHIN A REASONABLE AMOUNT OF TIME. THE FINAL TEST WILL CHECK THAT THE PRINTER WILL NOT INTERRUPT ABOVE PRIORITY LEVEL 3 AND WILL INTERRUPT AT ALL PRIORITY LEVELS BELOW LEVEL 4.

6.1.2 TEST 01 - TOP OF FORM SWITCH TEST

THIS TEST CHECKS ALL POSITIONS OF THE TOP OF FORM SWITCH. THE PROGRAM WILL PRINT INSTRUCTIONS FOR THE NEXT SETTING OF THE TOP OF FORM SWITCH ON THE CONSOLE TERMINAL (IF AVAILABLE) AND THEN WAIT FOR THE OPERATOR TO COMPLETE THE ACTION. AFTER SETTING THE SWITCH, DEPRESS THE SPACE BAR OF THE CONSOLE DEVICE (OR CONTINUE ON THE PROCESSOR IF NO CONSOLE DEVICE EXISTS) TO TEST THAT SWITCH POSITION. AFTER CHECKING ALL POSITIONS, THE PRINTER OUTPUT CAN BE VISUALLY VERIFIED. A LINE OF ALL DASHES IS PRINTED AS A STARTING POINT AND THEN LINES ARE PRINTED TO INDICATE THE PROPER SPACING (IN INCHES) FROM THE PREVIOUS LINE TO THAT LINE.

EXAMPLE:

```
------------------------------

----- 4.0 INCH FORM FEED -----
```

6.1.3 TEST 02 - PRINT SPEED TIMING TEST

THIS TEST IS DESIGNED TO TIME THE LA180 FOR ONE FULL MINUTE WHILE A SWIRL PATTERN IS PRINTED TO THE SELECTED MAXIMUM NUMBER OF COLUMNS. IF A LINE CLOCK OR A PROGRAMMABLE CLOCK OPTION IS DETERMINED TO BE AVAILABLE BY THE PROGRAM, IT WILL BE USED TO AUTOMATICALLY TIME THE PRINTER. WHEN NEITHER CLOCK OPTION IS AVAILABLE, MANUAL TIMING WILL BE USED AND OPERATING INSTRUCTIONS WILL BE TYPED ON THE CONSOLE DEVICE IF IT IS AVAILABLE. WHICHEVER METHOD OF TIMING IS USED, AT THE END OF ONE FULL MINUTE THE APPROXIMATE PRINT SPEED WILL BE PRINTED ON THE LA180 AND ALSO ON THE CONSOLE DEVICE (IF AVAILABLE). REMEMBER, THE PRINT SPEED IS DIRECTLY RELATED TO THE NUMBER OF COLUMNS BEING PRINTED. ALSO, THE CONTENTS OF ONE LOCATION IN MEMORY WILL HAVE TO BE CHANGED IF THE LINE FREQUENCY IS 50 HZ. AND A CLOCK OPTION IS BEING USED FOR TIMING.

6.2 PRINTING TESTS

THESE TESTS ARE DESIGNED AS A TEST OF THE PRINTING MECHANISM AND THE ASSOCIATED CONTROL LOGIC. AT THE BEGINNING OF EACH TEST, A TEST HEADER WILL INDICATE THE TEST NUMBER BEING EXECUTED. THE TEST PROGRAM CONTINUALLY MONITORS FOR PROPER OPERATION OF THE LINE PRINTER AFTER EACH PRINTER OPERATION HAS BEEN COMPLETED, THROUGH THE PRINTER "READY" LINE AND THE SETTING OF THE "DEMAND" FLAG. IT SHOULD BE NOTED, HOWEVER, THAT THE "DEMAND" RETURN FROM THE PRINTER IS CONDITIONAL UPON THE PRINTER "READY". SINCE THE PROCESSOR CAN ONLY DETECT THE CURRENT CONDITION OF THE "READY" AND "DEMAND" RETURN LINES IT IS NECESSARY TO EXAMIME THE PRINT PATTERNS PRODUCED BY THE VARIOUS TEST ROUTINES. EACH PATTERN HAS BEEN CHOSEN FOR EASE OF VISUAL VERIFICATION. DETAILED DESCRIPTIONS OF EACH TEST PATTERN APPEARS IN THE DESCRIPTION OF THE FOLLOWING TEST ROUTINES.

6.2.1 TEST 20 - DATA TRANSFER PATHS TEST

THIS TEST IS DESIGNED TO TEST THE DATA LINES TO AND THROUGH THE INTERFACE AND TO THE LA180 PRINTER. AN ALTERNATING BIT PATTERN IS SENT WHICH WILL PRINT ALTERNATING *'S AND U'S IN A CHECKERBOARD PATTERN TO THE MAXIMUM COLUMN WIDTH. THE STARTING CHARACTER FOR EACH LINE IS ALTERNATED AND A TOTAL OF 16 LINES ARE PRINTED.

EXAMPLE:

```
*U*U*U*U  .....  *U*U
U*U*U*U*  .....  U*U*
*U*U*U*U  .....  *U*U
U*U*U*U*  .....  U*U*
```

6.2.2 TEST 21 - HEAD POSITIONING TEST

THIS TEST CHECKS THE CARRIAGE RETURN FROM ALL EVEN NUMBERED COLUMNS AND THE SPACING OF THE SOLENOID HEAD FROM THE LEFT MARGIN. HOWEVER, THE PRIMARY PURPOSE OF THIS TEST IS TO TEST THE SOLENOID HEAD POSITION DECODER FOR PROPER OPERATION.

THE TEST PRINTS A FULL LINE OF ALTERNATING 0'S AND SPACES, STARTING WITH A 0. AT THE END OF THE LINE THE PRINT HEAD IS RETURNED TO THE LEFT MARGIN WITH A CARRIAGE RETURN. THE SPACES ARE THEN FILLED IN BY SPACING THE PRINT HEAD OUT FROM THE LEFT MARGIN TO THE FIRST SPACE, PRINTING AN "X", AND EXECUTING A CARRIAGE RETURN. THIS PATTERN IS REPEATED UNTIL THE LINE IS COMPLETED. CHECK TO SEE THAT ALL X'S ARE IN THE MIDDLE OF THE SPACE BETWEEN THE TWO ADJACENT ZEROES.

EXAMPLE:

```
0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X0X
```

6.2.3 TEST 22 - BACKSPACE TEST

THIS TEST IS DESIGNED TO CHECK THE BACKSPACE FEATURE OF THE LA180 PRINTER. TWO LINES OF X'S INTERSPACED WITH DASHES WILL BE PRINTED BY PRINTING A SLASH, EXECUTING A BACKSPACE, AND THEN PRINTING A BACKSLASH TO COMPLETE EACH X CHARACTER. A MAXIMUM OF 127 COLUMNS WILL BE PRINTED BY THIS TEST.

EXAMPLE:

```
X-X-X-X-X-X-X-X
X-X-X-X-X-X-X-X
```

6.2.4 TEST 23 - CHARACTER GENERATOR TEST

THIS TEST CHECKS THE SPACE ALL 94 PRINTABLE CHARACTERS (ASCII CODES 040 TO 176) BY PRINTING A SINGLE LINE, 30 CHARACTERS LONG, OF EACH CHARACTER.

EXAMPLE:

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
   .
   .
AAAÀAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBBBBBB
```

6.2.5 TEST 24 - NON-PRINTABLE CHARACTER TEST

THIS TEST IS DESIGNED TO TEST THE LA180 HANDLING OF NON-PRINTABLE CHARACTERS AND TO EXERCISE THE FULL RANGE OF THE CHARACTER STORAGE BUFFER. THE TEST PATTERN PRODUCED WILL BE A 30 LINE SWIRL PATTERN, CONSISTING OF FULL LINES OF THE ENTIRE PRINTABLE CHARACTER SET. IF THIS TEST IS LOOPED ON, THE PATTERN WILL CONTINUE A FULL SWIRL, RATHER THAN ONLY 30 LINES AND THEN REPEATING. AS THE SWIRL PATTERN IS PRODUCED, THE GROUP OF PRINTABLE CHARACTERS WILL BE SHIFTED (IN INCREMENTS DEPENDING ON THE NUMBER OF COLUMNS BEING TESTED) THROUGH THE FULL RANGE OF THE CHARACTER BUFFER, STARTING AT THE END OF THE BUFFER. NON-PRINTABLE CHARACTERS WILL BE USED TO FILL THE CHARACTER BUFFER BEFORE AND AFTER THE GROUP OF PRINTABLE CHARACTERS, FOR EACH PRINTED LINE. ALL NON-PRINTABLE CHARACTERS HAVING NO CONTROL FUNCTION WITHIN THE LA180 WILL BE USED.

EXAMPLE:

```
!"#$%&'()*+,-./0123456789:;<=>?@ABC....
"#$%&'()*+,-./0123456789:;<=>?@ABCD....
#$%&'()*+,-./0122456789:;<=>?@ABCDE....
```

6.2.6 TEST 25 - BUFFER TEST

THIS TEST IS DESIGNED TO TEST THE CHARACTER STORAGE BUFFER IN THE LA180 FOR PROPER OPERATION. THIS TEST WILL PRODUCE FOUR LINES OF PRINT WITH 2 BLANK LINES BETWEEN THE FIRST AND SECOND LINES. THE LINES PRINTED WILL ALSO SERVE AS A CHECK OF PRINTING THE CORRECT COLUMN WIDTH. THE PATTERNS ARE DESCRIBED FOR 132 COLUMNS BUT WILL BE SHORTENED ACCORDINGLY FOR NARROWER TEST WIDTHS. BEFORE THE FIRST LINE IS STORED, 16 E'S WILL BE LOADED INTO THE BUFFER. THEN A RUBOUT (177) WILL BE SENT TO CHECK THAT A RUBOUT WILL CLEAR THE BUFFER. BEFORE EACH OF THE LAST THREE LINES IS PRINTED AND BEFORE THE BLANK LINES BETWEEN THE FIRST AND SECOND PRINTED LINES, THE CHARACTER BUFFER WILL BE FILLED WITH ALL E'S. THUS, AN E PRINTED ANYWHERE IN THE TEST PATTERN INDICATES AN ERROR.

THE FIRST LINE WILL CONTAIN 100 ONES, 30 THREES, AND 2 TWOS. THE SECOND PRINTED LINE WILL CONTAIN 99 ZEROES AND 33 ONES. THE THIRD LINE WILL CONSIST OF THE NUMBERS 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, 1, 2, AND 3 IN GROUPS OF 10 CHARACTERS EACH (EXCEPT THE FIRST GROUP OF ZEROES WILL CONTAIN ONLY 9 CHARACTERS). THE LAST LINE WILL CONTAIN THE NUMBERS 1 TO 9 THEN 0 IN SUCCESSION, REPEATED TO THE MAXIMUM COLUMN.

THUS, THE COLUMN NUMBER MAY BE READ DIRECTLY BY READING THE NUMBERS IN ANY GIVEN COLUMN ON THE LAST THREE LINES, FROM TOP TO BOTTOM.

COLUMN 30 WOULD BE 0
0
3

COLUMN 132 WOULD BE 1
3
2

EXAMPLE:

```
11111111111111111111111111111111.....322

000000000000000000000000000000.....111
000000000111111111122222222233.....333
123456789012345678901234567890.....012
```

5.2.7 TEST 26 - OVERPRINT TEST

THIS TEST IS DESIGNED TO CHECK THE SPACING AND REPEATABLE PRINTING CHARACTERISTICS OF THE PRINTER. FOUR LINES OF CHARACTERS ARE EACH OVERPRINTED TWO TIMES. THE ROWS CONSIST OF THE FOLLOWING CHARACTERS ALTERNATED ACROSS THE LINE.

ROW 1 E - SP
ROW 2 SP - @
ROW 3 M - SP
ROW 4 SP - *

THE RESULTING PATTERN WILL BE A CHECKERBOARD PATTERN AND THE OVERPRINTED CHARACTERS SHOULD BE ALIGNED PROPERLY WITH THE INITIAL CHARACTERS.

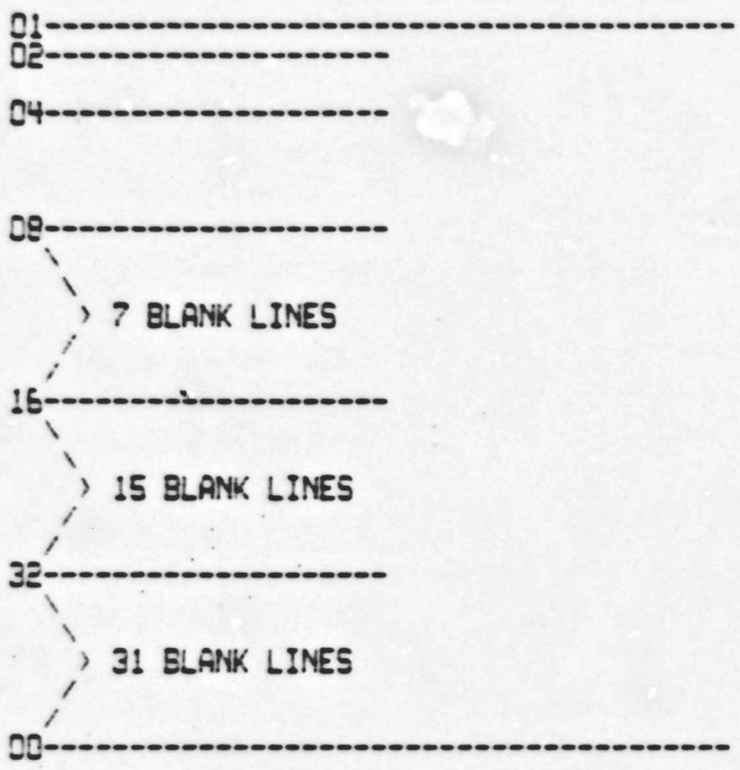
EXAMPLE:

```
E E E E E E E E E E
 @ @ @ @ @ @ @ @ @ @
M M M M M M M M M M
 * * * * * * * * * *
```

6.2.8 TEST 27 - MULTIPLE LINE FEED TEST

THIS TEST CHECKS THE LINE FEED CAPABILITY OF THE PRINTER BY SENDING VARIOUS GROUPS OF LINE FEEDS INTERSPACED WITH REFERENCE LINES. THE NUMBER PRINTED AT THE LEFT MARGIN OF THE REFERENCE LINE INDICATES THE NUMBER OF LINE FEEDS THAT FOLLOW. EACH LINE WILL CONTAIN A STRING OF DASHES AS REFERENCE POINTS FOR MEASURING, THE FIRST AND LAST BEING 132 CHARACTERS LONG (MAXIMUM) AND THE MIDDLE LINES BEING 30 CHARACTERS LONG.

EXAMPLE:



6.2.9 TEST 30 - RIBBON FEED TEST

THIS TEST CHECKS THE RIBBON FEED MECHANISM BY PRINTING A SINGLE COLUMN OF 24 LINES OF X'S DOWN THE LEFT HAND MARGIN OF THE PAGE. VISUALLY CHECK FOR PROPER OPERATION OF THE RIBBON FEED MECHANISM DURING THIS TEST.

EXAMPLE:

```
X
X
X
.
.
.
X
X
X
```

6.2.10 TEST 31 - BELL TEST

THIS TEST IS DESIGNED TO CHECK THE BELL CODE LOGIC AND THE TIMING SEQUENCE OF THE MICRO LOGIC. THE TEST WILL PRINT "BELL TEST" INTERSPACED WITH BELL CODES BETWEEN CHARACTERS AND THE FOLLOWING CARRIAGE RETURN AND LINE FEED FUNCTIONS. A TOTAL OF FIVE BELLS WILL BE SOUNDED. THIS TEST WILL ALSO AUDIBLY INDICATE AN END OF A COMPLETE PASS THROUGH THE PRINTING TEST SEQUENCE.

EXAMPLE:

```
<BEL> BELL <BEL> <SP> TEST <BEL> <CR>
<BEL> <LF> <BEL> <CR>
```

6.3 MAINTANANCE AIDS

THESE TESTS ARE PROVIDED AS ADDITIONAL DEBUGGING AND EXERCISING AIDS FOR THE LA180 PRINTER. A DETAILED DESCRIPTION OF EACH TEST FOLLOWS.

6.3.1 TEST 60 - LIFE TEST

THIS TEST RUNS CONTINUOUSLY AND IS RUN AS AN INDIVIDUAL, SPECIAL TEST, AND IS NOT PART OF THE STANDARD PRINTING TEST SEQUENCE. THIS TEST PRINTS 2 LINES OF EACH PRINTABLE CHARACTER AND THEN REPEATS CONTINUOUSLY. THE SECOND LINE OF EACH CHARACTER IS OVERPRINTED 4 TIMES TO CONSERVE PAPER. AT THE COMPLETION OF EACH PASS THROUGH THE ENTIRE PRINTABLE CHARACTER SET, THE PASS COUNT WILL BE PRINTED ON THE LA180.

TIME FOR A COMPLETE PASS, WITH 132 COLUMNS IS APPROXIMATELY 10 MINUTES.

EXAMPLE:

```
     AAAAAAAAAAAAAAAAAAA
     AAAAAAAAAAAAAAAAAAA
     BBBBBBBBBBBBBBBBBBB
     BBBBBBBBBBBBBBBBBBB
```

6.3.2 TEST 61 - SCOPE DRIVE ROUTINE

THE PURPOSE OF THIS TEST IS TO PROVIDE THE OPERATOR WITH A SHORT BUT COMPREHENSIVE SCOPE DRIVER ROUTINE FOR USE IN TROUBLE SHOOTING THE PRINTER AND INTERFACE CONTROL LOGIC WITH AN OSCILLISCOPE.

DEPENDING ON THE SETTING OF THE SINGLE CHAR/FULL LINE SWITCH OF THE SWITCH REGISTER (SWITCH 09) THIS TEST WILL EITHER CONTINUALLY SEND WHATEVER CHARACTER IS SET IN THE SWITCH REGISTER TO THE LINE PRINTER, OR ONLY SEND IT ONCE AND HALT. WHEN CONTINUOUSLY SENDING CHARACTERS, A LINE FEED WILL BE INSERTED AFTER THE MAXIMUM COLUMN COUNT IS REACHED TO PRINT THE LINE. WHEN SENDING SINGLE CHARACTERS, DEPRESS CONTINUE TO SEND THE CHARACTER SET IN THE SWITCH REGISTER. TO RESUME SENDING CONTINUOUS CHARACTERS, PLACE THE SINGLE CHAR/FULL LINE CONTROL SWITCH DOWN, SET THE DESIRED CHARACTER, AND DEPRESS CONTINUE. TO STOP SENDING CONTINUOUSLY PLACE THE SINGLE CHAR/FULL LINE SWITCH UP AND THE PROGRAM WILL HALT WAITING FOR A CHARACTER SELECTION. WHEN SENDING INDIVIDUAL CHARACTERS OR IF SENDING NON-PRINTABLE CHARACTERS, NO LINE FEEDS OR CARRIAGE RETURNS WILL BE INSERTED BY THE PROGRAM.

6.3.3 TEST 62 - LINE PRINT TEST

THIS TEST CONTINUOUSLY PRINTS FULL LINES OF WHATEVER CHARACTER IS TYPED ON THE CONSOLE KEYBOARD. TO CHANGE CHARACTERS, RESELECT THIS TEST AND TYPE ANOTHER CHARACTER. AN ERROR MESSAGE WILL BE PRINTED ON THE LA180 IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST.

6.3.4 TEST 63 - CHARACTER PRINT TEST

THIS TEST LOADS WHATEVER CHARACTER IS TYPED ON THE CONSOLE KEYBOARD TO THE LA180, CHARACTER BY CHARACTER. ALL TYPED CHARACTERS ARE ECHOED TO THE CONSOLE DEVICE AS THEY ARE LOADED TO THE LA180. EXTRA CARRIAGE RETURNS OR LINE FEEDS ARE ECHOED TO THE CONSOLE DEVICE TO AVOID OVERPRINTING LINES. IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST AN ERROR MESSAGE WILL BE PRINTED ON THE LA180.

H02

```
                        .ENABLE ABS,AMA

                        .MCALL  .SWRHI,.EQUAT,.$CATCH,.$EOP,SETPRI
                        .MCALL  .$TRAP,.$TYPOCT,.$TYPDEC,.$POWER,.HEADER
                        .MCALL  .$DB2D,.$SB2D,.$DB20,.$SB20,.$READ
                        .MCALL  TYPNAM,.SETUP,TRMTRP,.$RDDEC,.$SAVE,.$ACT11

                .TITLE  MAINDEC-11-DZLAE-A
                ;*COPYRIGHT (C) 1975
                ;*DIGITAL EQUIPMENT CORP.
                ;*MAYNARD, MASS. 01754
                ;*
                ;*PROGRAM BY ROBERT BAKER
                ;*
                ;*THIS PROGRAM WAS ASSEMBLED USING THE PDP-11 MAINDEC SYSMAC
                ;*PACKAGE (MAINDEC-11-DZQAC-B1),AUG 29,1975.
                ;*


                .SBTTL  OPERATIONAL SWITCH SETTINGS
                ;*
                ;*      SWITCH                  USE
                ;*      ------          --------------------
                ;*        15            HALT ON ERROR
                ;*        14            LOOP ON TEST
                ;*        13            INHIBIT ERROR TYPEOUTS
                ;*        12            MANUAL TIMING
                ;*        10            BELL ON ERROR
                ;*         9            SNGL CHAR/FULL LINE - SCOPE ROUTINE
                ;*         8            HALT & SELECT TEST

                ;*      07--00          # COLUMNS AT START UP

                ;*      05--00          TEST # SELECTION

                ;*      06--00          CHAR SELECTION FOR SCOPE ROUTINE


                ;***  SET ALL SWITCHES UP BEFORE STARTING THE PROGRAM TO USE THE
                ;     SOFTWARE SWITCH REGISTER CONTROL.  MAKE SURE LOCATION 000176
                ;     CONTAINS THE DESIRED SWITCH SETTINGS BEFORE STARTING.
```

```
                        .SBTTL  BASIC DEFINITIONS

                        ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
001100                  STACK=  1100
                        .EQUIV  EMT,ERROR       ;;BASIC DEFINITION OF ERROR CALL
                        .EQUIV  IOT,SCOPE       ;;BASIC DEFINITION OF SCOPE CALL
177776                  PS=     177776          ;;PROCESSOR STATUS WORD
                        .EQUIV  PS,PSW
177774                  STKLMT= 177774          ;;STACK LIMIT REGISTER
177772                  PIRQ=   177772          ;;PROGRAM INTERRUPT REQUEST REGISTER
177570                  DSWR=   177570          ;;HARDWARE SWITCH REGISTER
177570                  DDISP=  177570          ;;HARDWARE DISPLAY REGISTER

                        ;*GENERAL PURPOSE REGISTER DEFINITIONS
000000                  R0=     %0              ;;GENERAL REGISTER
000001                  R1=     %1              ;;GENERAL REGISTER
000002                  R2=     %2              ;;GENERAL REGISTER
000003                  R3=     %3              ;;GENERAL REGISTER
000004                  R4=     %4              ;;GENERAL REGISTER
000005                  R5=     %5              ;;GENERAL REGISTER
000006                  R6=     %6              ;;GENERAL REGISTER
000007                  R7=     %7              ;;GENERAL REGISTER
                        .EQUIV  R6,SP           ;;STACK POINTER
                        .EQUIV  R7,PC           ;;PROGRAM COUNTER

                        ;*PRIORITY LEVEL DEFINITIONS
000000                  PR0=    0               ;;PRIORITY LEVEL 0
000040                  PR1=    40              ;;PRIORITY LEVEL 1
000100                  PR2=    100             ;;PRIORITY LEVEL 2
000140                  PR3=    140             ;;PRIORITY LEVEL 3
000200                  PR4=    200             ;;PRIORITY LEVEL 4
000240                  PR5=    240             ;;PRIORITY LEVEL 5
000300                  PR6=    300             ;;PRIORITY LEVEL 6
000340                  PR7=    340             ;;PRIORITY LEVEL 7

                        ;*"SWITCH REGISTER" SWITCH DEFINITIONS
100000                  SW15=   100000
040000                  SW14=   40000
020000                  SW13=   20000
010000                  SW12=   10000
004000                  SW11=   4000
002000                  SW10=   2000
001000                  SW09=   1000
000400                  SW08=   400
000200                  SW07=   200
000100                  SW06=   100
000040                  SW05=   40
000020                  SW04=   20
000010                  SW03=   10
000004                  SW02=   4
000002                  SW01=   2
000001                  SW00=   1
                        .EQUIV  SW09,SW9
```

```
                                .EQUIV  SW08,SW8
                                .EQUIV  SW07,SW7
                                .EQUIV  SW06,SW6
                                .EQUIV  SW05,SW5
                                .EQUIV  SW04,SW4
                                .EQUIV  SW03,SW3
                                .EQUIV  SW02,SW2
                                .EQUIV  SW01,SW1
                                .EQUIV  SW00,SW0

                                ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
            100000              BIT15=  100000
            040000              BIT14=  40000
            020000              BIT13=  20000
            010000              BIT12=  10000
            004000              BIT11=  4000
            002000              BIT10=  2000
            001000              BIT09=  1000
            000400              BIT08=  400
            000200              BIT07=  200
            000100              BIT06=  100
            000040              BIT05=  40
            000020              BIT04=  20
            000010              BIT03=  10
            000004              BIT02=  4
            000002              BIT01=  2
            000001              BIT00=  1
                                .EQUIV  BIT09,BIT9
                                .EQUIV  BIT08,BIT8
                                .EQUIV  BIT07,BIT7
                                .EQUIV  BIT06,BIT6
                                .EQUIV  BIT05,BIT5
                                .EQUIV  BIT04,BIT4
                                .EQUIV  BIT03,BIT3
                                .EQUIV  BIT02,BIT2
                                .EQUIV  BIT01,BIT1
                                .EQUIV  BIT00,BIT0

                                ;*BASIC "CPU" TRAP VECTOR ADDRESSES
            000004              ERRVEC= 4               ;;TIME OUT AND OTHER ERRORS
            000010              RESVEC= 10              ;;RESERVED AND ILLEGAL INSTRUCTIONS
            000014              TBITVEC=14              ;;"T" BIT
            000014              TRTVEC= 14              ;;TRACE TRAP
            000014              BPTVEC= 14              ;;BREAKPOINT TRAP (BPT)
            000020              IOTVEC= 20              ;;INPUT/OUTPUT TRAP (IOT) **SCOPE**
            000024              PWRVEC= 24              ;;POWER FAIL
            000030              EMTVEC= 30              ;;EMULATOR TRAP (EMT) **ERROR**
            000034              TRAPVEC=34              ;;"TRAP" TRAP
            000060              TKVEC=  60              ;;TTY KEYBOARD VECTOR
            000064              TPVEC=  64              ;;TTY PRINTER VECTOR
            000240              PIRQVEC=240             ;;PROGRAM INTERRUPT REQUEST VECTOR
```

```
                        000015          CR=15
                        000012          LF=12
                        000014          FF=14
                        000200          CRLF=200

                                        ;*****************************************************************

                                        .SBTTL  TRAP CATCHER

                        000000                  .=0
                                        ;*ALL UNUSED LOCATIONS FROM 4 - 776 CONTAIN A ".+2,HALT"
                                        ;*SEQUENCE TO CATCH ILLEGAL TRAPS AND INTERRUPTS
                                        ;*LOCATION 0 CONTAINS 0 TO CATCH IMPROPERLY LOADED VECTORS
                        000174                  .=174
000174  000000                          DISPREG: .WORD  0               ;;SOFTWARE DISPLAY REGISTER
000176  000000                          SWREG:   .WORD  0               ;;SOFTWARE SWITCH REGISTER

                                        ;*****************************************************************

                                        .SBTTL  ACT11 HOOKS
                                        ;HOOKS REQUIRED BY ACT11
                        000200                  $SVPC=.                 ;SAVE PC
                        000046                  .=46
000046  004756                          $ENDAD                          ;;1)SET LOC.46 TO ADDRESS OF $ENDAD IN .$EOP
                        000052                  .=52
000052  020000                          .WORD   20000                   ;;2)SET LOC.52 TO 20000
                        000200                  .=$SVPC                 ;; RESTORE PC
```

```
                        ;*****************************************************************

                        .=30
000030  006572          $ERROR                  ;EMT - ERROR HANDLER
000032  000000          0

                        .=100
000100  005440          LKSRV                   ;KW11-L  INTERRUPT
000102  000000          0

000104  005430          DCI                     ;KW11-P  INTERRUPT
000106  000000          0


                        ;*****************************************************************

                        .SBTTL  STARTING ADDRESSES

                        .=200
000200  000137  001154          JMP     START           ;GENERAL START

                        .=600
000600  000137  001170          JMP     RESTRT          ;RESTART - NO INTERACTIVE TESTS

000604  000137  001200          JMP     CONTRL          ;GO TO KEYBOARD CONTROL
                                                        ;WILL DEFAULT TO SWITCH REG
                                                        ;IF CONSOLE DEVICE DOES NOT EXIST

                        ;*****************************************************************

                        .SBTTL  COMMON TAGS

                        .=1100
001100  177560         TKS:    177560                  ;TTY KYBD STATUS REG. ADDRESS
001102  177562         TKB:    177562                  ;TTY KYBD BUFFER REG. ADDRESS
001104  177564         TPS:    177564                  ;TTY PRINTER STATUS REG. ADDRESS
001106  177566         TPB:    177566                  ;TTY PRINTER BUFFER REG. ADDRESS


                                .EQUIV  IKS,$TKS
                                .EQUIV  TKB,$TKB
                                .EQUIV  TPS,$TPS
                                .EQUIV  TPB,$TPB

001110  177514         LPS:    177514                  ;LINE PRINTER STATUS REG. ADDRESS
                                                        ;BIT 15 = ERROR
                                                        ;BIT  7 = READY
                                                        ;BIT  6 = INTERRUPT ENABLE
```

```
001112  177516          LPB:    177516          ;LINE PRINTER DATA BUFFER REG. ADDRESS
                                                ;BITS 0-6 = ASCII CHAR BUFFER
                                                ;BITS 7-15 = NOT USED

001114  172540          PLKS:   172540          ;KL11-P CLOCK STATUS REG. ADDRESS
001116  172542          CSBR:   172542          ;KL11-P COUNT SET ADDRESS

001120  177546          LKS:    177546          ;KW11-L CLOCK STATUS REG. ADDRESS

001122  177570          SWR:    .WORD   177570  ;SW REG ADDRESS
001124  177570          DISPLAY: .WORD  177570  ;DISPLAY ADR

001126  000000          $TSTNM: .WORD   0       ;TEST NUMBER
001130  000204          WIDTH:  .WORD   132.    ;NUMBER OF COLUMNS
001132     000          STRONE: .BYTE   0       ;RUN TEST ONCE FLAG (SW REG CTL)
001133     000          TRONE:  .BYTE   0       ;RUN TEST ONCE FLAG (KYBD CTL)
001134     000          TLOOP:  .BYTE   0       ;LOOP ON TEST FLAG (KYBD CTL)

001135     000          CKFLAG: .BYTE   0       ;CLOCK OPTION FLAG
                                                ;0 = NONE AVAILABLE
                                                ;+1 = KL11-L
                                                ;-1 = KL11-P

001136  000207          $BELL:  .ASCIZ  <207>   ;BELL CODE
001140     077          $QUES:  .ASCII  /?/     ;QUESTION MARK
001141     015          $CRLF:  .ASCII  <15>    ;CARRIAGE RETURN - LINE FEED
001142  000012          $LF:    .ASCIZ  <12>    ;LINE FEED

001144  000015          $CR:    .ASCIZ  <15>    ;CARRIAGE RETURN ONLY
001146  000014          $FF:    .ASCIZ  <14>    ;FORM FEED

                        .EVEN

                ;*****************************************************************
                ;THE FOLLOWING LOCATIONS ARE USED BY THE TTY TYPE ROUTINES
                ;SET THE FILL CHARACTERS AS REQUIRED FOR VARIOUS CONSOLE TERMINALS
                ;THE TERMINAL AVAILABLE F' AG WILL BE SET BY THE PROGRAM.

C01150     000          $NULL:  .BYTE   0       ;NULL CHARACTER FOR FILLS
001151     002          $FILLS: .BYTE   2       ;NUMBER OF FILLER CHARACTERS REQUIRED
001152     012          $FILLC: .BYTE   12      ;INSERT FILL CHARACTERS AFTER LINE FEED
001153     000          $TPFLG: .BYTE   0       ;TERMINAL AVAILABLE FLAG
                                                ;BIT <07> = 0 = YES

                        .EVEN
```

```
                                ;*****************************************************************
                                .SBTTL  PROGRAM INITIALIZATION
001154  005037  001126          START:  CLR     $TSTNM          ;SET TEST NUMBER TO ZERO
001160  023737  000042  000046          CMP     @#42,@#46       ;CHECK IF IN ACT QUICK VERIFY
                                                                ;SKIP MANUAL INTERVENTION TESTS IF YES
001166  001007                          BNE     STARTX          ;INITIALIZE
001170  012737  000020  001126  RESTRT: MOV     #20,$TSTNM      ;SET TEST NUMBER TO 20
001176  000403                          BR      STARTX          ;INITIALIZE
001200  012737  177777  001126  CONTRL: MOV     #-1,$TSTNM      ;SET CONTROL FLAG
001206  012737  177570  001122  STARTX: MOV     #177570,SWR     ;INITIALIZE SWR CONTROL
001214  013737  001122  001124          MOV     SWR,DISPLAY
001222  012706  001100                  MOV     #STACK,SP       ;;SETUP THE STACK POINTER
001226  012737  011320  000034          MOV     #$TRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
001234  012737  000340  000036          MOV     #340,@#TRAPVEC+2;LEVEL 7
001242  012737  011434  000024          MOV     #$PWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
001250  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;LEVEL 7
001256  005037  004772                  CLR     $PASS           ;;CLEAR THE PASS COUNT
001262  013737  004742  004734          MOV     $ENDCT,$EOPCT   ;;SETUP END-OF-PROGRAM COUNTER
001270  013746  000004                  MOV     @#4,-(SP)       ;;SAVE ERROR VECTOR
001274  013746  000006                  MOV     @#6,-(SP)
001300  012737  001314  000004          MOV     #64$,4          ;;SET UP TIME OUT VECTOR
001306  005777  177610                  TST     @SWR            ;;TRY TO REFERENCE HARDWARE SWR
001312  000407                          BR      65$             ;;BRANCH IF NO TIMEOUT TRAP OCCURS
001314  012737  000176  001122  64$:    MOV     #SWREG,SWR      ;;POINT TO SOFTWARE SWR
001322  012737  000174  001124          MOV     #DISPREG,DISPLAY ;;POINT TO SOFTWARE DISPLAY REG
001330  022626                          CMP     (SP)+,(SP)+     ;;RESTORE STACK
001332  012637  000006          65$:    MOV     (SP)+,@#6       ;;RESTORE ERROR VECTOR
001336  012637  000004                  MOV     (SP)+,@#4
001342  017700  177554                  MOV     @SWR,R0         ;GET SWITCHES
001346  005200                          INC     R0              ;CHECK IF ALL SWITCHES ARE UP
001350  001006                          BNE     6$              ;CONTINUE IF NOT
001352  012737  000176  001122          MOV     #SWREG,SWR      ;IF UP, SET SOFTWARE SWITCH CONTROL
001360  012737  000174  001124          MOV     #DISPREG,DISPLAY
001366  017700  177530          6$:     MOV     @SWR,R0         ;GET SW REG
001372  042700  177400                  BIC     #177400,R0      ;SAVE BITS 0-7
001376  020027  000204                  CMP     R0,#132.        ;TEST # COLUMNS
001402  003003                          BGT     2$              ;TOO BIG, DEFAULT TO 132(10)
001404  020027  000002          1$:     CMP     R0,#2.          ;TEST # COLUMNS
001410  103002                          BHIS    3$              ;BRANCH IF OK
001412  012700  000204          2$:     MOV     #132.,R0        ;DEFAULT TO 132(10)
001416  010037  001130          3$:     MOV     R0,WIDTH        ;SAVE # COLUMNS
001422  105037  001134                  CLRB    TLOOP           ;RESET FLAGS
001426  105037  001132                  CLRB    STRONE
001432  105037  001133                  CLRB    TRONE
001436  005037  010242                  CLR     SVTST
001442  000401                          BR      10$             ;REPLACE THIS INSTRUCTION WITH NOP (204)
                                                                ;TO SKIP CLOCK TIMINGS
001444  000424                          BR      20$
001446  012737  000002  000006  10$:    MOV     #RTI,@#6        ;SET TRAP RETURN
001454  012737  000006  000004          MOV     #6,@#4
001462  112737  177777  001135          MOVB    #-1,CKFLAG      ;SET CLOCK FLAG FOR KW11-P
001470  000261                          SEC
```

```
  327  001472  105777  177416                    TSTB    @PLKS           ;KW11-P AVAILABLE?
  328  001476  103011                            BCC     30$             ;YES, CHECK FOR CONSOLE TERMINAL
  329  001500  112737  000001  001135            MOVB    #1,CKFLAG       ;SET CLOCK FLAG FOR KW11-L
  330  001506  000261                            SEC
  331  001510  105777  177404                    TSTB    @LKS            ;KW11-L AVAILABLE?
  332  001514  103002                            BCC     30$             ;YES, CHECK FOR CONSOLE TERMINAL
  333  001516  105037  001135          20$:      CLRB    CKFLAG          ;CLEAR CLOCK AVAILABLE FLAG - NONE THERE
  334  001522  112737  177777  001153  30$:      MOVB    #-1,$TPFLG      ;CLEAR TERMINAL AVAILABLE FLAG
  335  001530  000261                            SEC
  336  001532  105777  177342                    TSTB    @TKS            ;CONSOLE TERMINAL THERE?
  337  001536  103402                            BCS     4$              ;NO, CONTINUE
  338  001540  105037  001153                    CLRB    $TPFLG          ;YES, SET TERMINAL AVAILABLE FLAG
  339  001544  103002                  4$:       BCC     5$              ;CONTINUE IF CONSOLE
  340  001546  104413  013433                    PRINT   #NOMSG          ;PRINT NO CONSOLE MESSAGE
  341  001552  005037  000006          5$:       CLR     @#6             ;RESET TRAP VECTOR HALTS
  342  001556  005037  000004                    CLR     @#4
  343  001562  005227  177777                    INC     #-1             ;;FIRST TIME?
  344  001566  001022                            BNE     66$             ;;BRANCH IF NO
  345  001570  022737  004756  000042            CMP     #$ENDAD,@#42    ;;ACT-11 AUTO-ACCEPT?
  346  001576  001416                            BEQ     66$             ;;BRANCH IF NO
  347  001600  104400  001606                    TYPE    ,67$            ;;TYPE ASCIZ STRING
  348  001604  000413                            BR      66$             ;;GET OVER THE ASCIZ
  349                                  ;;67$:    .ASCIZ  <200>#MAINDEC-11-DZLAE-A#<200>
  350  001634                          66$:
  351  001634  005737  001126                    TST     $TSTNM          ;WANT CONTROL NOW?
  352  001640  002005                            BGE     11$             ;NO, CONTINUE
  353  001642  105737  001153          15$:      TSTB    $TPFLG          ;TERMINAL THERE?
  354  001646  001006                            BNE     13$             ;NO, DEFAULT TO SW REG CONTROL
  355  001650  000137  006270                    JMP     KYBDST          ;YES, GO TO KYBD CONTROL
  356  001654  032777  000400  177240  11$:      BIT     #SW8,@SWR       ;WANT TEST SELECTION?
  357  001662  001402                            BEQ     12$             ;NO, CHECK TEST #
  358  001664  000137  005624          13$:      JMP     SELECT          ;YES, GO TO TEST SELECTION HALT
  359  001670  013700  001126          12$:      MOV     $TSTNM,R0       ;GET TEST NUMBER
  360  001674  006300                            ASL     R0              ;SET POINTER
  361  001676  005760  011564                    TST     TAT(R0)         ;CHECK IF TEST IN TABLE
  362  001702  003004                            BGT     14$             ;BRANCH IF IN TABLE
  363  001704  002756                            BLT     15$             ;END OF SEQUENCE, SELECT TEST
  364  001706  005237  001126                    INC     $TSTNM          ;INCREMENT TEST NUMBER
  365  001712  000760                            BR      11$             ;CHECK NEXT TEST NUMBER IN TABLE
  366  001714  000170  011564          14$:      JMP     @TAT(R0)        ;GO TO TEST
```

```
                                ;*****************************************************************

                                .SBTTL  OPERATOR INTERVENTION TESTS

                                ;/////////////////////////////////////////////////////////////////

                                ;TESTO  -       INTERFACE AND CONTROL TESTS
                                ;
                                ;TEST ERROR AND READY BITS, PRINTER OFF LINE - POWER OFF

                                ;/////////////////////////////////////////////////////////////////

001720  104400  013722        TESTO:  TYPE,   TOMSGO          ;TYPE INSTRUCTIONS
001724  104420                        HOLD                    ;WAIT FOR OPERATOR
001726  104417                28$:    CHECK                   ;CHECK FOR CONTROL
001730  005777  177154                TST     @LPS            ;CHECK FOR ERROR CONDITION
001734  100402                        BMI     1$              ;OK, ERROR SET
001736  104001                        ERROR   1               ;ERROR CLEAR, POWER OFF
001740  000772                        BR      28$             ;RETEST
001742  105777  177142        1$:     TSTB    @LPS            ;CHECK READY
001746  100002                        BPL     2$              ;OK, READY NOT SET
001750  104002                        ERROR   2               ;READY SET, POWER OFF
001752  000765                        BR      28$             ;RETEST

                                ;/////////////////////////////////////////////////////////////////

                                ;TEST ERROR AND READY BITS, PRINTER OFF LINE - POWER ON

                                ;/////////////////////////////////////////////////////////////////

001754  104400  013761        2$:     TYPE,   TOMSG1          ;TYPE INSTRUCTION - TURN POWER ON
001760  104420                        HOLD                    ;WAIT FOR OPERATOR
001762  104417                3$:     CHECK                   ;CHECK FOR CONTROL
001764  005777  177120                TST     @LPS            ;CHECK ERROR
001770  100402                        BMI     4$              ;OK, ERROR SET
001772  104003                        ERROR   3               ;ERROR CLEAR, PRINTER OFF LINE
001774  000772                        BR      3$              ;RETEST
001776  105777  177106        4$:     TSTB    @LPS            ;CHECK READY
002002  100002                        BPL     5$              ;OK, READY NOT SET
002004  104004                        ERROR   4               ;READY SET, PRINTER OFF LINE
002006  000765                        BR      3$              ;RETEST

                                ;/////////////////////////////////////////////////////////////////

                                ;TEST ERROR AND READY BITS, PRINTER ON LINE

                                ;/////////////////////////////////////////////////////////////////

002010  104400  014004        5$:     TYPE    ,TOMSG2         ;TYPE INSTRUCTION, TURN ON LINE
002014  104420                        HOLD                    ;WAIT FOR OPERATOR
002016  104417                6$:     CHECK                   ;CHECK FOR CONTROL
002020  005777  177064                TST     @LPS            ;CHECK ERROR
002024  100002                        BPL     7$              ;OK, ERROR CLEAR
002026  104005                        ERROR   5               ;ERROR SET, PRINTER ON LINE
```

```
                                ;//////////////////////////////////////////////////////////////////////////////////
                                ;TEST PAPER OUT SWITCH
                                ;//////////////////////////////////////////////////////////////////////////////////

002044  104400  014040          8$:     TYPE    ,TOMSG3         ;TYPE INSTRUCTION, PAPER OUT
002050  104420                          HOLD                    ;WAIT FOR OPERATOR
002052  104417                  9$:     CHECK                   ;CHECK CONTROL
002054  012777  000012  177030          MOV     #12,@LPB        ;SEND LF
002062  005777  177022                  TST     @LPS            ;CHECK FOR ERROR CONDITION
002066  100402                          BMI     10$             ;OK, ERROR SET
002070  104007                          ERROR   7               ;ERROR CLEAR, PAPER OUT ERROR
002072  000767                          BR      9$              ;RETEST
002074  105777  177010          10$:    TSTB    @LPS            ;CHECK READY
002100  100002                          BPL     11$             ;OK, READY CLEAR
002102  104010                          ERROR   10              ;READY SET, PAPER OUT, ON LINE
002104  000762                          BR      9$              ;RETEST

                                ;//////////////////////////////////////////////////////////////////////////////////
                                ;TEST ABILITY TO CLEAR ERROR CONDITION
                                ;//////////////////////////////////////////////////////////////////////////////////

002106  104400  014072          11$:    TYPE    ,TOMSG4         ;TYPE INSTRUCTION, RESET & ON LINE
002112  104420                          HOLD                    ;WAIT FOR OPERATOR
002114  104417                  12$:    CHECK                   ;CHECK FOR CONTROL
002116  005777  176766                  TST     @LPS            ;CHECK ERROR
002122  100002                          BPL     13$             ;OK, ERROR CLEAR
002124  104011                          ERROR   11              ;ERROR DID NOT CLEAR
002126  000772                          BR      12$             ;RETEST
002130  105777  176754          13$:    TSTB    @LPS            ;CHECK READY
002134  100402                          BMI     14$             ;OK, READY SET
002136  104012                          ERROR   12              ;READY NOT SET
002140  000773                          BR      13$             ;RETEST

                                ;//////////////////////////////////////////////////////////////////////////////////
                                ;CHECK ERROR & READY BITS AFTER RESET INSTRUCTION
                                ;//////////////////////////////////////////////////////////////////////////////////

002142  104417                  14$:    CHECK                   ;CHECK CONTROL
002144  000005                          RESET                   ;CLEAR WORLD
002146  005777  176736                  TST     @LPS            ;CHECK ERROR
002152  100002                          BPL     15$             ;OK, ERROR CLEAR
002154  104013                          ERROR   13              ;ERROR BIT SET AFTER RESET INSTR.
```

```
                                        BR      14$             ;RETEST
002160  104417                  15$:    CHECK                   ;CHECK CONTROL
002162  000005                          RESET                   ;CLEAR WORLD
002164  105777  176720                  TSTB    @LPS            ;CHECK READY
002170  100402                          BMI     16$             ;OK, READY SET
002172  104014                          ERROR   14              ;READY BIT CLEAR AFTER RESET INSTR.
002174  000771                          BR      15$             ;RETEST

                                ;////////////////////////////////////////////////////////////////////////

                                ;CHECK THAT LOADING CHAR BUFFER RESETS READY BIT
                                ;AND PRINTER DOES GO BACK READY.

                                ;////////////////////////////////////////////////////////////////////////

002176  104417                  16$:    CHECK                   ;CHECK CONTROL
002200  005005                          CLR     R5              ;CLEAR TIME OUT COUNTER
002202  012777  000015  176702          MOV     #15,@LPB        ;LOAD CARRIAGE RETURN INTO BUFFER
002210  105777  176674                  TSTB    @LPS            ;CHECK READY
002214  100002                          BPL     17$             ;OK, READY CLEAR
002216  104015                          ERROR   15              ;READY BIT NOT CLEAR WHEN CHAR LOADED
002220  000766                          BR      16$             ;RETEST
002222  005777  176662          17$:    TST     @LPS            ;CHECK ERROR
002226  100002                          BPL     18$             ;OK, ERROR CLEAR
002230  104016                          ERROR   16              ;ERROR BIT SET AFTER CHAR LOAD
002232  000761                          BR      16$             ;RETEST
002234  105777  176650          18$:    TSTB    @LPS            ;PRINTER STILL BUSY
002240  100404                          BMI     19$             ;NO, NEXT TEST
002242  005205                          INC     R5              ;YES, INC TIMER
002244  001366                          BNE     17$             ;WAIT FOR FLAG
002246  104017                          ERROR   17              ;NO, TOO LONG
002250  000752                          BR      16$             ;RETEST

                                ;////////////////////////////////////////////////////////////////////////

                                ;CHECK INTERRUPT LEVEL OF PRINTER
                                ;PRINTER SHOULD BE AT LEVEL 4
                                ;
                                ;TEST THAT PRINTER WILL NOT INTERRUPT ABOVE LEVEL 3

                                ;////////////////////////////////////////////////////////////////////////

002252  012705  000340          19$:    MOV     #PR7,R5         ;SET FIRST LEVEL
002256  104417                  20$:    CHECK                   ;CHECK CONTROL
002260  012737  002362  000200          MOV     #23$,200        ;SET INTERRUPT RETURN
002266  012737  000340  000202          MOV     #PR7,202        ;SET PRIORITY 7 ON INTERRUPT
002274  005777  176610                  TST     @LPS            ;CHECK FOR ERROR
002300  100002                          BPL     21$             ;OK, ERROR CLEAR
002302  104020                          ERROR   20              ;ERROR BIT SET
002304  000764                          BR      20$             ;RETEST
002306  105777  176576          21$:    TSTB    @LPS            ;CHECK READY
002312  100402                          BMI     22$             ;OK, READY SET
002314  104021                          ERROR   21              ;READY BIT NOT SET
002316  000757                          BR      20$             ;RETEST
```

```
                                22$:
002320                                  MOV     R5,-(SP)        ;;PUT NEW PS ON STACK
002320  010546                          MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
002322  012746  002330                  RTI                     ;; POP NEW PC AND PS
002326  000002                  64$:
002330                                  BIS     #BIT6,@LPS      ;SET PRINTER INT. ENABLE
002330  052777  000100  176552          NOP                     ;DELAY
002336  000240                          BIC     #BIT6,@LPS      ;CLEAR PRINTER INT. ENABLE
002340  042777  000100  176542          SUB     #40,R5          ;SET NEXT LEVEL
002346  162705  000040                  CMP     R5,#PR3         ;LEVEL 3?
002352  020527  000140                  BEQ     24$             ;YES, CONTINUE NEXT TEST
002356  001404                          BR      20$             ;NO, TEST THIS LEVEL
002360  000736
                                23$:    CMP     (SP)+,(SP)+     ;RESTORE STACK
002362  022626                          ERROR   22              ;INTERRUPT ABOVE LEVEL 3
002364  104022                          BR      20$             ;RETEST
002366  000733

                                ;////////////////////////////////////////////////////////////////////////////////

                                ;TEST ABILITY OF PRINTER TO INTERRUPT AT ALL PRIORITY LEVELS BELOW 4

                                ;////////////////////////////////////////////////////////////////////////////////

002370  104417                  24$:    CHECK                   ;CHECK FOR CONTROL
002372  012737  002456  000200          MOV     #27$,200        ;SET INTERRUPT RETURN
002400  005777  176504                  TST     @LPS            ;CHECK FOR ERROR
002404  100002                          BPL     25$             ;OK, ERROR CLEAR
002406  104020                          ERROR   20              ;ERROR BIT SET
002410  000767                          BR      24$             ;RETEST
002412  105777  176472          25$:    TSTB    @LPS            ;CHECK READY
002416  100402                          BMI     26$             ;OK, READY SET
002420  104021                          ERROR   21              ;READY CLEAR
002422  000762                          BR      24$             ;RETEST
002424                          26$:
002424  010546                          MOV     R5,-(SP)        ;;PUT NEW PS ON STACK
002426  012746  002434                  MOV     #65$,-(SP)      ;;PUT NEW PC ON  STACK
002432  000002                          RTI                     ;; POP NEW PC AND PS
002434                          65$:
002434  052777  000100  176446          BIS     #BIT6,@LPS      ;SET PRINTER INTR. ENABLE
002442  000240                          NOP                     ;DELAY
002444  042777  000100  176436          BIC     #BIT6,@LPS      ;CLEAR PRINTER INTR. ENABLE
002452  104023                          ERROR   23              ;NO INTERRUPT BELOW LEVEL 4
002454  000745                          BR      24$             ;RETEST

002456  042777  000100  176424  27$:    BIC     #BIT6,@LPS      ;CLEAR PRINTER INTR. ENABLE
002464  022626                          CMP     (SP)+,(SP)+     ;RESET STACK
002466  162705  000040                  SUB     #40,R5          ;SET NEXT LEVEL
002472  002336                          BGE     24$             ;RETEST IF NOT DONE ALL LEVELS
002474  012737  000137  000200          MOV     #137,200        ;RESET INSTRUCTIONS AT 200-202
002502  012737  001154  000202          MOV     #START,202
002510  012746  000000                  MOV     #0,-(SP)        ;;PUT NEW PS ON STACK
002514  012746  002522                  MOV     #66$,-(SP)      ;;PUT NEW PC ON  STACK
002520  000002                          RTI                     ;; POP NEW PC AND PS
002522                          66$:
```

H03


```
   583  002522  000137  005516                  JMP     EXIT            ;EXIT TEST
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST1  -       TOP OF FORM SWITCH TEST
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////

002526  104412                  TEST1:  PRTHDR                  ;PRINT TEST HEADER
002530  012705  002640                  MOV     #4$,R5          ;SET TABLE POINTER
002534  012701  000036                  MOV     #30.,R1         ;SET CHAR COUNT
002540  012700  000055                  MOV     #55,R0          ;SET DASH CHAR
002544  104415                          MLOAD                   ;LOAD DASHED LINE
002546  104413  001144                  PRINT   ,$CR            ;PRINT LINE
002552  104400  014170          3$:     TYPE    ,T1MSG3         ;TYPE INSTRUCTIONS
002556  010537  002564                  MOV     R5,1$           ;SET SWITCH SETTING FOR MESG
002562  104400                          TYPE
002564  000000                  1$:     .WORD   0
002566  104400  014222                  TYPE    ,T1MSG4         ;FINISH INSTRUCTIONS
002572  104420                          HOLD                    ;WAIT FOR OPERATOR
002574  104417                          CHECK                   ;CHECK FOR CONTROL
002576  104413  001146                  PRINT   ,$FF            ;ISSUE FORM FEED
002602  104413  014132                  PRINT   ,T1MSG1         ;PRINT REFERENCE LINE
002606  010537  002614                  MOV     R5,2$           ;SET FORM FEED LENGTH FOR MESG
002612  104413                          PRINT
002614  000000                  2$:     .WORD   0
002616  104413  014141                  PRINT   ,T1MSG2         ;FINISH MESG
002622  022525                          CMP     (R5)+,(R5)+     ;INC TABLE POINTER
002624  005715                          TST     (R5)            ;CHECK TABLE TO SEE IF DONE TEST
002626  001351                          BNE     3$              ;FINISH TEST
002630  104413  001142                  PRINT   $LF             ;ADVANCE PAPER WHEN DONE
002634  000137  005516                  JMP     EXIT            ;EXIT TEST

002640  031440  000040          4$:     .ASCIZ  / 3 /           ;FORM FEED SWITCH SETTINGS
002644  027063  000065                  .ASCIZ  /3.5/
002650  032040  000040                  .ASCIZ  / 4 /
002654  027065  000065                  .ASCIZ  /5.5/
002660  033040  000040                  .ASCIZ  / 6 /
002664  033440  000040                  .ASCIZ  / 7 /
002670  034040  000040                  .ASCIZ  / 8 /
002674  027070  000065                  .ASCIZ  /8.5/
002700  030461  000040                  .ASCIZ  /11 /
002704  031061  000040                  .ASCIZ  /12 /
002710  032061  000040                  .ASCIZ  /14 /
002714  000000                          .WORD   0               ;END OF TABLE
```

```
                                ;//////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST2  -       PRINT SPEED TIMING
                                ;
                                ;A SWIRL PATTERN IS PRINTED FOR ONE FULL MINUTE
                                ;WHILE THE NUMBER OF LINES PRINTED IS COUNTED.
                                ;TIMING WILL BE DONE BY KW11-L/KW11-P CLOCK OTION IF EITHER AVAILABLE.
                                ;OTHERWISE, MANUAL TIMING WILL BE USED TO OBTAIN APPROX. PRINT TIMINGS.
                                ;
                                ;IF A HARDWARE SWITCH REGISTER IS NOT AVAILABLE, THIS TEST
                                ;CANNOT BE RUN WITHOUT A CLOCK OPTION BEING AVAILABLE.  THE
                                ;PROGRAM WILL AUTOMATICALLY SKIP THIS TEST IF IT CANNOT BE RUN.
                                ;
                                ;//////////////////////////////////////////////////////////////////////

002716  104412                  TEST2:  PRTHDR                  ;PRINT TEST HEADER
002720  012737  003134  005462          MOV     #SPD,TORTN      ;SET TIME OUT RETURN
002726  005004                          CLR     R4              ;CLEAR LINE COUNT
002730  105737  001135                  TSTB    CKFLAG          ;TEST CLOCK FLAG
002734  001417                          BEQ     4$              ;NONE THERE, MANUAL TIMING
002736  002407                          BLT     1$              ;KW11-P
002740  013737  005464  005460          MOV     MINCNT,CNTR     ;SET KW11-L CLOCK COUNT
002746  012777  000100  176144          MOV     #BIT6,@LKS      ;ENABLE CLOCK INTERRUPT
002754  000427                          BR      T2SP            ;START PRINTING
002756  013777  005464  176132  1$:     MOV     MINCNT,@CSBR    ;SET CLOCK COUNT
002764  012777  000105  176122          MOV     #105,@PLKS      ;START CLOCK
002772  000420                          BR      T2SP            ;START PRINTING
002774  023727  001122  177570  4$:     CMP     SWR,#177570     ;CLECK SW REG ADR
003002  001406                          BEQ     2$
003004  104413  014267                  PRINT   ,T2EM           ;CONTINUE IF HARDWARE
003010  104400  014267                  TYPE    ,T2EM           ;PRINT ERRORS MESG
003014  000137  005516                  JMP     EXIT            ;EXIT TEST
003020  104400  013461          2$:     TYPE    ,MANMSG         ;PRINT INSTRUCTIONS
003024  032777  010000  176070  3$:     BIT     #SW12,@SWR      ;SW12 UP?
003032  001774                          BEQ     3$              ;NO, WAIT FOR START

003034  012702  000041          T2SP:   MOV     #41,R2          ;SET START CHAR
003040  010200                  1$:     MOV     R2,R0           ;SET CHAR
003042  013701  001130          2$:     MOV     WIDTH,R1        ;SET COLUMN COUNT
003046  104414                  3$:     LOAD                    ;LOAD CHAR
003050  005301                          DEC     R1              ;DEC CHAR COUNT
003052  001407                          BEQ     4$              ;BRANCH IF DONE LINE
003054  005200                          INC     R0              ;NEXT CHAR
003056  020027  000177                  CMP     R0,#177         ;CHECK CHAR
003062  001371                          BNE     3$              ;OK, CONTINUE
003064  012700  000040                  MOV     #40,R0          ;SET CHAR = SPACE
003070  000766                          BR      3$              ;CONTINUE
003072  104413  001142          4$:     PRINT   ,$LF            ;PRINT LINE
003076  005204                          INC     R4              ;INC LINE COUNT
003100  105737  001135                  TSTB    CKFLAG          ;USING CLOCK TIMING?
003104  001006                          BNE     5$              ;YES, BYPASS MANUAL TIMING
003106  032777  010000  176006          BIT     #SW12,@SWR      ;SW12 DOWN?
003114  001002                          BNE     5$              ;NO, CONTINUE
003116  000137  003134                  JMP     SPD             ;YES, EXIT PRINTING ROUTINE
```

```
                                ;
003122  005202          5$:     INC     R2              ;INC START CHAR
003124  020227  000177          CMP     R2,#177         ;CHECK IT
003130  001343                  BNE     1$              ;OK, CONTINUE
003132  000740                  BR      T2SP            ;RESET START CHAR
                                ;
                                ;////////////////////////////////////////////////////////////////////////
                                ;
                                ;ROUTINE TO PRINT/TYPE MEASURED PRINT SPEED FOR TEST 2.
                                ;
                                ;////////////////////////////////////////////////////////////////////////
                                ;
003134  012700  000177  SPD:    MOV     #177,R0         ;SET RUBOUT CHAR
003140  104414                  LOAD                    ;CLEAR CHAR BUFFER
003142  104400  013623          TYPE    ,PRSP1          ;START MESG
003146  104413  013623          PRINT   ,PRSP1
003152  105737  001135          TSTB    CKFLAG          ;USING CLOCK?
003156  001004                  BNE     1$              ;YES, BRANCH
003160  104400  013644          TYPE    ,PRSP2          ;ADD WORD "APPROXIMATELY" TO MESG
003164  104413  013644          PRINT   ,PRSP2
003170                  1$:
003170  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
003172  004737  011120          JSR     PC,$SB2D        ;CONVERT #
003176  104416                  CNLOAD                  ;LOAD #
003200  010446                  MOV     R4,-(SP)        ;;PUSH R4 ON STACK
003202  104404                  TYPDS                   ;TYPE #
003204  104413  013655          PRINT   ,PRSP3          ;LOAD MORE OF MESG
003210  104400  013655          TYPE    ,PRSP3
003214  013746  001130          MOV     WIDTH,-(SP)     ;#COLUMNS ON STACK
003220  104404                  TYPDS                   ;TYPE #
003222  104400  013704          TYPE    ,PRSP4          ;TYPE END OF MESG
003226  013746  001130          MOV     WIDTH,-(SP)     ;# COLUMNS ON STACK AGAIN
003232  004737  011120          JSR     PC,$SB2D        ;CONVERT #
003236  104416                  CNLOAD                  ;LOAD #
003240  104413  013704          PRINT   ,PRSP4          ;PRINT MESG ON LA180
003244  000137  005516          JMP     EXIT            ;EXIT TEST
```

```
                                ;*****************************************************************

                                .SBTTL  PRINTING TESTS



                                ;/////////////////////////////////////////////////////////////////

                                ;TEST20 -       DATA TRANSFER PATHS TEST
                                ;
                                ;THIS TEST PRINTS 16 LINES OF ALTERNATING *'S AND U'S IN A CHECKERBOARD
                                ;PATTERN

                                ;/////////////////////////////////////////////////////////////////

003250  104412                  TEST20: PRTHDR                  ;PRINT TEST HEADER
003252  012703  052452                  MOV     #"*U,R3         ;SET FIRST CHAR PAIR
003256  012702  000020                  MOV     #16.,R2         ;SET LINE COUNT
003262  010300                  1$:     MOV     R3,R0           ;SET CHAR PAIR
003264  013701  001130                  MOV     WIDTH,R1        ;SET COLUMN COUNT
003270  104414                  2$:     LOAD                    ;LOAD CHAR
003272  000300                          SWAB    R0              ;SET NEXT CHAR
003274  005301                          DEC     R1              ;DEC COLUMN COUNT
003276  001374                          BNE     2$              ;FINISH LINE
003300  000303                          SWAB    R3              ;SET NEXT LINE START CHAR
003302  104413  001142                  PRINT   $LF             ;PRINT LINE
003306  005302                          DEC     R2              ;DEC LINE COUNT
003310  001364                          BNE     1$              ;FINISH TEST
003312  000137  005516                  JMP     EXIT            ;EXIT WHEN DONE
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST21 -       HEAD POSITIONING TEST
                                ;
                                ;THIS TEST PRINTS A SINGLE LINE OF ALTERNATING O'S AND SPACES
                                ;THEN FILLS IN THE SPACES WITH X'S ONE AT A TIME.
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////

003316  104412                  TEST21: PRTHDR                  ;PRINT TEST HEADER
003320  013701  001130                  MOV     WIDTH,R1        ;SET COLUMN COUNT
003324  012700  000060          1$:     MOV     #60,R0          ;SET CHAR
003330  104414                          LOAD                    ;LOAD CHAR
003332  005301                          DEC     R1              ;DEC CHAR COUNT
003334  001405                          BEQ     2$              ;PRINT LINE WHEN LOADED
003336  012700  000040                  MOV     #40,R0          ;SET SPACE CHAR
003342  104414                          LOAD                    ;LOAD SPACE
003344  005301                          DEC     R1              ;DEC CHAR COUNT
003346  001366                          BNE     1$              ;FINISH LINE
003350  104413  001144          2$:     PRINT   ,$CR            ;PRINT LINE
003354  012702  000002                  MOV     #2,R2           ;SET FIRST CHAR COUNT
003360  012700  000040          3$:     MOV     #40,R0          ;SET SPACE CHAR
003364  010201                          MOV     R2,R1           ;GET CHAR COUNT
003366  005301                          DEC     R1              ;SUBTRACT ONE
003370  104415                          MLOAD                   ;LOAD SPACES
003372  012700  000130                  MOV     #'X,R0          ;SET X CHAR
003376  104414                          LOAD                    ;LOAD X
003400  104413  001144                  PRINT   ,$CR            ;PRINT LINE
003404  062702  000002                  ADD     #2,R2           ;ADD 2 TO CHAR COUNT
003410  020237  001130                  CMP     R2,WIDTH        ;DONE LINE?
003414  101761                          BLOS    3$              ;NO, FINISH LINE
003416  104413  001142                  PRINT   ,$LF            ;YES, ADVANCE PAPER
003422  000137  005516                  JMP     EXIT            ;EXIT TEST
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST22 -       BACKSPACE TEST
                                ;
                                ;2 LINES OF X'S INTERSPACED WITH DASHES WILL BE PRINTED BY PRINTING A SLASH,
                                ;EXECUTING A BACKSPACE, AND THEN PRINTING A BACKSLASH TO
                                ;COMPLETE EACH X CHAR.
                                ;A MAXIMUM OF 127 COLUMNS WILL BE PRINTED BY THIS TEST.
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////

003426  104412          TEST22: PRTHDR                  ;PRINT TEST HEADER
003430  012702  000002          MOV     #2,R2           ;SET LINE COUNT
003434  013701  001130  1$:     MOV     WIDTH,R1        ;SET COLUMN COUNT
003440  020127  000177          CMP     R1,#127.        ;CHECK # COLUMNS
003444  003402                  BLE     2$              ;GREATER THAN 127?
003446  012701  000177          MOV     #127.,R1        ;YES, SET TO 127
003452  104413  003510  2$:     PRINT   ,10$            ;LOAD SLASH-BS-BACKSLASH
003456  005301                  DEC     R1              ;DEC CLOUMN COUNT
003460  001405                  BEQ     3$              ;PRINT LINE IF DONE
003462  012700  000055          MOV     #55,R0          ;SET ASCII OF DASH
003466  104414                  LOAD                    ;LOAD DASH CHAR
003470  005301                  DEC     R1              ;DEC COLUMN COUNT
003472  001367                  BNE     2$              ;FINISH LINE
003474  104413  001142  3$:     PRINT   ,$LF            ;PRINT LINE
003500  005302                  DEC     R2              ;DEC LINE COUNT
003502  001354                  BNE     1$              ;FINISH TEST
003504  000137  005516          JMP     EXIT            ;EXIT TEST

003510  004057  000134  10$:    .ASCIZ  <57><10><134>

                                .EVEN
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST23 -       CHARACTER GENERATOR TEST
                                ;
                                ;THIS TEST PRINTS A SINGLE LINE (30 CHARACTERS LONG) OF EACH PRINTABLE CHAR
                                ;PRECEDED BY A LINE OF ALL SPACES
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
003514  104412                  TEST23: PRTHDR                  ;PRINT TEST HEADER
003516  012700  000040                  MOV     #40,R0          ;SET FIRST CHAR
003522  012701  000036          1$:     MOV     #30.,R1         ;SET CHAR COUNT
003526  104415                          MLOAD                   ;LOAD LINE
003530  104413  001142                  PRINT   $LF             ;PRINT LINE
003534  005200                          INC     R0              ;SET NEXT CHAR
003536  020027  000177                  CMP     R0,#177         ;CHAR = RUBOUT?
003542  001367                          BNE     1$              ;NO, FINISH TEST
003544  000137  005516                  JMP     EXIT            ;EXIT TEST
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST24 -       NON-PRINTABLE CHARACTER TEST
                                ;
                                ;THIS TEST PRINTS A 30 LINE SWIRL PATTERN WITH NON-PRINTABLE CHARACTERS
                                ;LOADED BEFORE AND AFTER THE PRINTING CHARACTERS TO TEST ALL AREAS OF THE
                                ;CHARACTER BUFFER IN THE LA180.  IF THIS TEST IS LOOPED ON, THE SWIRL
                                ;PATTERN WILL CONTINUE, 30 LINES PRINTED EACH TIME THE TEST IS LOOPED.
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////

003550  104412                  TEST24: PRTHDR                  ;PRINT TEST HEADER
003552  012702  000041                  MOV     #41,R2          ;SET START CHAR
003556  012705  000036                  MOV     #30.,R5         ;SET LINE COUNT
003562  013701  001130                  MOV     WIDTH,R1        ;GET COLUMN COUNT
003566  012703  000377                  MOV     #255.,R3        ;SET BUFFER SIZE
003572  160103                        SUB     R1,R3           ;SUBTRACT COLUMNS COUNT
003574  005004                        CLR     R4              ;CLEAR CHAR INC COUNT
003576  162703  000035          2$:     SUB     #29.,R3         ;DIVIDE NON-PRINT CHAR COUNT BY 29
003602  002402                        BLT     3$
003604  005204                        INC     R4              ;R4 = NON-PRINT CHAR INC COUNT
003606  000773                        BR      2$
003610  005003                  3$:     CLR     R3              ;CLEAR NON-PRINT CHAR COUNT 2ND BLOCK
003612  162701  000377          4$:     SUB     #255.,R1        ;CALCULATE # NON-PRINT CHARS, 1ST BLOCK
003616  005401                        NEG     R1
003620  160301                        SUB     R3,R1
003622  004737  003754                  JSR     PC,10$          ;LOAD 1ST BLOCK OF NON-PRINT CHARS
003626  013701  001130                  MOV     WIDTH,R1        ;SET # PRINTABLE CHARS (COLUMN COUNT)
003632  010200                        MOV     R2,R0           ;SET FIRST PRINT CHAR
003634  104414                  5$:     LOAD                    ;LOAD PRINTABLE CHAR
003636  005301                        DEC     R1              ;DEC CHAR COUNT
003640  001407                        BEQ     6$              ;BRANCH IF DONE PRINTABLE CHARS
003642  005200                        INC     R0              ;NEXT CHAR
003644  020027  000177                  CMP     R0,#177         ;CHECK CHAR
003650  001371                        BNE     5$              ;OK - CONTINUE
003652  012700  000040                  MOV     #40,R0          ;RESET CHAR = SPACE
003656  000766                        BR      5$              ;CONTINUE
003660  010301                  6$:     MOV     R3,R1           ;SET # NON-PRINT CHARS, 2ND BLOCK
003662  004737  003754                  JSR     PC,10$          ;LOAD 2ND BLOCK NON-PRINT CHARS
003666  104413  001142                  PRINT   $LF             ;PRINT LINE
003672  005305                        DEC     R5              ;DEC LINE COUNT
003674  003015                        BGT     8$              ;CONTINUE TEST
003676  105737  001134                  TSTB    TLOOP           ;LOOP ON TEST?
003702  001006                        BNE     7$              ;YES, INITIALIZE
003704  032777  040000  175210          BIT     #SW14,@SWR      ;LOOP ON TEST?
003712  001002                        BNE     7$              ;YES, INITIALIZE
003714  000137  005516                  JMP     EXIT            ;EXIT TEST
003720  012705  000036          7$:     MOV     #30.,R5         ;RESET LINE COUNT
003724  005003                        CLR     R3              ;CLEAR NON-PRINT CHAR COUNT
003726  000401                        BR      9$              ;CONTINUE SWIRL
003730  060403                  8$:     ADD     R4,R3           ;INC NON-PRINT CHAR COUNT, 2ND BLOCK
003732  013701  001130          9$:     MOV     WIDTH,R1        ;RESET COLUMN COUNT
003736  005202                        INC     R2              ;INC START CHAR
003740  020227  000177                  CMP     R2,#177         ;CHECK START CHAR
```

```
 882  003744  001322                    BNE     4$              ;OK, CONTINUE
 883  003746  012702  000041            MOV     #41,R2          ;RESET START CHAR
 884  003752  000717                    BR      4$              ;CONTINUE
 885
 886                                    ;///////////////////////////////////////////////////////////////////////
 887
 888                                    ;ROUTINE TO LOAD NON-PRINTABLE CHARACTERS FOR TEST 24.
 889
 890                                    ;///////////////////////////////////////////////////////////////////////
 891
 892  003754  005701            10$:    TST     R1              ;TEST CHAR COUNT
 893  003756  001430                    BEQ     14$             ;RETURN IF ZERO
 894  003760  005000            11$:    CLR     R0              ;SET FIRST NON-PRINT CHAR
 895  003762  104414            12$:    LOAD                    ;LOAD CHAR
 896  003764  005301                    DEC     R1              ;DEC CHAR COUNT
 897  003766  003424                    BLE     14$             ;RETURN IF DONE
 898  003770  005200            13$:    INC     R0              ;NEXT CHAR
 899  003772  020027  000007            CMP     R0,#7           ;CHAR = BELL ?
 900  003776  001774                    BEQ     13$             ;YES, NEXT CHAR
 901  004000  020027  000010            CMP     R0,#10          ;CHAR = BS?
 902  004004  001771                    BEQ     13$             ;YES, NEXT CHAR
 903  004006  020027  000012            CMP     R0,#12          ;CHAR = LF?
 904  004012  001766                    BEQ     13$             ;YES, NEXT CHAR
 905  004014  020027  000014            CMP     R0,#14          ;CHAR = FF?
 906  004020  001763                    BEQ     13$             ;YES, NEXT CHAR
 907  004022  020027  000015            CMP     R0,#15          ;CHAR = CR?
 908  004026  001760                    BEQ     13$             ;YES, NEXT CHAR
 909  004030  020027  000040            CMP     R0,#40          ;CHAR = SPACE?
 910  004034  001751                    BEQ     11$             ;YES, RESET CHAR
 911  004036  000751                    BR      12$             ;CONTINUE
 912  004040  000207            14$:    RTS     PC              ;RETURN
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST25 -       BUFFER TEST
                                ;
                                ;THIS TEST CHECKS THE CHARACTER BUFFER OF THE LA180 WHILE PRINTING
                                ;FOUR LINES OF NUMBERS (WITH 2 BLANK LINES BETWEEN THE FIRST AND SECOND
                                ;LINE).  THESE LINES CAN BE USED TO CHECK THE PROPER PRINTING WIDTH.
                                ;ANY E PRINTED INDICATES AN INCORRECT LOAD OR BUFFER ACTION.
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////

004042  104412          TEST25: PRTHDR                  ;PRINT TEST HEADER
004044  012701  000020          MOV     #16.,   R1      ;SET CHAR COUNT
004050  012700  000105          MOV     #'E,R0          ;SET E CHAR
004054  104415                  MLOAD                   ;LOAD BUFFER
004056  012700  000177          MOV     #177,R0         ;SET RUBOUT CHAR
004062  104414                  LOAD                    ;CLEAR BUFFER
004064  005002                  CLR     R2              ;CLEAR CHAR COUNT
004066  013701  001130          MOV     WIDTH,R1        ;SET COLUMN COUNT
004072  012700  000061          MOV     #61,R0          ;SET CHAR
004076  104414          1$:     LOAD                    ;LOAD CHAR
004100  005301                  DEC     R1              ;DEC COLUMN COUNT
004102  001414                  BEQ     2$              ;PRINT LINE WHEN LOADED
004104  005202                  INC     R2              ;INC CHAR COUNT
004106  020227  000144          CMP     R2,#100.        ;DONE ONES?
004112  002771                  BLT     1$              ;NO, CONTINUE
004114  012700  000063          MOV     #63,R0          ;SET NEXT CHAR
004120  020227  000202          CMP     R2,#130.        ;DONE 3'S?
004124  002764                  BLT     1$              ;NO, CONTINUE
004126  012700  000062          MOV     #62,R0          ;YES, SET NEXT CHAR
004132  000761                  BR      1$              ;CONTINUE LOADING CHARACTERS
004134  104413  001142  2$:     PRINT   $LF             ;PRINT LINE
004140  012701  000400          MOV     #256.,R1        ;SET CHAR COUNT
004144  012700  000105          MOV     #'E,R0          ;SET E CHAR
004150  104415                  MLOAD                   ;LOAD BUFFER
004152  104413  001142          PRINT   $LF             ;PRINT BLANK LINE
004156  012701  000376          MOV     #254.,R1        ;SET CHAR COUNT
004162  012700  000105          MOV     #'E,R0          ;SET E CHAR
004166  104415                  MLOAD                   ;LOAD BUFFER
004170  012700  000177          MOV     #177,R0         ;SET RUBOUT CHAR
004174  104414                  LOAD                    ;CLEAR BUFFER
004176  104413  001142          PRINT   $LF             ;BLANK LINE
004202  012701  000400          MOV     #256.,R1        ;SET CHAR COUNT
004206  012700  000105          MOV     #'E,R0          ;SET E CHAR
004212  104415                  MLOAD                   ;LOAD BUFFER
004214  013701  001130          MOV     WIDTH,R1        ;SET COLUMN COUNT
004220  012700  000060          MOV     #60,R0          ;SET CHAR
004224  005002                  CLR     R2              ;CLEAR CHAR COUNT
004226  104414          3$:     LOAD                    ;LOAD CHAR
004230  005301                  DEC     R1              ;DEC COLUMN COUNT
004232  001407                  BEQ     4$              ;PRINT LINE WHEN LOADED
004234  005202                  INC     R2              ;INC CHAR COUNT
004236  020227  000143          CMP     R2,#99.         ;DONE ZEROS?
004242  002771                  BLT     3$              ;NO, CONTINUE
```

```
  967  004244  012700  000061                MOV     #61,R0          ;YES, SET NEXT CHAR
  968  004250  000766                       BR      3$              ;CONTINUE
  969  004252  104413  001142          4$:   PRINT   ,$LF            ;PRINT LINE
  970  004256  012701  000400                MOV     #256.,R1        ;SET CHAR COUNT
  971  004262  012700  000105                MOV     #'E,R0          ;SET E CHAR
  972  004266  104415                        MLOAD                   ;LOAD BUFFER
  973  004270  012700  000177                MOV     #177,R0         ;SET RUBOUT CHAR
  974  004274  104414                        LOAD                    ;CLEAR BUFFER
  975  004276  012700  000060                MOV     #60,R0          ;SET CHAR
  976  004302  012702  000011                MOV     #9.,R2          ;SET GROUP COUNT
  977  004306  013701  001130                MOV     WIDTH,R1        ;SET CHAR COUNT
  978  004312  104414                  5$:   LOAD                    ;LOAD CHAR
  979  004314  005302                        DEC     R2              ;DEC GROUP COUNT
  980  004316  001010                        BNE     7$              ;FINISH GROUP
  981  004320  005200                        INC     R0              ;SET NEXT CHAR
  982  004322  020027  000072                CMP     R0,#72          ;GOOD CHAR?
  983  004326  103402                        BLO     6$              ;YES, CONTINUE
  984  004330  012700  000060                MOV     #60,R0          ;NO, RESET CHAR TO ZERO
  985  004334  012702  000012          6$:   MOV     #10.,R2         ;RESET GROUP COUNT
  986  004340  005301                  7$:   DEC     R1              ;DEC CHAR COUNT
  987  004342  001363                        BNE     5$              ;FINISH LINE
  988  004344  104413  001142                PRINT   ,$LF            ;PRINT LINE
  989  004350  012701  000400                MOV     #256.,R1        ;SET CHAR COUNT
  990  004354  012700  000105                MOV     #'E,R0          ;SET E CHAR
  991  004360  104415                        MLOAD                   ;LOAD BUFFER
  992  004362  012700  000061                MOV     #61,R0          ;SET CHAR
  993  004366  013701  001130                MOV     WIDTH,R1        ;SET CHAR COUNT
  994  004372  104414                  8$:   LOAD                    ;LOAD CHAR
  995  004374  005200                        INC     R0              ;SET NEXT CHAR
  996  004376  020027  000072                CMP     R0,#72          ;GOOD CHAR?
  997  004402  103402                        BLO     9$              ;YES, CONTINUE
  998  004404  012700  000060                MOV     #60,R0          ;RESET CHAR
  999  004410  005301                  9$:   DEC     R1              ;DEC CHAR COUNT
 1000  004412  001367                        BNE     8$              ;FINISH LINE
 1001  004414  104413  001142                PRINT   ,$LF            ;PRINT LINE
 1002  004420  000137  005516                JMP     EXIT            ;EXIT TEST
```

```
1003                                    ;////////////////////////////////////////////////////////////////////////////////
1004
1005                                    ;TEST26 -       OVERPRINT TEST
1006                                    ;
1007                                    ;THIS TEST PRINTS FOUR LINES OF ALTERNATING CHARACTERS AND SPACES
1008                                    ;IN A CHECKERBOARD PATTERN.  EACH LINE IS OVERPRINTED TWICE.
1009
1010                                    ;////////////////////////////////////////////////////////////////////////////////
1011
1012  004424  104412                    TEST26: PRTHDR                  ;PRINT TEST HEADER
1013  004426  012703  004504                    MOV     #6$,R3          ;SET TABLE POINTER
1014  004432  012702  000003            1$:     MOV     #3,R2           ;SET OVERPRINT COUNT
1015  004436  011300                    2$:     MOV     (R3),R0         ;GET CHAR PAIR
1016  004440  001417                            BEQ     5$              ;EXIT IF DONE TEST
1017  004442  013701  001130                    MOV     WIDTH,R1        ;SET COLUMN COUNT
1018  004446  104414                    3$:     LOAD                    ;LOAD CHAR
1019  004450  000300                            SWAB    R0              ;SET NEXT CHAR
1020  004452  005301                            DEC     R1              ;DEC COLUMN COUNT
1021  004454  001374                            BNE     3$              ;FINISH LINE
1022  004456  005302                            DEC     R2              ;DEC OVERPRINT COUNT
1023  004460  001403                            BEQ     4$              ;BRANCH IF DONE OVERPRINT
1024  004462  104413  001144                    PRINT   #CR             ;PRINT LINE
1025  004466  000763                            BR      2$              ;CONTINUE
1026  004470  104413  001142            4$:     PRINT   #LF             ;PRINT LINE
1027  004474  005723                            TST     (R3)+           ;INC TABLE POINTER
1028  004476  000755                            BR      1$              ;PRINT NEXT LINE
1029  004500  000137  005516            5$:     JMP     EXIT            ;EXIT TEST
1030
1031  004504  020105                    6$:     .ASCII  /E /
1032  004506  040040                            .ASCII  /  /
1033  004510  020115                            .ASCII  /M /
1034  004512  021440                            .ASCII  /  /
1035  004514  000000                            .WORD   0               ;END OF TABLE
```

```
1036                                    ;////////////////////////////////////////////////////////////////////////
1037
1038                                    ;TEST27 -       MULTIPLE LINE FEED TEST
1039                                    ;
1040                                    ;NUMBER PRINTED INDICATES NUMBER OF LINE FEEDS FOLLOWING THAT LINE.
1041                                    ;DASHED REFERENCE LINES ARE PRINTED TO AID IN CHECKING PROFER
1042                                    ;LINE FEEDS.
1043
1044                                    ;////////////////////////////////////////////////////////////////////////
1045
1046  004516  104412                    TEST27: PRTHDR                  ;PRINT TEST HEADER
1047  004520  012703  004624                    MOV     #5$,R3          ;SET TABLE POINTER
1048  004524  111346                    1$:     MOVB    (R3),-(SP)      ;NUMBER ONTO STACK
1049  004526  004737  011120                    JSR     PC,$$B2D        ;CONVERT #
1050  004532  104416                            CNLOAD                  ;LOAD NUMBER
1051  004534  121327  000001                    CMPB    (R3),#1         ;TEST #
1052  004540  101406                            BLOS    2$              ;PRINT FULL DASH LINE IF 0 OR 1
1053  004542  012701  000035                    MOV     #29.,R1         ;SET DASH LENGTH
1054  004546  121327  000010                    CMPB    (R3),#8.        ;CHECK #
1055  004552  101411                            BLOS    4$              ;2,4 OR 8 - PRINT 29 DASHES
1056  004554  000407                            BR      3$              ;16 OR 32 - PRINT 28 DASHES
1057  004556  013701  001130            2$:     MOV     WIDTH,R1        ;SET CHAR COUNT
1058  004562  020127  000036                    CMP     R1,#30.         ;CHECK IT
1059  004566  103002                            BHIS    3$              ;OK, CONTINUE
1060  004570  012701  000036                    MOV     #30.,R1         ;SET TO 30
1061  004574  005301                    3$:     DEC     R1              ;SUBTRACT ONE
1062  004576  012700  000055            4$:     MOV     #55,R0          ;SET DASH CHAR
1063  004602  104415                            MLOAD                   ;LOAD DASH LINE
1064  004604  111301                            MOVB    (R3),R1         ;SET LF COUNT
1065  004606  113700  001142                    MOVB    $LF,R0          ;SET LF CHAR
1066  004612  104415                            MLOAD                   ;LOAD LF'S
1067  004614  105723                            TSTB    (R3)+           ;INC TABLE POINTER
1068  004616  003342                            BGT     1$              ;FINISH TEST
1069  004620  000137  005516                    JMP     EXIT            ;EXIT TEST
1070
1071  004624    001     002     004     5$:     .BYTE   1,2,4,8.,16.,32.,0
1072  004627    010     020     040
1073  004632    000
1074
1075          004634                            .EVEN
```

```
1076                                    ;//////////////////////////////////////////////////////////////////////////////
1077
1078                                    ;TEST30 -       RIBBON FEED TEST
1079                                    ;
1080                                    ;THIS TEST PRINTS A SINGLE COLUMN OF 24 LINES OF X'S DOWN THE LEFT
1081                                    ;HAND MARGIN OF THE PAGE.
1082
1083                                    ;//////////////////////////////////////////////////////////////////////////////
1084
1085  004634  104412                   TEST30: PRTHDR                  ;PRINT TEST HEADER
1086  004636  012701  000030                   MOV     #24.,R1         ;SET LINE COUNT
1087  004642  104413  004656           1$:     PRINT   ,2$             ;PRINT X - LF
1088  004646  005301                           DEC     R1              ;DEC LINE COUNT
1089  004650  001374                           BNE     1$              ;FINISH TEST
1090  004652  000137  005516                   JMP     EXIT            ;EXIT TEST
1091
1092  004656  005130     000          2$:     .ASCIZ  /X/<12>
1093
1094          004662                           .EVEN
1095
1096
1097
1098                                    ;//////////////////////////////////////////////////////////////////////////////
1099
1100                                    ;TEST31 -       BELL TEST
1101                                    ;
1102                                    ;THIS TEST WILL SOUND 5 BELLS BETWEEN PRINTING "BELL TEST"
1103
1104                                    ;//////////////////////////////////////////////////////////////////////////////
1105
1106  004662  104412                   TEST31: PRTHDR                  ;PRINT TEST HEADER
1107  004664  104413  004674                   PRINT   ,1$             ;DO TEST
1108  004670  000137  004716                   JMP     $EOP            ;EXIT TEST
1109
1110  004674  041007  046105  003514   1$:     .ASCIZ  <7>/BELL/<7>/ TEST/<7><15><7><12><7><15>
1111  004702  052040  051505  003524
1112  004710  003415  003412  000015
1113
1114                                           .EVEN
```

```
1115                                    ;*****************************************************************
1116
1117                                    .SBTTL  END OF PASS ROUTINE
1118
1119                                    ;*INCREMENT THE PASS NUMBER ($PASS)
1120                                    ;*IF THERES A MONITOR GO TO IT
1121                                    ;*IF THERE ISN'T JUMP TO EXIT
1122
1123  004716                            $EOP:
1124  004716  000240                           NOP
1125  004720  005237  004772                   INC     $PASS           ;;INCREMENT THE PASS NUMBER
1126  004724  042737  100000  004772           BIC     #100000,$PASS   ;;DON'T ALLOW A NEG. NUMBER
1127  004732  005327                           DEC     (PC)+           ;;LOOP?
1128  004734  000001                    $EOPCT: .WORD   1
1129  004736  003013                           BGT     $DOAGN          ;;YES
1130  004740  012737                           MOV     (PC)+,@(PC)+    ;;RESTORE COUNTER
1131  004742  000001                    $ENDCT: .WORD   1
1132  004744  004734                           $EOPCT
1133  004746                            $GET42:
1134
1135  004746  013700  000042                   MOV     @#42,R0         ;;GET MONITOR ADDRESS
1136  004752  001405                           BEQ     $DOAGN          ;;BRANCH IF NO MONITOR
1137  004754  000005                           RESET                   ;;CLEAR THE WORLD
1138  004756  004710                    $ENDAD: JSR     PC,(R0)         ;;GO TO MONITOR
1139  004760  000240                           NOP                     ;;SAVE ROOM
1140  004762  000240                           NOP                     ;;FOR
1141  004764  000240                           NOP                     ;;ACT11
1142  004766                            $DOAGN:
1143  004766  000137  005516                   JMP     @#EXIT          ;;RETURN
1144  004772  000000                    $PASS:  .WORD   0               ;;NUMBER OF PASSES
```

```
1145                                ;*****************************************************************
1146
1147                                .SBTTL  MAINTENANCE AIDS
1148
1149
1150
1151                                ;/////////////////////////////////////////////////////////////////
1152
1153                                ;TEST60 -       LIFE TEST
1154                                ;
1155                                ;THIS TEST PRINTS 2 FULL LINES OF EACH PRINTABLE CHARACTER
1156                                ;THE SECOND LINE IS OVERPRINTED 4 TIMES TO CONSERVE PAPER
1157                                ;AT THE END OF EACH PASS THROUGH THE ENTIRE PRINTABLE CHARACTER
1158                                ;SET, THE PASS COUNT WILL BE PRINTED ON THE LA180.
1159
1160                                ;/////////////////////////////////////////////////////////////////
1161
1162  004774  005037  005106        TEST60: CLR     PASCNT          ;CLEAR PASS COUNT
1163  005000  104412                1$:     PRTHDR                  ;PRINT TEST HEADER, FEED BLANK LINES
1164  005002  012700  000041                MOV     #41,R0          ;SET FIRST CHAR
1165  005006  013701  001130        2$:     MOV     WIDTH,R1        ;SET COLUMN COUNT
1166  005012  104415                        MLOAD                   ;LOAD LINE
1167  005014  104413  001142                PRINT   ,$LF            ;PRINT LINE
1168  005020  012702  000005                MOV     #5,R2           ;SET OVERPRINT COUNT
1169  005024  013701  001130        3$:     MOV     WIDTH,R1        ;SET COLUMN COUNT
1170  005030  104415                        MLOAD                   ;LOAD LINE
1171  005032  104413  001144                PRINT   ,$CR            ;PRINT LINE
1172  005036  005302                        DEC     R2              ;DEC OVERPRINT COUNT
1173  005040  001371                        BNE     3$              ;FINISH OVERPRINT
1174  005042  104413  001142                PRINT   ,$LF            ;ADVANCE PAPER
1175  005046  005200                        INC     R0              ;SET NEXT CHAR
1176  005050  020027  000177                CMP     R0,#177         ;TEST CHAR
1177  005054  001354                        BNE     2$              ;OK, CONTINUE
1178  005056  005237  005106                INC     PASCNT          ;INC PASS COUNT
1179  005062  104413  013310                PRINT   ,PASMSG         ;LOAD PASS COUNT MESG
1180  005066  013746  005106                MOV     PASCNT,-(SP)    ;;PUSH PASCNT ON STACK
1181  005072  004737  011120                JSR     PC,$SB2D        ;CONVERT #
1182  005076  104416                        CNLOAD                  ;LOAD #
1183  005100  104413  001142                PRINT   ,$LF            ;PRINT MESG
1184  005104  000735                        BR      1$              ;START NEXT PASS
1185
1186  005106  000000        PASCNT: .WORD   0               ;PASS COUNT
```

```
1187                                    ;//////////////////////////////////////////////////////////////////////////////
1188
1189                                    ;TEST61 -       SCOPE DRIVE ROUTINE
1190                                    ;
1191                                    ;THIS TEST WILL LOAD A CHARACTER SET IN SWITCH REGISTER BITS 0-6
1192                                    ;IF SWITCH 9 IS DOWN, FULL LINES WILL BE LOADED & PRINTED (LF).
1193                                    ;IF SWITCH 9 IS UP, THE CHAR WILL BE LOADED ONCE AND THE PROGRAM
1194                                    ;WILL HALT.  NO LINE FEEDS OR CARRIAGE RETURNS WILL BE SENT BY THE
1195                                    ;PROGRAM.
1196
1197                                    ;//////////////////////////////////////////////////////////////////////////////
1198
1199  005110  104412                   TEST61: PRTHDR                  ;PRINT TEST HEADER
1200  005112  000422                           BR      11$             ;CHECK SWITCH REG FIRST
1201  005114  013701  001130           10$:    MOV     WIDTH,R1        ;SET COLUMN COUNT
1202  005120  017700  173776           1$:     MOV     @SWR,R0         ;GET CHARACTER
1203  005124  042700  177600                   BIC     #^C177,R0       ;MASK UNWANTED BITS
1204  005130  104414                           LOAD                    ;LOAD CHAR
1205  005132  020027  000015                   CMP     R0,#15          ;CHAR = CR?
1206  005136  001410                           BEQ     11$             ;YES, RESET COLUMN COUNT
1207  005140  020027  000012                   CMP     R0,#12          ;CHAR = LF?
1208  005144  001405                           BEQ     11$             ;YES, RESET COLUMN COUNT
1209  005146  020027  000040                   CMP     R0,#40          ;NON-PRINTABLE CHAR?
1210  005152  103404                           BLO     12$             ;YES, DON'T DEC COLUMN COUNT
1211  005154  005301                           DEC     R1              ;DEC COLUMN COUNT
1212  005156  000402                           BR      12$             ;CONTINUE
1213  005160  013701  001130           11$:    MOV     WIDTH,R1        ;RESET COLUMN COUNT
1214  005164  032777  001000  173730   12$:    BIT     #SW9,@SWR       ;TEST SWITCH 9
1215  005172  001402                           BEQ     2$              ;PRINT FULL LINE
1216  005174  000000                           HALT                    ;ONE CHAR - HALT
1217  005176  000750                           BR      1$              ;GET NEXT CHAR
1218  005200  005701                   2$:     TST     R1              ;TEST COLUMN COUNT
1219  005202  003346                           BGT     1$              ;CONTINUE IF NOT DONE LINE
1220  005204  001403                           BEQ     3$              ;LOADED MORE THAN WIDTH?
1221  005206  012700  000177                   MOV     #177,R0         ;YES, CLEAR BUFFER
1222  005212  104414                           LOAD
1223  005214  104413  001142           3$:     PRINT   $LF             ;PRINT LINE, ADVANCE PAPER
1224  005220  000735                           BR      10$             ;CONTINUE
```

```
1225                                    ;//////////////////////////////////////////////////////////////////////////
1226
1227                                    ;TEST62 -       LINE PRINT TEST
1228                                    ;
1229                                    ;THIS TEST PRINTS FULL LINES CONTINUOUSLY OF WHATEVER CHARACTER
1230                                    ;IS TYPED ON THE CONSOLE KEYBOARD.  TO CHANGE CHARACTERS, RESELECT
1231                                    ;THIS TEST.  AN ERROR MESG WILL BE PRINTED IF THIS TEST IS SELECTED
1232                                    ;AND A CONSOLE TERMINAL DOES NOT EXIST.
1233
1234                                    ;//////////////////////////////////////////////////////////////////////////
1235
1236  005222  104412                    TEST62: PRTHDR                  ;PRINT TEST HEADER
1237  005224  105737  001153                    TSTB    $TPFLG          ;CHECK IF TERMINAL EXISTS
1238  005230  001073                            BNE     TERR            ;EXIT IF NONE
1239  005232  104400  013413                    TYPE    ,TCHAR          ;TYPE INSTR
1240  005236  105777  173636            2$:     TSTB    @TKS            ;WAIT FOR KYBD FLAG
1241  005242  100375                            BPL     2$
1242  005244  104417                            CHECK                   ;CHECK CHAR FOR CONTROL
1243  005246  017700  173630                    MOV     @TKB,R0         ;GET CHAR
1244  005252  010046                            MOV     R0,-(SP)        ;CHAR ONTO STACK
1245  005254  004737  007172                    JSR     PC,$TYPEC       ;ECHO CHAR
1246  005260  012746  000200                    MOV     #CRLF,-(SP)     ;SEND CR-LF
1247  005264  004737  007172                    JSR     PC,$TYPEC
1248  005270  013701  001130            1$:     MOV     WIDTH,R1        ;SET COLUMN COUNT
1249  005274  104415                            MLOAD                   ;LOAD LINE
1250  005276  104413  001142                    PRINT   ,$LF            ;PRINT LINE
1251  005302  000772                            BR      1$              ;CONTINUE
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                ;TEST63 -       CHARACTER PRINT TEST
                                ;
                                ;THIS TEST LOADS WHATEVER CHARACTER IS TYPED ON THE CONSOLE KEYBOARD
                                ;TO THE LA180, CHARACTER BY CHARACTER.
                                ;IF THIS TEST IS SELECTED AND A CONSOLE TERMINAL DOES NOT EXIST,
                                ;AN ERROR MESSAGE WILL BE PRINTED.
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
005304  104412          TEST63: PRTHDR                  ;PRINT TEST HEADER
005306  105737  001153          TSTB    $TPFLG          ;CHECK IF TERMINAL EXISTS
005312  001042                  BNE     TERR            ;EXIT IF NONE
005314  104400  013413          TYPE    ,TCHAR          ;TYPE INSTR
005320  104400  001141          TYPE    ,$CRLF          ;SEND CR-LF
005324  105777  173550  1$:     TSTB    @TKS            ;WAIT FOR KYBD FLAG
005330  100375                  BPL     1$              ;WAIT FOR FLAG
005332  104417                  CHECK                   ;CHECK CHAR FOR CONTROL
005334  017700  173542          MOV     @TKB,R0         ;GET CHAR
005340  010046                  MOV     R0,-(SP)        ;CHAR ONTO STACK
005342  004737  007172          JSR     PC,$TYPEC       ;ECHO CHAR
005346  104414                  LOAD                    ;LOAD CHAR
005350  020027  000015          CMP     R0,#CR          ;SEND LF AFTER CR
005354  001003                  BNE     2$
005356  012746  000012          MOV     #LF,-(SP)
005362  000413                  BR      4$
005364  020027  000012  2$:     CMP     R0,#LF          ;SEND CR AFTER LF
005370  001003                  BNE     3$
005372  012746  000015          MOV     #CR,-(SP)
005376  000405                  BR      4$
005400  020027  000014  3$:     CMP     R0,#FF          ;SND CRLF AFTER FF
005404  001347                  BNE     1$
005406  012746  000200          MOV     #CRLF,-(SP)
005412  004737  007172  4$:     JSR     PC,$TYPEC
005416  000742                  BR      1$              ;CONTINUE
                        
005420  104413  013433  TERR:   PRINT   ,NCMSG          ;PRINT ERROR MESG
005424  000137  005516          JMP     EXIT            ;EXIT TEST
```

```
1291                            ;//////////////////////////////////////////////////////////////////////////
1292
1293                            .SBTTL  CLOCK INTERRUPT SERVICE ROUTINES
1294
1295                            ;//////////////////////////////////////////////////////////////////////////
1296
1297  005430  004737  005466   DCI:    JSR     PC,@RDCI        ;DISABLE KW11-P INTERRUPT
1298  005434  000177  000022           JMP     @TORTN          ;TIME OUT RETURN
1299
1300  005440  005337  005460   LKSRV:  DEC     CNTR            ;DEC TIME COUNT
1301  005444  001401                   BEQ     1$              ;TIME OUT?
1302  005446  000002                   RTI                     ;NO, RETURN
1303  005450  004737  005466   1$:     JSR     PC,@RDCI        ;DISABLE KW11-L INTERRUPT
1304  005454  000177  000002           JMP     @TORTN          ;TIME OUT RETURN
1305
1306  005460  000000           CNTR:   .WORD   0               ;KW11-L TIMING COUNT
1307  005462  000000           TORTN:  .WORD   0               ;TIME OUT RETURN ADDRESS
1308
1309  005464  007020           MINCNT: .WORD   7020            ;60 HZ LINE FREQ. MINUTE COUNT
1310                                                           ;SET TO 5670(8) FOR 50 HZ. LINE FREQ.
1311
1312                            ;//////////////////////////////////////////////////////////////////////////
1313
1314                            ;SUBROUTINE TO DISABLE CLOCK OPTION INTERRUPTS
1315
1316                            ;//////////////////////////////////////////////////////////////////////////
1317
1318  005466  105737  001135   SRDCI:  TSTB    CKFLAG          ;CHECK CLOCK OPTION FLAG
1319  005472  001410                   BEQ     2$              ;RETURN IF NONE
1320  005474  002404                   BLT     1$              ;BRANCH IF KW11-P
1321  005476  042777  000100  173414   BIC     #BIT6,@LKS      ;DISABLE KW11-L INTERRUPT
1322  005504  000403                   BR      2$              ;RETURN
1323  005506  042777  000100  173400  1$:     BIC     #BIT6,@PLKS     ;DISABLE KW11-P INTERRUPT
1324  005514  000207           2$:     RTS     PC
```

```
1325                                    ;//////////////////////////////////////////////////////////////////////////////
1326
1327                                    .SBTTL  TEST EXIT ROUTINE
1328
1329                                    ;//////////////////////////////////////////////////////////////////////////////
1330
1331  005516  004737  006012           EXIT:   JSR     PC,KYBDF        ;CHECK FOR KYBD FLAG
1332  005522  032777  040000  173372           BIT     #SW14,@SWR      ;LOOP ON TEST SWITCH?
1333  005530  001016                           BNE     3$              ;YES, RETURN TO TEST
1334  005532  032777  000400  173362           BIT     #SW8,@SWR       ;WANT SW REG TEST SELECTION?
1335  005540  001031                           BNE     SELECT          ;YES, SELECT TEST
1336  005542  105737  001134                   TSTB    TLOOP           ;KYBD CTRL - LOOP ON TEST?
1337  005546  001007                           BNE     3$              ;YES, RETURN TO TEST
1338  005550  105737  001133                   TSTB    TRONE           ;KYBD CTRL - RUN TEST ONCE?
1339  005554  001402                           BEQ     2$              ;NO, CONTINUE
1340  005556  000137  006336                   JMP     TSEL            ;YES, SELECT TEST
1341  005562  005237  001126           2$:     INC     $TSTNM          ;INCREMENT TEST NUMBER
1342  005566  013700  001126           3$:     MOV     $TSTNM,R0       ;GET NEW TEST NUMBER
1343  005572  006300                           ASL     R0              ;SET TABLE POINTER
1344  005574  005760  011564                   TST     TAT(R0)         ;CHECK ADDRESS IN TABLE
1345  005600  003005                           BGT     4$              ;OK, GO TO TEST
1346  005602  001767                           BEQ     2$              ;ZERO, SKIP TEST
1347  005604  012737  000020  001126           MOV     #20,$TSTNM      ;END OF SEQ. - RESET TEST # TO 20
1348  005612  000765                           BR      3$              ;TEST NEW NUMBER
1349  005614  012706  001100           4$:     MOV     #STACK,SP       ;RESET STACK
1350  005620  000170  011564                   JMP     @TAT(R0)        ;GO TO TEST
```

```
1351                                    ;*****************************************************************
1352
1353                                    .SBTTL  ROUTINES TO SELECT DESIRED TEST
1354
1355
1356
1357                                    ;/////////////////////////////////////////////////////////////////
1358
1359                                    ;ROUTINE TO SELECT TEST FROM SW REG, BITS 0-5
1360
1361                                    ;/////////////////////////////////////////////////////////////////
1362
1363  005624  004737  005466      SELECT: JSR     PC,$RDCI        ;CLEAR CLOCK INTER
1364  005630  105037  001132              CLRB    $TRONE          ;CLEAR PROGRAM CONTROL FLAGS
1365  005634  105037  001133              CLRB    TRONE
1366  005640  105037  001134              CLRB    TLOOP
1367  005644  004737  006012              JSR     PC,KYBDF        ;CHECK IF KYBD FLAG
1368  005650  000000              1$:     HALT                    ;NO KYBD FLAG - HALT
1369                                                            ;WAIT FOR OPERATOR TO SELECT TEST
1370                                                            ;PRESS CONTINUE WHEN READY
1371  005652  032777  000400  173242      BIT     #SW8,@SWR       ;CHECK SW8
1372  005660  001403                      BEQ     2$              ;WANT TO RUN TEST ONCE & HALT
1373  005662  112737  177777  001132      MOVB    #-1,STRONE      ;YES, SET FLAG
1374  005670  017700  173226      2$:     MOV     @SWR,R0         ;NO, CHECK SW REG
1375  005674  042700  177700              BIC     #^C77,R0        ;MASK BITS 0-5
1376  005700  010037  001126              MOV     R0,$TSTNM       ;SAVE TEST NUMBER
1377  005704  006300                      ASL     R0              ;SET TABLE POINTER
1378  005706  005760  011564              TST     TAT(R0)         ;CHECK IF TEST IS IN TABLE
1379  005712  003744                      BLE     SELECT          ;NOT THERE, GET NEW SELECTION
1380  005714  012706  001100              MOV     #STACK,SP       ;RESET STACK
1381  005720  000170  011564              JMP     @TAT(R0)        ;GO TO SELECTED TEST
1382
1383                                    ;/////////////////////////////////////////////////////////////////
1384
1385                                    ;ROUTINE TO CHECK FOR KYBD OR SW REG CONTROL
1386                                    ;CALL:  CHECK
1387
1388                                    ;/////////////////////////////////////////////////////////////////
1389
1390  005724  004737  006012      $CHECK: JSR     PC,KYBDF        ;CHECK FOR KYBD FLAG
1391  005730  010046                      MOV     R0,-(SP)        ;;PUSH R0 ON STACK
1392  005732  005000                      CLR     R0              ;CLEAR R0
1393  005734  032777  000400  173160      BIT     #SW8,@SWR       ;CHECK SW8
1394  005742  001401                      BEQ     1$              ;BRANCH IF SW DOWN
1395  005744  005300                      DEC     R0              ;SET FLAG IF UP
1396  005746  123700  001132      1$:     CMPB    $TRONE,R0       ;CHANGE IN SWITCH?
1397  005752  001402                      BEQ     2$              ;NO, RETURN
1398  005754  000137  005624              JMP     SELECT          ;YES,  SELECT TEST
1399  005760                      2$:
1400  005760  012600                      MOV     (SP)+,R0        ;;POP STACK INTO R0
1401  005762  000002                      RTI                     ;RETURN
```

```
1402                                    ;//////////////////////////////////////////////////////////////////////////////
1403
1404                                    ;ROUTINE TO WAIT FOR OPERATOR ACTION
1405
1406                                    ;//////////////////////////////////////////////////////////////////////////////
1407
1408  005764  105737  001153      $HOLD:  TSTB    @#TPFLG         ;TERMINAL THERE?
1409  005770  100002                  BPL     1$              ;BRANCH IF YES
1410  005772  000000                  HALT                    ;HALT IF NO
1411  005774  000405                  BR      2$              ;RETURN ON CONTINUE SWITCH
1412  005776  104400  013352      1$:     TYPE    ,WTMSG          ;TYPE WAIT MESG
1413  006002  105777  173072      3$:     TSTB    @#TKS           ;KYBD FLAG?
1414  006006  100375                  BPL     3$              ;NO, WAIT FOR FLAG
1415  006010  000002              2$:     RTI                     ;RETURN
1416
1417
1418                                    ;//////////////////////////////////////////////////////////////////////////////
1419
1420                                    ;ROUTINE TO CHECK FOR KEYBOARD FLAGS
1421                                    ;WHEN LOOKING FOR CONTROL FROM THE CONSOLE DEVICE KEYBOARD
1422                                    ;CALL:  JSR     PC,KYBDF
1423
1424                                    ;//////////////////////////////////////////////////////////////////////////////
1425
1426  006012  105737  001153      KYBDF:  TSTB    @#TPFLG         ;TERMINAL THERE?
1427  006016  001121                  BNE     1$              ;NO, EXIT
1428  006020  105777  173054          TSTB    @#TKS           ;FLAG SET?
1429  006024  100116                  BPL     1$              ;NO - EXIT
1430  006026  104405              2$:     RDCHR                   ;FLAG SET - READ CHAR
1431  006030  023727  001122  000176      CMP     SWR,#SWREG      ;USING HARDWARE SW REG?
1432  006036  001101                  BNE     4$              ;BRANCH IF YES
1433  006040  022716  000007          CMP     #7,(SP)         ;CHAR = BEL <007>?
1434  006044  001076                  BNE     4$              ;BRANCH IF NOT
1435  006046  005726              5$:     TST     (SP)+           ;RESET STACK
1436  006050  005037  006264          CLR     20$             ;CLEAR NEW SW SETTING
1437  006054  005037  006266          CLR     30$             ;CLEAR INPUT FLAG
1438  006060  104400  013330          TYPE    ,DSMSG1         ;TYPE MESG
1439  006064  013746  000176          MOV     @#SWREG,-(SP)   ;;PUSH SWREG ON STACK
1440  006070  104401                  TYPOC                   ;TYPE IT
1441  006072  104400  013340          TYPE    ,DSMSG2         ;TYPE MORE OF MESG
1442  006076  104405              9$:     RDCHR                   ;READ CHAR
1443  006100  021627  000025          CMP     (SP),#25        ;CHAR = CONTROL-U ?
1444  006104  001003                  BNE     10$             ;BRANCH IF NOT
1445  006106  104400  010534          TYPE    ,$CNTLU         ;ECHO CONTROL-U
1446  006112  000755                  BR      5$              ;RESTART ROUTINE
1447  006114  021627  000015      10$:    CMP     (SP),#CR        ;CHAR = CR?
1448  006120  001011                  BNE     7$              ;BRANCH IF NOT
1449  006122  104400  001141          TYPE    ,$CRLF          ;ECHO CR-LF
1450  006126  005737  006266          TST     30$             ;CHECK INPUT FLAG
1451  006132  001452                  BEQ     6$              ;LEAVE SW SETTINGS ALONE IF NO INPUT
1452  006134  013737  006264  000176      MOV     20$,@#SWREG     ;SET NEW SW REG
1453  006142  000446                  BR      6$              ;RETURN TO TEST
1454  006144  021627  000012      7$:     CMP     (SP),#LF        ;CHAR = LF?
1455  006150  001011                  BNE     8$              ;BRANCH IF NOT
```

```
1456  006152  104400  001141                TYPE    $CRLF           ;ECHO CR-LF
1457  006156  005737  006266                TST     30$             ;CHECK INPUT FLAG
1458  006162  001465                        BEQ     TSEL            ;LEAVE SW SETTINGS ALONE IF NO INPUT
1459  006164  013737  006264  000176        MOV     20$,SWREG       ;SET NEW SW REG
1460  006172  000461                        BR      TSEL            ;GO TO TEST SELECT
1461  006174  042716  177770          8$:   BIC     #^C7,(SP)       ;MASK DIGIT
1462  006200  062716  000060                ADD     #60,(SP)        ;MAKE ASCII
1463  006204  004737  007172                JSR     PC,$TYPEC       ;PRINT DIGIT
1464  006210  042716  177770                BIC     #^C7,(SP)       ;MASK DIGIT
1465  006214  006337  006264                ASL     20$             ;SHIFT SWTICH SETTINGS FOR NEW ONE
1466  006220  006337  006264                ASL     20$
1467  006224  006337  006264                ASL     20$
1468  006230  062637  006264                ADD     (SP)+,20$       ;ADD NEW SWITCH
1469  006234  005237  006266                INC     30$             ;SET INPUT FLAG
1470  006240  000716                        BR      9$              ;CONTINUE
1471  006242  022716  000177          4$:   CMP     #177,(SP)       ;CHAR = RUBOUT?
1472  006246  001001                        BNE     3$              ;NO, CHECK AGAIN
1473  006250  000432                        BR      TSEL            ;YES, GET TEST SELECTION
1474  006252  022716  000003          3$:   CMP     #3,(SP)         ;CHAR = CNTL C ?
1475  006256  001404                        BEQ     KYBDST          ;YES, GET # COLUMNS
1476  006260  005726                  6$:   TST     (SP)+           ;RESET STACK
1477  006262  000207                  1$:   RTS     PC              ;NO, RETURN
1478
1479  006264  000000                 20$:   .WORD   0               ;SW SETTING INPUT
1480  006266  000000                 30$:   .WORD   0               ;INPUT FLAG
```

```
1481                                    ;////////////////////////////////////////////////////////////////////////
1482
1483                                    ;ROUTINE TO SET NUMBER OF COLUMNS FROM CONSOLE DEVICE KYBD
1484
1485                                    ;////////////////////////////////////////////////////////////////////////
1486
1487  006270  004737  005466      KYBDST: JSR     PC,SRDCI        ;CLEAR CLOCK INTER
1488  006274  104400  013157              TYPE    ,COLUMN         ;TYPE COLUMNS MESSAGE
1489  006300  104407              2$:     RDDEC                   ;GET # COLUMNS
1490  006302  012605                      MOV     (SP)+,R5        ;;POP STACK INTO R5
1491  006304  020527  000204              CMP     R5,#132.        ;TEST SIZE OF NUMBER
1492  006310  003003                      BGT     1$              ;TOO BIG, GET AGAIN
1493  006312  020527  000002              CMP     R5,#2           ;TEST SIZE AGAIN
1494  006316  103005                      BHIS    3$              ;BRANCH IF OK
1495  006320  104400  001140      1$:     TYPE    ,$QUES          ;INPUT ERROR - TYPE QUESTION MARK
1496  006324  104400  001141              TYPE    ,$CRLF
1497  006330  000763                      BR      2$              ;GET INPUT AGAIN
1498  006332  010537  001130      3$:     MOV     R5,WIDTH        ;OK, SAVE # COLUMNS
1499
1500                                    ;////////////////////////////////////////////////////////////////////////
1501
1502                                    ;ROUTINE TO SELECT TEST FROM CONSOLE DEVICE KEYBOARD
1503                                    ;AND DETERMINE TEST ACTION BY INPUT CONTROL CHARACTER.
1504                                    ;TEST NUMBER MUST BE OCTAL, FOLLOWED BY ONE OF THE
1505                                    ;FOLLOWING CONTROL CHARACTERS:
1506
1507                                    ;       PERIOD  .       =       RUN TEST ONCE AND SELECT NEXT TEST
1508                                    ;
1509                                    ;               L       =       LOOP ON SELECTED TEST
1510                                    ;
1511                                    ;               S       =       START TEST SEQUENCE WITH SELECTED TEST
1512
1513                                    ;////////////////////////////////////////////////////////////////////////
1514
1515  006336  004737  005466      TSEL:   JSR     PC,SRDCI        ;CLEAR CLOCK INTER
1516  006342  105037  001133              CLRB    TRONE           ;CLEAR PROGRAM CONTROL FLAGS
1517  006346  105037  001134              CLRB    TLOOP
1518  006352  105037  001132              CLRB    STRONE
1519  006356  104400  013175              TYPE    ,SELTST         ;TYPE SELECT TEST MESG
1520  006362  104406              5$:     RDLIN                   ;GET TEST SELECTION
1521  006364  012605                      MOV     (SP)+,R5        ;;POP STACK INTO R5
1522  006366  112500                      MOVB    (R5)+,R0        ;SET TEST # IN R0
1523  006370  042700  177600              BIC     #^C177,R0
1524  006374  022700  000003              CMP     #3,R0           ;CHECK IF CHAR = CNTL-C
1525  006400  001733                      BEQ     KYBDST          ;GET # COLUMNS IF CNTL-C
1526  006402  020027  000060              CMP     R0,#60          ;CHECK IF OCTAL NUMBER
1527  006406  103464                      BLO     4$              ;NOT OCTAL - INPUT ERRO
1528  006410  020027  000067              CMP     R0,#67
1529  006414  101061                      BHI     4$              ;NOT OCTAL - INPUT ERROR
1530  006416  042700  177770              BIC     #^C7,R0         ;OK - STORE DIGIT
1531  006422  006300                      ASL     R0
1532  006424  006300                      ASL     R0
1533  006426  006300                      ASL     R0
1534  006430  112501                      MOVB    (R5)+,R1        ;GET SECOND DIGIT
```

```
1535  006432  042701  177600                    BIC     #^C177,R1       ;CHECK IF AN OCTAL DIGIT
1536  006436  020127  000060                    CMP     R1,#60
1537  006442  103446                            BLO     4$              ;NOT OCTAL - INPUT ERROR
1538  006444  020127  000067                    CMP     R1,#67
1539  006450  101043                            BHI     4$              ;NOT OCTAL - INPUT ERROR
1540  006452  042701  177770                    BIC     #^C7,R1         ;OK - MASK DIGIT
1541  006456  060100                            ADD     R1,R0           ;MAKE COMPLETE TEST NUMBER
1542  006460  010037  001126                    MOV     R0,$TSTNM       ;SAVE TEST NUMBER
1543  006464  006300                            ASL     R0              ;SET TABLE POINTER
1544  006466  005760  011564                    TST     TAT(R0)         ;CHECK IF TEST IS IN TABLE
1545  006472  003432                            BLE     4$              ;NOT IN TABLE, GET NEW SELECTION
1546  006474  112501                            MOVB    (R5)+,R1        ;GET CONTROL CHAR
1547  006476  042701  177600                    BIC     #^C177,R1       ;MASK BITS
1548  006502  020127  000056                    CMP     R1,#56          ;CHAR = PERIOD?
1549  006506  001004                            BNE     1$              ;NO, CONTINUE CHECK
1550  006510  112737  177777  001133            MOVB    #-1,TRONE       ;YES, SET FLAG
1551  006516  000414                            BR      3$              ;CONTINUE
1552  006520  042701  000040          1$:       BIC     #BIT5,R1                ;MASK BIT 5 (ALLOW UPPER OR LOWER CASE)
1553  006524  022701  000114                    CMP     #'L,R1          ;CHAR = L?
1554  006530  001004                            BNE     2$              ;NO, CONTINUE
1555  006532  112737  177777  001134            MOVB    #-1,TLOOP       ;YES, SET FLAG
1556  006540  000403                            BR      3$              ;CONTINUE
1557  006542  022701  000123          2$:       CMP     #'S,R1          ;CHAR = S?
1558  006546  001004                            BNE     4$              ;NO, INPUT ERROR
1559  006550  012706  001100          3$:       MOV     #STACK,SP       ;RESET STACK
1560  006554  000170  011564                    JMP     @TAT(R0)        ;ALL OK - GO TO SELECTED TEST
1561  006560  104400  001140          4$:       TYPE    ,$QUES          ;INPUT ERROR
1562  006564  104400  001141                    TYPE    ,$CRLF          ;PRINT QUESTION MARK
1563  006570  000674                            BR      5$              ;GET NEW INPUT
```

```
                                ;*****************************************************************

                                .SBTTL  ERROR HANDLER ROUTINE

                                ;THIS ROUTINE WILL SAVE THE ERROR NUMBER AND THE ADR OF THE ERROR CALL
                                ;AND GO TO REPORT ON ERROR
                                ;THE SWITCH OPTIONS PROVIDED BY THIS ROUTINE ARE:
                                ;       SW15 = 1        HALT ON ERROR
                                ;       SW13 = 1        INHIBIT ERROR TYPEOUTS
                                ;       SW10 = 1        BELL ON ERROR
                                ;
                                ;CALL
                                ;       ERROR   N               ;ERROR = EMT & N = ERROR ITEM NUMBER

006572  013777  001126  172324  $ERROR: MOV     $TSTNM,@DISPLAY;DISPLAY TEST NUMBER AND ERROR FLAG
006600  032777  002000  172314          BIT     #BIT10,@SWR     ;BELL ON ERROR?
006606  001402                          BEQ     1$              ;NO - SKIP
006610  104400  001136                  TYPE    ,$BELL          ;RING BELL
006614  011637  006666          1$:     MOV     (SP),$ERRPC     ;GET ADDRESS OF ERROR INSTRUCTION
006620  162737  000002  006666          SUB     #2,$ERRPC
006626  117737  000034  006670          MOVB    @$ERRPC,$ITEMB  ;STRIP AND SAVE THE ERROR ITEM CODE
006634  032777  020000  172260          BIT     #BIT13,@SWR     ;SKIP TYPEOUTS IF SET
006642  001004                          BNE     2$              ;SKIP TYPEOUTS
006644  004737  006672                  JSR     PC,REPORT       ;GO TO REPORT ROUTINE
006650  104400  001141                  TYPE    ,$CRLF
006654  005777  172242          2$:     TST     @SWR            ;HALT ON ERROR IF SET
006660  100001                          BPL     3$              ;SKIP IS CONTINUE
006662  104420                          HOLD                    ;DYNAMIC HALT
006664  000002          3$:     RTI                             ;RETURN

006666  000000  $ERRPC: .WORD   0               ;LAST ERROR INSTRUCTION EXECUTED
006670  000000  $ITEMB: .WORD   0               ;ITEM CODE
```

```
                                        ;////////////////////////////////////////////////////////////////////////
                                        ;ERROR REPORT ROUTINE
                                        ;
                                        ;ERROR MESSAGE WILL USE THE FOLLOWING FORM:
                                        ;TEST #XX,  PC=XXXXXX,  ERROR #XXX,  MESSAGE >>>>>>>>>>>>>
                                        ;////////////////////////////////////////////////////////////////////////

006672  105737  001153        REPORT: TSTB    $TPFLG          ;TERMINAL EXIT?
006676  001035                        BNE     2$              ;NO, EXIT
006700  010046                        MOV     R0,-(SP)        ;;PUSH R0 ON STACK
006702  104400  013252                TYPE    ,ETSTNO         ;TYPE FIRST PART OF ERROR MESG
006706  013746  001126                MOV     $TSTNM,-(SP)    ;;PUSH $TSTNM ON STACK
006712  104402                        TYPOS                   ;TYPE TEST NUMBER
006714     002                        .BYTE   2               ;TWO DIGITS MAX.
006715     001                        .BYTE   1               ;TYPE LEADING ZEROS
006716  104400  013262                TYPE    ,PCMSG          ;TYPE PART OF ERROR MESG
006722  013746  006666                MOV     $ERRPC,-(SP)    ;;PUSH $ERRPC ON STACK
006726  104401                        TYPOC                   ;TYPE ERROR PC
006730  104400  013271                TYPE    ,ERR            ;TYPE MORE OF ERROR MESG
006734  013746  006670                MOV     $ITEMB,-(SP)    ;;PUSH $ITEMB ON STACK
006740  104402                        TYPOS                   ;TYPE ERROR NUMBER
006742     003                        .BYTE   3               ;3 DIGITS MAX.
006743     001                        .BYTE   1               ;TYPE LEADING ZEROS
006744  104400  013304                TYPE    ,ERRS           ;TYP SPACES
006750  013700  006670                MOV     $ITEMB,R0       ;GET ERROR NUMBER
006754  006300                        ASL     R0              ;SET TABLE POINTER
006756  016037  011762  006766        MOV     EMAT-2(R0),1$   ;SET ERROR MESSAGE ADR
006764  104400                        TYPE                    ;TYPE ERROR MESG
006766  000000                1$:     .WORD   0
006770  012600                        MOV     (SP)+,R0        ;;POP STACK INTO R0
006772  000207                2$:     RTS     PC              ;RETURN
```

```
                                ;*****************************************************************

                                .SBTTL  SAVE AND RESTORE R0-R5 ROUTINES

                                ;*SAVE R0-R5
                                ;*CALL:
                                ;*      SAVREG
                                ;*UPON RETURN FROM $SAVREG THE STACK WILL LOOK LIKE:
                                ;*
                                ;*TOP---(+16)
                                ;* +2---(+18)
                                ;* +4---R5
                                ;* +6---R4
                                ;* +8---R3
                                ;*+10---R2
                                ;*+12---R1
                                ;*+14---R0

006774                          $SAVREG:
006774  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
006776  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
007000  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
007002  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
007004  010446                          MOV     R4,-(SP)        ;;PUSH R4 ON STACK
007006  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
007010  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
007014  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
007020  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PS OF CALL
007024  016646  000022                  MOV     22(SP),-(SP)    ;;SAVE PC OF CALL
007030  000002                          RTI

                                ;*RESTORE R0-R5
                                ;*CALL:
                                ;*      RESREG
007032                          $RESREG:
007032  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF CALL
007036  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF CALL
007042  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
007046  012666  000022                  MOV     (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
007052  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
007054  012604                          MOV     (SP)+,R4        ;;POP STACK INTO R4
007056  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
007060  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
007062  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
007064  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
007066  000002                          RTI
```

```
                                        ;*****************************************************************

                                        .SBTTL  TYPE ROUTINE

                                        ;ROUTINE TO TYPE ASCIZ MESSAGES, MESSAGE MUST TERMINATE WITH A 0 BYTE.
                                        ;THE ROUTINE WILL INSERT A NUMBER OF NULL CHARACTERS AFTER A LINE FEED.
                                        ;NOTE1: $NULL CONTAINS THE CHARACTER TO BE USED AS THE FILLER CHARACTER
                                        ;NOTE2: $FILLS CONTAINS THE NUMBER OF FILLER CHARACTERS REQUIRED.
                                        ;NOTE3: $FILLC CONTAINS THE CHARACTER TO FILL AFTER.
                                        ;
                                        ;CALL:
                                        ;
                                        ;       TYPE    ,MESADR         ;MESADR IS ADDRESS OF FIRST CHAR IN ASCIZ STRING

007070  105737  001153          $TYPE:  TSTB    $TPFLG          ;IS THERE A TERMINAL?
007074  100407                          BMI     3$              ;LEAVE IF NO TERMINAL
007076  010046                  1$:     MOV     R0,-(SP)        ;SAVE R0
007100  017600  000002                  MOV     @2(SP),R0       ;GET ADR OF ASCIZ STRING
007104  112046                  2$:     MOVB    (R0)+,-(SP)     ;PUSH CHARACTER TO BE TYPED ONTO STACK
007106  001005                          BNE     4$              ;BR IF IT ISN'T THE TERMINATOR
007110  005726                          TST     (SP)+           ;IF TERMINATOR, POP IT OFF STACK
007112  012600                          MOV     (SP)+,R0        ;RESTORE R0
007114  062716  000002          3$:     ADD     #2,(SP)         ;ADJUST RETURN PC
007120  000002                          RTI                     ;RETURN
007122  122716  000200          4$:     CMPB    #CRLF,(SP)      ;BRANCH IF NOT <CRLF>
007126  001004                          BNE     5$
007130  005726                          TST     (SP)+           ;POP <CR><LF> EQUIV
007132  104400  001141                  TYPE,   $CRLF           ;TYPE CR-LF
007136  000762                          BR      2$              ;GET NEXT CHAR
007140  004737  007172          5$:     JSR     PC,$TYPEC       ;GO TYPE CHAR
007144  123726  001152          6$:     CMPB    $FILLC,(SP)+    ;IS IT TIME FOR FILLER CHARS?
007150  001355                          BNE     2$              ;IF NO GO GET NEXT CHAR
007152  013746  001150                  MOV     $NULL,-(SP)     ;GET # FILLER CHARS NEEDED
                                                                ;AND THE NULL CHAR
007156  105366  000001          7$:     DECB    1(SP)           ;DOES A NULL NEED TO BE TYPED?
007162  002770                          BLT     6$              ;BR IF NO - GO POP THE NULL OFF OF STACK
007164  004737  007172                  JSR     PC,$TYPEC       ;GO TYPE NULL
007170  000772                          BR      7$              ;LOOP

007172  105777  171706          $TYPEC: TSTB    @$TPS           ;WAIT UNTIL PRINTER IS READY
007176  100375                          BPL     $TYPEC
007200  116677  000002  171700          MOVB    2(SP),@$TPB     ;LOAD CHAR TO BE TYPED INTO DATA REG.
007206  000207                          RTS     PC              ;RETURN
```

```
                                ;*****************************************************************
                                .SBTTL  CONVERT BINARY TO DECIMAL AND TYPE ROUTINE

                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 5-DIGIT
                                ;*SIGNED DECIMAL (ASCII) NUMBER AND TYPE IT. DEPENDING ON WHETHER THE
                                ;*NUMBER IS POSITIVE OR NEGATIVE A SPACE OR A MINUS SIGN WILL BE TYPED
                                ;*BEFORE THE FIRST DIGIT OF THE NUMBER. LEADING ZEROS WILL ALWAYS BE
                                ;*REPLACED WITH SPACES.
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;PUT THE BINARY NUMBER ON THE STACK
                                ;*      TYPDS                   ;;GO TO THE ROUTINE

007210                          $TYPDS:
007210  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
007212  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
007214  010246                          MOV     R2,-(SP)        ;;PUSH R2 ON STACK
007216  010346                          MOV     R3,-(SP)        ;;PUSH R3 ON STACK
007220  010546                          MOV     R5,-(SP)        ;;PUSH R5 ON STACK
007222  012746  020200                  MOV     #20200,-(SP)    ;;SET BLANK SWITCH AND SIGN
007226  016605  000020                  MOV     20(SP),R5       ;;GET THE INPUT NUMBER
007232  100004                          BPL     1$              ;;BR IF INPUT IS POS.
007234  005405                          NEG     R5              ;;MAKE THE BINARY NUMBER POS.
007236  112766  000055  000001          MOVB    #'-,1(SP)       ;;MAKE THE ASCII NUMBER NEG.
007244  005000                  1$:     CLR     R0              ;;ZERO THE CONSTANTS INDEX
007246  012703  007424                  MOV     #$DBLK,R3       ;;SETUP THE OUTPUT POINTER
007252  112723  000040                  MOVB    #' ,(R3)+       ;;SET THE FIRST CHARACTER TO A BLANK
007256  005002                  2$:     CLR     R2              ;;CLEAR THE BCD NUMBER
007260  016001  007414                  MOV     $DTBL(R0),R1    ;;GET THE CONSTANT
007264  160105                  3$:     SUB     R1,R5           ;;FORM THIS BCD DIGIT
007266  002402                          BLT     4$              ;;BR IF DONE
007270  005202                          INC     R2              ;;INCREASE THE BCD DIGIT BY 1
007272  000774                          BR      3$
007274  060105                  4$:     ADD     R1,R5           ;;ADD BACK THE CONSTANT
007276  005702                          TST     R2              ;;CHECK IF BCD DIGIT=0
007300  001002                          BNE     5$              ;;FALL THROUGH IF 0
007302  105716                          TSTB    (SP)            ;;STILL DOING LEADING 0'S?
007304  100407                          BMI     7$              ;;BR IF YES
007306  106316                  5$:     ASLB    (SP)            ;;MSD?
007310  103003                          BCC     6$              ;;BR IF NO
007312  116663  000001  177777          MOVB    1(SP),-1(R3)    ;;YES--SET THE SIGN
007320  052702  000060          6$:     BIS     #'0,R2          ;;MAKE THE BCD DIGIT ASCII
007324  052702  000040          7$:     BIS     #' ,R2          ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
007330  110223                          MOVB    R2,(R3)+        ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
007332  005720                          TST     (R0)+           ;;JUST INCREMENTING
007334  020027  000010                  CMP     R0,#10          ;;CHECK THE TABLE INDEX
007340  002746                          BLT     2$              ;;GO DO THE NEXT DIGIT
007342  003002                          BGT     8$              ;;GO TO EXIT
007344  010502                          MOV     R5,R2           ;;GET THE LSD
007346  000764                          BR      6$              ;;GO CHANGE TO ASCII
007350  105726                  8$:     TSTB    (SP)+           ;;WAS THE LSD THE FIRST NON-ZERO?
007352  100003                          BPL     9$              ;;BR IF NO
007354  116663  177777  177776          MOVB    -1(SP),-2(R3)   ;;YES--SET THE SIGN FOR TYPING
007362  105013                  9$:     CLRB    (R3)            ;;SET THE TERMINATOR
```

```
1772  007364  012605                          MOV     (SP)+,R5        ;;POP STACK INTO R5
1773  007366  012603                          MOV     (SP)+,R3        ;;POP STACK INTO R3
1774  007370  012602                          MOV     (SP)+,R2        ;;POP STACK INTO R2
1775  007372  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
1776  007374  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
1777  007376  104400  007424                  TYPE    ,$DBLK          ;;NOW TYPE THE NUMBER
1778  007402  016666  000002  000004          MOV     2(SP),4(SP)     ;;ADJUST THE STACK
1779  007410  012616                          MOV     (SP)+,(SP)
1780  007412  000002                          RTI                     ;;RETURN TO USER
1781  007414  023420                  $DTBL:  10000.
1782  007416  001750                          1000.
1783  007420  000144                          100.
1784  007422  000012                          10.
1785  007424  000004                  $DBLK:  .BLKW   4
```

```
                                ;*****************************************************
                                .SBTTL  BINARY TO OCTAL (ASCII) AND TYPE
                                ;*THIS ROUTINE IS USED TO CHANGE A 16-BIT BINARY NUMBER TO A 6-DIGIT
                                ;*OCTAL (ASCII) NUMBER AND TYPE IT.
                                ;*$TYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOS                   ;;CALL FOR TYPEOUT
                                ;*      .BYTE   N               ;;N=1 TO 6 FOR NUMBER OF DIGITS TO TYPE
                                ;*      .BYTE   M               ;;M=1 OR 0
                                ;*                                      ;;1=TYPE LEADING ZEROS
                                ;*                                      ;;0=SUPPRESS LEADING ZEROS
                                ;*
                                ;*$TYPON----ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
                                ;*$TYPOS OR $TYPOC
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPON                   ;;CALL FOR TYPEOUT
                                ;*
                                ;*$TYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
                                ;*CALL:
                                ;*      MOV     NUM,-(SP)       ;;NUMBER TO BE TYPED
                                ;*      TYPOC                   ;;CALL FOR TYPEOUT

007434  017646  000000          $TYPOS: MOV     @(SP),-(SP)     ;;PICKUP THE MODE
007440  116637  000001  007657          MOVB    1(SP),$OFILL    ;;LOAD ZERO FILL SWITCH
007446  112637  007661                  MOVB    (SP)+,$OMODE+1  ;;NUMBER OF DIGITS TO TYPE
007452  062716  000002                  ADD     #2,(SP)         ;;ADJUST RETURN ADDRESS
007456  000406                          BR      $TYPON
007460  112737  000001  007657  $TYPOC: MOVB    #1,$OFILL       ;;SET THE ZERO FILL SWITCH
007466  112737  000006  007661          MOVB    #6,$OMODE+1     ;;SET FOR SIX(6) DIGITS
007474  112737  000005  007656  $TYPON: MOVB    #5,$OCNT        ;;SET THE ITERATION COUNT
007502  010346                          MOV     R3,-(SP)        ;;SAVE R3
007504  010446                          MOV     R4,-(SP)        ;;SAVE R4
007506  010546                          MOV     R5,-(SP)        ;;SAVE R5
007510  113704  007661                  MOVB    $OMODE+1,R4     ;;GET THE NUMBER OF DIGITS TO TYPE
007514  005404                          NEG     R4
007516  062704  000006                  ADD     #6,R4           ;;SUBTRACT IT FOR MAX. ALLOWED
007522  110437  007660                  MOVB    R4,$OMODE       ;;SAVE IT FOR USE
007526  113704  007657                  MOVB    $OFILL,R4       ;;GET THE ZERO FILL SWITCH
007532  016605  000012                  MOV     12(SP),R5       ;;PICKUP THE INPUT NUMBER
007536  005003                          CLR     R3              ;;CLEAR THE OUTPUT WORD
007540  006105                  1$:     ROL     R5              ;;ROTATE MSB INTO "C"
007542  000404                          BR      3$              ;;GO DO MSB
007544  006105                  2$:     ROL     R5              ;;FORM THIS DIGIT
007546  006105                          ROL     R5
007550  006105                          ROL     R5
007552  010503                          MOV     R5,R3
007554  006103                  3$:     ROL     R3              ;;GET LSB OF THIS DIGIT
007556  105337  007660                  DECB    $OMODE          ;;TYPE THIS DIGIT?
007562  100016                          BPL     7$              ;;BR IF NO
007564  042703  177770                  BIC     #177770,R3      ;;GET RID OF JUNK
```

```
 1840  007570  001002                        BNE     4$              ;;TEST FOR 0
 1841  007572  005704                        TST     R4              ;;SUPPRESS THIS 0?
 1842  007574  001403                        BEQ     5$              ;;BR IF YES
 1843  007576  005204                4$:     INC     R4              ;;DON'T SUPPRESS ANYMORE 0'S
 1844  007600  052703  000060              5$:     BIS     #'0,R3          ;;MAKE THIS DIGIT ASCII
 1845  007604  052703  000040                      BIS     #' ,R3          ;;MAKE ASCII IF NOT ALREADY
 1846  007610  110337  007654                      MOVB    R3,8$           ;;SAVE FOR TYPING
 1847  007614  104400  007654                      TYPE    ,8$             ;;GO TYPE THIS DIGIT
 1848  007620  105337  007656              7$:     DECB    $OCNT           ;;COUNT BY 1
 1849  007624  003347                        BGT     2$              ;;BR IF MORE TO DO
 1850  007626  002402                        BLT     6$              ;;BR IF DONE
 1851  007630  005204                        INC     R4              ;;INSURE LAST DIGIT ISN'T A BLANK
 1852  007632  000744                        BR      2$              ;;GO DO THE LAST DIGIT
 1853  007634  012605                6$:     MOV     (SP)+,R5        ;;RESTORE R5
 1854  007636  012604                        MOV     (SP)+,R4        ;;RESTORE R4
 1855  007640  012603                        MOV     (SP)+,R3        ;;RESTORE R3
 1856  007642  016666  000002  000004        MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
 1857  007650  012616                        MOV     (SP)+,(SP)
 1858  007652  000002                        RTI                     ;;RETURN
 1859  007654  000                   8$:     .BYTE   0               ;;STORAGE FOR ASCII DIGIT
 1860  007655  000                           .BYTE   0               ;;TERMINATOR FOR TYPE ROUTINE
 1861  007656  000                   $OCNT:  .BYTE   0               ;;OCTAL DIGIT COUNTER
 1862  007657  000                   $OFILL: .BYTE   0               ;;ZERO FILL SWITCH
 1863  007660  000000                $OMODE: .WORD   0               ;;NUMBER OF DIGITS TO TYPE
```

```
                        ;*****************************************************************

                        .SBTTL  ROUTINES TO LOAD CHARACTERS TO LA180

                        ;/////////////////////////////////////////////////////////////////

                        ;ROUTINE TO LOAD SINGLE CHARACTERS TO LA180 PRINTER
                        ;CALL:  MOV     CHAR,R0         ;PUT CHAR IN R0
                        ;       LOAD
                        ;
                        ;IF PRINTER DOES NOT GO READY WITHIN 4.4 TO 16.2 SECONDS
                        ;(DEPENDING ON CPU AND MEMORY TYPE) THE DIAGNOSTIC WILL
                        ;INDICATE AN ERROR - ERROR #24 - NOT READY.

                        ;/////////////////////////////////////////////////////////////////

007662  104417          $LOAD:  CHECK                   ;CHECK FOR CONTROL
007664  012737  000020  007756          MOV     #16.,6$ ;SET DELAY LOOP COUNT
007672  005777  171212          TST     @LPS            ;CHECK FOR ERROR CONDX
007676  100002                  BPL     1$              ;BRANCH IF OK
007700  104024                  ERROR   24              ;PRINTER ERROR BEFORE LOAD
007702  000423                  BR      4$              ;EXIT
007704  005037  007754  1$:     CLR     5$              ;CLEAR DELAY COUNT
007710  005237  007754  2$:     INC     5$              ;INC COUNT
007714  001005                  BNE     3$              ;COUNTINUE
007716  005337  007756          DEC     6$              ;DEC DELAY LOOP COUNT
007722  001370                  BNE     1$              ;WAIT IF NOT READY
007724  104025                  ERROR   25              ;ERROR, PRINTER NOT READY
007726  000411                  BR      4$              ;EXIT
007730  105777  171154  3$:     TSTB    @LPS            ;CHECK FOR PRINTER READY
007734  100365                  BPL     2$              ;WAIT FOR READY
007736  110077  171150          MOVB    R0,@LPB         ;LOAD CHAR
007742  005777  171142          TST     @LPS            ;TEST FOR ERROR CONDX AGAIN
007746  100001                  BPL     4$              ;BRANCH IF OK
007750  104026                  ERROR   26              ;PRINTER ERROR AFTER LOAD
007752  000002          4$:     RTI                     ;RETURN

007754  000000          5$:     .WORD   0               ;DELAY COUNTER
007756  000020          6$:     .WORD   16.             ;DELAY LOOP COUNTER
```

```
1904                                    ;//////////////////////////////////////////////////////////////////////////////
1905
1906                                    ;ROUTINE TO LOAD MULTIPLE CHARACTERS (NOT ASCIZ/ASCII STRINGS)
1907                                    ;WILL LOAD CHAR ONCE IF COUNT = 0
1908                                    ;PUT CHARACTER COUNT IN R1 (POSITIVE)
1909                                    ;PUT ASCII CHARACTER IN R0
1910                                    ;CALL:  MLOAD
1911
1912                                    ;//////////////////////////////////////////////////////////////////////////////
1913
1914  007760  104414                    $MLOAD: LOAD                    ;LOAD CHAR
1915  007762  005301                            DEC     R1             ;DEC COUNT
1916  007764  003375                            BGT     $MLOAD         ;FINISH LOAD
1917  007766  000002                            RTI                    ;RETURN
1918
1919
1920                                    ;//////////////////////////////////////////////////////////////////////////////
1921
1922                                    ;ROUTINE TO LOAD CONVERTED NUMBERS AND SUPPRESS LEADING ZEROS
1923                                    ;IF ALL DIGITS ARE ZERO, ROUTINE WILL PRINT A SINGLE ZERO
1924                                    ;ENTER WITH ADDRESS OF ASCIZ STRING ON STACK
1925                                    ;CALL:  CNLOAD
1926
1927                                    ;//////////////////////////////////////////////////////////////////////////////
1928
1929  007770                            $CNLD:
1930  007770  010046                            MOV     R0,-(SP)       ;;PUSH R0 ON STACK
1931  007772  010146                            MOV     R1,-(SP)       ;;PUSH R1 ON STACK
1932  007774  010246                            MOV     R2,-(SP)       ;;PUSH R2 ON STACK
1933  007776  005002                            CLR     R2
1934  010000  016601  000012                    MOV     12(SP),R1      ;GET ADR
1935  010004  112100                    1$:     MOVB    (R1)+,R0       ;GET CHAR
1936  010006  001410                            BEQ     3$             ;RETURN WHEN DONE
1937  010010  005702                            TST     R2             ;DONE LEADING ZEROS?
1938  010012  001004                            BNE     2$             ;YES, LOAD CHAR
1939  010014  020027  000060                    CMP     R0,#60         ;NO, CHECK THIS CHAR
1940  010020  001771                            BEQ     1$             ;SKIP IF ZERO
1941  010022  005202                            INC     R2             ;SET FLAG IF NON-ZERO
1942  010024  104414                    2$:     LOAD                   ;LOAD CHAR
1943  010026  000766                            BR      1$             ;CONTINUE
1944  010030  005702                    3$:     TST     R2             ;ALL CHARS ZERO?
1945  010032  001003                            BNE     4$             ;NO, EXIT
1946  010034  012700  000060                    MOV     #60,R0         ;YES, LOAD ZERO
1947  010040  104414                            LOAD
1948  010042                            4$:
1949  010042  012602                            MOV     (SP)+,R2       ;;POP STACK INTO R2
1950  010044  012601                            MOV     (SP)+,R1       ;;POP STACK INTO R1
1951  010046  012600                            MOV     (SP)+,R0       ;;POP STACK INTO R0
1952  010050  016666  000002  000004            MOV     2(SP),4(SP)    ;ADJUST STACK
1953  010056  012616                            MOV     (SP)+,(SP)
1954  010060  000002                            RTI                    ;RETURN
```

```
                                ;//////////////////////////////////////////////////////////////////////////////////
                                ;
                                ;ROUTINE TO PRINT ASCIZ STRINGS ON LA180 PRINTER
                                ;STRING MUST BE TERMINATED BY NULL BYTE
                                ;CALL:          PRINT
                                ;               MESADR
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////////
                                ;
010062                          $PRINT:
010062  010046                          MOV     R0,-(SP)        ;;PUSH R0 ON STACK
010064  010146                          MOV     R1,-(SP)        ;;PUSH R1 ON STACK
010066  017601  000004                  MOV     @4(SP),R1       ;GET ADDRESS OF ASCIZ STRING
010072  112100                  1$:     MOVB    (R1)+,R0        ;GET CHAR
010074  001407                          BEQ     2$              ;BRANCH IF TERMINATOR (NULL)
010076  120027  000200                  CMPB    R0,#CRLF        ;CHECK IF CRLF CODE
010102  001002                          BNE     3$              ;BRANCH IF NOT
010104  012700  000012                  MOV     #LF,R0          ;YES, DO LF ONLY
010110  104414                  3$:     LOAD                    ;LOAD CHAR
010112  000767                          BR      1$              ;GET NEXT CHAR
010114                          2$:
010114  012601                          MOV     (SP)+,R1        ;;POP STACK INTO R1
010116  012600                          MOV     (SP)+,R0        ;;POP STACK INTO R0
010120  062716  000002                  ADD     #2,(SP)         ;ADJUST RETURN PC
010124  000002                          RTI                     ;RETURN
```

```
                                        ;//////////////////////////////////////////////////////////////////////////////
                                        .SBTTL  PRINT TEST HEADER
                                        ;THE NUMBER OF COLUMNS WILL ALSO BE PRINTED FOR TEST 25 ONLY
                                        ;CALL:  PRTHDR
                                        ;//////////////////////////////////////////////////////////////////////////////
010126                                  $PRHDR:
010126  012746  000000                          MOV     #0,-(SP)        ;;PUT NEW PS ON STACK
010132  012746  010140                          MOV     #64$,-(SP)      ;;PUT NEW PC ON  STACK
010136  000002                          64$:    RTI                     ;; POP NEW PC AND PS
010140
010140  012700  000177                          MOV     #177,R0         ;SET RUBOUT CHAR
010144  104414                                  LOAD                    ;CLEAR LA180 CHAR BUFFER
010146  023737  001126  010242                  CMP     $TSTNM,SVTST    ;CHECK IF PRINTED THIS # LAST
010154  001427                                  BEQ     3$              ;YES,  PRINT BLANK LINE & EXIT
010156  013737  001126  010242                  MOV     $TSTNM,SVTST    ;NO, STORE NEW #
010164  104413  013217                          PRINT   ,TSTNO          ;LOAD TEST # MESG
010170  013746  001126                          MOV     $TSTNM,-(SP)    ;;PUSH $TSTNM ON STACK
010174  004737  011270                          JSR     PC,$SB2O        ;CONVERT #
010200  104416                                  CNLOAD                  ;LOAD NUMBER
010202  104413  001142                          PRINT   ,$LF            ;PRINT LINE
010206  023727  001126  000025                  CMP     $TSTNM,#25      ;IS THIS TEST 25?
010214  001007                                  BNE     3$              ;NO, SKIP COLUMN MESG
010216  013746  001130                          MOV     WIDTH,-(SP)     ;PUT # COLUMNS ON STACK
010222  004737  011120                          JSR     PC,$SB2D        ;CONVERT #
010226  104416                                  CNLOAD                  ;LOAD NUMBER
010230  104413  013237                          PRINT   ,COLMN          ;LOAD CLOUMN MESG
010234  104413  001142                  3$:     PRINT   ,$LF            ;BLANK LINE
010240  000002                          4$:     RTI                     ;RETURN
010242  000000                          SVTST:  .WORD   0               ;SAVE TEST NUMBER
```

```
                                        ;*****************************************************************
                                        .SBTTL  TTY INPUT ROUTINE
                                        ;*THIS ROUTINE WILL INPUT A SINGLE CHARACTER FROM THE TTY
                                        ;*CALL:
                                        ;*      RDCHR                   ;;INPUT A SINGLE CHARACTER FROM THE TTY
                                        ;*      RETURN HERE             ;;CHARACTER IS ON THE STACK
                                        ;
010244  011646                  $RDCHR: MOV     (SP),-(SP)      ;;PUSH DOWN THE PC
010246  016666  000004  000002          MOV     4(SP),2(SP)     ;;SAVE THE PS
010254  105777  170620          1$:     TSTB    @$TKS           ;;WAIT FOR
010260  100375                          BPL     1$              ;;A CHARACTER
010262  117766  170614  000004          MOVB    @$TKB,4(SP)     ;;READ THE TTY
010270  042766  177600  000004          BIC     #^C<177>,4(SP)  ;;GET RID OF JUNK IF ANY
010276  000002                          RTI                     ;;GO BACK TO USER
                                        ;*****************************************************************
                                        ;*THIS ROUTINE WILL INPUT A STRING FROM THE TTY
                                        ;*CALL:
                                        ;*      RDLIN                   ;;INPUT A STRING FROM THE TTY
                                        ;*      RETURN HERE             ;;ADDRESS OF FIRST CHARACTER WILL BE ON THE STACK
                                        ;*                              ;;TERMINATOR WILL BE A BYTE OF ALL 0'S
010300  010346                  $RDLIN: MOV     R3,-(SP)        ;;SAVE R3
010302  005046                          CLR     -(SP)           ;;CLEAR THE RUBOUT KEY
010304  012703  010541          1$:     MOV     #$TTYIN,R3      ;;GET ADDRESS
010310  022703  010545          2$:     CMP     #$TTYIN+4,R3    ;;BUFFER FULL?
010314  101456                          BLOS    4$              ;;BR IF YES
010316  104405                          RDCHR                   ;;GO READ ONE CHARACTER FROM THE TTY
010320  112613                          MOVB    (SP)+,(R3)      ;;GET CHARACTER
010322  122713  000177                  CMPB    #177,(R3)       ;;IS IT A RUBOUT
010326  001022                          BNE     5$              ;;BR IF NO
010330  005716                          TST     (SP)            ;;IS THIS THE FIRST RUBOUT?
010332  001007                          BNE     6$              ;;BR IF NO
010334  112737  000134  010532          MOVB    #'\,9$          ;;TYPE A BACK SLASH
010342  104400  010532                  TYPE    ,9$
010346  012716  177777                  MOV     #-1,(SP)        ;;SET THE RUBOUT KEY
010352  005303                  6$:     DEC     R3              ;;BACKUP BY ONE
010354  020327  010541                  CMP     R3,#$TTYIN      ;;STACK EMPTY?
010360  103434                          BLO     4$              ;;BR IF YES
010362  111337  010532                  MOVB    (R3),9$         ;;SETUP TO TYPEOUT THE DELETED CHAR.
010366  104400  010532                  TYPE    ,9$             ;;GO TYPE
010372  000746                          BR      2$              ;;GO READ ANOTHER CHAR.
010374  005716                  5$:     TST     (SP)            ;;RUBOUT KEY SET?
010376  001406                          BEQ     7$              ;;BR IF NO
010400  112737  000134  010532          MOVB    #'\,9$          ;;TYPE A BACK SLASH
010406  104400  010532                  TYPE    ,9$
010412  005016                          CLR     (SP)            ;;CLEAR THE RUBOUT KEY
010414  122713  000025          7$:     CMPB    #25,(R3)        ;;IS CHARACTER A CTRL U?
010420  001003                          BNE     8$              ;;BR IF NO
010422  104400  010534                  TYPE    ,$CNTLU         ;;TYPE A CONTROL "U"
010426  000726                          BR      1$              ;;GO START OVER
010430  122713  000012          8$:     CMPB    #12,(R3)        ;;IS CHARACTER A "LF"?
```

```
2068  010434  001011                          BNE     3$              ;;BRANCH IF NO
2069  010436  105013                          CLRB    (R3)            ;;CLEAR THE CHARACTER
2070  010440  104400  001141                  TYPE    ,$CRLF          ;;TYPE A "CR" & "LF"
2071  010444  104400  010541                  TYPE    ,$TTYIN         ;;TYPE THE INPUT STRING
2072  010450  000717                          BR      2$              ;;GO PICKUP ANOTHER CHACTER
2073  010452  104400  001140          4$:     TYPE    ,$QUES          ;;TYPE A '?'
2074  010456  000712                          BR      1$              ;;CLEAR THE BUFFER AND LOOP
2075  010460  111337  010532          3$:     MOVB    (R3),9$         ;;ECHO THE CHARACTER
2076  010464  104400  010532                  TYPE    ,9$
2077  010470  122723  000015                  CMPB    #15,(R3)+       ;;CHECK FOR RETURN
2078  010474  001305                          BNE     2$              ;;LOOP IF NOT RETURN
2079  010476  105063  177777                  CLRB    -1(R3)          ;;CLEAR RETURN (THE 15)
2080  010502  104400  001142                  TYPE    ,$LF            ;;TYPE A LINE FEED
2081  010506  005726                          TST     (SP)+           ;;CLEAN RUBOUT KEY FROM THE STACK
2082  010510  012603                          MOV     (SP)+,R3        ;;RESTORE R3
2083  010512  011646                          MOV     (SP),-(SP)      ;;ADJUST THE STACK AND PUT ADDRESS OF THE
2084  010514  016666  000004  000002          MOV     4(SP),2(SP)     ;;      FIRST ASCII CHARACTER ON IT
2085  010522  012766  010541  000004          MOV     #$TTYIN,4(SP)
2086  010530  000002                          RTI                     ;;RETURN
2087  010532     000          9$:     .BYTE   0                       ;;STORAGE FOR ASCII CHAR. TO TYPE
2088  010533     000                  .BYTE   0                       ;;TERMINATOR
2089  010534  052536  005015     000  $CNTLU: .ASCIZ  /↑U/<15><12>    ;;CONTROL "U"
2090  010541  000004                  $TTYIN: .BLKB   4               ;;RESERVE 4 BYTES FOR TTY INPUT
2091          010546                  .EVEN
```

```
2092                                    ;*****************************************************************
2093
2094                                    .SBTTL  READ A DECIMAL NUMBER FROM THE TTY
2095
2096                                    ;*THIS ROUTINE WILL READ A DECIMAL (ASCII) NUMBER FROM THE TTY AND
2097                                    ;*CHANGE IT TO BINARY. IF TOO MANY CHARACTERS OR ANY ILLEGAL CHARACTERS
2098                                    ;*ARE READ A "?" FOLLOWED BY A CARRIAGE RETURN-LINE FEED WILL BE TYPED.
2099                                    ;*THE COMPLETE NUMBER MUST BE RETYPED. THE INPUT IS TERMINATED BY THE
2100                                    ;*USER TYPING A CARRIAGE RETURN. THE RANGE OF THE INPUT NUMBER IS
2101                                    ;*POSITIVE 32767 TO NEGATIVE 32768.
2102                                    ;*CALL:
2103                                    ;*      RDDEC                   ;;READ A DECIMAL NUMBER
2104                                    ;*      RETURN HERE             ;;NUMBER IS ON TOP OF THE STACK
2105                                    ;
2106
2107  010546  011646                    $RDDEC: MOV     (SP),-(SP)      ;;PROVIDE SPACE FOR
2108  010550  016666  000004  000002            MOV     4(SP),2(SP)     ;;THE INPUT NUMBER
2109  010556  010046                            MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2110  010560  010146                            MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2111  010562  010246                            MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2112  010564  104406                    1$:     RDLIN                   ;;READ AN ASCIZ LINE
2113  010566  012600                            MOV     (SP)+,R0        ;;ADDRESS OF 1ST CHAR.
2114  010570  010037  010714                    MOV     R0,6$           ;;SAVE INCASE OF BAD INPUT
2115  010574  005046                            CLR     -(SP)           ;;CLEAR DATA WORD
2116  010576  005002                            CLR     R2              ;;SIGN SET POSITIVE
2117  010600  122710  000055                    CMPB    #'-,(R0)        ;;SEE IF A MINUS SIGN WAS TYPED
2118  010604  001001                            BNE     2$              ;;BR IF NO MINUS SIGN
2119  010606  112002                            MOVB    (R0)+,R2        ;;SAVE FOR LATER USE
2120  010610  112001                    2$:     MOVB    (R0)+,R1        ;;PICKUP THIS CHARACTER
2121  010612  001424                            BEQ     3$              ;;GET OUT IF ZERO
2122  010614  122701  000060                    CMPB    #'0,R1          ;;MAKE SURE THIS CHARACTER
2123  010620  003032                            BGT     5$              ;;IS A DIGIT BETWEEN 0 & 9
2124  010622  122701  000071                    CMPB    #'9,R1
2125  010626  002427                            BLT     5$
2126  010630  032716  170000                    BIT     #^C7777,(SP)    ;;DON'T LET NUMBER GET TO BIG
2127  010634  001024                            BNE     5$              ;;BR IF NUMBER WOULD OVERFLOW
2128  010636  006316                            ASL     (SP)            ;;*2
2129  010640  011646                            MOV     (SP),-(SP)      ;;SAVE FOR LATER
2130  010642  006316                            ASL     (SP)            ;;*4
2131  010644  006316                            ASL     (SP)            ;;*8.
2132  010646  062616                            ADD     (SP)+,(SP)      ;;*10.
2133  010650  102416                            BVS     5$              ;;OVERFLOW ISN'T ALLOWED
2134  010652  162701  000060                    SUB     #'0,R1          ;;STRIP AWAY THE ASCII JUNK
2135  010656  060116                            ADD     R1,(SP)         ;;ADD IN THIS DIGIT
2136  010660  102412                            BVS     5$              ;;OVERFLOW ISN'T ALLOWED
2137  010662  000752                            BR      2$              ;;LOOP
2138  010664  005702                    3$:     TST     R2              ;;CHECK IF NUMBER IS NEG
2139  010666  001401                            BEQ     4$              ;;BR IF NO
2140  010670  005416                            NEG     (SP)            ;;YES--NEGATE THE NUMBER
2141  010672  012666  000012            4$:     MOV     (SP)+,12(SP)    ;;SAVE THE RESULT
2142  010676  012602                            MOV     (SP)+,R2        ;;POP STACK INTO R2
2143  010700  012601                            MOV     (SP)+,R1        ;;POP STACK INTO R1
2144  010702  012600                            MOV     (SP)+,R0        ;;POP STACK INTO R0
2145  010704  000002                            RTI                     ;;RETURN
```

```
 2146
 2147  010706  005726                  5$:     TST     (SP)+           ;;CLEAN PARTIAL NUMBER FROM STACK
 2148  010710  105010                          CLRB    (R0)            ;;SET A TERMINATOR
 2149  010712  104400                          TYPE                    ;;TYPE THE INPUT UP TO BAD CHAR.
 2150  010714  000000                  6$:     .WORD   0               ;;POINTER GOES HERE
 2151  010716  104400  001140                  TYPE    ,$QUES          ;;"?" "CR" &"LF"
 2152  010722  000720                          BR      1$              ;;TRY AGAIN
```

```
                                        ;*****************************************************************
                                        .SBTTL  DOUBLE LENGTH BINARY TO DECIMAL ASCII CONVERT ROUTINE

                                        ;*THIS ROUTINE WILL CONVERT A 32-BIT BINARY NUMBER TO AN UNSIGNED
                                        ;*DECIMAL (ASCII) NUMBER. THE SIGN OF THE BINARY NUMBER MUST BE
                                        ;*POSITIVE.
                                        ;*CALL
                                        ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                        ;*      JSR     PC,@#$DB2D
                                        ;*      RETURN                  ;;THE FIRST ADDRESS OF ASCIZ
                                                                        ;;IS ON THE STACK


010724  104410                  $DB2D:  SAVREG                  ;;SAVE REGISTERS
010726  016602  000002                  MOV     2(SP),R2        ;;PICKUP THE DATA POINTER
010732  012700  011104                  MOV     #$DECVL,R0      ;;GET ADDRESS OF "$DECVL" STRING
010736  010066  000002                  MOV     R0,2(SP)        ;;PUT ADDRESS OF ASCIZ STRING ON STACK
010742  012201                          MOV     (R2)+,R1        ;;PICKUP THE BINARY NUMBER
010744  012202                          MOV     (R2)+,R2
010746  012737  000012  011022          MOV     #10.,4$         ;;SET UP TO DO 10 CONVERSIONS
010754  012704  011034                  MOV     #$TNPWR,R4      ;;ADDRESS OF TEN POWER
010760  012705  011036                  MOV     #$TNPWR+2,R5
010764  005003                  1$:     CLR     R3              ;;CLEAR PARTIAL
010766  161401                  2$:     SUB     (R4),R1         ;;SUBTRACT TEN POWER
010770  005602                          SBC     R2
010772  161502                          SUB     (R5),R2
010774  002402                          BLT     3$              ;;BR IF TEN POWER TO LARGE
010776  005203                          INC     R3              ;;ADD 1 TO PARTIAL
011000  000772                          BR      2$              ;;LOOP
011002  062401                  3$:     ADD     (R4)+,R1        ;;RESTORE SUBTRACTED VALUE
011004  005502                          ADC     R2
011006  062402                          ADD     (R4)+,R2
011010  022525                          CMP     (R5)+,(R5)+     ;;MOVE TO NEXT TEN POWER
011012  052703  000060                  BIS     #'0,R3          ;;CHANGE PARTIAL TO ASCII
011016  110320                          MOVB    R3,(R0)+        ;;SAVE IT
011020  005327                          DEC     (PC)+           ;;DONE?
011022  000000                  4$:     .WORD   0
011024  001357                          BNE     1$              ;;BR IF NO
011026  105020                          CLRB    (R0)+           ;;TERMINATOR
011030  104411                          RESREG                  ;;RESTORE REGISTERS
011032  000207                          RTS     PC              ;;RETURN
011034  145000                  $TNPWR: 145000                  ;;1.0E09
011036  035632                          35632
011040  160400                          160400                  ;;1.0E08
011042  002765                          2765
011044  113200                          113200                  ;;1.0E07
011046  000230                          230
011050  041100                          041100                  ;;1.0E06
011052  000017                          17
011054  103240                          103240                  ;;1.0E05
011056  000001                          1
011060  023420                          23420                   ;;1.0E04
011062  000000                          0
```

```
2207  011064  001750                        1750                    ;;1.0E03
2208  011066  000000                        0
2209  011070  000144                        144                     ;;1.0E02
2210  011072  000000                        0
2211  011074  000012                        12                      ;;1.0E01
2212  011076  000000                        0
2213  011100  000001                        1                       ;;1.0E00
2214  011102  000000                        0
2215  011104  000014             $DECVL: .BLKB   12.                ;;RESERVE STORAGE FOR ASCIZ STRING
2216
2217                              ;*****************************************************************
2218
2219                              .SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCIZ ROUTINE
2220
2221                              ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
2222                              ;*UNSIGNED DECIMAL ASCIZ NUMBER.
2223                              ;*CALL
2224                              ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
2225                              ;*      JSR     PC,@#$SB2D      ;;CALL
2226                              ;*      RETURN                  ;;ADDRESS OF THE 1ST ASCIZ CHAR.IS ON THE STACK
2227
2228
2229  011120  016637  000002  011144  $SB2D:  MOV     2(SP),1$        ;;SAVE BINARY NUMBER
2230  011126  012746  011144                  MOV     #1$,-(SP)       ;;SET POINTER
2231  011132  004737  010724                  JSR     PC,@#$DB2D      ;;CALL DOUBLE LENGTH CONVERT
2232  011136  012666  000002                  MOV     (SP)+,2(SP)     ;;PICKUP POINTER
2233  011142  000207                          RTS     PC              ;;RETURN
2234  011144  000000  000000          1$:     .WORD   0,0
```

```
                                ;*****************************************************************

                                .SBTTL  DOUBLE LENGTH BINARY TO OCTAL ASCII CONVERT ROUTINE

                                ;*THIS ROUTINE WILL CONVERT A 32-BIT UNSIGNED BINARY NUMBER TO AN
                                ;*UNSIGNED OCTAL ASCIZ NUMBER.
                                ;*CALL
                                ;*      MOV     #PNTR,-(SP)     ;;POINTER TO LOW WORD OF BINARY NUMBER
                                ;*      JSR     PC,@#$DB20      ;;CALL THE ROUTINE
                                ;*      RETURN                  ;;THE ADDRESS OF THE FIRST ASCIZ CHAR. IS ON THE STACK

011150  104410          $DB20:  SAVREG                          ;;SAVE ALL REGISTERS
011152  016601  000002          MOV     2(SP),R1                ;;PICKUP THE POINTER TO LOW WORD
011156  012705  011267          MOV     #$OCTVL+13.,R5          ;;POINTER TO DATA TABLE
011162  012704  000014          MOV     #12.,R4                 ;;DO ELEVEN CHARACTERS
011166  012703  177770          MOV     #^C7,R3                 ;;MASK
011172  012100                  MOV     (R1)+,R0                ;;LOWER WORD
011174  012101                  MOV     (R1)+,R1                ;;HIGH WORD
011176  005002                  CLR     R2                      ;;TERMINATOR
011200  110245          1$:     MOVB    R2,-(R5)                ;;PUT CHARACTER IN DATA TABLE
011202  010002                  MOV     R0,R2                   ;;GET THIS DIGIT
011204  005304                  DEC     R4                      ;;COUNT THIS CHARACTER
011206  003007                  BGT     3$                      ;;BR IF NOT THE LAST DIGIT
011210  001405                  BEQ     2$                      ;;BR IF IT IS THE LAST DIGIT
011212  005205                  INC     R5                      ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
011214  010566  000002          MOV     R5,2(SP)                ;;ASCIZ CHAR. & PUT IT ON THE STACK
011220  104411                  RESREG                          ;;RESTORE ALL REGISTERS
011222  000207                  RTS     PC                      ;;RETURN TO USER
011224  006203          2$:     ASR     R3                      ;;POSITION THE MASK FOR THE LAST DIGIT
011226  006001          3$:     ROR     R1                      ;;POSITION THE BINARY NUMBER FOR
011230  006000                  ROR     R0                      ;;      THE NEXT OCTAL DIGIT
011232  006001                  ROR     R1
011234  006000                  ROR     R0
011236  006001                  ROR     R1
011240  006000                  ROR     R0
011242  040302                  BIC     R3,R2                   ;;MASK OUT ALL JUNK
011244  062702  000060          ADD     #'0,R2                  ;;MAKE THIS CHAR. ASCII
011250  000753                  BR      1$                      ;;GO PUT IT IN THE DATA TABLE
011252  000016          $OCTVL: .BLKB   14.                     ;;RESERVE DATA TABLE
```

```
                                ;*****************************************************************

                                .SBTTL  SINGLE LENGTH BINARY TO OCTAL ASCIZ ROUTINE

                                ;*THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
                                ;*UNSIGNED OCTAL ASCIZ NUMBER.
                                ;*CALL
                                ;*      MOV     NUMBER,-(SP)    ;;PUT BINARY NUMBER ON THE STACK
                                ;*      JSR     PC,@#$$B20      ;;CALL
                                ;*      RETURN                  ;;ADDRESS OF 1ST ASCIZ CHAR. IS ON THE STACK

011270  016637  000002  011314 $$B20:  MOV     2(SP),1$        ;;SAVE THE BINARY NUMBER
011276  012746  011314                 MOV     #1$,-(SP)       ;;SET POINTER
011302  004737  011150                 JSR     PC,@#$DB20      ;;CALL DOUBLE LENGTH CONVERT ROUTINE
011306  012666  000002                 MOV     (SP)+,2(SP)     ;;PICKUP POINTER
011312  000207                        RTS     PC              ;;RETURN
011314  000000  000000          1$:     .WORD   0,0
```

```
                                ;*****************************************************************

                                .SBTTL  TRAP DECODER

                                ;*THIS ROUTINE WILL PICKUP THE LOWER BYTE OF THE "TRAP" INSTRUCTION
                                ;*AND USE IT TO INDEX THROUGH THE TRAP TABLE FOR THE STARTING ADDRESS
                                ;*OF THE DESIRED ROUTINE. THEN USING THE ADDRESS OBTAINED IT WILL
                                ;*GO TO THAT ROUTINE.

011320  016646  000002          $TRAP:  MOV     2(SP),-(SP)     ;;ASSUME THE STATUS OF
011324  042716  000020                  BIC     #20,(SP)        ;;  THE CALLER--DONOT ALLOW
011330  012746  011336                  MOV     #1$,-(SP)       ;;  T-BIT TRAPS
011334  000002                          RTI                     ;;SET THE NEW STATUS
011336  010046                  1$:     MOV     R0,-(SP)        ;;SAVE R0
011340  016600  000002                  MOV     2(SP),R0        ;;GET TRAP ADDRESS
011344  005740                          TST     -(R0)           ;;BACKUP BY 2
011346  111000                          MOVB    (R0),R0         ;;GET RIGHT BYTE OF TRAP
011350  022700  000042                  CMP     #$TERM,R0       ;;CHECK FOR OUT OF BOUNDS
011354  003002                          BGT     .+6             ;;BR IF OK
011356  000000                          HALT                    ;;OUT OF BOUNDS
011360  000776                          BR      .-2             ;;HANGUP
011362  006300                          ASL     R0              ;;POSITION FOR INDEXING
011364  016000  011372                  MOV     $TRPAD(R0),R0   ;;INDEX TO TABLE
011370  000200                          RTS     R0              ;;GO TO ROUTINE


                                .SBTTL  TRAP TABLE

                                ;*THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
                                ;*BY THE "TRAP" INSTRUCTION.

                                ;       ROUTINE
                                ;       -------
011372                          $TRPAD:
011372  007070                          $TYPE   ;;CALL=TYPE     TRAP+0(104400)  TTY TYPEOUT ROUTINE
011374  007460                          $TYPOC  ;;CALL=TYPOC    TRAP+1(104401)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
011376  007434                          $TYPOS  ;;CALL=TYPOS    TRAP+2(104402)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
011400  007474                          $TYPON  ;;CALL=TYPON    TRAP+3(104403)  TYPE OCTAL NUMBER (AS PER LAST CALL)
011402  007210                          $TYPDS  ;;CALL=TYPDS    TRAP+4(104404)  TYPE DECIMAL NUMBER (WITH SIGN)
011404  010244                          $RDCHR  ;;CALL=RDCHR    TRAP+5(104405)  TTY TYPEIN CHARACTER ROUTINE
011406  010300                          $RDLIN  ;;CALL=RDLIN    TRAP+6(104406)  TTY TYPEIN STRING ROUTINE
011410  010546                          $RDDEC  ;;CALL=RDDEC    TRAP+7(104407)  READ A DECIMAL NUMBER FROM TTY
011412  006774                          $SAVREG ;;CALL=SAVREG   TRAP+10(104410) SAVE R0-R5 ROUTINE
011414  007032                          $RESREG ;;CALL=RESREG   TRAP+11(104411) RESTORE R0-R5 ROUTINE
011416  010126                          $PRHDR  ;;CALL=PRTHDR   TRAP+12(104412) PRINT TEST HEADER
011420  010062                          $PRINT  ;;CALL=PRINT    TRAP+13(104413) PRINT ROUTINE
011422  007662                          $LOAD   ;;CALL=LOAD     TRAP+14(104414) LOAD CHAR ROUTINE
011424  007760                          $MLOAD  ;;CALL=MLOAD    TRAP+15(104415) MULTIPLE CHAR LOAD
011426  007770                          $CNLD   ;;CALL=CNLOAD   TRAP+16(104416) LOAD CONVERTED NUMBER
011430  005724                          $CHECK  ;;CALL=CHECK    TRAP+17(104417) CHECK FOR KYBD OR SW REG CONTROL
011432  005764                          $HOLD   ;;CALL=HOLD     TRAP+20(104420) WAIT FOR OPERATOR ACTION
        000042                  $TERM=.-$TRPAD
```

```
2344                                    ;*****************************************************************
2345
2346                                    .SBTTL  POWER DOWN AND UP ROUTINES
2347
2348                                    ;POWER DOWN ROUTINE
2349  011434  012737  011556  000024  $PWRDN: MOV     #$ILLUP,@#PWRVEC ;;SET FOR FAST UP
2350  011442  012737  000340  000026          MOV     #340,@#PWRVEC+2 ;;PRIO:7
2351  011450  010046                         MOV     R0,-(SP)        ;;PUSH R0 ON STACK
2352  011452  010146                         MOV     R1,-(SP)        ;;PUSH R1 ON STACK
2353  011454  010246                         MOV     R2,-(SP)        ;;PUSH R2 ON STACK
2354  011456  010346                         MOV     R3,-(SP)        ;;PUSH R3 ON STACK
2355  011460  010446                         MOV     R4,-(SP)        ;;PUSH R4 ON STACK
2356  011462  010546                         MOV     R5,-(SP)        ;;PUSH R5 ON STACK
2357  011464  010637  011562                 MOV     SP,$SAVR6       ;;SAVE SP
2358  011470  012737  011502  000024         MOV     #$PWRUP,@#PWRVEC ;;SET UP VECTOR
2359  011476  000000                         HALT
2360  011500  000776                         BR      .-2             ;;HANG UP
2361
2362                                    ;POWER UP ROUTINE
2363  011502  013706  011562  $PWRUP: MOV     $SAVR6,SP       ;;GET SP
2364  011506  005037  011562          CLR     $SAVR6          ;;WAIT LOOP FOR THE TTY
2365  011512  005237  011562  1$:     INC     $SAVR6          ;;WAIT FOR THE INC
2366  011516  001375                  BNE     1$              ;;OF  WORD
2367  011520  012605                  MOV     (SP)+,R5        ;;POP STACK INTO R5
2368  011522  012604                  MOV     (SP)+,R4        ;;POP STACK INTO R4
2369  011524  012603                  MOV     (SP)+,R3        ;;POP STACK INTO R3
2370  011526  012602                  MOV     (SP)+,R2        ;;POP STACK INTO R2
2371  011530  012601                  MOV     (SP)+,R1        ;;POP STACK INTO R1
2372  011532  012600                  MOV     (SP)+,R0        ;;POP STACK INTO R0
2373  011534  012737  011434  000024         MOV     #$PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
2374  011542  012737  000340  000026         MOV     #340,@#PWRVEC+2 ;;PRIO:7
2375  011550  104400                  TYPE                    ;;REPORT THE POWER FAILURE
2376  011552  013423          $PWRMG: .WORD   PWRMSG          ;;POWER FAIL MESSAGE POINTER
2377  011554  000002                  RTI
2378  011556  000000          $ILLUP: HALT                    ;;THE POWER UP SEQUENCE WAS STARTED
2379  011560  000776                  BR      .-2             ;; BEFORE THE POWER DOWN WAS COMPLETE
2380  011562  000000          $SAVR6: 0                       ;;PUT THE SP HERE
```

```
                                ;//////////////////////////////////////////////////////////////////////////////////////////////////
                                ;
                                .SBTTL  TEST ADDRESS TABLE
                                ;
                                ;THE PRINTING TEST SEQUENCE STARTS WITH TEST20
                                ;TO REMOVE A TEST FROM THE PROGRAM -
                                ;DEPOSIT ZERO FOR THE TEST ADDRESS IN THIS TABLE
                                ;A MINUS ONE (-1) IN THE TABLE INDICATES THE END OF THE PRINTING SEQUENCE
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////////////////////////
                                ;
011564  001720          TAT:    TEST0
011566  002526                  TEST1
011570  002716                  TEST2
011572  000000                  0               ;TEST3
011574  000000                  0               ;TEST4
011576  000000                  0               ;TEST5
011600  000000                  0               ;TEST6
011602  000000                  0               ;TEST7
011604  000000                  0               ;TEST10
011606  000000                  0               ;TEST11
011610  000000                  0               ;TEST12
011612  000000                  0               ;TEST13
011614  000000                  0               ;TEST14
011616  000000                  0               ;TEST15
011620  000000                  0               ;TEST16
011622  000000                  0               ;TEST17
011624  003250                  TEST20
011626  003316                  TEST21
011630  003426                  TEST22
011632  003514                  TEST23
011634  003550                  TEST24
011636  004042                  TEST25
011640  004424                  TEST26
011642  004516                  TEST27
011644  004634                  TEST30
011646  004662                  TEST31
011650  177777                  -1              ;TEST32
011652  000000                  0               ;TEST33
011654  000000                  0               ;TEST34
011656  000000                  0               ;TEST35
011660  000000                  0               ;TEST36
011662  000000                  0               ;TEST37
011664  000000                  0               ;TEST40
011666  000000                  0               ;TEST41
011670  000000                  0               ;TEST42
011672  000000                  0               ;TEST43
011674  000000                  0               ;TEST44
011676  000000                  0               ;TEST45
011700  000000                  0               ;TEST46
011702  000000                  0               ;TEST47
011704  000000                  0               ;TEST50
011706  000000                  0               ;TEST51
011710  000000                  0               ;TEST52
```

```
2435  011712  000000                    0               ;TEST53
2436  011714  000000                    0               ;TEST54
2437  011716  000000                    0               ;TEST55
2438  011720  000000                    0               ;TEST56
2439  011722  000000                    0               ;TEST57
2440  011724  004774                    TEST60
2441  011726  005110                    TEST61
2442  011730  005222                    TEST62
2443  011732  005304                    TEST63
2444  011734  000000                    0               ;TEST64
2445  011736  000000                    0               ;TEST65
2446  011740  000000                    0               ;TEST66
2447  011742  000000                    0               ;TEST67
2448  011744  000000                    0               ;TEST70
2449  011746  000000                    0               ;TEST71
2450  011750  000000                    0               ;TEST72
2451  011752  000000                    0               ;TEST73
2452  011754  000000                    0               ;TEST74
2453  011756  000000                    0               ;TEST75
2454  011760  000000                    0               ;TEST76
2455  011762  000000                    0               ;TEST77
2456
2457
2458                    ;////////////////////////////////////////////////////////////////////////
2459
2460                    .SBTTL  ERROR MESSAGE ADDRESS TABLE
2461
2462                    ;////////////////////////////////////////////////////////////////////////
2463
2464  011764  012040    EMAT:   ERR1
2465  011766  012067            ERR2
2466  011770  012114            ERR3
2467  011772  012152            ERR4
2468  011774  012206            ERR5
2469  011776  012241            ERR6
2470  012000  012276            ERR7
2471  012002  012325            ERR10
2472  012004  012352            ERR11
2473  012006  012376            ERR12
2474  012010  012440            ERR13
2475  012012  012474            ERR14
2476  012014  012532            ERR15
2477  012016  012566            ERR16
2478  012020  012622            ERR17
2479  012022  012657            ERR20
2480  012024  012711            ERR21
2481  012026  012745            ERR22
2482  012030  013001            ERR23
2483  012032  013040            ERR24
2484  012034  013077            ERR25
2485  012036  013121            ERR26
```

```
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
                                .SBTTL  ERROR MESSAGES
                                ;
                                ;//////////////////////////////////////////////////////////////////////////////
                                ;
012040  051105  047522  020122 ERR1:   .ASCIZ  /ERROR CLEAR, POWER OFF/
012046  046103  040505  026122
012054  050040  053517  051105
012062  047440  043106     000
012067     122  040505  054504 ERR2:   .ASCIZ  /READY SET, POWER OFF/
012074  051440  052105  020054
012102  047520  042527  020122
012110  043117  000106
012114  051105  047522  020122 ERR3:   .ASCIZ  /ERROR CLEAR, PRINTER OFF LINE/
012122  046103  040505  026122
012130  050040  044522  052116
012136  051105  047440  043106
012144  046040  047111  000105
012152  042522  042101  020131 ERR4:   .ASCIZ  /READY SET, PRINTER OFF LINE/
012160  042523  026124  050040
012166  044522  052116  051105
012174  047440  043106  046040
012202  047111  000105
012206  051105  047522  020122 ERR5:   .ASCIZ  /ERROR SET, PRINTER ON LINE/
012214  042523  026124  050040
012222  044522  052116  051105
012230  047440  020116  044514
012236  042516     000
012241     122  040505  054504 ERR6:   .ASCIZ  /READY CLEAR, PRINTER ON LINE/
012246  041440  042514  051101
012254  020054  051120  047111
012262  042524  020122  047117
012270  046040  047111  000105
012276  051105  047522  020122 ERR7:   .ASCIZ  /ERROR CLEAR, PAPER OUT/
012304  046103  040505  026122
012312  050040  050101  051105
012320  047440  052125     000
012325     122  040505  054504 ERR10:  .ASCIZ  /READY SET, PAPER OUT/
012332  051440  052105  020054
012340  040520  042520  020122
012346  052517  000124
012352  051105  047522  020122 ERR11:  .ASCIZ  /ERROR DID NOT CLEAR/
012360  044504  020104  047516
012366  020124  046103  040505
012374  000122
012376  042522  042101  020131 ERR12:  .ASCIZ  /READY NOT SET AFTER ERROR CLEARED/
012404  047516  020124  042523
012412  020124  043101  042524
012420  020122  051105  047522
012426  020122  046103  040505
012434  042522  000104
012440  051105  047522  020122 ERR13:  .ASCIZ  /ERROR SET AFTER RESET INSTR/
012446  042523  020124  043101
```

```
2540  012454  042524  020122  042522
2541  012462  042523  020124  047111
2542  012470  052123  000122
2543  012474  042522  042101  020131  ERR14:  .ASCIZ  /READY CLEAR AFTER RESET INSTR/
2544  012502  046103  040505  020122
2545  012510  043101  042524  020122
2546  012516  042522  042523  020124
2547  012524  047111  052123  000122
2548  012532  042522  042101  020131  ERR15:  .ASCIZ  /READY SET AFTER CHAR LOADED/
2549  012540  042523  020124  043101
2550  012546  042524  020122  044103
2551  012554  051101  046040  040517
2552  012562  042504  000104
2553  012566  051105  047522  020122  ERR16:  .ASCIZ  /ERROR SET AFTER CHAR LOADED/
2554  012574  042523  020124  043101
2555  012602  042524  020122  044103
2556  012610  051101  046040  040517
2557  012616  042504  000104
2558  012622  042522  042101  020131  ERR17:  .ASCIZ  /READY NEVER SET, CHAR LOADED/
2559  012630  042516  042526  020122
2560  012636  042523  026124  041440
2561  012644  040510  020122  047514
2562  012652  042101  042105     000
2563  012657     105  051122  051117  ERR20:  .ASCIZ  /ERROR SET, INTERRUPT TEST/
2564  012664  051440  052105  020054
2565  012672  047111  042524  051122
2566  012700  050125  020124  042524
2567  012706  052123     000
2568  012711     122  040505  054504  ERR21:  .ASCIZ  /READY CLEAR, INTERRUPT TEST/
2569  012716  041440  042514  051101
2570  012724  020054  047111  042524
2571  012732  051122  050125  020124
2572  012740  042524  052123     000
2573  012745     120  044522  052116  ERR22:  .ASCIZ  /PRINTER INTER ABOVE LEVEL 3/
2574  012752  051105  044440  052116
2575  012760  051105  040440  047502
2576  012766  042526  046040  053105
2577  012774  046105  031440     000
2578  013001     116  020117  051120  ERR23:  .ASCIZ  /NO PRINTER INTER BELOW LEVEL 4/
2579  013006  047111  042524  020122
2580  013014  047111  042524  020122
2581  013022  042502  047514  020127
2582  013030  042514  042526  020114
2583  013036  000064
2584  013040  051120  047111  042524  ERR24:  .ASCIZ  /PRINTER ERROR BEFORE CHAR LOAD/
2585  013046  020122  051105  047522
2586  013054  020122  042502  047506
2587  013062  042522  041440  040510
2588  013070  020122  047514  042101
2589  013076     000
2590  013077     120  044522  052116  ERR25:  .ASCIZ  /PRINTER NOT READY/
2591  013104  051105  047040  052117
2592  013112  051040  040505  054504
2593  013120     000
```

```
 2594  013121     120  044522  052116  ERR26:  .ASCIZ  /PRINTER ERROR AFTER CHAR LOAD/
 2595  013126  051105  042440  051122
 2596  013134  051117  040440  052106
 2597  013142  051105  041440  040510
 2598  013150  020122  047514  042101
 2599  013156     000
 2600
 2601
 2602
 2603                          ;//////////////////////////////////////////////////////////////////////////////
 2604
 2605                          .SBTTL  PROGRAM MESSAGES
 2606
 2607                          ;//////////////////////////////////////////////////////////////////////////////
 2608
 2609  013157     200  020043  047503  COLUMN: .ASCIZ  <CRLF>/# COLUMNS = /
 2610  013164  052514  047115  020123
 2611  013172  020075     000
 2612  013175     200  042523  042514  SELTST: .ASCIZ  <CRLF>/SELECT TEST #   /
 2613  013202  052103  052040  051505
 2614  013210  020124  020043  020040
 2615  013216     000
 2616  013217     012  052012  051505  TSTNO:  .ASCIZ  <LF><LF>/TEST NUMBER  /
 2617  013224  020124  052516  041115
 2618  013232  051105  020040     000
 2619  013237     040  041440  046117  COLMN:  .ASCIZ  /  COLUMNS/<LF>
 2620  013244  046525  051516  000012
 2621  013252  052200  051505  020124  ETSTNO: .ASCIZ  <CRLF>/TEST #/
 2622  013260  000043
 2623  013262  020054  050040  036503  PCMSG:  .ASCIZ  /,  PC=/
 2624  013270     000
 2625  013271     054  020040  051105  ERR:    .ASCIZ  /,  ERROR #/
 2626  013276  047522  020122  000043
 2627  013304  020054  000040          ERRS:   .ASCIZ  /,  /
 2628  013310  042412  042116  047440  PASMSG: .ASCIZ  <LF>/END OF PASS  #/
 2629  013316  020106  040520  051523
 2630  013324  020040  000043
 2631  013330  051600  051127  036440  DSMSG1: .ASCIZ  <CRLF>/SWR = /
 2632  013336  000040
 2633  013340  020040  047040  053505  DSMSG2: .ASCIZ  /   NEW = /
 2634  013346  036440  000040
 2635  013352  040527  052111  047111  WTMSG:  .ASCIZ  /WAITING,  TYP SPACE TO CONTINUE/<CRLF>
 2636  013360  026107  020040  054524
 2637  013366  020120  050123  041501
 2638  013374  020105  047524  041440
 2639  013402  047117  044524  052516
 2640  013410  100105     000
 2641  013413     103  040510  020122  TCHAR:  .ASCIZ  /CHAR = /
 2642  013420  020075     000
 2643  013423     200  047520  042527  PWRMSG: .ASCIZ  <CRLF>/POWER/<CRLF>
 2644  013430  100122     000
 2645  013433     012  047516  041440  NCMSG:  .ASCIZ  <LF>/NO CONSOLE TERMINAL/<LF>
 2646  013440  047117  047523  042514
 2647  013446  052040  051105  044515
```

```
 2648  013454  040516  005114     000
 2649  013461     120  044522  052116  MANMSG: .ASCII  /PRINT SPEED MANUAL TIMING/<CRLF>
 2650  013466  051440  042520  042105
 2651  013474  046440  047101  040525
 2652  013502  020114  044524  044515
 2653  013510  043516     200
 2654  013513     120  052125  051440          .ASCII  /PUT SWITCH 12 UP TO START TIMING/<CRLF>
 2655  013520  044527  041524  020110
 2656  013526  031061  052440  020120
 2657  013534  047524  051440  040524
 2658  013542  052122  052040  046511
 2659  013550  047111  100107
 2660  013554  052520  020124  053523          .ASCIZ  /PUT SWITCH 12 DOWN AT END OF 1 MINUTE/<CRLF>
 2661  013562  052111  044103  030440
 2662  013570  020062  047504  047127
 2663  013576  040440  020124  047105
 2664  013604  020104  043117  030440
 2665  013612  046440  047111  052125
 2666  013620  100105     000
 2667  013623     200  051120  047111  PRSP1:  .ASCIZ  <CRLF>/PRINT SPEED IS /
 2668  013630  020124  050123  042505
 2669  013636  020104  051511  000040
 2670  013644  050101  051120  054117  PRSP2:  .ASCIZ  /APPROX. /
 2671  013652  020056     000
 2672  013655     040  046040  047111  PRSP3:  .ASCIZ  /  LINES/<57>/MINUTE , WITH /
 2673  013662  051505  046457  047111
 2674  013670  052125  020105  020054
 2675  013676  044527  044124  000040
 2676  013704  020040  044103  051101  PRSP4:  .ASCIZ  /  CHARS/<57>/LINE/<CRLF>
 2677  013712  027523  044514  042516
 2678  013720  000200
 2679  013722  052524  047122  050040  TOMSG0: .ASCIZ  /TURN POWER OFF & SET OFF LINE/<CRLF>
 2680  013730  053517  051105  047440
 2681  013736  043106  023040  051440
 2682  013744  052105  047440  043106
 2683  013752  046040  047111  100105
 2684  013760     000
 2685  013761     117  026113  052040  TOMSG1: .ASCIZ  /OK, TURN POWER ON/<CRLF>
 2686  013766  051125  020116  047520
 2687  013774  042527  020122  047117
 2688  014002  000200
 2689  014004  045517  020054  042523  TOMSG2: .ASCIZ  /OK, SET PRINTER TO ON-LINE/<CRLF>
 2690  014012  020124  051120  047111
 2691  014020  042524  020122  047524
 2692  014026  047440  026516  044514
 2693  014034  042516  000200
 2694  014040  045517  020054  051124  TOMSG3: .ASCIZ  /OK, TRY PAPER OUT SWITCH/<CRLF>
 2695  014046  020131  040520  042520
 2696  014054  020122  052517  020124
 2697  014062  053523  052111  044103
 2698  014070  000200
 2699  014072  045517  020054  042522  TOMSG4: .ASCIZ  /OK, RESTORE PRINTER TO ON-LINE/<CRLF>
 2700  014100  052123  051117  020105
 2701  014106  051120  047111  042524
```

```
 2702  014114  020122  047524  047440
 2703  014122  026516  044514  042516
 2704  014130  000200
 2705  014132  026455  026455  020055  T1MSG1: .ASCIZ  /----- /
 2706  014140     000
 2707  014141     040  047111  044103  T1MSG2: .ASCIZ  / INCH FORM FEED -----/<CR>
 2708  014146  043040  051117  020115
 2709  014154  042506  042105  026440
 2710  014162  026455  026455  000015
 2711  014170  042523  020124  047506  T1MSG3: .ASCIZ  /SET FORM FEED SWITCH TO  /
 2712  014176  046522  043040  042505
 2713  014204  020104  053523  052111
 2714  014212  044103  052040  020117
 2715  014220  000040
 2716  014222  020040  047111  044103  T1MSG4: .ASCIZ  /  INCHES & DEPRESS TOF RESET SWITCH/<CRLF>
 2717  014230  051505  023040  042040
 2718  014236  050105  042522  051523
 2719  014244  052040  043117  051040
 2720  014252  051505  052105  051440
 2721  014260  044527  041524  100110
 2722  014266     000
 2723  014267     116  020117  042515  T2EM:   .ASCIZ  /NO METHOD OF TIMING AVAILABLE/<CRLF>
 2724  014274  044124  042117  047440
 2725  014302  020106  044524  044515
 2726  014310  043516  040440  040526
 2727  014316  046111  041101  042514
 2728  014324  000200
 2729
 2730
 2731          000001                  .END
```

```
BIT0   = 000001   BIT00  = 000001   BIT01  = 000002   BIT02  = 000004
BIT03  = 000010   BIT04  = 000020   BIT05  = 000040   BIT06  = 000100
BIT07  = 000200   BIT08  = 000400   BIT09  = 001000   BIT1   = 000002
BIT10  = 002000   BIT11  = 004000   BIT12  = 010000   BIT13  = 020000
BIT14  = 040000   BIT15  = 100000   BIT2   = 000004   BIT3   = 000010
BIT4   = 000020   BIT5   = 000040   BIT6   = 000100   BIT7   = 000200
BIT8   = 000400   BIT9   = 001000   BPTVEC= 000014   CHECK  = 104417
CKFLAG  001135    CNLOAD= 104416    CNTR    005460    COLMN    013237
COLUMN  013157    CONTRL  001200    CR    = 000015    CRLF   = 000200
CSBR    001116    DCI     005430    DDISP  = 177570    DISPLA   001124
DISPRE  000174    DSMSG1  013330    DSMSG2   01334C    DSWR   = 177570
EMAT    011764    EMTVEC= 000030    ERR     013271    ERRS     013304
ERRVEC= 000004    ERR1    012040    ERR10   012325    ERR11    012352
ERR12   012376    ERR13   012440    ERR14   012474    ERR15    012532
ERR16   012566    ERR17   012622    ERR2    012067    ERR20    012657
ERR21   012711    ERR22   012745    ERR23   013001    ERR24    013040
ERR25   013077    ERR26   013121    ERR3    012114    ERR4     012152
ERR5    012206    ERR6    012241    ERR7    012276    ETSTNO   013252
EXIT    005516    FF     = 000014   HOLD   = 104420   IOTVEC= 000020
KYBDF   006012    KYBDST  006270    LF     = 000012   LKS      001120
LKSRV   005440    LOAD   = 104414   LPB     001112    LPS      001110
MANMSG  013461    MINCNT  005464    MLOAD  = 104415   NCMSG    013433
PASCNT  005106    PASMSG  013310    PC     =%000007   PCMSG    013262
PIRQ   = 177772   PIRQVE= 000240    PLKS    001114    PRINT  = 104413
PRSP1   013623    PRSP2   013644    PRSP3   013655    PRSP4    013704
PRTHDR= 104412    PR0    = 000000   PR1    = 000040   PR2    = 000100
PR3    = 000140   PR4    = 000200   PR5    = 000240   PR6    = 000300
PR7    = 000340   PS     = 177776   PSW    = 177776   PWRMSG   013423
PWRVEC= 000024    RDCHR  = 104405   RDDEC  = 104407   RDLIN  = 104406
REPORT  006672    RESREG= 104411    RESTRT  001170    RESVEC= 000010
R0     =%000000   R1     =%000001   R2     =%000002   R3     =%000003
R4     =%000004   R5     =%000005   R6     =%000006   R7     =%000007
SAVREG= 104410    SELECT  005624    SELTST  013175    SP     =%000006
SPD     003134    SRDCI   005466    STACK  = 001100    START    001154
STARTX  001206    STKLMT= 177774    STRONE  001132    SVTST    010242
SWR     001122    SWREG   000176    SW0    = 000001   SW00   = 000001
SW01   = 000002   SW02   = 000004   SW03   = 000010   SW04   = 000020
SW05   = 000040   SW06   = 000100   SW07   = 000200   SW08   = 000400
SW09   = 001000   SW1    = 000002   SW10   = 002000   SW11   = 004000
SW12   = 010000   SW13   = 020000   SW14   = 040000   SW15   = 100000
SW2    = 000004   SW3    = 000010   SW4    = 000020   SW5    = 000040
SW6    = 000100   SW7    = 000200   SW8    = 000400   SW9    = 001000
TAT     011564    TBITVE= 000014    TCHAR   013413    TERR     005420
TEST0   001720    TEST1   002526    TEST2   002716    TEST20   003250
TEST21  003316    TEST22  003426    TEST23  003514    TEST24   003550
TEST25  004042    TEST26  004424    TEST27  004516    TEST30   004634
TEST31  004662    TEST60  004774    TEST61  005110    TEST62   005222
TEST63  005304    TKB     001102    TKS     001100    TKVEC  = 000060
TLOOP   001134    TORTN   005462    TPB     001106    TPS      001104
TPVEC  = 000064   TRAPVE= 000034    TRONE   001133    TRTVEC= 000014
TSEL    006336    TSTNO   013217    TYPDS  = 104404   TYPE   = 104400
TYPOC  = 104401   TYPON  = 104403   TYPOS  = 104402   TOMSG0   013722
TOMSG1  013761    TOMSG2  014004    TOMSG3  014040    TOMSG4   014072
T1MSG1  014132    T1MSG2  014141    T1MSG3  014170    T1MSG4   014222
```

M07

DZLAEA.P11 SYMBOL TABLE

```
T2EM    014267          T2SP    003034          WIDTH   001130          WTMSG   013352
$BELL   001136          $CHECK  005724          $CNLD   007770          $CNTLU  010534
$CR     001144          $CRLF   001141          $DBLK   007424          $DB2D   010724
$DB20   011150          $DECVL  011104          $DOAGN  004766          $DTBL   007414
$ENDAD  004756          $ENDCT  004742          $EOP    004716          $EOPCT  004734
$ERROR  006572          $ERRPC  006666          $FF     001146          $FILLC  001152
$FILLS  001151          $GET42  004746          $HD   = 000000          $HOLD   005764
$ILLUP  011556          $ITEMB  006670          $LF     001142          $LOAD   007662
$MLOAD  007760          $NULL   001150          $OCNT   007656          $OCTVL  011252
$OMODE  007660          $PASS   004772          $PRHDR  010126          $PRINT  010062
$PWRDN  011434          $PWRMG  011552          $PWRUP  011502          $QUES   001140
$RCCHR  010244          $RDDEC  010546          $RDLIN  010300          $RDSZ = 000004
$RESRE  007032          $SAVRE  006774          $SAVR6  011562          $SB2D   011120
$SB20   011270          $SETUP= 000034          $STUP = 177777          $SVPC = 000200
$SWR  = 162000          $TERM = 000042          $TKB    001102          $TKS    001100
$TN   = 000000          $TNPWR  011034          $TPB    001106          $TPFLG  001153
$TPS    001104          $TRAP   011320          $TRP  = 000021          $TRPAD  011372
$TSTNM  001126          $TTYIN  010541          $TYPDS  007210          $TYPE   007070
$TYPEC  007172          $TYPOC  007460          $TYPON  007474          $TYPOS  007434
$DFILL  007657          .     = 014326
```

ERRORS DETECTED: 0

*DZLAEA,DZLAEA/SOL←DZLAEA
RUN-TIME: 51 23 0 SECONDS
CORE USED: 16K

N07

Spooler runtime 10 Seconds, 304 KCS, 300 disk reads, 4 disk writes, 90 pages

[redacted] Date 14-Oct-75 15:20:11 Monitor IPC-0 5078 (103) [redacted]

```
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000111111111111111111111111111111110
000000000111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111111112222222222233312
[redacted]567890123456789012 **
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000111111111111111111111111111111110
900000000111111111122222222223333333333444444444455555555556666666666777777777788888888889999999999000000000011111111112222222222233312
```