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IDENTIFICATION

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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 TO 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 EITHER A STANDARD PARALLEL INTERFACE OR A KL11/DL11 SERIAL INTERFACE. MULTIPLE LA180-S, ON INDIVIDUAL INTERFACES, CAN BE RUN TOGETHER PROVIDING THEY ARE ON EITHER ALL SERIAL OR ALL PARALLEL INTERFACES, AND PROVIDING THEIR ADDRESS ASSIGNMENTS ARE CONTIGUOUS. 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 SECTION 5.5 FOR INTERFACE CONTROL INFORMATION.

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. FOR USE ON SINGLE-PARALLEL INTERFACE ONLY.

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 500 (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 OPTICNS 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) 0 (DWN)	STOP ON ERROR CONTINUE ON ERROR
14	1 (UP) 0 (DWN)	LOOP ON TEST NORMAL OPERATION
13	1 (UP) 0 (DWN)	INHIBIT ERROR TYPEOUT NORMAL OPERATION
11		MANUAL TIMING - OVER ALL PRINT SPEED TIMING
10	1 (UP) 0 (DWN)	BELL ON ERROR NORMAL OPERATION
09	1 (UP) 0 (DWN)	SINGLE CHAR - SCOPE ROUTINE FULL LINES
08	1 (UP) 0 (DWN)	HALT & SELECT TEST 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 REENTER 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.

6.1.1 TEST 00 - INTERFACE & CONTROL TESTS

THIS TEST IS DESIGNED AS A COMMAND DECODE AND CONTROL PARALLEL-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 DEVICE 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 LASHES 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 EXAMINE 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.

6.2.4 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:

!!!!!!!!!!!!!!!!!!!!!!!!!!!!

.
AAAAAAAAAAAAAAAAAAAAAAAAAAAA
BBBBBBBBBBBBBBBBBBBBBBBBBB

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 LOOPEL 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.

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:

```
01-----  
02-----  
04-----  
  
08-----  
  > 7 BLANK LINES  
16-----  
  > 15 BLANK LINES  
32-----  
  > 31 BLANK LINES  
00-----
```


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 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 SCUNDED. 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 OPTION TESTS

6.3.1 TEST 50 - SECONDARY CHARACTER SET OPTION

THIS TEST IS DESIGNED TO EXERCISE THE SECONDARY CHARACTER SET OPTION, TESTING THE ABILITY TO SELECT EITHER CHARACTER SET UNDER SOFTWARE CONTROL FROM THE CPU, AND ALSO TESTING THAT THE CORRECT CHARACTERS ARE PRINTED WITHIN EACH SET.

A NUMBER IS PRINTED AT THE LEFT MARGIN INDICATING WHICH CHARACTER SET IS BEING PRINTED. #1 INDICATES THE PRIMARY SET AND #2 INDICATES THE SECONDARY (APL) SET. FOLLOWING THE NUMBER THE APPROPRIATE CHARACTER SET, DISTINGUISHED BY THE ABSENCE OR PRESENCE OF THE 8TH BIT IN EACH CHARACTER, IS PRINTED IN ITS ENTIRETY.

IF LESS THAN 98 COLUMNS ARE BEING TESTED, ADDITIONAL LINE(S) WILL BE PRINTED TO COMPLETE EACH CHARACTER SET.

EXAMPLES:

```
#1= !"#$$%&'()*...ETC..PRIMARY CHARACTER SET...  
#2= !"#$$%&'()*...ETC..SECONDARY CHARACTER SET...
```

6.4 MAINTENANCE AIDS

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

6.4.1 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 LA160.

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

EXAMPLE:

```
AAAAAAAAAAAAAAAAAAAA  
AAAAAAAAAAAAAAAAAAAA  
BBBBBBBBBBBBBBBBBB  
BBBBBBBBBBBBBBBBBB
```

6.4.2 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 PRINTERS, 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.

6.4.3 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.

6.4.4 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.

6.4.5 TEST 64 - SELECTED PATTERN PRINT TEST

THIS TEST REPEATEDLY LOADS THE LA180 PRINTER BUFFER WITH A STRING OF DATA PENDING IN STORAGE. THIS STRING IS ESTABLISHED BY TYPING ON THE CONSOLE KEYBOARD AND TERMINATING THE STRING BY DEPRESSING EITHER CTL-A OR CTL-B. PRINTING THEN BEGINS AUTOMATICALLY. PRINTING CAN BE INTERRUPTED BY DEPRESSING CTL-SPACE WHEREUPON A NEW PATTERN CAN BE ENTERED. IF CTL-A OR CTL-B IS THE FIRST KEY DEPRESSED, PRINTING OF THE INTERRUPTED PATTERN WILL RESUME.

IF A PATTERN OF CHARACTERS IS TO BE REPEATED OVER AND OVER (ON A SINGLE LINE) IT IS ONLY NECESSARY TO ENTER THE PATTERN ONCE AND THEN DEPRESS CTL-B. EXAMPLE: IF ABC(SP)(CTL-B) IS ENTERED, EACH LINE PRINTED WILL BE ABC ABC ABC ABC ETC., (TO MAXIMUM NUMBER OF SPECIFIED COLUMNS).

NOTE THAT NO PRINT COMMAND CODE (LF, CR, OR FF) IS USED WHEN ENTERING PATTERNS TO BE REPEATED BY CTL-B.

OPTIONALLY PRINT COMMANDS CAN BE ENTERED INTO THE CHARACTER STRING TO OBTAIN ALMOST ANY DESIRED SEQUENCE OF ACTIONS. SUCH A STRING SHOULD BE TERMINATED BY DEPRESSING CTL-A ONLY.

NOTE THAT THE STRING IS STORED AT THE END OF ALL DIAGNOSTIC CODING THEREBY ALLOWING IT TO BE OPEN-ENDED IN LENGTH (UP TO THE MEMORY LIMIT).

TO STOP PRINTING AND ENTER A NEW STRING DEPRESS CTL-SPACE. TO SELECT A NEW TEST DEPRESS DELETE/RUBOUT. TO CHANGE THE NUMBER OF COLUMNS DEPRESS CTL-C.

.ENABLE ABS,AMA

```

-TITLE MAINDEC-11-DZLAE-B
;*COPYRIGHT (C) 1977
;*DIGITAL EQUIPMENT CORP.
;*MAYNARD, MASS. 01754
;*
;*PROGRAM BY ROBERT BAKER
;*
;*THIS PROGRAM WAS ASSEMBLED USING THE POP-11 MAINDEC SYSMAC
;*PACKAGE (MAINDEC-11-DZQAC-C3), JAN 19, 1977.
;*
```

```

.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

```

001100      ;*INITIAL ADDRESS OF THE STACK POINTER *** 1100 ***
            STACK= 1100
            .EQUIV EMT,ERROR      ;;BASIC DEFINITION OF ERROR CALL
            .EQUIV IOT,SCOPE     ;;BASIC DEFINITION OF SCOPE CALL

000011      ;*MISCELLANEOUS DEFINITIONS
000012      HT= 11                ;;CODE FOR HORIZONTAL TAB
000015      LF= 12                ;;CODE FOR LINE FEED
000200      CR= 15                ;;CODE FOR CARRIAGE RETURN
177774      CRLF= 200            ;;CODE FOR CARRIAGE RETURN-LINE FEED
177774      PS= 177776           ;;PROCESSOR STATUS WORD
            .EQUIV PS,PSW

177774      STKLM= 177774        ;;STACK LIMIT REGISTER
177772      PIRQ= 177772        ;;PROGRAM INTERRUPT REQUEST REGISTER
177570      USWR= 177570        ;;HARDWARE SWITCH REGISTER
177570      DDISP= 177570       ;;HARDWARE DISPLAY REGISTER

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

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

100000      ;**SWITCH REGISTER** SWITCH DEFINITIONS
040000      SW15= 100000
020000      SW14= 40000
010000      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
  
```

```

000007      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

100000      ;*DATA BIT DEFINITIONS (BIT00 TO BIT15)
040000      BIT15= 100000
020000      BIT14= 40000
010000      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

000004      ;*BASIC "CPU" TRAP VECTOR ADDRESSES
000010      EPRVEC= 4          ;;TIME OUT AND OTHER ERRORS
000014      RESVEC= 10         ;;RESERVED AND ILLEGAL INSTRUCTIONS
000014      TBIVVEC= 14        ;;**T** BIT
000014      TRIVVEC= 14        ;;TRACE TRAP
000020      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 CGNTAIN 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      .SSVPC=- ;SAVE PC
000046 00046 .-=46
000046 005327 SENDAD ;1)SET LOC.46 TO ADDRESS OF SENDAD IN .SEOP
000052      .-=52
000052 020000 .WORD 20000 ;2)SET LOC.52 TO 20000
000200      .SSVPC ;RESTORE PC

```

```

;*****
000030      .-=30
000030 007744 ERROR ;FMT - ERROR HANDLER
000032 000000 0
000100      .-=100
000100 005566 LKSRV ;KW11-L INTEPRUPT
000102 000000 0
000104 006556 DCI ;KW11-P INTERRUPT
000106 000000 0
;*****
.SBTTL STAPTING ADDRESSES
000200      .-=200
000200 000137 001174 JMP START ;GENERAL START
000600      .-=600
000600 000137 001210 JMP RESTRT ;RESTART - NO INTERACTIVE TESTS
000604 000137 001220 JMP CONTRL ;GO TO KEYS CARD CONTROL
;WILL DEFAULT TO SWITCH REG
;IF CONSOLE DEVICE DOES NOT EXIST
;*****
.SBTTL COMMON TAGS
001100      .-=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 TKS,STKS
.EQUIV TKB,STKB
.EQUIV TPS,STPS
.EQUIV TPB,STPB

```

```

001110 000000 LPKS: 0 ;THE FOLLOWING 4 LOCATIONS ARE INITIALIZED
;BY THE PPROGRAM
;LINE PRINTER KBD STATUS REG ADDRESS
;(IF SERIAL INTERFACE)
;BIT 6 = INTERRUPT ENABLE

001112 000000 LPKB: 0 ;LINE PRINTER KBD BUFFER REG ADDRESS

001114 000000 LPS: 0 ;LINE PRINTER STATUS REG. ADDRESS
;BIT 15 = ERROR (IF PARALLEL INTEFFACE)
;BIT 7 = READY
;BIT 6 = INTERRUPT ENABLE

001116 000000 LPE: 0 ;LINE PRINTER DATA BUFFER REG. ADDRESS
;BITS 0-6 = ASCII CHAR BUFFER
;BITS 7-15 = NOT USED

001120 000000 SERSW: 0 ;SERIAL SWITCH. THE PRESENCE OF ANY 1-BITS
;IN THIS WORD WILL INDICATE THAT
;SERIAL-INTERFACED LA180'S ARE TO BE TESTED.
;DEFAULT IS ALL 0'S = PARALLEL INTERFFACE.

001122 000001 NUMLP: 1 ;THE NUMBER OF LA180'S WHICH THIS
;DIAGNOSTIC WILL ATTEMPT TO TEST.
;DEFAULT = 1

001124 175610 FSTSAD: 175610 ;FIRST LA180 ADDRESS TO BE USED IF INTERFACE-
;TYPE INDICATED IN LOCATION SERSW IS SERIAL.

001126 177510 FSTPAD: 177510 ;FIRST LA180 ADDRESS TO BE USED IF INTERFACE-
;TYPE INDICATED IN LOCATION SERSW IS PARALLEL.

001130 000000 ACTFST: 0 ;ACTUAL FIRST ADDRESS BEING USED
;DURING PPROGRAM EXECUTION. INITIALIZED BY PROGRAM ITSELF

001132 000000 LPCTR: 0 ;LP COUNTER (USED BY PROGRAM ONLY)

001134 172540 PLKS: 172540 ;KL11-P CLOCK STATUS REG. ADDRESS
001136 172542 CSBR: 172542 ;KL11-P COUNT SET ADDRESS

001140 17754f LKS: 177546 ;KL11-L CLOCK STATUS REG. ADDRESS

001142 177570 SWR: .WORD 177570 ;SW REG ADDRESS
001144 177570 DISPLAY: .WORD 177570 ;DISPLAY ADR

```

```

001146 000000 STSNM: .WORD 0 ;TEST NUMBER
001150 000204 WIDTH: .WORD 132. ;NUMBER OF COLUMNS
001152 000 STRONE: .BYTE 0 ;RUN TEST ONCE FLAG (SW REG CTL)
001153 000 TRONE: .BYTE 0 ;PUN TEST ONCE FLAG (KYBD CTL)
001154 000 TLGOP: .BYTE 0 ;LGOP ON TEST FLAG (KYBD CTL)

001155 000 CKFLAG: .BYTE 0 ;CLOCK OPTION FLAG
;0 = NONE AVAILABLE
;+1 = KL11-L
;-1 = KL11-P

001156 000207 SBELL: .ASCIZ <207> ;BELL CODE
001160 077 SQUES: .ASCIZ /?/ ;QUESTION MARK
001161 015 SCRLF: .ASCIZ <15> ;CARRIAGE RETURN - LINE FEED
001162 000017 SLF: .ASCIZ <12> ;LINE FEED

001164 000015 SCR: .ASCIZ <15> ;CARRIAGE RETURN ONLY
001166 000014 SFF: .ASCIZ <14> ;FORM FEED

.EVEN

;*****
;THE FOLLOWING LOCATIONS ARE USED BY THE TTY TYPE ROUTINES
;SET THE FILL CHARACTERS AS REQUIRED FOR VARIOUS CONSOLE TEPMINALS
;THE TEPMINAL AVAILABLE FLAG WILL BE SET BY THE PROGRAM.

001170 000 SNULL: .BYTE 0 ;NULL CHARACTER FOR FILLS
001171 002 SFILLS: .BYTE 2 ;NUMBER OF FILLER CHARACTERS REQUIRED
001172 012 SFILLC: .BYTE 12 ;INSERT FILL CHARACTERS AFTER LINE FEED
001173 000 STPLFG: .BYTE 0 ;TERMINAL UNAVAILABLE FLAG
;BIT <07> = 1 = UNAVAILABLE

.EVEN

```



```

;*****
.SBTTL PROGRAM INITIALIZATION
001174 005037 001146 START: CLP $TSTNM ;SET TEST NUMBER TO ZERO
001200 023737 000042 000046 CMP @#42,@#46 ;CHECK IF IN ACT QUICK VERIFY
;SKIP MANUAL INTERVENTION TESTS IF YES
001206 001007 BNE STARTX ;INITIALIZE
001210 012737 000020 001146 RSTRT: MOV #20,$TSTNM ;SET TEST NUMBER TO 20
001216 000403 BR STARTX ;INITIALIZE
001220 012737 177777 001146 CONTRL: MOV #-1,$TSTNM ;SET CONTROL FLAG
001226 012737 177570 001142 STARTX: MOV #177570,SWR ;INITIALIZE SWR CONTROL
001234 013737 001142 MOV SWR,DISPLAY
.SBTTL INITIALIZE THE COMMON TAGS
001242 012706 001100 MOV #STACK,SP ;;SETUP THE STACK POINTER
;;INITIALIZE A FEW VECTORS
001246 012737 013060 000034 MOV #STRAP,@#TRAPVEC ;;TRAP VECTOR FOR TRAP CALLS
001254 012737 000340 000036 MCV #340,@#TRAPVEC+2;LEVEL 7
001262 012737 013210 000024 MOV #SPWRDN,@#PWRVEC ;;POWER FAILURE VECTOR
001270 012737 000340 000026 MOV #340,@#PWRVEC+2 ;;LEVEL 7
001276 005037 005336 CLR $PASS ;;CLEAR THE PASS COUNT
001302 013737 005306 005300 MOV $ENDCT,$EOPCT ;;SETUP END-OF-PROGRAM COUNTER
;;SIZE FOR A HARDWARE SWITCH REGISTER. IF NOT FOUND OR IT IS
;;EQUAL TO A "-1", SETUP FOR A SOFTWARE SWITCH REGISTER.
001310 013746 000004 MCV @#ERRVEC,-(SP) ;;SAVE ERROR VECTOR
001314 012737 001350 000004 MOV #64$,@#ERRVEC ;;SET UP ERROR VECTOR
001322 012737 177570 001142 MOV #DSWR,SWR ;;SETUP FOR A HARDWARE SWICH REGISTER
001330 012737 177570 001144 MOV #DDISP,DISPLAY ;;AND A HARDWARE DISPLAY REGISTER
001336 022777 177777 177576 CMP #-1,@SWR ;;TRY TO REFERENCE HARDWARE SWR
001344 001012 BNE 66$ ;;BRANCH IF NO TIMEOUT TRAP OCCURRED
;;AND THE HARDWARE SWR IS NOT = -1
001346 000403 BR 65$ ;;BRANCH IF NO TIMEOUT
001350 012716 001356 64$: MOV #65$,(SP) ;;SET UP FOR TRAP RETURN
001354 000002 RTI
001356 012737 000176 001142 65$: MOV #SWREG,SWR ;;POINT TO SOFTWARE SWR
001364 012737 000174 001144 MOV #DISPREG,DISPLAY
001372 012637 000004 66$: MOV (SP)+,@#ERRVEC ;;RESTORE ERROR VECTOR
001376 017700 177540 MOV @SWR,R0 ;GET SWITCHES
001402 005200 INC R0 ;CHECK IF ALL SWITCHES ARE UP
001404 001006 BNE 65 ;CONTINUE IF NOT
001406 012737 000176 001142 MOV #SWREG,SWR ;IF UP, SET SOFTWARE SWITCH CONTROL
001414 012737 000174 001144 MOV #DISPREG,DISPLAY
001422 017700 177514 6$: MCV @SWR,R0 ;GET SW REG
001426 042700 177400 BIC #177400,R0 ;SAVE BITS 0-7
001432 020027 000204 CMP R0,#132. ;TEST # COLUMNS
001436 003003 BGT 2$ ;TGC BIG, DEFAULT TO 132(10)
001440 020027 000002 1$: CMP R0,#2. ;TEST # COLUMNS
001444 103002 BHS 3$ ;BRANCH IF OK
001446 012700 000204 2$: MOV #132.,R0 ;DEFAULT TO 132(10)
001452 010037 001150 3$: MCV R0,WIDTH ;SAVE # COLUMNS
001456 105037 001154 CLPP TL0CP ;RESET FLAGS
001462 105037 001152 CLRR STRONE
001466 105037 001153 CLRB TRONE
001472 005037 001160 CLR SVTST
001476 000401 BR 10$ ;REPLACE THIS INSTRUCTION WITH NOP (204)

```

```

;TC SKIP CLOCK TIMINGS
001500 000424 BR 20$
001502 012737 000002 000006 10$: MOV #RTI,@#6 ;SET TRAP RETURN
001510 012737 000006 000004 MOV #6,@#4
001516 112737 177777 001155 MOVR #-1,CKFLAG ;SET CLOCK FLAG FOR KW11-P
;SET C-RIT
001524 000261 TSTP @PLKS ;KW11-P AVAILABLE?
001526 105777 177402 BCC 30$ ;YES, CHECK FOR CONSOLE TERMINAL
001532 103011 BCC 30$ ;YES, CHECK FOR CONSOLE TERMINAL
001534 112737 000001 001155 MOVR #1,CKFLAG ;SET CLOCK FLAG FOR KW11-L
;SET C-RIT
001542 000261 TSTB @LKS ;KW11-L AVAILABLE?
001544 105777 177370 BCC 30$ ;YES, CHECK FOR CONSOLE TERMINAL
001550 103002 BCC 30$ ;YES, CHECK FOR CONSOLE TERMINAL
001552 105037 001155 20$: CLRP CKFLAG ;CLEAR CLOCK AVAILABLE FLAG - NONE THERE
001556 004737 001764 30$: JSR PC,QU01 ;INITIALIZE ACTSET AND SELECT DRIVER
001562 112737 177777 001173 MOVR #-1,STPFLG ;SET CONSOLE UNAVAILABLE FLAG
;SET C-RIT
001570 000261 TSTB @TKS ;CONSOLE TERMINAL THERE?
001572 105777 177302 BCS 4$ ;NO, BRANCH
001576 103402 BCS 4$ ;NO, BRANCH
001600 105037 001173 4$: CLRP STPFLG ;YES, CLEAR CONSOLE UNAVAILABLE FLAG
001604 103002 BCC 5$ ;CONTINUE IF CONSOLE
001606 104414 PRINT ,NMSG ;PRINT NO CONSOLE MESSAGE
001612 005037 000006 5$: CLR @#6 ;RESET TRAP VECTOR HALTS
001616 005037 000004 CLR @#4
001622 004737 002037 JSR PC,QU02 ;TYPE INTF. MISC. IF CONSOLE
.SBTTL TYPE PROGRAM NAME
;;TYPE THE NAME OF THE PROGRAM IF FIRST PASS
001626 005227 177777 INC #-1 ;;FIRST TIME?
001632 001022 BNE 67$ ;;BRANCH IF NO
001634 022737 005322 000042 CMP #SENDAD,@#42 ;;ACT-11?
001642 001416 BEQ 67$ ;;BRANCH IF YES
001644 104401 TYPE ,68$ ;;TYPE ASCII STRING
001650 000413 BR 67$ ;;GET OVER THE ASCII
;;68$: .ASCIIZ <CRLF>#MAINDEC-11-DZLAE-B#<CRLF>
001700 005737 001146 67$: TST $TSTNM ;WANT CONTROL NOW?
001704 002005 BGE 11$ ;NO, CONTINUE
001706 105737 001173 15$: TSTP STPFLG ;TERMINAL THERE?
001712 100406 EMI 13$ ;INC, DEFAULT TO SW REG CONTROL
001714 000137 007442 JMP KYBDST ;YES, GO TO KYBD CONTROL
001720 032777 000400 177214 11$: BIT #SWR,@SWR ;WANT TEST SELECTION?
001726 001402 BEQ 12$ ;NO, CHECK TEST #
001730 000137 006752 13$: JMP SELECT ;YES, GO TO TEST SELECTION HALT
001734 013700 001146 12$: MCV $TSTNM,R0 ;GET TEST NUMBER
001740 006300 ASL R0 ;SET POINTER
001742 005760 TST TAT(R0) ;CHECK IF TEST IN TABLE
001746 003004 BGT 14$ ;BRANCH IF IN TABLE
001750 002756 BLT 15$ ;END OF SEQUENCE, SELECT TEST
001752 005237 001146 INC $TSTNM ;INCREMENT TEST NUMBER
001756 000760 BP 11$ ;CHECK NEXT TEST NUMBER IN TABLE
001760 000170 013356 14$: JMP @TAT(P0) ;GO TO TEST

```

```

001764 005737 001120 QU01: TST SERSW ;IS SERIAL SWITCH SET?
001770 001407 BEQ 80$ ;ZERUS=NO=PARALLEL=BRANCH
001772 013737 001124 001130 MOV FSTPAD,ACTFST ;SET ADDRESS OF 1ST SERIAL INTF.
002000 012737 011206 011042 MOV #SLOAD,LDPTR+2 ;SWITCH TO SERIAL LOADER
002006 000406 BR 90$ ;GET AROUND NEXT 2 INSTPS
002010 013737 001126 001130 80$: MOV FSTPAD,ACTFST ;SET ADDRESS OF 1ST PARALLEL INTF.
002016 012737 011044 011042 MOV #PLOAD,LDPTR+2 ;SWITCH TO PARALLEL LOADER
002024 004737 011316 90$: JSR PC,RSTADR ;ADDRESS 1ST LINE PRINTER
002030 000207 RTS PC ;RETURN

002032 105737 001173 QU02: TSTB STPFLG ;IS THERE A CONSOLE TERMINAL?
002036 100400 BMI 78$ ;BRANCH IF NONE
002040 104401 002176 TYPE ,74$ ;CRLF CONSOLE
002044 005737 011120 TST SERSW ;IS SERIAL SWITCH SET?
002050 001407 BEQ 77$ ;ZERUS=NO=PARALLEL=BRANCH
002052 104401 002122 TYPE ,71$ ;SERIAL
002056 104401 002132 70$: TYPE ,72$ ;INTERFACED LA180 TEST, CRLF
002062 104401 002161 TYPE ,73$ ;# LA180'S =
002066 013746 001122 MOV NUMLP,-(SP) ;PUT # OF LP'S ONTO STACK
002072 104405 TYPDS ;TYPE # OF LP'S BEING TESTED
002074 104401 002176 TYPE ,74$ ;CRLF
002100 104401 002700 TYPE ,75$ ;FIRST PRINTER'S ADDRESS IS
002104 013746 001130 MOV ACTFST,-(SP) ;PUT VALUE ONTO STACK
002110 104403 TYPDS ;TYPE OCTAL ADDRESS
002112 006 ;BYTE 6
002114 001 ;BYTE 1
002114 104401 002176 TYPE ,74$ ;CRLF
002120 000207 78$: RTS PC ;EXIT
002122 042523 044522 046101 71$: .ASCIZ /SERIAL /
002130 000040
002132 047111 042524 043122 72$: .ASCIZ /INTERFACED LA180 TEST/<CRLF>
002140 041501 042105 046040
002146 030501 030070 052040
002154 051505 100124 000
002161 043 046040 030501 73$: .ASCIZ /# LA180'S = /
002166 030070 051447 036440
002174 000040
002176 000207 74$: .ASCIZ <CRLF>
002200 044506 051522 020124 75$: .ASCIZ /FIRST PRINTER'S ADDRESS IS /
002206 051120 047111 042524
002214 023522 020123 042101
002222 051104 051505 020123
002230 051511 000040
002234 040520 040522 046114 76$: .ASCIZ /PARALLEL /
002242 046105 000040 .EVEN

002246 104401 002234 77$: TYPE ,76$ ;PARALLEL
002252 000701 BR 70$ ;CONTINUE
  
```

```

;*****
.SBTTL OPERATOR INTERVENTION TESTS
;////////////////////////////////////
;TEST0 - INTERFACE AND CNTRCL TESTS (PARALLEL INTF ONLY)
;
;TEST EPPOR AND READY BITS, PRINTER OFF LINE - POWER OFF
;////////////////////////////////////

002254 005737 001120 TEST0: TST SERSW ;IS PARALLEL INTF INDICATED?
002260 001402 BEQ 29$ ;BRANCH IF YES
002262 000137 006644 JMP EXIT ;OTHERWISE EXIT TEST
002266 104401 015567 29$: TYPE, TOMSG0 ;TYPE INSTRUCTIONS
002272 104421 HOLD ;WAIT FOR OPERATOR
002274 104420 28$: CHECK ;CHECK FOR CONTROL
002276 005777 176612 TST @LPS ;CHECK FOR ERROR CONDITION
002302 100402 BMI 1$ ;OK, ERROR SET
002304 104001 ERROR 1 ;ERROR CLEAR, POWER OFF
002306 000772 BR 28$ ;RETEST
002310 105777 176600 1$: TSTB @LPS ;CHECK READY
002314 100002 BPL 2$ ;OK, READY NOT SET
002316 104002 ERROR 2 ;READY SET, POWER OFF
002320 000765 BR 28$ ;RETEST

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

002322 104401 015626 2$: TYPE, TOMSG1 ;TYPE INSTRUCTION - TURN POWER ON
002326 104421 HOLD ;WAIT FOR OPERATOR
002330 104420 3$: CHECK ;CHECK FOR CONTROL
002332 005777 176556 TST @LPS ;CHECK ERROR
002336 100402 BMI 4$ ;OK, ERROR SET
002340 104003 ERROR 3 ;ERROR CLEAR, PRINTER OFF LINE
002342 000772 BR 3$ ;RETEST
002344 105777 176544 4$: TSTB @LPS ;CHECK READY
002350 100002 BPL 5$ ;OK, READY NOT SET
002352 104004 ERROR 4 ;READY SET, PRINTER OFF LINE
002354 000765 BR 3$ ;RETEST

;////////////////////////////////////
;TEST ERROR AND READY BITS, PRINTER ON LINE
;////////////////////////////////////

002356 104401 015651 5$: TYPE ,TOMSG2 ;TYPE INSTRUCTION, TURN ON LINE
002362 104421 HOLD ;WAIT FOR OPERATOR
002364 104420 6$: CHECK ;CHECK FOR CONTROL
002366 005777 176522 TST @LPS ;CHECK ERROR
002372 100002 BPL 7$ ;OK, ERROR CLEAR
  
```

```

002374 104005          ERROR 5          ;ERROR SET, PRINTER ON LINE
002376 000772          BR 6S           ;RETEST
002400 105777 176510 7S:  TSTB @LPS    ;CHECK READY
002404 100402          BMI 4S          ;OK, READY SET
002406 104006          ERROR 6          ;READY CLEAR, PRINTER ON LINE
002410 000765          BR 6S           ;RETEST
  
```

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

```

002412 104401 015705 8S:  TYPE ,TOMSG3 ;TYPE INSTRUCTION, PAPER OUT
002416 104423          HOLD           ;WAIT FOR OPERATOR
002420 104420          9S:  CHECK           ;CHECK CONTROL
002422 012777 000012 176466 MOV #12,@LPS    ;SEND LF
002430 005777 176460 TST @LPS        ;CHECK FOR ERROR CONDITION
002434 104002          BMI 10S         ;OK, ERROR SET
002436 104007          ERROR 7          ;ERROR CLEAR, PAPER OUT ERROR
002440 000767          BR 9S           ;RETEST
002442 105777 176446 10$: TSTB @LPS    ;CHECK READY
002446 100002          BPL 11S         ;OK, READY CLEAR
002450 104010          ERROR 10         ;READY SET, PAPER OUT, ON LINE
002452 000762          BR 9S           ;RETEST
  
```

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

```

002454 104401 015737 11$: TYPE ,TOMSG4 ;TYPE INSTRUCTION, RESET & ON LINE
002460 104421          HOLD           ;WAIT FOR OPERATOR
002462 104420          12$: CHECK           ;CHECK FOR CONTRCL
002464 005777 176424 TST @LPS        ;CHECK ERROR
002470 100002          BPL 13S         ;OK, ERROR CLEAR
002472 104011          ERROR 11         ;ERROR DID NOT CLEAR
002474 000772          BR 12S         ;RETEST
002476 105777 176412 13$: TSTB @LPS    ;CHECK READY
002502 100402          BMI 14S         ;OK, READY SET
002504 104012          ERROR 12         ;READY NOT SET
002506 000773          BR 13S         ;RETEST
  
```

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

```

002510 104420          14$: CHECK           ;CHECK CONTROL
002512 000005          RESFT          ;CLEAR WORLD
002514 005777 176374 TST @LPS        ;CHECK ERROR
002520 100002          BPL 15S         ;OK, ERROR CLEAR
002522 104013          ERROR 13         ;ERROR BIT SET AFTER RESET INSTR.
002524 000771          BR 14S         ;RETEST
  
```

```

002526 104420          15$: CHECK           ;CHECK CONTROL
002530 000005          RESFT          ;CLEAR WORLD
002532 105777 176356 TSTB @LPS       ;CHECK READY
002536 100402          BMI 16S         ;OK, READY SET
002540 104014          ERROR 14         ;READY BIT CLEAR AFTER RESET INSTR.
002542 000771          BR 15S         ;RETEST
  
```

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

```

002544 104420          16$: CHECK           ;CHECK CONTROL
002546 005005          CLR R5          ;CLRFR TIME OUT COUNTER
002550 012777 000015 176340 MOV #15,@LPS    ;LOAD CARRIAGE RETURN INTO BUFFER
002556 105777 176332 TSTB @LPS       ;CHECK READY
002562 100002          BPL 17S         ;OK, READY CLEAR
002564 104015          ERROR 15         ;READY BIT NOT CLEAR WHEN CHAR LOADED
002566 000766          BR 16S         ;RETEST
002570 005777 176320 17$: TST @LPS        ;CHECK ERROR
002574 100002          BPL 18S         ;OK, ERROR CLEAR
002576 104016          ERROR 16         ;ERROR BIT SET AFTER CHAR LOAD
002600 000761          BR 16S         ;RETEST
002602 105777 176306 18$: TSTB @LPS    ;PRINTER STILL BUSY
002606 100404          BMI 19S         ;NO, NEXT TEST
002610 005205          INC R5          ;YES, INC TIMER
002612 001366          BNE 17S         ;WAIT FOR FLAG
002614 104017          ERROR 17         ;NO, TOO LONG
002616 000752          BR 16S         ;RETEST
  
```

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

```

002620 012705 000340 19$: MOV #R7,R5 ;SET FIRST LEVEL
002624 104420          20$: CHECK           ;CHECK CONTROL
002626 012737 002730 000200 MOV #23$,200    ;SET INTERRUPT RETURN
002634 012737 000340 000202 MOV #R7,202     ;SET PRIORITY 7 ON INTERRUPT
002642 005777 176246 TST @LPS        ;CHECK FOR ERROR
002646 100002          BPL 21S         ;OK, ERROR CLEAR
002650 104020          ERROR 20         ;ERROR BIT SET
002652 000764          BR 20S         ;RETEST
002654 105777 176234 21$: TSTB @LPS    ;CHECK READY
002660 100402          BMI 22S         ;OK, READY SET
002662 104021          ERROR 21         ;READY BIT NOT SET
002664 000757          BR 20S         ;RETEST
002666          22$: MOV R5,-(SP) ;PUT NEW PS ON STACK
002666 010546          MOV #64$,-(SP) ;PUT NEW PC ON STACK
002670 012746 002676
  
```

```

002674 000002          RTI          ;;POP NEW PC AND PS
002676          64$:
002676 052777 000100 176210  BIS      #BIT6,@LPS  ;SET PRINTER INT. ENABLE
002704 000240          NOP          ;DELAY
002706 042777 000100 176200  BIC      #BIT6,@LPS  ;CLEAR PRINTER INT. ENABLE
002714 162705 000040          SUB      #40,R5     ;SET NEXT LEVEL
002720 020527 000140          CMP      R5,#PR3    ;LEVEL 3?
002724 001404          BRQ      24$        ;YES, CONTINUE NEXT TEST
002726 000736          BR       20$        ;NO, TEST THIS LEVEL

002730 02262f          23$:  CMP      (SP)+,(SP)+  ;RESTORE STACK
002732 104022          ERROR   22         ;INTERRUPT ABOVE LEVEL 3
002734 000733          BR      20$        ;RETEST
  
```

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

```

002736 104420          24$:  CHECK   ;CHECK FOR CONTROL
002740 012737 003024 000200  MOV      #27$,200  ;SET INTERRUPT RETURN
002746 057777 176142          TST      @LPS      ;CHECK FOR ERROR
002752 100002          RPL      25$      ;OK, ERROR CLEAR
002754 104020          ERROR   20         ;ERROR BIT SET
002756 000767          BR      24$      ;RETEST
002760 105777 176130          25$:  TSTB   @LPS      ;CHECK READY
002764 100402          BMI      26$      ;OK, READY SET
002766 104021          ERROR   21         ;READY CLEAR
002770 000762          BR      24$      ;RETEST

002772          26$:
002772 010546          MOV      R5,-(SP)  ;;PUT NEW PS ON STACK
002774 012746 003002          MOV      #65$,-(SP) ;PUT NEW PC ON STACK
003000 000002          RTI          ;;POP NEW PC AND PS
003002          65$:
003002 052777 000100 176104  BIS      #BIT6,@LPS  ;SET PRINTER INTR. ENABLE
003010 000240          NOP          ;DELAY
003012 042777 000100 176074  BIC      #BIT6,@LPS  ;CLEAR PRINTER INTR. ENABLE
003020 104022          ERROR   23         ;NO INTERRUPT BELOW LEVEL 4
003022 000745          BR      24$      ;RETEST

003024 042777 000100 176062  27$:  BIC      #BIT6,@LPS  ;CLEAR PRINTER INTR. ENABLE
003032 02262f          CMP      (SP)+,(SP)+ ;RESET STACK
003034 162705 000040          SUB      #40,R5     ;SET NEXT LEVEL
003040 002336          BGE      24$        ;RETEST IF NOT DONE ALL LEVELS
003042 012737 000137 000200  MOV      #137,200   ;RESET INSTRUCTIONS AT 200-202
003050 012737 001174 000202  MOV      #START,202
003056 005046          CLR      -(SP)     ;;PUT NEW PS ON STACK
003060 012746 003066          MOV      #66$,-(SP) ;PUT NEW PC ON STACK
003064 000007          RTI          ;;POP NEW PC AND PS
003066          66$:
003066 000137 006644          JMP      EXIT      ;EXIT TEST
  
```

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

```

003072 104413          TEST1: PRTHDR  ;PRINT TEST HEADER
003074 012705 003204          MOV      #4$,R5    ;SET TABLE POINTER
003100 012701 000036          MCV      #30,,R1   ;SET CHAR COUNT
003104 012700 000055          MOV      #55,R0    ;SET DASH CHAR
003110 104416          MLOAD   ;LOAD DASHED LINE
003112 104414 001164          PRINT   ,SCR       ;PRINT LINE
003116 104401 016035          3$:  TYPE   ,T1MSG3    ;TYPE INSTRUCTIONS
003122 010537 003130          MOV      R5,1$     ;SET SWITCH SETTING FOR MSG3
003126 104401          TYPE   ;
003130 000000          1$:  .WORD   0          ;
003132 104401 016067          TYPE   ,T1MSG4    ;FINISH INSTRUCTIONS
003136 104421          HOLD   ;WAIT FOR OPERATOR
003140 104420          CHECK  ;CHECK FOR CONTROL
003142 104414 001166          PRINT   ,$FF      ;ISSUE FORM FEED
003146 104414 015777          PRINT   ,T1MSG1    ;PRINT REFERENCE LINE
003152 010537 003160          MOV      R5,2$     ;SET FORM FEED LENGTH FOR MSG3
003156 104414          PRINT   ;
003160 000000          2$:  .WORD   0          ;
003162 104414 016006          PRINT   ,T1MSG2    ;FINISH MSG3
003166 02252f          CMP      (P5)+,(R5)+ ;INC TABLE POINTER
003170 005715          TST      (R5)      ;CHECK TABLE TO SEE IF DONE TEST
003172 001351          BNE     3$         ;FINISH TEST
003174 104414 001162          PRINT   ,SLF      ;ADVANCE PAPER WHEN DONE
003200 000137 006644          JMP      EXIT      ;EXIT TEST

003204 031440 000040          4$:  .ASCIZ  / 3 /      ;FORM FEED SWITCH SETTINGS
003210 027063 000065          .ASCIZ  /3.5/
003214 032040 000040          .ASCIZ  / 4 /
003220 027065 000065          .ASCIZ  /5.5/
003224 033040 000040          .ASCIZ  / 6 /
003230 033440 000040          .ASCIZ  / 7 /
003234 034040 000040          .ASCIZ  / 8 /
003240 027070 000065          .ASCIZ  /8.5/
003244 030461 000040          .ASCIZ  /11 /
003250 031061 000040          .ASCIZ  /12 /
003254 032061 000040          .ASCIZ  /14 /
003260 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 OPTION 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.
;////////////////////////////////////
  
```

```

003262 104413 TEST2: PRTHDR ;PRINT TEST HEADER
003264 012737 003500 006610 MOV #SPD,TORTN ;SET TIME OUT RETURN
003272 005004 CLR R4 ;CLEAR LINE COUNT
003274 105737 001155 TSTB CKFLAG ;TEST CLOCK FLAG
003300 001417 BEQ 4$ ;NONE THERE, MANUAL TIMING
003302 002407 BLT 1$ ;KW11-P
003304 013737 006612 006606 MOV MINCNT,CMTR ;SET KW11-L CLOCK COUNT
003312 012777 000100 175620 MOV #BITE,@LKS ;ENABLE CLOCK INTERRUPT
003320 000427 BR T2SP ;START PRINTING
003322 013777 006612 175606 1$: MOV MINCNT,@CSBP ;SET CLOCK COUNT
003330 012777 000105 175576 MOV #105,@PLKS ;START CLOCK
003336 000420 BR T2SP ;START PRINTING
003340 023727 001142 177570 4$: CMP SWR,#177570 ;CHECK SW REG ADR
003346 001406 BEQ 2$ ;CONTINUE IF HARDWARE
003350 104414 PRINT ,T2EM ;PRINT ERRORS MSG
003354 104401 016134 TYPE ,T2EM ;EXIT TEST
003360 000137 006644 JMP EXIT ;PRINT INSTRUCTIONS
003364 104401 015253 2$: TYPE ,MANMSG ;SW12 UP?
003370 032777 010000 175544 3$: BIT #SW12,@SWR ;NO, WAIT FOR START
003376 001774 BEQ 3$

003400 012702 000041 T2SP: MOV #41,R2 ;SET START CHAR
003404 010200 1$: MOV R2,R0 ;SET CHAR
003406 013701 001150 2$: MOV WIDTH,R1 ;SET COLUMN COUNT
003412 104415 3$: LOAD ;LOAD CHAR
003414 005301 DEC R1 ;DEC CHAR COUNT
003416 001407 BEQ 4$ ;BRANCH IF DONE LINE
003420 005200 INC R0 ;NEXT CHAR
003422 020027 000177 CMP R0,#177 ;CHECK CHAR
003426 001371 BNE 3$ ;OK, CONTINUE
003430 012700 MOV #40,R0 ;SET CHAR = SPACE
003434 000766 BR 3$ ;CONTINUE
003436 104414 001162 4$: PRINT ,SLF ;PRINT LINE
003442 005204 INC R4 ;INC LINE COUNT
003444 105737 001155 TSTB CKFLAG ;USING CLOCK TIMING?
003450 001006 BNE 5$ ;YES, BYPASS MANUAL TIMING
003452 032777 010000 175462 BIT #SW12,@SWR ;SW12 DOWN?
003460 001002 BNE 5$ ;NO, CONTINUE
003462 000137 003500 JMP SPD ;YES, EXIT PRINTING ROUTINE
003466 005202 5$: INC R2 ;INC START CHAR
003470 020227 000177 CMP R2,#177 ;CHECK IT
  
```

```

003474 001343 BNE 1$ ;OK, CONTINUE
003476 000740 BR T2SP ;RESET START CHAR
  
```

```

;////////////////////////////////////
;ROUTINE TO PRINT/TYPER MEASURED PRINT SPEED FOR TEST 2.
;////////////////////////////////////
  
```

```

003500 012700 000177 SPD: MOV #177,R0 ;SET RUBOUT CHAR
003504 104415 LOAD ;CLEAR CHAR BUFFER
003506 104401 015470 TYPE, PRSP1 ;START MSG
003512 104414 015470 PRINT ,PRSP1
003516 105737 001155 TSTB CKFLAG ;USING CLOCK?
003522 001004 BNE 1$ ;YES, BRANCH
003524 104401 015511 TYPE ,PRSP2 ;ADD WORD "APPROXIMATELY" TO MSG
003530 104414 015511 PRINT ,PRSP2
003534 1$: MOV R4,-(SP) ;;PUSH R4 ON STACK
003536 004737 012650 JSR PC,$SR2D ;CONVERT #
003542 104417 CNLOAD ;LOAD #
003544 104446 MOV R4,-(SP) ;;PUSH R4 ON STACK
003546 104405 TYPDS ;TYPE #
003550 104414 015522 PRINT ,PRSP3 ;LOAD MORE OF MSG
003554 104401 015522 TYPE ,PRSP3
003560 013746 001150 MOV WIDTH,-(SP) ;#COLUMNS ON STACK
003564 104405 TYPDS ;TYPE #
003566 104401 015551 TYPE ,PRSP4 ;TYPE END OF MSG
003572 013746 001150 MOV WIDTH,-(SP) ;# COLUMNS ON STACK AGAIN
003576 004737 012650 JSR PC,$SR2D ;CONVERT #
003602 104417 CNLGD ;LOAD #
003604 104414 015551 PRINT ,PRSP4 ;PRINT MSG ON LA180
003610 000137 006644 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
;////////////////////////////////////

```

003614	104413		TEST20: PRTHDR		;PRINT TEST HEADER
003616	012703	052452	MOV	#*'U,R3	;SET FIRST CHAR PAIR
003622	012702	000020	MOV	#16.,R2	;SET LINE COUNT
003626	010300		1\$: MOV	R3,R0	;SET CHAR PAIR
003630	013701	00115C	MOV	WIDTH,R1	;SET COLUMN COUNT
003634	104415		2\$: LOAD		;LOAD CHAR
003636	000300		SWAB	R0	;SET NEXT CHAR
003640	005301		DEC	R1	;DEC COLUMN COUNT
003642	001374		BNE	2\$;FINISH LINE
003644	000303		SWAB	R3	;SET NEXT LINF START CHAR
003646	104414	001162	PRINT	,SLF	;PRINT LINE
003652	005302		DEC	R2	;DEC LINE COUNT
003654	001364		BNE	1\$;FINISH TEST
003656	000137	006644	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.
;////////////////////////////////////

```

003662	104413		TEST21: PRTHDR		;PRINT TEST HEADER
003664	013701	001150	MOV	WIDTH,P1	;SET COLUMN COUNT
003670	012700	000060	1\$: MOV	#60,R0	;SET CHAR
003674	104415		LOAD		;LOAD CHAR
003676	005301		DEC	R1	;DEC CHAR COUNT
003700	001405		BEQ	2\$;PRINT LINE WHEN LOADED
003702	012700	000040	MOV	#40,R0	;SET SPACE CHAR
003706	104415		LOAD		;LOAD SPACE
003710	005301		DEC	R1	;DEC CHAR COUNT
003712	001366		BNE	1\$;FINISH LINE
003714	104414	001164	2\$: PRINT	,SCR	;PRINT LINE
003720	012702	000002	MOV	#2,R2	;SET FIRST CHAR COUNT
003724	012700	000040	3\$: MOV	#40,R0	;SET SPACE CHAR
003730	010201		MOV	R2,R1	;GET CHAR COUNT
003732	005301		DEC	R1	;SUBTRACT ONE
003734	104416		MLOAD		;LOAD SPACES
003736	012700	000130	MOV	#*X,R0	;SET X CHAR
003742	104415		LOAD		;LOAD X
003744	104414	001164	PRINT	,SCR	;PRINT LINE
003750	062702	000002	ADD	#2,R2	;ADD 2 TO CHAR COUNT
003754	020237	001150	CMP	?2,WIDTH	;DONE LINE?
003760	101761		BLOS	3\$;NO, FINISH LINE
003762	104414	001162	PRINT	,SLF	;YES, ADVANCE PAPER
003766	000137	006644	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.
;////////////////////////////////////
  
```

```

003772 104413
003774 012702 000002
004000 013701 001150
004004 020127 000177
004010 003402
004012 012701 000177
004016 104414 004054
004022 005301
004024 001405
004026 012700 000055
004032 104415
004034 005301
004036 001367
004040 104414 001162
004044 005307
004046 001354
004050 000137 006644

004054 004057 000134
  
```

```

TEST22: PPTHDR          ;PRINT TEST HEADER
        MOV             #2,R2          ;SET LINE COUNT
1$:     MOV             WIDTH,R1       ;SET COLUMN COUNT
        CMP             R1,#127.      ;CHECK # COLUMNS
        BLE             2$           ;GREATER THAN 127?
        MOV             #127.,R1      ;YES, SET TO 127
        PPINT          ,10$          ;LOAD SLASH-BS-BACKSLASH
        DEC             R1            ;DEC COLUMN COUNT
        BEQ             3$           ;PRINT LINE IF DONE
        MOV             #55,R0        ;SET ASCII OF DASH
        LOAD            ;LOAD DASH CHAR
        DEC             R1            ;DEC COLUMN COUNT
        BNE             2$           ;FINISH LINE
3$:     PRINT          ,SLF          ;PRINT LINE
        DEC             R2            ;DEC LINE COUNT
        BNE             1$           ;FINISH TEST
        JMP             EXIT         ;EXIT TEST

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
;////////////////////////////////////
  
```

```

004060 104413
004062 012700 000040
004066 012701 000030
004072 104416
004074 104414 001162
004100 005200
004102 020027 000177
004106 001367
004110 000137 006644
  
```

```

TEST23: PPTHDR          ;PRINT TEST HEADER
        MOV             #40,R0        ;SET FIRST CHAR
1$:     MOV             #30.,R1       ;SET CHAR COUNT
        MLOAD          ;LOAD LINE
        PRINT          ,SLF          ;PRINT LINE
        INC             R0            ;SET NEXT CHAR
        CMP             R0,#177      ;CHAR = RUBOUT?
        BNE             1$           ;NO, FINISH TEST
        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.
////////////////////////////////////

```

```

004114 104413 TEST24: PRTHDR ;PRINT TEST HEADER
004116 012702 MOV #41,R2 ;SET START CHAR
004122 012705 000041 MOV #30,R5 ;SET LINE COUNT
004126 013701 00115C MOV WIDTH,R1 ;GET COLUMN COUNT
004132 012703 000377 MOV #255,R3 ;SET BUFFER SIZE
004136 160103 SUB R1,R3 ;SUBTRACT COLUMNS COUNT
004140 005004 CLR R4 ;CLEAR CHAR INC COUNT
004142 162703 000035 25: SUB #29,R3 ;DIVIDE NON-PRINT CHAR COUNT BY 29
004146 002402 BLT 35 ;
004150 005204 INC R4 ;R4 = NON-PRINT CHAR INC COUNT
004152 000773 BR 25 ;
004154 005002 35: CLR R3 ;CLEAR NON-PRINT CHAR COUNT 2ND BLOCK
004156 162701 000377 45: SUP #255,R1 ;CALCULATE # NON-PRINT CHARS, 1ST BLOCK
004162 005401 NEG R1 ;
004164 160301 SUB R3,R1 ;
004166 004737 004320 JSR PC,10$ ;LOAD 1ST BLOCK OF NON-PRINT CHARS
004172 013701 001150 MOV WIDTH,R1 ;SET # PRINTABLE CHARS (COLUMN COUNT)
004176 010200 MOV #2,R0 ;SET FIRST PRINT CHAR
004200 10441F 55: LOAD ;LOAD PRINTABLE CHAR
004202 005301 DEC R1 ;DEC CHAR COUNT
004204 001407 BEQ 6$ ;BRANCH IF DONE PRINTABLE CHARS
004206 005200 INC R0 ;NEXT CHAR
004210 020027 000177 CMP R0,#177 ;CHECK CHAR
004214 001371 ENF 5$ ;OK - CONTINUE
004216 012700 000040 MOV #40,R0 ;RESET CHAR = SPACE
004222 000766 BR 5$ ;CONTINUE
004224 010301 65: MOV R3,R1 ;SET # NON-PRINT CHARS, 2ND BLOCK
004226 004737 004320 JSR PC,10$ ;LOAD 2ND BLOCK NON-PRINT CHARS
004232 10441A PRINT ,SLF ;PRINT LINE
004236 00530F DEC R5 ;DEC LINE COUNT
004240 003015 BGT 8$ ;CONTINUE TEST
004242 105737 001154 TSTR TLOOP ;LOOP ON TEST?
004246 001006 BNE 7$ ;YES, INITIALIZE
004250 032777 040000 174664 BIT #SW14,0SWR ;LOOP ON TEST?
004256 001002 BNE 7$ ;YES, INITIALIZE
004260 000137 JMP EXIT ;EXIT TEST
004264 012705 000036 75: MOV #30,R5 ;RESET LINE COUNT
004270 005002 CLR R3 ;CLEAR NON-PRINT CHAR COUNT
004272 000401 BR 9$ ;CONTINUE SWIRL
004274 060403 85: ADD #4,R3 ;INC NON-PRINT CHAR COUNT, 2ND BLOCK
004276 013701 001150 95: MOV WIDTH,R1 ;RESET COLUMN COUNT
004302 005202 INC R2 ;INC START CHAR
004304 020227 000177 CMP R2,#177 ;CHECK START CHAR
004310 001322 BNE 4$ ;OK, CONTINUE
004312 012702 000041 MOV #41,R2 ;RESET START CHAR

```

```

004316 000717 BR 4$ ;CONTINUE
////////////////////////////////////
;ROUTINE TO LOAD NON-PRINTABLE CHARACTERS FOR TEST 24.
////////////////////////////////////
004320 005701 10$: TST R1 ;TEST CHAR COUNT
004322 001430 PFG 14$ ;RETURN IF ZERO
004324 005000 11$: CLR R0 ;SET FIRST NON-PRINT CHAR
004326 104415 12$: LOAD ;LOAD CHAR
004330 005301 DEC R1 ;DEC CHAR COUNT
004332 003424 BLE 14$ ;RETURN IF DONE
004334 005200 13$: INC R0 ;NEXT CHAR
004336 020027 000007 CMP R0,#7 ;CHAR = BELL ?
004342 001774 BEQ 13$ ;YES, NEXT CHAR
004344 020027 000010 CMP R0,#10 ;CHAR = BS?
004350 001771 BEQ 13$ ;YES, NEXT CHAR
004352 020027 000012 CMP R0,#12 ;CHAR = LF?
004356 00176F BEQ 13$ ;YES, NEXT CHAR
004360 020027 000014 CMP R0,#14 ;CHAR = FF?
004364 001763 BEQ 13$ ;YES, NEXT CHAR
004366 020027 000015 CMP R0,#15 ;CHAR = CR?
004372 001760 BEQ 13$ ;YES, NEXT CHAR
004374 020027 000040 CMP R0,#40 ;CHAR = SPACE?
004400 001751 BEQ 11$ ;YES, RESET CHAR
004402 000751 BR 12$ ;CONTINUE
004404 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 F PRINTED INDICATES AN INCORRECT LOAD OR BUFFER ACTION.
 //////////////////////////////////////

004406	104413		TEST25: PRTHDR		;PRINT TEST HEADER
004410	012701	000020	MOV	#16,R1	;SET CHAR COUNT
004414	012700	000105	MOV	#*E,R0	;SET E CHAR
004420	104416		MLOAD		;LOAD BUFFER
004422	012700	000177	MOV	#177,R0	;SET RUBOUT CHAR
004426	104415		LOAD		;CLEAR BUFFER
004430	005002		CLR	R2	;CLEAR CHAR COUNT
004432	013701	001150	MOV	WIDTH,R1	;SET COLUMN COUNT
004436	012700	000081	MOV	#61,R0	;SET CHAR
004442	104415		1S: LOAD		;LOAD CHAR
004444	005301		DEC	R1	;DEC COLUMN COUNT
004446	001414		BEG	ZS	;PRINT LINE WHEN LOADED
004450	005202		INC	R2	;INC CHAR COUNT
004452	020227	000144	CMP	R2,#100.	;DONE ONES?
004456	002771		BLT	1S	;NO, CONTINUE
004460	012700	000063	MOV	#63,R0	;SET NEXT CHAR
004464	020227	000202	CMP	R2,#130.	;DONE 3'S?
004470	002764		BLT	1S	;NO, CONTINUE
004472	012700	000062	MOV	#62,R0	;YES, SET NEXT CHAR
004476	000761		BR	1S	;CONTINUE LOADING CHARACTERS
004500	104414	001162	2S: PRINT	,SLF	;PRINT LINE
004504	012701	000400	MOV	#256,R1	;SET CHAR COUNT
004510	012700	000105	MOV	#*E,R0	;SET E CHAR
004514	104416		MLOAD		;LOAD BUFFER
004516	104414	001162	PRINT	,SLF	;PRINT BLANK LINE
004522	012701	000376	MOV	#254,R1	;SET CHAR COUNT
004526	012700	000105	MOV	#*E,R0	;SET E CHAR
004532	104416		MLOAD		;LOAD BUFFER
004534	012700	000177	MOV	#177,R0	;SET RUBOUT CHAR
004540	104415		LOAD		;CLEAR BUFFER
004542	104414	001162	PRINT	,SLF	;BLANK LINE
004546	012701	000400	MOV	#256,R1	;SET CHAR COUNT
004552	012700	000105	MOV	#*E,R0	;SET E CHAR
004556	104416		MLOAD		;LOAD BUFFER
004560	013701	001150	MOV	WIDTH,R1	;SET COLUMN COUNT
004564	012700	000060	MOV	#60,R0	;SET CHAR
004570	005002		CLR	R2	;CLEAR CHAR COUNT
004572	104415		3S: LOAD		;LOAD CHAR
004574	005301		DEC	R1	;DEC COLUMN COUNT
004576	001407		BEG	ZS	;PRINT LINE WHEN LOADED
004600	005202		INC	R2	;INC CHAR COUNT
004602	020227	000143	CMP	R2,#99.	;DONE ZEROS?
004606	002771		BLT	3S	;NO, CONTINUE
004610	012700	000061	MOV	#61,R0	;YES, SET NEXT CHAR
004614	000766		BR	3S	;CONTINUE

004616	104414	001162	4S: PRINT	,SLF	;PRINT LINE
004622	012701	000400	MOV	#256,R1	;SET CHAR COUNT
004626	012700	000105	MOV	#*E,R0	;SET E CHAR
004632	104416		MLOAD		;LOAD BUFFER
004634	012700	000177	MOV	#177,R0	;SET RUBOUT CHAR
004640	104415		LOAD		;CLEAR BUFFER
004642	012700	000060	MOV	#60,R0	;SET CHAR
004646	012702	000011	MOV	#9,R2	;SET GROUP COUNT
004652	013701	001150	MOV	WIDTH,R1	;SET CHAR COUNT
004656	104415		5S: LOAD		;LOAD CHAR
004660	005302		DEC	R2	;DEC GROUP COUNT
004662	001010		BNE	ZS	;FINISH GROUP
004664	005200		INC	R0	;SET NEXT CHAR
004666	020027	000072	CMP	R0,#72	;GOOD CHAR?
004672	103402		BLO	6S	;YES, CONTINUE
004674	012700	000060	MCV	#60,R0	;INC, RESET CHAR TO ZERO
004700	012702	000012	6S: MOV	#10,R2	;RESET GROUP COUNT
004704	005301		7S: DEC	R1	;DEC CHAR COUNT
004706	001362		BNE	5S	;FINISH LINE
004710	104414	001162	PRINT	,SLF	;PRINT LINE
004714	012701	000400	MOV	#256,R1	;SET CHAR COUNT
004720	012700	000105	MOV	#*E,R0	;SET E CHAR
004724	104416		MLOAD		;LOAD BUFFER
004726	012700	000061	MCV	#61,R0	;SET CHAR
004732	013701	001150	MOV	WIDTH,R1	;SET CHAR COUNT
004736	104415		8S: LOAD		;LOAD CHAR
004740	005200		INC	R0	;SET NEXT CHAR
004742	020027	000072	CMP	R0,#72	;GOOD CHAR?
004746	103402		BLO	9S	;YES, CONTINUE
004750	012700	000060	MOV	#60,R0	;RESET CHAR
004754	005301		9S: DEC	R1	;DEC CHAR COUNT
004756	001367		BNE	8S	;FINISH LINE
004760	104414	001162	PRINT	,SLF	;PRINT LINE
004764	000137	006644	JMP	EXIT	;EXIT TEST

////////////////////////////////////
 ;TEST26 - OVERPRINT TEST
 ;
 ;THIS TEST PRINTS FOUR LINES OF ALTERNATING CHARACTERS AND SPACES
 ;IN A CHECKERBOARD PATTERN. EACH LINE IS OVERPRINTED TWICE.
 //////////////////////////////////////

```

004770 104413          TEST26: PRTHDP          ;PRINT TEST HEADER
004777 012703 005050  MOV      #65,R3          ;SET TABLE POINTER
004776 012707 000003 15:     MOV      #3,R2          ;SET OVERPRINT COUNT
005002 011300          25:     MOV      (R3),R0        ;GET CHAR PAIR
005004 001417          DEQ      55          ;EXIT IF DONE TEST
005006 013701 001150  MOV      WIDTH,R1        ;SET COLUMN COUNT
005012 104415          35:     LOAD     SWAB          ;LOAD CHAR
005014 000306          SWAB     R0          ;SET NEXT CHAR
005016 005301          DEC      R1          ;DEC COLUMN COUNT
005020 001374          DNE     35          ;FINISH LINE
005022 005302          DEC     R2          ;DEC OVERPRINT COUNT
005024 001403          BEQ     45          ;BRANCH IF DONE OVERPRINT
005026 104415 001164  PRINT   ,5CR          ;PRINT LINE
005032 000707          BR      25          ;CONTINUE
005034 104414 001162  45:     PRINT   ,5LF          ;PRINT LINE
005040 005723          TST    (R3)+          ;INC TABLE POINTER
005042 000755          BR      15          ;PRINT NEXT LINE
005044 000137 006644  55:     JMP     EXIT          ;EXIT TEST

005050 020105 65:     .ASCII  /E /
005052 040404          .ASCII  / 0 /
005054 020115          .ASCII  /M /
005056 021440          .ASCII  / # /
005060 000000          .WORD   0          ;END OF TABLE
  
```

////////////////////////////////////
 ;TEST27 - MULTIPLE LINE FEED TEST
 ;
 ;NUMBER PRINTED INDICATES NUMBER OF LINE FEEDS FOLLOWING THAT LINE.
 ;DASHED REFERENCE LINES ARE PRINTED TO AID IN CHECKING PROPER
 ;LINE FEEDS.
 //////////////////////////////////////

```

005062 104413          TEST27: PRTHDP          ;PRINT TEST HEADER
005064 012703 005170  MOV      #55,R1          ;SET TABLE POINTER
005070 111346          15:     MOV      (R1),-(SP)        ;NUMBER DASH STACK
005072 004737 012650  JSR      PC,55B2D        ;CONVERT #
005074 104417          CNLOAD  ;LOAD NUMBER
005100 121377 000001  CMP     (R1),#1          ;TEST #
005104 101406          BLS     25          ;PRINT FULL DASH LINE IF 0 OR 1
005106 012701 000035  MOV      #29,R1          ;SET DASH LENGTH
005112 121377 000010  CMP     (R1),#9         ;CHECK #
005116 101411          BLOS   45          ;2,4 OR 8 - PRINT 29 DASHES
005120 000407          BR      15          ;16 OR 32 - PRINT 28 DASHES
005122 013701 001150  25:     MOV      WIDTH,R1        ;SET CHAR COUNT
005126 020127 000030  CMP     R1,#30          ;CHECK IT
005132 103002          BHS     15          ;OK, CONTINUE
005134 012701 000030  MOV      #30,R1          ;SET TO 30
005140 005301          DEC     R1          ;SUBTRACT ONE
005142 012700 000055  45:     MOV      #55,R0          ;SET DASH CHAR
005146 104416          MLOAD  ;LOAD DASH LINE
005150 111301          MOV     (R1),R1        ;SET LF COUNT
005152 113700 001162  MOV     5LF,R0          ;SET LF CHAR
005156 104416          MLOAD  ;LOAD LFS
005160 105723          TSTR   (R1)+          ;INC TABLE POINTER
005162 003747          BGT     15          ;FINISH TEST
005164 000137 006644  JMP     EXIT          ;EXIT TEST

005170 001 002 004 55:     .BYTE  1,2,4,8,16,32,0
005172 010 020 040          .BYTE  0
005176 000          .EVEN

005200          .EVEN
  
```

```

;////////////////////////////////////
;TEST30 - RIBBON FEED TEST
;
;THIS TEST PRINTS A SINGLE COLUMN OF 24 LINES OF X'S DOWN THE LEFT
;HAND MARGIN OF THE PAGE.
;////////////////////////////////////
005200 104413 TEST30: PRTHDR ;PRINT TEST HEADER
005202 012701 000030 MOV #24,R1 ;SET LINE COUNT
005206 104414 005222 1S: PRINT #2S ;PRINT X - LF
005212 005301 DEC R1 ;DEC LINE COUNT
005214 001374 BNE 1S ;FINISH TEST
005216 000137 006644 JMP EXIT ;EXIT TEST

005222 005130 000 2S: .ASCIZ /X/<12>
005226 .EVEN
  
```

```

;////////////////////////////////////
;TEST31 - BELL TEST
;
;THIS TEST WILL SOUND 5 BELLS WHILE PRINTING "BELL TEST"
;////////////////////////////////////
005226 104413 TEST31: PRTHDR ;PRINT TEST HEADER
005230 104414 005240 PRINT #1S ;DC TEST
005234 000137 005262 JMP $EOP ;EXIT TEST

005240 041007 046105 003514 1S: .ASCII <7>/BELL/<7>/ TEST/<7><15><7><12><7><15>
005246 052040 051505 003524
005254 00341F 003412 000015

.EVEN
  
```

```

.SBTTL END OF PASS ROUTINE
;*****
;INCREMENT THE PASS NUMBER (SPASS)
;IF THERES A MONITOR GO TO IT
;IF THERE ISN'T JUMP TO EXIT

SEOP:
005262 NOP
005267 000240 INC SPASS ;INCREMENT THE PASS NUMBER
005264 005237 005336 BIC #100C00,SPASS ;DON'T ALLGW A NEG. NUMBER
005270 042737 10CC00 00533E (PC)+ ;LOOP?
005276 005327 SEOPCT: .WORD 1
005300 000001 BGT $D0AGN ;YES
005302 003013 MOV #0,SPASS ;RESTORE COUNTER
005304 012737 SENDCT: .WORD 1
005306 000001 SFOPCT
005310 005300 SGET42: MOV @#42,R0 ;GET MONITOR ADDRESS
005312 013700 000042 BEQ $D0AGN ;BRANCH IF NO MONITOR
005316 00140F RESET ;CLEAR THE WORLD
005320 000005 SENDAD: JSF PC,(R0) ;GO TO MONITOR
005322 004710 NOP ;SAVE R0CM
005324 000240 NOP ;PCR
005326 000240 NOP ;ACT11
005330 000240 $D0AGN: MOV @PC,PC ;RETURN
005332 000137 SPTNAD: .WORD EXIT
005334 006644 SPASS: .WORD 0 ;NUMBER OF PASSES
005336 000000
  
```

.SBTTL OPTION TESTS

```

;//////////////////////////////////////////////////////////////////
;
;TEST 50 - SECONDARY CHARACTER SET
;
;//////////////////////////////////////////////////////////////////

005340 104413 TEST50: PRTHDR ;PRINT TEST HEADER
005342 012737 000004 005422 MOV #4,T50PCT ;SET PAIR COUNT
005350 104414 005424 1$: PRINT ,T50M1 ;PRINT LEADER # 1
005354 012737 000040 005440 MOV #40,CHLD ;SET CHAR (SET # 1)
005362 004737 005442 JSP PC,PRTSET ;PRINT ENTIRE CHARACTER SET
005366 104414 005430 PRINT ,T50M2 ;PRINT LEADER # 2
005372 012737 000240 005440 MCV #240,CHLD ;SET CHAR (SET # 2)
005400 004737 005442 JSR PC,PRTSET ;PRINT ENTIRE CHARACTER SET
005404 104414 001162 PRINT ,SLF ;BLANK LINE
005410 005337 005422 DEC T50PCT ;DECREMENT PAIR COUNTER
005414 001355 BNE 1$ ;CONTINUE IF NOT ZERO
005416 000137 006644 JMP EXIT ;EXIT TEST

005422 000000 T50PCT: 0
005424 030443 000075 T50M1: .ASCIZ /#1=/
005430 031043 000075 T50M2: .ASCIZ /#2=/
005434 020040 000040 SP3: .ASCIZ / /
005440 000000 CHLD: 0 ;3 SPACES
;CHARACTER HOLD

005442 013701 001150 PRTSET: MOV WIDTH,R1 ;SET COLUMN COUNT
005446 162701 006003 SUB #3,R1 ;ADJUST COUNT
005452 013700 005440 1$: MOV CHLD,R0 ;FETCH CURRENT CHARACTER
005456 104415 LOAD ;LOAD CHAR
005460 005301 DFC R1 ;DEC CHAR COUNT
005462 003412 BLE 3$ ;BRANCH IF # OF COLUMNS IS EXHAUSTED
005464 005237 005440 2$: INC CHLD ;INCREMENT CHAR
005470 013702 005440 MOV CHLD,R2 ;COPY IT
005474 042702 177600 BIC #177600,R2 ;STRIP LEFT BITS
005500 022707 006177 CMP #177,P2 ;IS RESIDUE = 177?
005504 001412 BEQ 4$ ;YES, BRANCH, LAST CHAR OF SET IS LOADED
005506 000761 BR 1$ ;GO LOAD NEXT CHAR
005510 104414 001162 3$: PRINT ,SLF ;PRINT PARTIAL SET
005514 013701 001150 MOV WIDTH,R1 ;SET COLUMN COUNT AGAIN
005520 162701 000003 SUB #3,R1 ;ADJUST COUNT AGAIN
005524 104414 005434 PRINT ,SP3 ;LOAD THREE SPACES
005530 000755 BR 2$ ;CONTINUE LOADING SET
005532 104414 001162 4$: PRINT ,SLF ;PRINT LINE
005536 000207 RTS PC ;RETURN
```

;*****
.SBTTL MAINTENANCE AIDS

```

;//////////////////////////////////////////////////////////////////
;
;TEST60 - LIFE TEST
;
;THIS TEST PRINTS 2 FULL LINES OF EACH PRINTABLE CHARACTER
;THE SECOND LINE IS OVERPRINTED 4 TIMES TO CONSERVE PAPER
;AT THE END OF EACH PASS THROUGH THE ENTIRE PRINTABLE CHARACTER
;SET, THE PASS COUNT WILL BE PRINTED ON THE LA180.
;//////////////////////////////////////////////////////////////////

005540 005037 005652 TEST60: CLR PASCNT ;CLEAR PASS COUNT
005544 104413 1$: PRTHDR ;PRINT TEST HEADER, FEED BLANK LINES
005546 012700 000041 MOV #41,R0 ;SET FIRST CHAR
005552 013701 001150 2$: MOV WIDTH,R1 ;SET COLUMN COUNT
005556 104416 MLOAD ;LOAD LINE
005560 104414 001162 PRINT ,SLF ;PRINT LINE
005564 012702 000005 MOV #5,R2 ;SET OVERPRINT COUNT
005570 013701 001150 3$: MOV WIDTH,R1 ;SET COLUMN COUNT
005574 104416 MLOAD ;LOAD LINE
005576 104414 001164 PRINT ,SCR ;PRINT LINE
005602 005302 DFC R2 ;DEC OVERPRINT COUNT
005604 001371 BNE 3$ ;FINISH OVERPRINT
005606 104414 001162 PRINT ,SLF ;ADVANCE PAPER
005612 005200 INC R0 ;SET NEXT CHAR
005614 020027 000177 CMP R0,#177 ;TEST CHAR
005620 001354 BNE 2$ ;OK, CONTINUE
005622 005237 005652 INC PASCNT ;INC PASS COUNT
005626 104414 015102 PRINT ,PASMMSG ;LOAD PASS COUNT MESSG
005632 013746 005652 MOV PASCNT,-(SP) ;PUSH PASCNT ON STACK
005636 004737 012650 JSR PC,$SB2D ;CONVERT #
005642 104417 CNLOAD ;LOAD #
005644 104414 001162 PRINT ,SLF ;PRINT MESSG
005650 000735 BR 1$ ;START NEXT PASS
005652 000000 PASCNT: .WORD 0 ;PASS COUNT
```

```

;/////////////////////////////////////////////////////////////////
;TEST61 - SCOPE DRIVE ROUTINE
;
;THIS TEST WILL LOAD A CHARACTER SET IN SWITCH REGISTER BITS 0-6
;IF SWITCH 9 IS DOWN, FULL LINES WILL BE LOADED & PRINTED (LF).
;IF SWITCH 9 IS UP, THE CHAR WILL BE LOADED ONCE AND THE PROGRAM
;WILL HALT. NO LINE FEEDS OR CARRIAGE RETURNS WILL BE SENT BY THE
;PROGRAM.
;/////////////////////////////////////////////////////////////////

```

```

005654 104413 TEST61: PPTHDP ;PRINT TEST HEADER
005656 000422 BR 11$ ;CHECK SWITCH REG FIRST
005660 013701 001150 10$: MOV WIDTH,R1 ;SET COLUMN COUNT
005664 017700 173252 1$: MOV @SWR,R0 ;GET CHARACTER
005670 042700 177600 BIC #C177,R0 ;MASK UNWANTED BITS
005674 104415 LOAD ;LOAD CHAR
005676 020027 000015 CMP R0,#15 ;CHAR = CR?
005702 001410 BEQ 11$ ;YES, RESET COLUMN COUNT
005704 020027 000012 CMP R0,#12 ;CHAR = LF?
005710 001405 BEQ 11$ ;YES, RESET COLUMN COUNT
005712 020027 000040 CMP R0,#40 ;NON-PRINTABLE CHAR?
005716 103404 BLD 12$ ;YES, DON'T DEC COLUMN COUNT
005720 005301 DEC R1 ;DEC COLUMN COUNT
005722 000402 RR 12$ ;CONTINUE
005724 013701 001150 11$: MOV WIDTH,R1 ;RESET COLUMN COUNT
005730 032777 001000 173204 12$: BIT #SW9,@SWR ;TEST SWITCH 9
005736 001407 BEQ 2$ ;PRINT FULL LINE
005740 000000 HALT ;ONE CHAR - HALT
005742 000750 BR 1$ ;GET NEXT CHAR
005744 005701 2$: TST R1 ;TEST COLUMN COUNT
005746 003346 BGT 1$ ;CONTINUE IF NOT DONE LINE
005750 001403 BEQ 3$ ;LOADED MORE THAN WIDTH?
005752 012700 MOV #177,R0 ;YES, CLEAR BUFFER
005756 104415 LOAD
005760 104414 001162 3$: PRINT ,SLF ;PRINT LINE, ADVANCE PAPER
005764 000735 BR 10$ ;CONTINUE

```

```

;/////////////////////////////////////////////////////////////////
;TEST62 - LINE PRINT TEST
;
;THIS TEST PRINTS FULL LINES CONTINUOUSLY OF WHATEVER CHARACTER
;IS TYPED ON THE CONSOLE KEYBOARD. TO CHANGE CHARACTERS, RESELECT
;THIS TEST. AN ERROR MESSG WILL BE PRINTED IF THIS TEST IS SELECTED
;AND A CONSOLE TERMINAL DOES NOT EXIST.
;/////////////////////////////////////////////////////////////////

```

```

005766 104413 TEST62: PRTHDR ;PRINT TEST HEADER
005770 105737 001172 TST STPFLG ;CHECK IF TERMINAL EXISTS
005774 100473 BMI TERP ;EXIT IF NONE
005776 104401 015205 TYPE ,TCHAR ;TYPE INSTR
006002 105777 173072 4$: TSTB @TKS ;WAIT FOR KYBD FLAG
006006 10037F BPL 2$
006010 104420 CHECK ;CHECK CHAR FOR CONTROL
006012 017700 MOV @TKB,R0 ;GET CHAR
006016 010046 MOV R0,-(SP) ;CHAR ONTO STACK
006020 004737 010344 JSR PC,STYPEC ;ECHO CHAR
006024 012746 000200 MOV #CRLF,-(SP) ;SEND CR-LF
006030 004737 010344 JSR PC,STYPEC
006034 013701 001150 1$: MOV WIDTH,R1 ;SET COLUMN COUNT
006040 10441F MLOAD ;LOAD LINE
006042 104414 001162 PRINT ,SLF ;PRINT LINE
006046 000772 BR 1$ ;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.
////////////////////////////////////

```

```

TEST63: PRTHDR                                ;PRINT TEST HEADER
        TSTP STPFLG                            ;CHECK IF TERMINAL EXISTS
        BMI TERR                                ;EXIT IF NONE
        TYPE ,TCHAR                            ;TYPE INSTR
        TYPE ,SCRFLF                          ;SEND CR-LF
1$:     TSTB @TKS                              ;WAIT FOR KYBD FLAG
        BPL IS                                ;WAIT FOR FLAG
        CHECK                                  ;CHECK CHAR FOR CONTROL
        MOV @TKB,R0                            ;GET CHAR
        MCV RO,-(SP)                          ;CHAR ONTO STACK
        JSR PC,STYPEC                          ;ECHO CHAR
        LCAD                                  ;LOAD CHAR
        CMP RO,#CR                            ;SEND LF AFTER CR
        BNE ZS
        MOV #LF,-(SP)
        BR 4S
2$:     CMP RO,#LF                            ;SEND CR AFTER LF
        BNE ZS
        MOV #CR,-(SP)
        BR 4S
3$:     CMP RO,#FF                            ;SND CRLF AFTER FF
        BNE IS
        MOV #CRLF,-(SP)
4$:     JSR PC,STYPEC
        BR IS                                ;CONTINUE

006164 104414 015225      TERR: PRINT ,NMSG          ;PRINT NO CONSOLE MESS
006170 000137 006752      JMP SELECT          ;RETURN TO SELECT TEST (HALT)

```

```

////////////////////////////////////
;TEST 64 - SELECTED PATTERN PRINT TEST
;
;1) TYPE DESIRED CHARACTERS INCLUDING, WHERE APPROPRIATE, LA180
; PRINT COMMANDS (IE., LF OR CR OR FF). TERMINATE STRING BY
; TYPING CTL-A. PRINTING WILL BEGIN.
;
;OR
;
;2) TYPE A DESIRED PATTERN (TO BE AUTOMATICALLY REPEATED UNTIL
; PREVIOUSLY SPECIFIED # OF COLUMNS HAS BEEN FILLED).
; DO NOT INSERT ANY PRINT COMMANDS. TERMINATE PATTERN BY TYPING
; CTL-B. AFTER PROPAGATING THE PATTERN TO THE PROPER # OF COLUMNS
; AN LF PRINT COMMAND WILL BE INSERTED AND PRINTING WILL BEGIN.
;
;TC STOP PRINTING AND ENTER A NEW PATTERN TYPE CTL-SPACE.
;TG SELECT A NEW TEST TYPE DELETE/RUBOUT.
;TO CHANGE # OF COLUMNS TYPE CTL-C.
////////////////////////////////////

```

```

TEST64: PRTHDR                                ;PRINT TEST HEADER
        TSTP STPFLG                            ;CHECK IF CONSOLE TERMINAL EXISTS
        BMI TERR                                ;EXIT IF NONE
        TYPE ,T64MSG                          ;TYPE BRIEF INSTRS
ACCEPT: TYPE ,TWCBEL                          ;RING CONSOLE BELL TWICE
        MOV #TABL64,R1                        ;SET POINTER LEFTMOST IN TABLE
        MOV #177,R0
        LOAD                                  ;RESET PRINTER BUFFER POINTER.
2$:     TSTB @TKS                              ;WAIT FOR CONSOLE KBD FLAG
        BPL ZS                                ;CHECK FOR KBD CONTROL CHARACTERS
        CHECK                                  ;AND CHECK SWITCHES ALSO.
        MOV @TKB,R0                            ;SAME CHAR TO R0
        BIC #177600,R0                        ;STRIP UNWANTED BITS
        CMP #1,R0
        BEQ CTLA                              ;BRANCH IF CONTROL A
        CMP #2,PC
        BEQ CTRP                              ;BRANCH IF CONTROL P
        MOV RO,-(SP)                          ;CHAR ONTO STACK
        JSR PC,STYPEC                          ;ECHO CHARACTER TO CONSOLE
        TST (SP)+
        MOVP RO,(R1)+                          ;CHAR TO PRINT TABLE
        CMP RO,#CR                            ;SEND LF AFTER CR (TO CONSOLE)
        BNE 4S
        MOV #LF,-(SP)
        BR 4S
4$:     CMP RO,#LF                            ;SEND CR AFTER LF (TO CONSOLE)
        BNE 6S
        MOV #CR,-(SP)
        BR 8S
6$:     CMP RO,#FF                            ;SEND CRLF AFTER FF (TO CONSOLE)
        BNE ZS                                ;CONTINUE ACCEPTING PATTERN
        MOV #CRLF,-(SP)
8$:     JSR PC,STYPEC

```

```

006342 005726          TST      (SP)+      ;ADJUST STACK
006344 00073F          BR       2S          ;CONTINUE ACCEPTING PATTERN

006346 022701 016174    CTLA:  CMP      #TABL64,R1 ;IF POINTER IS LEFTMOST
006352 00144F          BEQ      PRPAT       ;RESUME PRINTING PREVIOUS PATTERN
006354 010137 006512    MOV      R1,ENDADR   ;CURRENT POINTER TO ENDADR
006360 000442          PR       PRPAT       ;GO PRINT NEW PATTERN

006362 022701 016174    CTLB:  CMP      #TABL64,R1 ;IF POINTER IS LEFTMOST
006366 001437          BEQ      PRPAT       ;RESUME PRINTING PREVIOUS PATTERN
006370 162701 016174    SUB      #TABL64,R1   ;GET PATTERN LENGTH INTO R1
006374 013737 001150 006506    MOV      WIDTH,COLCTR ;GET # OF COLUMNS INTO COUNTER
006402 010137 006510    MOV      R1,CHACTR   ;GET # CF CHARS INTO COUNTER
006406 002701 016174    ADD      #TABL64,R1   ;RE-ESTABLISH POINTER
006412 012702 016174    MOV      #TABL64,R2   ;ESTABLISH SECONDARY POINTER
006416 163737 006510 006506    SUB      CHACTR,COLCTR ;REMAINING COLUMNS INTO COLCTR
006424 112221          PRCPAT: MOV#      (R2)+,(R1)+ ;PROPAGATE PATTERN TO # OF SPECIFIED COLUMNS
006426 005337 006506    DEC      COLCTR
006432 003001          BGT      1S
006434 000407          BR       DUNCOL
006436 005337 006510    1S:     DEC      CHACTR
006442 0014C1          BEQ      DUNPAT
006444 000767          BR       PRPAT
006446 012702 016174    DUNPAT: MOV      #TABL64,R2 ;RE-ADDRESS PATTERN
006452 000764          BR       PRPAT
006454 112721 000C12    DUNCGL: MGV#      #LF,(R1)+ ;INSEPT LA180 PRINT COMMAND
006460 010137 006512    MOV      R1,ENDADR
006464 00040C          BR       PRPAT       ;GO PRINT REPEATED PATTERN

006466 0127C1 016174    PRPAT:  MOV      #TABL64,R1 ;SET POINTER LEFTMOST
006472 112100          1S:     MGV#      (R1)+,R0
006474 104415          LOAD
;LOAD CHAP (FROM R0) TO LA180
;ALSC CHK CONSOLE KBD AND CPU SWS
;END OF TABLE DATA?
;YES, PRINT IT OVER.
;NG, CONTINUE LOADING LA180 BUFFER

006476 020137 006512    CMP      R1,ENDADR
006502 001771          BEQ      PRPAT
006504 000772          BR       1S
;COLUMN COUNTER
;CHARACTER COUNTER
;HELDS ENDING ADDR+1 OF PRINT DATA.

006510 000000          COLCTR: 0
006510 00000C          CHACTR: 0
006512 016240          ENDADR: #TABL64+44

006514 005037 001120    TEST76: CLR      SERSW   ;CLFAR SWITCH (TO PARALLEL)
006520 004737 001764    JSR      PC,QU01    ;INITILIZE ACTFST AND SELECT DRIVER
006524 004737 002032    JSR      PC,QU02    ;TYPE INTF MISC IF CONSOLE
006530 000137 006644    JMP      EXIT       ;EXIT TEST.

006534 012737 052525 001120 TEST77: MCV      #52525,SERSW ;SET SWITCH (TG SERIAL)
006542 004737 001764    JSR      PC,QU01    ;INITILIZE ACTFST AND SELECT DRIVER
006546 004737 002032    JSR      PC,QU02    ;TYPE INTF MISC IF CONSOLE
006552 000137 006644    JMP      EXIT       ;EXIT TEST
  
```

```

;////////////////////////////////////
;SBTTL CLOCK INTERRUPT SERVICE ROUTINES
;////////////////////////////////////

006556 004737 006614    DCI:   JSR      PC,SRDCI ;DISABLE #W11-P INTERRUPT
006562 000177 000022    JMP      @TORIN        ;TIME OUT RETURN

006566 005337 006606    LKSPV: DEC      CNTR    ;DEC TIME COUNT
006572 001401          BEQ      1S           ;TIME OUT?
006574 000002          RTI      1S         ;NC, RETURN
006576 004737 006614    1S:   JSR      PC,SRDCI ;DISABLE #W11-L INTERRUPT
006602 000177 000002    JMP      @TORIN        ;TIME OUT RETURN

006606 00000C          CNTR:  -WORD 0       ;#W11-L TIMING COUNT
006610 00000C          TORIN: -WORD  C      ;TIME OUT RETURN ADDRESS

006612 007020          MINCNT: -WORD 7020  ;60 HZ LINE FREQ. MINUTE COUNT
;SET TO 5670(8) FOR 50 HZ. LINE FREQ.

;////////////////////////////////////
;SUBROUTINE TO DISABLE CLOCK OPTION INTERRUPTS
;////////////////////////////////////

006614 105737 001155    SRDCI: TSTB     CKFLAG   ;CHECK CLOCK OPTION FLAG
006620 00141F          BEQ      2S           ;RETURN IF NONE
006622 002404          BLT      1S           ;BRANCH IF #W11-P
006624 042777 000100 172306    BIT     #BIT6,@LKS   ;DISABLE #W11-L INTERRUPT
006632 000403          BR       2S           ;RETURN
006634 042777 000100 172272    BIT     #BIT6,@PLKS  ;DISABLE #W11-P INTERRUPT
006642 000207          2S:     RTS      PC
  
```

////////////////////////////////////
 .SBTTL TEST EXIT ROUTINE
 //////////////////////////////////////

```

006644 004737 007140 EXIT: JSR PC,KYBDF ;CHECK FOR KYBD FLAG
006650 032777 040000 172264 BIT #SW14,@SWR ;LOOP ON TEST SWITCH?
006656 0C101E BNE 35 ;YES, RETURN TO TEST
006660 032777 000400 172254 BIT #SW8,@SWR ;WANT SW REG TEST SELECTION?
006666 001031 BNE SELECT ;YES, SELPCT TEST (HALT)
006670 1C5937 001154 TSTB TLOOP ;KYBD CTRL - LOOP ON TEST?
006674 001007 BNE 35 ;YES, RETURN TO TEST
006676 105737 001153 TSTB TRONE ;KYBD CTRL - RUN TEST ONCE?
006702 001402 BEQ 25 ;NO, CONTINUE
006704 000137 JMP TSEL ;YES, SELECT TEST
006710 005237 001146 2S: INC $TSTNM ;INCREMENT TEST NUMBER
006714 013700 001146 3S: MOV $TSTNM,R0 ;GET NEW TEST NUMBER
006720 0C63C0 ASL R0 ;SET TABLE POINTER
006722 005760 013356 TST TAT(R0) ;CHECK ADDRESS IN TABLE
006726 003005 BGT 45 ;OK, GO TO TEST
006730 001767 BEQ 25 ;ZERO, SKIP TEST
006732 012737 000C2C 001146 MOV #20,$TSTNM ;END OF SEQ. - RESET TEST # TO 20
006740 000765 BR 35 ;TEST NEW NUMBER
006742 012706 001100 4S: MOV #STACK,SP ;RESET STACK
006746 000170 013356 JMP @TAT(R0) ;GO TO TEST
  
```

;;*****
 .SBTTL ROUTINES TO SELECT DESIPED TEST

////////////////////////////////////
 ;ROUTINE TO SELECT TEST FROM SW REG, BITS 0-5
 //////////////////////////////////////

```

006752 0C4737 006614 SELECT: JSR PC,SRDCI ;CLEAR CLOCK INTER
006756 105037 001152 CLR# STRONE ;CLEAR PROGRAM CONTROL FLAGS
006762 105037 001153 CLR# TRONE
006766 1C5C37 001154 CLR# TLOOP
006772 004737 007140 JSR PC,KYBDF ;CHECK IF KYBD FLAG
006776 000000 HALT ;NO KYBD FLAG - HALT
;WAIT FOR OPERATOR TO SELECT TEST
;PRESS CONTINUE WHEN READY
;CHECK SWR
;WANT TO RUN TEST ONCE & HALT
;YES, SFT FLAG
;NO, CHECK SW REG
;MASK BITS 0-5
;SAVE TEST NUMBER
;SET TABLE POINTER
;CHECK IF TEST IS IN TABLE
;NOT THERE, GET NEW SELECTION
;RESET STACK
;GO TO SELECTED TEST
007000 032777 000400 172134 BIT #SW8,@SWR
007006 001403 BEQ 25
007010 112737 177777 001152 MOV# #-1,STRONE
007016 0177C0 17212C 2S: MOV @SWR,PC
007022 042700 177700 BIT #C77,R0
007026 010037 001146 MOV R0,$TSTNM
007032 0C63C0 ASL P0
007034 005760 013356 TST TAT(R0)
007040 003744 BLE SELECT
007042 012706 001100 MOV #STACK,SP
007046 0C017C 013356 JMP @TAT(P0)
  
```

////////////////////////////////////
 ;ROUTINE TO CHECK FOR KYBD OR SW REG CONTROL
 ;CALL: CHECK
 //////////////////////////////////////

```

007052 0C4737 007140 $CHECK: JSR PC,KYBDF ;CHECK FOR KYBD FLAG
007056 010046 MOV R0,-(SP) ;PUSH R0 ON STACK
007060 005000 CLR R0 ;CLEAR R0
007062 032777 000400 172052 BIT #SW8,@SWR ;CHECK SWR
007070 001401 BEQ 1S ;BRANCH IF SW DOWN
007072 005300 DEC R0 ;SET FLAG IF UP
007074 123700 001152 1S: CMP# STRONE,R0 ;CHANGE IN SWITCH?
007100 001402 BEQ 2S ;NO, RETURN (CHANGE TO 0402 TO DISABLE SW 8)
007102 000137 006752 JMP SELECT ;YES, SELECT TEST (HALT)
007106 2S: MOV (SP)+,R0 ;POP STACK INTO R0
007110 000902 RTI ;RETURN
  
```


////////////////////////////////////
 ;ROUTINE TO WAIT FOR OPERATOR ACTION
 //////////////////////////////////////

007112	105737	001173	SHOLD:	TSTB	\$TPFLG	; TERMINAL THERE?
007116	100002			BPL	1S	; BRANCH IF YES
007120	000000			HALT		; HALT IF NO
007122	000405			BR	2S	; RETURN ON CONTINUE SWITCH
007124	104401	015144	1S:	TYPE	,WMSG	; TYPE WAIT MMSG
007130	105777	171744	3S:	TSTB	@TKS	; KYBD FLAG?
007134	100375			BPL	3S	; NO, WAIT FOR FLAG
007136	000002		2S:	RTI		; RETURN

////////////////////////////////////
 ;ROUTINE TO CHECK FOR KEYBOARD FLAGS
 ;WHEN LOCKING FOR CONTROL FROM THE CONSOLE DEVICE KEYBOARD
 ;CALL: JSR PC,KYBDF
 //////////////////////////////////////

007140	105737	001173	KYBDF:	TSTB	\$TPFLG	; TERMINAL THERE?
007144	100527			BMI	1S	; NO, EXIT
007146	105777	171726		TSTB	@TKS	; FLAG SET?
007152	100124			BPL	1S	; NC - EXIT
007154	104406		2S:	RDCHR		; FLAG SET - READ CHAR
007156	023727	001142	000176	CMF	SWR,#SWREG	; USING HARDWARE SW REG?
007164	001101			BNE	4S	; BRANCH IF YES
007166	022716	000007		CMF	#7,(SP)	; CHAR = BEL <007>?
007172	001076			BNE	4S	; BRANCH IF NOT
007174	005726		5S:	TST	(SP)+	; RESET STACK
007176	005037	007436		CLP	20S	; CLEAR NEW SW SETTING
007202	005037	007440		CLR	30S	; CLEAR INPUT FLAG
007206	104401	015122		TYPE	,DSMSG1	; TYPE MMSG
007212	013746	000176		MOV	SWREG,-(SP)	; PUSH SWREG ON STACK
007216	104402			TYPE	PC	; TYPE IT
007220	104401	015132		TYPE	,DSMSG2	; TYPE MORE OF MMSG
007224	104406		9S:	RDCHR		; READ CHAR
007226	021627	000025		CMF	(SP),#25	; CHAR = CONTROL-U ?
007232	001003			BNE	10S	; BRANCH IF NOT
007234	104401	012242		TYPE	,SCNTLU	; ECHO CONTROL-U
007240	000755			BR	5S	; RESTART ROUTINE
007242	021627	000015	10S:	CMF	(SP),#CR	; CHAR = CR?
007246	001011			BNE	7S	; BRANCH IF NOT
007250	104401	001161		TYPE	,SCRLF	; ECHO CR-LF
007254	005737	007440		TST	30S	; CHECK INPUT FLAG
007260	001460			PFQ	6S	; LEAVE SW SETTINGS ALONE IF NO INPUT
007262	013737	007436	000176	MOV	20S,SWREG	; SET NEW SW REG
007270	000454			BR	6S	; RETURN TO TEST
007272	021627	000012	7S:	CMF	(SP),#LF	; CHAR = LF?
007276	001011			BNE	8S	; BRANCH IF NOT
007300	104401	001161		TYPE	,SCRLF	; ECHO CR-LF
007304	005737	007440		TST	30S	; CHECK INPUT FLAG

007310	001477			BEG	TSEL	; LEAVE SW SETTINGS ALONE IF NO INPUT
007312	013737	007436	000176	MOV	20S,SWREG	; SET NEW SW REG
007320	000473			BR	TSEL	; GO TO TEST SELECT (VIA KEYBOARD)
007322	042716	177770	8S:	BIC	#^C7,(SP)	; MASK DIGIT
007326	062716	000000		ADD	#60,(SP)	; MAKE ASCII
007332	004737	010344		JSR	PC,\$TYPEC	; PRINT DIGIT
007336	042716	177770		BIC	#^C7,(SP)	; MASK DIGIT
007342	006337	007436		ASL	20S	; SHIFT SWITCH SETTINGS FOR NEW ONE
007346	006337	007436		ASL	20S	
007352	006337	007436		ASL	20S	
007356	062637	007436		ADD	(SP)+,20S	; ADD NEW SWITCH
007362	005237	007440		INC	30S	; SET INPUT FLAG
007366	000716			ER	9S	; CONTINUE
007370	022716	000177	4S:	CMF	#177,(SP)	; CHAR = RUBOUT?
007374	001001			BNE	3S	; NO, CHECK AGAIN
007376	000444			BR	TSEL	; YES, GET TEST SELECTION (VIA KEYBOARD)
007400	022716	000003	3S:	CMF	#3,(SP)	; CHAR = CNTL C ?
007404	001416			BEG	KYBDST	; YES, GET # COLUMNS
007406	005716			TST	(SP)	; IS CDDF = NUL, IE, CTL-SPACE?
007410	001004			BNE	6S	; BRANCH IF NOT
007412	022737	000064	001146	CMF	#64,\$STSTNM	; IS THIS TEST 64 ?
007420	001402			BEG	11S	; BRANCH IF YES
007422	005726		6S:	TST	(SP)+	; RESET STACK
007424	000207		1S:	RTS	PC	; NO, RETURN
007426	012706	001100	11S:	MOV	#STACK,SP	; FIX STACK
007432	000137	006210		JMP	ACCEPT	; TO WITHIN TEST 64
007436	000000		20S:	.WORD	0	; SW SETTING INPUT
007440	000000		30S:	.WORD	0	; INPUT FLAG

```

;////////////////////////////////////
;ROUTINE TO SET NUMBER OF COLUMNS FROM CONSOLE DEVICE KYBD
;////////////////////////////////////
007442 004737 006614 KYBDST: JSR PC,SRDCI ;CLEAR CLOCK INTER
007446 104401 014751 TYPE ,COLUMN ;TYPE COLUMNS MESSAGE
007452 104410 2$: RDDEC ;GET # COLUMNS
007454 012605 MOV (SP)+,R5 ;POP STACK INTO R5
007456 020527 000204 CMP R5,#132. ;TEST SIZE OF NUMBER
007462 003003 BGT 1$ ;TOO BIG, GET AGAIN
007464 020527 000002 CMP R5,#2 ;TEST SIZE AGAIN
CC7470 103005 BHIS 3$ ;BRANCH IF OK
007472 104401 001160 1$: TYPE ,SQUES ;INPUT ERROR - TYPE QUESTION MARK
007476 104401 001161 TYPE ,SCRLF
007502 000763 BR 2$ ;GET INPUT AGAIN
007504 010537 001150 3$: MOV R5,WIDTH ;OK, SAVE # COLUMNS
;////////////////////////////////////

```

```

;ROUTINE TO FETCH TEST # FROM CONSOLE KEYBOARD
;AND DETERMINE TEST ACTION .
;TEST NUMBER MUST BE OCTAL, FOLLOWED BY ONE OF THE
;FOLLOWING CONTROL CHARACTERS:
;
; PEPID . = RUN TEST ONCE AND SELECT NEXT TEST
;
; L = LOGP CN SELECTED TEST
;
; S = START TEST SEQUENCE WITH SELECTED TEST
;////////////////////////////////////

```

```

007510 004737 006614 TSEL: JSR PC,SRDCI ;CLEAR CLOCK INTER
007514 105037 001153 .CLRB TRONE ;CLEAR PROGRAM CONTROL FLAGS
007520 105037 001154 CLRB TLOOP
007524 1C5037 001152 CLPB STRONE
007530 104401 014767 TYPE ,SELTST ;TYPE SELECT TEST MESC
007534 104407 5$: RDLIN ;GET TEST SELECTION
007536 012605 MOV (SP)+,R5 ;POP STACK INTO R5
CC7540 112500 MOVB (R5)+,R0 ;SET TEST # IN R0
007542 042700 177600 BIC #^C177,R0
007546 022700 000003 CMP #3,R0 ;CHECK IF CHAR = CNTL-C
007552 0C1733 BEQ KYBDST ;GET # COLUMNS IF CNTL-C
007554 020027 000060 CMP R0,#60 ;CHECK IF OCTAL NUMBER
007560 103464 BLG 4$ ;NCT OCTAL - INPUT ERRO
CC7562 020027 000067 CMP R0,#67
007566 101061 BHI 4$ ;NOT OCTAL - INPUT ERROR
007570 042700 177770 BIC #^C7,R0 ;OK - STORE DIGIT
007574 006300 ASL R0
CC7576 0C6300 ASL R0
007600 006300 ASL R0
007602 112501 MOVB (R5)+,R1 ;GET SECOND DIGIT
007604 042701 177600 BIC #^C177,R1 ;CHECK IF AN OCTAL DIGIT
007610 020127 000060 CMP R1,#60

```

```

007614 103446 BLD 4$ ;NOT OCTAL - INPUT ERROR
007616 020127 000067 CMP R1,#67
007622 101043 BHI 4$ ;NOT OCTAL - INPUT ERRCR
007624 042701 177770 BIC #^C7,R1 ;OK - MASK DIGIT
007630 060100 ADD R1,R0 ;MAKE COMPLETE TEST NUMBER
007632 010037 001146 MOV R0,STSTNM ;SAVE TEST NUMBER
CC7636 0C6300 ASL R0 ;SET TABLE POINTER
007640 005760 013356 TST TAT(R0) ;CHECK IF TEST IS IN TABLE
007644 003432 BLE 4$ ;NOT IN TABLE, GET NEW SELECTION
007646 112501 MOVB (R5)+,R1 ;GET CONTROL CHAR
CC7650 042701 177600 BIC #^C177,R1 ;MASK BITS
007654 020127 000056 CMP R1,#56 ;CHAR = PERIOD?
007660 001004 BNE 1$ ;NO, CONTINUE CHECK
007662 112737 177777 001153 MOVB #-1,TRONE ;YES, SET FLAG
007670 000414 BR 3$ ;CONTINUE
007672 042701 000040 1$: BIC #BITS,R1 ;MASK BIT 5 (ALLOW UPPER OR LOWER CASE)
007676 022701 000114 CMP #^L,R1 ;NO, CONTINUE
CC7702 001004 BNE 2$ ;NO, CONTINUE
007704 112737 177777 001154 MOVB #-1,TLOOP ;YES, SET FLAG
007712 000403 BR 3$ ;CONTINUE
007714 022701 000123 2$: CMP #^S,R1 ;CHAR = S?
007720 001004 BNE 4$ ;NO, INPUT ERROP
007722 012706 001100 3$: MOV #STACK,SP ;RESET STACK
007726 000170 013356 JMP @TAT(R0) ;ALL OK - GO TO SELECTED TEST
CC7732 104401 001160 4$: TYPE ,SQUES ;INPUT ERROR
007736 104401 001161 TYPE ,SCRLF ;PRINT QUESTION MARK
007742 000674 BR 5$ ;GET NEW INPUT

```

```

;*****
.SBttl  ERRCR 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

007744 013777 001146 171172 $ERRCR: MOV $STNM,@DISPLAY;DISPLAY TEST NUMBER AND ERROR FLAG
007752 032777 002000 171162 BIT #BIT10,@SWR ;BELL ON ERROR?
007760 001402 BEQ 1$ ;NO - SKIP
007762 104401 001156 TYPE ,SBELL ;RING BELL
007766 011637 010040 1$: MOV (SP),$ERRPC ;GET ADDRESS OF ERROR INSTRUCTION
007772 162737 000002 010040 SUB #2,$ERRPC
010000 117737 000034 010042 MOVB @ERRPC,$ITEMB ;STRIP AND SAVE THE ERROR ITEM CODE
010006 032777 020600 171126 BIT #BIT13,@SWR ;SKIP TYPEOUTS IF SET
010014 001004 ENE 2$ ;SKIP TYPEOUTS
010016 004737 010044 JSR PC,REPORT ;GO TO REPORT ROUTINE
010022 104401 001161 TYPE ,SRLF
010026 005777 171110 2$: TST @SWP ;HALT ON ERROR IF SET
010032 100001 BPL 3$ ;SKIP IS CONTINUE
010034 104421 HOLD ;DYNAMIC HALT
010036 000002 3$: RTI ;RETURN

010040 000000 $ERRPC: .WORD 0 ;LAST ERROR INSTRUCTION EXECUTED
010042 000000 $ITEMB: .WORD 0 ;ITEM CODE
  
```

```

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

010044 105737 001173 REPORT: TSTB $TPFLG ;TERMINAL EXIT?
010050 100435 BMI 2$ ;NC, EXIT
010052 010046 MOV RO,-(SP) ;PUSH RO ON STACK
010054 104401 015044 TYPE ,ETSTNO ;TYPE FIRST PART OF ERRCR MESSG
010060 013746 001146 MOV $STNM,-(SP) ;PUSH $STNM ON STACK
010064 104403 TYPDS ;TYPE TEST NUMBER
010066 002 .BYTE 2 ;TW0 DIGITS MAX.
010067 001 .BYTE 1 ;TYPE LEADING ZEROS
010070 104401 015054 TYPE ,PCMSG ;TYPE PART OF ERRCR MESSG
010074 013746 010040 MOV $ERRPC,-(SP) ;PUSH $ERRPC ON STACK
010100 104402 TYPOC ;TYPE ERROR PC
010102 104401 015063 TYPE ,ERR ;TYPE MORE OF ERRCR MESSG
010106 013746 010042 MOV $ITEMB,-(SP) ;PUSH $ITEMB ON STACK
010112 104403 TYPDS ;TYPE ERROR NUMBER
010114 003 .BYTE 3 ;3 DIGITS MAX.
010115 001 .BYTE 1 ;TYPE LEADING ZEROS
010116 104401 015076 TYPE ,ERRS ;TYP SPACES
010122 013700 010042 MOV $ITEMB,RO ;GET ERROR NUMBER
010126 006300 ASL RO ;SET TABLE POINTER
010130 016037 013554 010140 MOV EMAT-2(RO),1$ ;SET ERROR MESSAGE ADR
010136 104401 TYPE ;TYPE ERROR MESSG
010140 000000 1$: .WORD 0
010142 012600 MOV (SP)+,RO ;POP STACK INTO RO
010144 000207 2$: RTS PC ;RETURN
  
```

.SBTTL SAVE AND RESTORE RO-R5 ROUTINES

```

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

010146          $SAVREG:
010146 010046      MOV      R0,-(SP)      ;;PUSH R0 ON STACK
010150 010146      MOV      R1,-(SP)      ;;PUSH R1 ON STACK
010152 010246      MOV      R2,-(SP)      ;;PUSH R2 ON STACK
010154 010346      MOV      R3,-(SP)      ;;PUSH R3 ON STACK
010156 010446      MOV      R4,-(SP)      ;;PUSH R4 ON STACK
010160 010546      MOV      R5,-(SP)      ;;PUSH R5 ON STACK
010162 016646 000022  MOV      22(SP),-(SP)    ;;SAVE PS OF MAIN FLOW
010166 016646 000022  MOV      22(SP),-(SP)    ;;SAVE PC OF MAIN FLOW
010172 016646 000022  MOV      22(SP),-(SP)    ;;SAVE PS OF CALL
010176 016646 000022  MOV      22(SP),-(SP)    ;;SAVE PC OF CALL
010202 000002      RTI

;RESTORE RO-R5
;CALL:
; RESREG
$RESREG:
010204          MOV      (SP)+,22(SP)    ;;RESTORE PC OF CALL
010210 012666 000022  MOV      (SP)+,22(SP)    ;;RESTORE PS OF CALL
010214 012666 000022  MOV      (SP)+,22(SP)    ;;RESTORE PC OF MAIN FLOW
010220 012666 000022  MOV      (SP)+,22(SP)    ;;RESTORE PS OF MAIN FLOW
010224 012605      MOV      (SP)+,R5      ;;POP STACK INTO R5
010226 012604      MOV      (SP)+,R4      ;;POP STACK INTO R4
010230 012603      MOV      (SP)+,R3      ;;POP STACK INTO R3
010232 012602      MOV      (SP)+,R2      ;;POP STACK INTO R2
010234 012601      MOV      (SP)+,R1      ;;POP STACK INTO R1
010236 012600      MOV      (SP)+,R0      ;;POP STACK INTO R0
010240 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

010242 105737 001173  $TYPE:  TSTB  $TPFLG      ;IS THERE A CONSOLE TERMINAL?
010246 100407          BMI  3$      ;BRANCH IF NO CONSOLE TERMINAL
010250 010046      1$:  MOV      R0,-(SP)      ;SAVE R0
010252 017600 000002  MOV      @2(SP),R0      ;GET ADR OF ASCIZ STRING
010256 112046      2$:  MOVBP  (R0)+,-(SP)    ;PUSH CHARACTER TO BE TYPED ONTO STACK
010260 001005      BNE  4$      ;BR IF IT ISN'T THE TERMINATOR
010262 005726      TST  (SP)+      ;IF TERMINATOR, POP IT OFF STACK
010264 012600      MOV  (SP)+,R0      ;RESTORE R0
010266 062716 000002  3$:  ADD      #2,(SP)      ;ADJUST RETURN PC
010272 000002      RTI      ;RETURN
010274 122716 000200  4$:  CMPB  #CRLF,(SP)    ;BRANCH IF NOT <CRLF>
010300 001004      BNE  5$      ;
010302 005726      TST  (SP)+      ;POP <CR><LF> EQUIV
010304 104401 001161  TYPE,  $CRLF      ;TYPE CR-LF
010310 000762      BP  2$      ;GET NEXT CHAR
010312 004737 010344  5$:  JSR  PC,$TYPEPC    ;GO TYPE CHAR
010316 123726 001172  6$:  CMPB  $FILLC,(SP)+    ;IS IT TIME FOR FILLER CHARS?
010322 001355      BNE  2$      ;IF NO GO GET NEXT CHAR
010324 013746      MOV  $NULL,-(SP)    ;GET # FILLER CHARS NEEDED
;AND THE NULL CHAR
010330 105366 000001  7$:  DECB  1(SP)      ;DOES A NULL NEED TO BE TYPED?
010334 002770      BLT  6$      ;BR IF NO - GO POP THE NULL OFF OF STACK
010336 004737 010344  JSR  PC,$TYPEPC    ;GO TYPE NULL
010342 000772      BR  7$      ;LGOP

010344 105777 170534  $TYPEPC: TSTB  @STPS      ;WAIT UNTIL CONSOLE PRINTER IS READY
010350 100375          BPL  $TYPEPC      ;
010352 116677 000002 170526  MOVBP  2(SP),@STPB  ;LGAU CHAR TO BE TYPED INTO DATA REG.
010360 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

STYPDS:
010362          MOV     R0,-(SP)           ;;PUSH R0 ON STACK
010362 010046   MOV     R1,-(SP)           ;;PUSH R1 ON STACK
010364 010146   MOV     R2,-(SP)           ;;PUSH R2 ON STACK
010366 010246   MOV     R3,-(SP)           ;;PUSH R3 ON STACK
010370 010346   MOV     R5,-(SP)           ;;PUSH R5 ON STACK
010372 010546   MOV     #20200,-(SP)          ;;SET BLANK SWITCH AND SIGN
010374 012746   MOV     20(SP),R5         ;;GET THE INPUT NUMBER
010400 016605   BPL     R5                          ;;BE IF INPUT IS POS.
01C404 100004   NEG     R5                          ;;MAKE THE BINARY NUMBER POS.
010410 112766   MOV     #'-',1(SP)          ;;MAKE THE ASCII NUMBER NEG.
010416 005000   CLR     R0                          ;;ZERO THE CONSTANTS INDEX
010420 012703   MOV     #SDBLK,R3          ;;SETUP THE OUTPUT POINTER
010424 112723   MOV     #',(R3)+          ;;SET THE FIRST CHARACTER TO A BLANK
010430 005002   CLR     R2                          ;;CLEAR THE BCD NUMBER
010432 016001   MOV     SDBLK(R0),R1       ;;GET THE CONSTANT
010436 160105   SUB     R1,R5               ;;FORM THIS BCD DIGIT
010440 002402   BLT     R5                  ;;BR IF DONE
010442 005202   INC     R2                  ;;INCREASE THE BCD DIGIT BY 1
010444 000774   BR     R2
010446 060105   ADD     R1,R5               ;;ADD BACK THE CONSTANT
010450 005702   TST     R2                  ;;CHECK IF BCD DIGIT=0
010452 001002   BNE     R5                  ;;FALL THROUGH IF 0
010454 105716   TSTB   (SP)                 ;;STILL DOING LEADING 0'S?
010456 100407   BMI     R5                  ;;BR IF YES
010460 106316   ASLB   (SP)                 ;;MSD?
01C462 103003   BCC     R5                  ;;BR IF NO
010464 116663   MOV     1(SP),-1(R3)        ;;YES--SET THE SIGN
010472 052702   BIS     #'0',R2            ;;MAKE THE BCD DIGIT ASCII
010476 052702   BIS     #'-',R2            ;;MAKE IT A SPACE IF NOT ALREADY A DIGIT
010502 110223   MOV     R2,(R3)+          ;;PUT THIS CHARACTER IN THE OUTPUT BUFFER
010504 005720   TST     (R0)+             ;;JUST INCREMENTING
010506 020027   CMP     R0,#10            ;;CHECK THE TABLE INDEX
010512 002746   BLT     R5                  ;;GO DO THE NEXT DIGIT
010514 003002   BGT     R5                  ;;GO TO EXIT
010516 010502   MOV     R5,R2             ;;GET THE LSD
010520 000764   BR     R5                  ;;CC CHANGE TO ASCII
010522 105726   STPE   (SP)+             ;;WAS THE LSD THE FIRST NON-ZERO?
010524 100003   BR     R5                  ;;BR IF NO
010526 116663   MOV     -1(SP),-2(R3)      ;;YES--SET THE SIGN FOR TYPING
010534 105013   CLRB   (R3)               ;;SET THE TERMINATOR
010536 012605   MOV     (SP)+,R5          ;;POP STACK INTO R5
010540 012603   MOV     (SP)+,R3          ;;POP STACK INTO R3
010542 012602   MOV     (SP)+,R2          ;;POP STACK INTO R2

```

```

010544 0126C1   MOV     (SP)+,R1           ;;POP STACK INTO R1
010546 012600   MOV     (SP)+,R0           ;;POP STACK INTO R0
010550 104401   TYPE   SDBLK              ;;NOW TYPE THE NUMBER
010554 016666   MOV     2(SP),4(SP)        ;;ADJUST THE STACK
010562 012616   MOV     (SP)+,(SP)        ;;RETURN TO USER
010564 000002   RTI
010566 023420   SDBLK: 10000.
010570 001750   1000.
010572 000144   100.
010574 000012   10.
010576 000004   SDBLK:  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.
;STYPOS---ENTER HERE TO SETUP SUPPRESS ZEROS AND NUMBER OF DIGITS TO TYPE
;CALL:
;*      MOV      NUM,--(SP)      ;;NUMBER TO BE TYPED
;*      TYPOS    NUM,--(SP)      ;;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
;
;STYPON---ENTER HERE TO TYPE OUT WITH THE SAME PARAMETERS AS THE LAST
;STYPOS OR STYPOC
;CALL:
;*      MOV      NUM,--(SP)      ;;NUMBER TO BE TYPED
;*      TYPON    NUM,--(SP)      ;;CALL FOR TYPEOUT
;
;STYPOC---ENTER HERE FOR TYPEOUT OF A 16 BIT NUMBER
;CALL:
;*      MOV      NUM,--(SP)      ;;NUMBER TO BE TYPED
;*      TYPOC    NUM,--(SP)      ;;CALL FOR TYPEOUT
;
010606 017646 000000          STYPOS: MOV      @(SP),-(SP)      ;;PICKUP THE MODE
010612 116637 000001 011031 MOVB     1(SP),SOFILL      ;;LOAD ZERO FILL SWITCH
010620 112637 011033          MOVB     (SP)+,SOMODE+1    ;;NUMBER OF DIGITS TO TYPE
010624 0E271E 000002          ADD      #2,(SP)          ;;ADJUST RETURN ADDRESS
010630 000406          BR       STYPON
010632 112737 000001 011031 STYPOC: MOVB     #1,SOFILL      ;;SET THE ZERO FILL SWITCH
010640 112737 000006 011033 MOVB     #6,SOMODE+1      ;;SET FOR SIX(6) DIGITS
010646 112737 000005 011030 STYPON: MOVB     #5,SOCNT      ;;SET THE ITERATION COUNT
010654 010346          MOV      R3,--(SP)        ;;SAVE R3
010656 010446          MOV      R4,--(SP)        ;;SAVE R4
010660 010546          MOV      R5,--(SP)        ;;SAVE R5
010662 113704 011033          MOVB     SOMODE+1,R4      ;;GET THE NUMBER OF DIGITS TO TYPE
010666 005404          NEG     R4
010670 062704 000006          ADD     #6,R4              ;;SUBTRACT IT FOR MAX. ALLOWED
010674 110437 011032          MOVB     R4,SOMODE        ;;SAVE IT FOR USE
010700 113704 011031          MOVB     SOFILL,R4        ;;GET THE ZERO FILL SWITCH
010704 01660E 000012          MOV      12(SP),R5        ;;PICKUP THE INPUT NUMBER
010710 005003          CLR     R3                ;;CLEAR THE OUTPUT WORD
010712 0C6105          1S:    ROL     R5          ;;ROTATE MSB INTO "C"
010714 000404          BR      3S                ;;GO DO MSB
010716 006105          2S:    ROL     R5          ;;FORM THIS DIGIT
010720 006105          ROL     R5
010722 006105          ROL     R5
010724 010503          MOV     R5,F3
010726 006103          3S:    ROL     R3          ;;GET LSB OF THIS DIGIT
010730 105337 011032          DECB   SOMODE            ;;TYPE THIS DIGIT?
010734 1C001E          EPL    7S                ;;BR IF NO
010736 042703 177770          BIC    #177770,R3        ;;GET RID OF JUNK
010742 001002          BNE    4S                ;;TEST FOR 0
010744 005704          TST    R4                ;;SUPPRESS THIS 0?
010746 001403          BEQ    5S                ;;BR IF YES
  
```

```

010750 005204          4S:    INC     R4          ;;DON'T SUPPRESS ANYMORE 0'S
010752 052703 000060          BIS    #'0,R3            ;;MAKE THIS DIGIT ASCII
010756 052703 000040          5S:    BIS    #' ,R3       ;;MAKE ASCII IF NOT ALREADY
010762 110337 011026          MOVB   R3,R5            ;;SAVE FOR TYPING
010766 104401 011026          TYPE   ,R5             ;;GO TYPE THIS DIGIT
010772 105337 011030          7S:    DECB   SOCNT      ;;COUNT BY 1
010776 003347          BGT    2S              ;;BR IF MORE TO DO
011000 002402          BLT    6S              ;;BR IF DONE
011002 005204          INC    R4              ;;INSURE LAST DIGIT ISN'T A BLANK
011004 000744          SP     2S              ;;GO DO THE LAST DIGIT
011006 012605          6S:    MOV     (SP)+,R5    ;;RESTORE R5
011010 012604          MOV     (SP)+,R4        ;;RESTORE R4
011012 012603          MOV     (SP)+,R3        ;;RESTORE R3
011014 016666 000002 000004          MOV     2(SP),4(SP)     ;;SET THE STACK FOR RETURNING
011022 012616          MOV     (SP)+,(SP)
011024 000602          RTI                    ;;RETURN
011026 000          8S:    .BYTE   0          ;;STOPAGE FOR ASCII DIGIT
011027 000          .BYTE   0          ;;TERMINATOR FOR TYPE ROUTINE
011030 000          SOCNT: .BYTE   0          ;;OCTAL DIGIT COUNTER
011031 000          SOFILL: .BYTE  0          ;;ZERO FILL SWITCH
011032 000000          SOMODE: .WORD  0          ;;NUMBER OF DIGITS TO TYPE
;
011034 0C4737 011316          SLCAB: JSR     PC,RSTADR  ;;RESTORE ADDRESSING TO FIRST PRINTER
011040 000137 000000          LDPTR: JMP     0          ;;SWITCH TO EITHER PARALLEL OR
;SERIAL SINGLE-CHARACTER LOADER.
;THIS SWITCH IS SET UP BY THE PROGRAM
;AT STARTUP PER THE CONTENTS OF SERSW WORD.
  
```

SBTTL ROUTINES TO LOAD CHARACTERS TO LA180

////////////////////////////////////

;ROUTINE TO LOAD SINGLE CHARACTERS TO LA180 PRINTER
 ;USING THE STANDARD PARALLEL INTERFACE
 ;CALL: MOV CHAR,R0 ;PUT CHAR IN R0
 ; LOAD
 ;
 ;IF PRINTER DOES NOT GO READY WITHIN 9 TO 32 SECONDS
 ;(DEPENDING ON CPU AND MEMORY TYPE) THE DIAGNOSTIC WILL
 ;INDICATE AN ERROR - ERROR #24 - NOT READY.

////////////////////////////////////

011044	104420			PLOAD:	CHECK				;CHECK FOR CONTROL
011046	012737	000040	011140		MOV	#40,6\$;SET DELAY LOOP COUNT
011054	005777	170034			TST	@LPS			;CHECK FOR ERROR CONDX
011060	100002				BPL	1\$;BRANCH IF OK
011062	104024				ERROR	24			;PRINTER ERROR BEFORE LOAD
011064	000423				BR	4\$;EXIT
011066	005037	011136		1\$:	CLR	5\$;CLEAR DELAY COUNT
011072	005237	011136		2\$:	INC	5\$;INC COUNT
011076	001005				BNE	3\$;CONTINUE
011100	005337	011140			DEC	6\$;DEC DELAY LOOP COUNT
011104	001370				BNE	1\$;WAIT IF NOT READY
011106	104025				ERROR	25			;ERROR, PRINTER NOT READY
011110	000411				BR	4\$;EXIT
011112	105777	167776		3\$:	TSTB	@LPS			;CHECK FOR PRINTER READY
011116	100365				BPL	2\$;WAIT FOR READY
011120	110077	167772			MOVB	R0,@LPB			;LOAD CHAR
011124	005777	167764			TST	@LPS			;TEST FOR ERROR CONDX AGAIN
011130	100001				BPL	4\$;BRANCH IF OK
011132	104026				ERROR	26			;PRINTER ERROR AFTER LOAD
011134	000402			4\$:	BR	NXTADR			;DOES ANOTHER PRINTER REQUIRE LOADING ALSO?
011136	000000			5\$:	.WORD	0			;DELAY COUNTER
011140	00004C			6\$:	.WORD	32.			;DELAY LOOP COUNTER
011142	005337	001132		NXTADR:	DEC	LPCTR			;DECREMENT LINE PRINTER COUNTER
011146	003416				BLE	10\$;BR IF COUNT IS ZERO OR LESS (TO EXIT)
011150	062737	000010	001110		ADD	#10,LPKS			;ADDRESS NEXT CONTIGUOUS LINE PRINTER
011156	062737	000010	001112		ADD	#10,LPKB			
011164	062737	000010	001114		ADD	#10,LPS			
011172	062737	000010	001116		ADD	#10,LPB			
011200	000177	177636			JMP	@LPTR+2			;GO LOAD SAME CHARACTER TO NEXT PRINTER
011204	000002			10\$:	RTI				;RETURN, SINGLE CHARACTER LOAD IS COMPLETE (TO ALL PRINTERS).

////////////////////////////////////

;ROUTINE TO LOAD SINGLE CHARACTERS TO THE LA180 PRINTER
 ;USING THE SERIAL INTERFACE.
 ;CALL: MOV CHAR,R0 ;PUT CHAR IN R0
 ; LOAD

////////////////////////////////////

011206	105777	167676		SLOAD:	TSTB	@LPKS			;CHECK FOR PRINT KBD INPUT
011212	100031				BPL	2\$;BRANCH IF NONE
011214	017737	167672	011314		MOV	@LPKB,10\$;READ PRINTER KEYBOARD CHARACTER
011222	042737	177600	011314		BIC	#177600,10\$;STRIP EXCESS BITS
011230	023727	011314	000023		CMP	10\$,#23			;IS CHARACTER XOFF?
011236	001017				BNE	2\$;NO, SO BRANCH
011240	104420			3\$:	CHECK				;YES, CHECK FOR OPERATOR INTERVENTION
011242	105777	167642			TSTB	@LPKS			;CHECK FOR MORE PRINTER KBD INPUT
011246	100374				BPL	3\$;NONE, WAIT FOR EXPECTED XON
011250	017737	167636	011314		MOV	@LPKB,10\$;READ PRINTER KEYBOARD CHARACTER
011256	042737	177600	011314		BIC	#177600,10\$;STRIP EXCESS BITS
011264	023727	011314	000021		CMP	10\$,#21			;IS CHARACTER XON?
011272	001362				BNE	3\$;NO, WAIT SOME MORE.
011274	000404				BR	4\$;YES, GO DIRECTLY TO LOAD A CHARACTER
011276	104420			2\$:	CHECK				;CHECK FOR OPERATOR INTERVENTION
011300	105777	167610			TSTB	@LPS			;IS PRINTER READY?
011304	100340				BPL	SLOAD			;NO, START CHECKS OVER
011306	110077	167604		4\$:	MOVB	R0,@LPB			;YES, LOAD CHARACTER
011312	000713				BR	NXTADR			;GO LOAD SAME CHARACTER TO NEXT PRINTER
011314	000000			10\$:	.WORD	0			;LA180 KEYBOARD CHARACTER STORAGE.
011316	013737	001130	001110	RSTADR:	MOV	ACTFST,LPKS			;SET PRINTER KBD STATUS REG ADDRESS
011324	013737	001110	001112		MOV	LPKS,LPKB			
011332	062737	000002	001112		ADD	#2,LPKB			;SET PRINTER KBD BUFFER ADDRESS
011340	013737	001112	001114		MOV	LPKB,LPS			
011346	062737	000002	001114		ADD	#2,LPS			;SET PRINTER STATUS REG ADDRESS
011354	013737	001114	001116		MOV	LPS,LPB			
011362	062737	000002	001116		ADD	#2,LPB			;SET PRINTER BUFFER ADDRESS
011370	013737	001122	001132		MOV	NUMLP,LPCTR			;PUT # OF LP'S INTO A COUNTER.
011376	000207				RTS	PC			;RETURN

```

;////////////////////////////////////
;ROUTINE TO LOAD MULTIPLE CHARACTERS (NOT ASCIZ/ASCII STRINGS)
;WILL LOAD CHAR ONCE IF COUNT = 0
;PUT CHARACTER COUNT IN R1 (POSITIVE)
;PUT ASCII CHARACTER IN R0
;CALL: MLOAD

```

```

011400 104415      SMLOAD: LOAD          ;LOAD CHAR
011402 005301      DEC          R1          ;DEC COUNT
011404 003375      BGT          SMLOAD       ;FINISH LOAD
011406 0C0002      RTI          ;RETURN

```

```

;////////////////////////////////////
;ROUTINE TO LOAD CONVERTED NUMBERS AND SUPPRESS LEADING ZEROS
;IF ALL DIGITS ARE ZERO, ROUTINE WILL PRINT A SINGLE ZERO
;ENTER WITH ADDRESS OF ASCIZ STRING ON STACK
;CALL: CNLOAD

```

```

011410      SCNLD:
011410 010046      MOV          R0,-(SP)      ;;PUSH R0 ON STACK
011412 010146      MOV          R1,-(SP)      ;;PUSH R1 ON STACK
011414 010246      MOV          R2,-(SP)      ;;PUSH R2 ON STACK
011416 0C5002      CLR          R2
011420 016601      MOV          12(SP),R1    ;GET ADR
011424 112100      MOVVB      (R1)+,R0      ;GET CHAR
011426 001410      BEQ          3$          ;RETURN WHEN DONE
011430 0C5702      TST          R2          ;DONE LEADING ZEROS?
011432 001004      BNE          2$          ;YES, LOAD CHAR
011434 020027      CMP          R0,#60      ;NO, CHECK THIS CHAR
011440 001771      BEQ          1$          ;SKIP IF ZERO
011442 005202      INC          R2          ;SET FLAG IF NON-ZERO
011444 104415      LOAD          ;LOAD CHAR
011446 000766      BR          1$          ;CONTINUE
011450 005702      3$: TST          R2          ;ALL CHARS ZERO?
011452 0C1003      BNE          4$          ;NO, EXIT
011454 012700      MOV          #60,R0      ;YES, LOAD ZERO
011460 104415      LOAD
011462          4$:
011462 012602      MOV          (SP)+,R2    ;;POP STACK INTO R2
011464 012601      MOV          (SP)+,R1    ;;POP STACK INTO R1
011466 012600      MOV          (SP)+,R0    ;;POP STACK INTO R0
011470 016666      MOV          2(SP),4(SP) ;ADJUST STACK
011476 012616      MOV          (SP)+,(SP)
011500 000002      RTI          ;RETURN

```

```

;////////////////////////////////////
;ROUTINE TO PRINT ASCIZ STRINGS ON LA180 PRINTER
;STRING MUST BE TERMINATED BY NULL BYTE
;CALL: PRINT
;      MESADR

```

```

011502      SPRINT:
011502 010046      MOV          R0,-(SP)      ;;PUSH R0 ON STACK
011504 010146      MOV          R1,-(SP)      ;;PUSH R1 ON STACK
011506 0176C1      MOV          @4(SP),R1    ;GET ADDRESS OF ASCIZ STRING
011512 112100      MOVVB      (R1)+,R0      ;GET CHAR
011514 001407      BEQ          2$          ;BRANCH IF TERMINATOR (NULL)
011516 120027      CMPB      R0,#CRLF      ;CHECK IF CRLF CODE
011522 001002      BNE          3$          ;BRANCH IF NOT
011524 012700      MOV          #LF,R0      ;YES, DO LF ONLY
011530 104415      3$: LOAD          ;LOAD CHAR
011532 0C0767      BP          1$          ;GET NEXT CHAR
011534          2$:
011534 012601      MOV          (SP)+,R1    ;;POP STACK INTO R1
011536 012600      MOV          (SP)+,R0    ;;POP STACK INTO R0
011540 0E2716      ADD          #2,(SP)      ;ADJUST RETURN PC
011544 000002      RTI          ;RETURN

```



```

;////////////////////////////////////
.SBTTL PRINT TEST HEADER

;THE NUMBER OF COLUMNS WILL ALSO BE PRINTED FOR TEST 25 ONLY
;CALL: PRTHDR
;////////////////////////////////////

011546          SPRHDR:
011546 005046          CLR      -(SP)          ;;PUT NEW PS ON STACK
011550 012746 011556  MOV      #64$,-(SP)      ;;PUT NEW PC ON STACK
011554 000002          RTI              ;;POP NEW PC AND PS
011556
011556 012700 000177  64$:  MOV      #177,R0          ;;SET RUBOUT CHAR
011562 1C4415          LOAD             ;;CLEAR LA180 CHAR BUFFER
011564 023737 001146 011660  CMP      $TSTNM,SVTST  ;;CHECK IF PRINTED THIS # LAST
011572 001427          BEQ              ;;YES, PRINT BLANK LINE & EXIT
011574 013737 001146 011660  MOV      $TSTNM,SVTST  ;;NO, STORE NEW #
011602 104414 015011          PRINT          ;;LOAD TEST # MESSG
011606 013746 001146          MOV      $TSTNM,-(SP)  ;;PUSH $TSTNM ON STACK
011612 004737 013024          JSR      PC,$SB2D     ;;CONVERT #
011616 1C4417          CNLOAD          ;;LOAD NUMBER
011620 104414 001162          PRINT          ;;PRINT LINE
011624 023727 001146 000025  CMP      $TSTNM,#25   ;;IS THIS TEST 25?
011632 001007          BNE              ;;NO, SKIP COLUMN MESSG
011634 013746 001150          MOV      WIDTH,-(SP) ;;PUT # COLUMNS ON STACK
011640 004737 012650          JSR      PC,$SB2D     ;;CONVERT #
011644 104417          CNLOAD          ;;LOAD NUMBER
011646 1C4414 015031          PRINT          ;;LOAD CLOUMN MESSG
011652 104414 001162          3$:  PRINT          ;;BLANK LINE
011656 000002          4$:  RTI              ;;RETURN

C11660 000000          SVTST: .WORD      0          ;;SAVE TEST NUMBER
  
```

```

.SBTTL TTY INPUT ROUTINE

;*****
;ENABL LSB
;DSABL LSB

;*****
;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
;*               ;;WITH PARITY BIT STRIPPED OFF
;

011662 011646          SRDCHR: MOV      (SP),-(SP)      ;;PUSH DOWN THE PC
011664 016666 000004 000002  MCV      4(SP),2(SP)  ;;SAVE THE PS
C11672 1C5777 1E72C2  1$:  TSTB     @STKS      ;;WAIT FOR
011676 100375          BPL              ;;A CHARACTER
011700 117766 167176 000004  MOVB     @STKB,4(SP)  ;;RFAD THE TTY
011706 042766 177600 000004  BIC      #'C177>,4(SP) ;;GET RID OF JUNK IF ANY
011714 C26627 C00CC4 000C23  CMP      4(SP),#23    ;;IS IT A CONTROL-S?
011722 001013          ENE              ;;BRANCH IF NO
011724 105777 167150  2$:  TSTB     @STKS      ;;WAIT FOR A CHARACTER
011730 1C0375          BPL              ;;LOOP UNTIL ITS THERE
011732 117746 167144  MOVB     @STKB,-(SP)  ;;GET CHARACTER
011736 042716 177600          BIC      #'C177,(SP) ;;MAKE IT 7-BIT ASCII
011742 022627 000021  CMP      (SP)+,#21    ;;IS IT A CONTROL-G?
011746 0C1366          BNE              ;;IF NOT DISCARD IT
011750 000750          BR              ;;YES, RESUME
011752 026627 000004 000140  3$:  CMP      4(SP),#140  ;;IS IT UPPER CASE?
011760 002407          BLT              ;;BRANCH IF YES
011762 026627 000004 000175  CMP      4(SP),#175  ;;IS IT A SPECIAL CHAR?
011770 003003          BGT              ;;BRANCH IF YES
011772 042766 000040 000004  BIC      #40,4(SP)   ;;MAKE IT UPPER CASE
012C00 0C0002          4$:  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

012002 010346          SRDLIN: MOV      R3,-(SP)  ;;SAVE R3
012004 005046          CLR      -(SP)      ;;CLEAR THE RUBOUT KEY
012C06 012703 012236  1$:  MOV      #$TTYIN,R3  ;;GET ADDRESS
012012 022703 012242  2$:  CMP      #$TTYIN+4,R3 ;;BUFFER FULL?
012016 10145F          BLOS     RDCHR      ;;BR IF YES
012020 1C440E          RDCHR          ;;GO READ ONE CHARACTER FROM THE TTY
012022 112613          MOVB     (SP)+,(R3)  ;;GET CHARACTER
012024 122713 000177  10$:  CMPB     #177,(R3)   ;;IS IT A RUBOUT
012030 001022          BNE              ;;BR IF NO
012032 0C571F          TST      (SP)        ;;IS THIS THE FIRST RUBOUT?
012034 001007          BNE              ;;BR IF NO
012036 112737 000134 012234  MOVB     #'\",9$     ;;TYPE A BACK SLASH
  
```

```

012044 104401 012234          TYPE      ,9$
012050 012716 177777          MOV      #-1,(SP)    ;;SET THE RUBOUT KEY
012054 005303                DEC      R3           ;;BACKUP BY ONE
012056 020327 012236          CMP      R3,#$TTYIN  ;;STACK EMPTY?
012062 103434                BLO     4$           ;;IF YES
012064 111337 012234          MOVB    (R3),9$     ;;SETUP TO TYPEOUT THE DELETED CHAR.
012070 104401 012234          TYPE      ,9$     ;;GO TYPE
012074 000746                BR      2$           ;;GO READ ANOTHER CHAR.
012076 005716                TST     (SP)        ;;RUBOUT KEY SET?
012100 00140F                BEQ     7$           ;;IF NO
012102 112737 000134 012234    MOVB    #"\,9$     ;;TYPE A BACK SLASH
012110 104401 012234          TYPE      ,9$
012114 005016                CLP     (SP)        ;;CLEAR THE RUBOUT KEY
012116 122713 000025          CMPB    #25,(R3)   ;;IS CHARACTER A CTRL U?
012122 001003                BNE     8$           ;;IF NC
012124 104401 012242          TYPE      ,SCNTLU   ;;TYPE A CONTROL "U"
012130 000726                BR      1$           ;;GO START OVER
012132 122713 000022          CMPP    #22,(R3)   ;;IS CHARACTER A "R"?
012136 001011                BNE     3$           ;;BRANCH IF NO
012140 105013                CLRB   (R3)        ;;CLEAR THE CHARACTER
012142 104401 001161          TYPE      ,SCRLF    ;;TYPE A "CR" & "LF"
012146 104401 012236          TYPE      ,STTYIN   ;;TYPE THE INPUT STPING
012152 000717                BR      2$           ;;GO PICKUP ANOTHER CHACTER
012154 104401 001160          4$:    TYPE      ,SQUES  ;;TYPE A "?"
012160 000712                BR      1$           ;;CLEAR THE BUFFER AND LOOP
012162 111337 012234          3$:    MOVB    (R3),9$  ;;ECHO THE CHARACTER
012166 104401 012234          TYPE      ,9$
012172 122723 000015          CMPB    #15,(R3)+  ;;CHECK FOR RETURN
012176 001305                BNE     2$           ;;LOOP IF NOT RETURN
012200 105063 177777          CLRB   -1(R3)     ;;CLEAR RETURN (THE 15)
012204 104401 001162          TYPE      ,SLF     ;;TYPE A LINE FEED
012210 005726                TST     (SP)+      ;;CLEAN RUBOUT KEY FROM THE STACK
012212 012603                MOV     (SP)+,R3   ;;RESTORE R3
012214 011646                MOV     (SP)+,-(SP) ;;ADJUST THE STACK AND PUT ADDRESS OF THE
012216 016666 000004 000002    MOV     4(SP),2(SP) ;; FIRST ASCII CHARACTER ON IT
012224 012766 012236 000004    MOV     #STTYIN,4(SP)
012232 000002                RTI
012234 000          9$:    -BYTE    0          ;;RETURN
012235 000          -BYTE    0          ;;STORAGE FOR ASCII CHAR. TO TYPE
012236 000004          STTYIN: -BLKB    4          ;;TERMINATOR
012242 052536 005015 000          SCNTLU: -ASCIZ  /~U<15><12> ;;RESERVE 4 BYTES FOR TTY INPUT
012247 136 006507 000012  SCNTLG: -ASCIZ  /~G<15><12> ;;CONTROL "U"
012254 005015 053523 020122  SMSWR:  -ASCIZ  <15><12>/SWR = / ;;CONTROL "C"
012262 020075 000
012265 040 047040 053505  SMNEW:  -ASCIZ  / NEW = /
012272 036440 000040

```

```

- SBTTL READ A DECIMAL NUMBER FROM THE TTY
;*****
;*THIS ROUTINE WILL READ A DECIMAL (ASCII) NUMBER FROM THE TTY AND
;*CHANGE IT TO BINARY. IF TOO MANY CHARACTERS OR ANY ILLEGAL CHARACTERS
;*ARE READ A "?" FOLLOWED BY A CARRIAGE RETURN-LINE FEED WILL BE TYPED.
;*THE COMPLETE NUMBER MUST BE RETYPED. THE INPUT IS TERMINATED BY THE
;*USER TYPING A CARRIAGE RETURN. THE RANGE OF THE INPUT NUMBER IS
;*POSITIVE 32767 TO NEGATIVE 32768.
;*CALL:
;* RDDEC          ;;READ A DECIMAL NUMBER
;* RETURN HERE   ;;NUMBER IS ON TOP OF THE STACK
;
012276 011646 000004 000002    SRLDEC: MOV     (SP)+,-(SP)  ;;PROVIDE SPACE FOR
012300 016666                MOV     4(SP),2(SP)     ;;THE INPUT NUMBER
012306 010046                MOV     R0,-(SP)       ;;PUSH R0 ON STACK
012310 010146                MOV     R1,-(SP)       ;;PUSH R1 ON STACK
012312 010246                MOV     R2,-(SP)       ;;PUSH R2 ON STACK
012314 104407          1$:    RDLIN   ;;READ AN ASCIZ LINE
012316 012600                MOV     (SP)+,R0       ;;ADDRESS OF 1ST CHAR.
012320 010037 012444          MOV     R0,6$         ;;SAVE IN CASE OF PAD INPUT
012324 005046                CLR     -(SP)         ;;CLEAR DATA WORD
012326 005002                CLR     R2           ;;SIGN SET POSITIVE
012330 122710 000055          CMPB    #-,(R0)       ;;SEE IF A MINUS SIGN WAS TYPED
012334 001001                BNE     2$           ;;IF NO MINUS SIGN
012336 112002                MOVR   (R0)+,R2      ;;SAVE FOR LATER USE
012340 112001          2$:    MOVR   (R0)+,R1      ;;PICKUP THIS CHARACTER
012342 001424                BEQ     3$           ;;GET OUT IF ZERO
012344 122701 000060          CMPP    #0,R1       ;;MAKE SURE THIS CHARACTER
012350 003032                BGT     5$           ;;IS A DIGIT BETWEEN 0 & 9
012352 122701 000071          CMPB    #9,R1
012356 002427                BLT     5$
012360 032716 170000          BIT     #C7777,(SP)  ;;DON'T LET NUMBER GET TO BIG
012364 001024                BNE     5$           ;;IF NUMBER WOULD OVERFLOW
012366 006316                ASL    (SP)          ;;*2
012370 011646                MOV     (SP)+,-(SP)   ;;SAVE FOR LATER
012372 006316                ASL    (SP)          ;;*4
012374 006316                ASL    (SP)          ;;*8
012376 002616                ADD    (SP)+,(SP)    ;;*10.
012400 102416                BVS    5$           ;;CARRYOVER ISN'T ALLOWED
012402 162701 000060          SUB     #0,R1       ;;STRIP AWAY THE ASCII JUNK
012406 00011F                ADD    R1,(SP)       ;;ADD IN THIS DIGIT
012410 102412                BVS    5$           ;;CARRYOVER ISN'T ALLOWED
012412 000752                BR      2$           ;;LOOP
012414 005702          3$:    TST     R2           ;;CHECK IF NUMBER IS NEG
012416 001401                BEQ     4$           ;;IF NO
012420 005416                NEG    (SP)         ;;YES--NEGATE THE NUMBER
012422 012666 000012          4$:    MOV     (SP)+,12(SP) ;;SAVE THE RESULT
012426 012602                MOV     (SP)+,R2     ;;POP STACK INTO R2
012430 012601                MOV     (SP)+,R1     ;;POP STACK INTO R1
012432 012600                MOV     (SP)+,R0     ;;POP STACK INTO R0
012434 000002                RTI
012436 005726          5$:    TST     (SP)+      ;;CLEAN PARTIAL NUMBER FROM STACK
012440 105010                CLRB   (R0)         ;;SET A TERMINATOR

```

012442	104401			TYPE		;;TYPE THE INPUT UP TO PAD CHAR.
012444	000000			WCRPD	0	;;POINTER GOES HERE
012446	104401	001160	6S:	TYPE	,SQUES	;;?" "CR" &"LF"
012452	000720			BR	1S	;;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 ASCIIZ
;;IS ON THE STACK

$DB2D: SAVREG ;;SAVE REGISTERS
MOV 2(SP),R2 ;;PICKUP THE DATA POINTER
MOV #SDECVL,R0 ;;GET ADDRESS OF "SDECVL" STRING
MOV R0,2(SP) ;;PUT ADDRESS OF ASCIIZ STRING ON STACK
MOV (R2)+,R1 ;;PICKUP THE BINARY NUMBER
MOV (R2)+,R2
MOV #10,,R4 ;;SET UP TO DO 10 CONVEPSIONS
MOV #STNPNR,R4 ;;ADDRESS OF TEN POWER
MOV #STNPNR+2,R5
1S: CLP R3 ;;CLEAR PARTIAL
2S: SUB (R4),R1 ;;SUBTRACT TEN POWER
SBC R2
SUE (R5),R2
PLT 3S ;;REP IF TEN POWER TO LARGE
INC R3 ;;ADD 1 TO PARTIAL
BR 2S ;;LGCP
3S: ADD (R4)+,R1 ;;RESTORE SUBTRACTED VALUE
ADC R2
ADD (R4)+,R2
CMP (R5)+,(R5)+ ;;MOVE TO NEXT TEN POWER
BIS #0,R3 ;;CHANGE PARTIAL TO ASCII
MOVB R3,(R0)+ ;;SAVE IT
DEC (PC)+ ;;DONE?
4S: WCRPD 0
BNE 1S ;;REP IF NO
CLRP (R0)+ ;;TERMINATCP
RESREG ;;RESTORE REGISTERS
RTS PC ;;RETURN
STNPNR: 145000 ;;1.0E09
35632
160400 ;;1.0E08
2765
113200 ;;1.0E07
230
041100 ;;1.0E06
17
103240 ;;1.0E05
1
23420 ;;1.0E04
0
1750 ;;1.0E03
0
0
144 ;;1.0E02

```

```

012622 000000          0
012624 0C0C12          12          ;;1.CE01
012626 000000          0
012630 000001          1          ;;1.0F00
012632 000000          0
012634 0C0014          0
$DECVL:  .BLKB  12.          ;;RESERVE STORAGE FOR ASCII STRING
.SBTTL  SINGLE LENGTH BINARY TO DECIMAL ASCII ROUTINE
;*****
;THIS ROUTINE WILL CONVERT A 16-BIT UNSIGNED BINARY NUMBER TO AN
;UNSIGNED DECIMAL ASCII NUMBER.
;CALL
;*      MOV      NUMBER,-(SP)          ;;PUT BINARY NUMBER ON THE STACK
;*      JSR      PC,@#SDB2D          ;;CALL
;*      RETURN          ;;ADDRESS OF THE 1ST ASCII CHAR. IS ON THE STACK

012650 016637 000002 012700  SDB2D:  MOV      2(SP),1$          ;;SAVE BINARY NUMBER
012656 012746 012700          MOV      #1$,-(SP)          ;;SET POINTER
012662 004737 012454          JSR      PC,@#SDB2D          ;;CALL DOUBLE LENGTH CONVERT
012666 062716 000005          ADD      #5,(SP)          ;;ONLY ALLOW FIVE CHARACTERS
012672 012666 000002          MOV      (SP)+,2(SP)          ;;PICKUP POINTER
012676 000207          RTS      PC          ;;RETURN
012700 000000 000000          1$:      .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 ASCII NUMBER.
;CALL
;*      MOV      #PNTR,-(SP)          ;;POINTER TO LOW WORD OF BINARY NUMBER
;*      JSR      PC,@#SDB2D          ;;CALL THE ROUTINE
;*      RETURN          ;;THE ADDRESS OF THE FIRST ASCII CHAR. IS ON THE STACK

012704 104411          SDB2D:  SAVREG          ;;SAVE ALL REGISTERS
012706 016601 000002          MOV      2(SP),R1          ;;PICKUP THE POINTER TO LOW WORD
012712 012705 013023          MOV      #SCTVL+13.,R5          ;;POINTER TO DATA TABLE
012716 012704 000014          MOV      #12.,R4          ;;DO ELEVEN CHARACTERS
012722 012703 177770          MOV      #^C7,R3          ;;MASK
012726 012100          MOV      (R1)+,R0          ;;LOWER WORD
012730 012101          MOV      (R1)+,R1          ;;HIGH WORD
012732 005002          CLR      R2          ;;TERMINATOR
012734 110245          1$:      MOVVB   R2,-(R5)          ;;PUT CHARACTER IN DATA TABLE
012736 010002          MOV      R0,R2          ;;GET THIS DIGIT
012740 005304          DEC      R4          ;;COUNT THIS CHARACTER
012742 003007          BGT      3$          ;;BR IF NOT THE LAST DIGIT
012744 001405          BEQ      2$          ;;BR IF IT IS THE LAST DIGIT
012746 0C5205          INC      R5          ;;ALL DIGITS DONE-ADJUST POINTER FOR FIRST
012750 010566 000002          MOV      P5,2(SP)          ;;ASCII CHAR. & PUT IT ON THE STACK
012754 104412          RESREG          ;;RESTORE ALL REGISTERS
012756 000207          RTS      PC          ;;RETURN TO USER
012760 0C6203          2$:      ASR      R3          ;;POSITION THE MASK FOR THE LAST DIGIT
012762 006001          3$:      ROR      R1          ;;POSITION THE BINARY NUMBER FOR
012764 006000          ROP      R0          ;; THE NEXT OCTAL DIGIT
012766 0C6CC3          ROR      R1
012770 006000          ROP      R0
012772 006001          ROR      R1
012774 006000          ROP      R0
012776 040307          BIC      R3,P2          ;;MASK OUT ALL JUNK
013000 062702 000060          ADD      #^0,R2          ;;MAKE THIS CHAR. ASCII
013004 000753          BR       1$          ;;GO PUT IT IN THE DATA TABLE
013006 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, @#SSB20      ;;CALL
;*      RETURN                    ;;ADDRESS OF 1ST ASCIZ CHAR. IS ON THE STACK

013024 016637 000002 013054 SSB20: MOV     2(SP), 1$      ;;SAVE THE BINARY NUMBER
013032 012746 013054        MOV     #1$, -(SP)    ;;SET POINTER
013036 004737 012704        JSR     PC, @#SSB20    ;;CALL DOUBLE LENGTH CONVERT ROUTINE
013042 062716 000005        ADD     #5, (SP)      ;;ONLY ALLOW SIX CHARACTERS
013046 012666 000002        MCV    (SP)+, 2(SP)   ;;PICKUP POINTER
013052 000207                    RTS     PC             ;;RETURN
013054 000000 000000        1$:     .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.

013060 016646 000002        STRAP: MCV     2(SP), -(SP)    ;;ASSUME THE STATUS OF
013064 042716 000020        BIC     #20, (SP)        ;; THE CALLER--DO NOT ALLOW
013070 012746 013076        MOV     #1$, -(SP)      ;; T-BIT TRAPS
013074 000002                    RTI                    ;;SET THE NEW STATUS
013076 010046                    LS:     MOV     R0, -(SP)    ;;SAVE R0
013100 016600 000002        MCV     2(SP), R0       ;;GET TRAP ADDRESS
013104 005740                    TST     -(R0)            ;;BACKUP BY 2
013106 111000                    MCVB    (R0), R0        ;;GET RIGHT BYTE OF TRAP
013110 022700 000044        CMP     #STRAP, R0      ;;CHECK FOR OUT OF BOUNDS
013114 003002                    PGT     .+6             ;;PR IF OK
013116 000000                    HALT                    ;;OUT OF BOUNDS
013120 009776                    BP     .-2             ;;HANGUP
013122 006300                    ASL     R0              ;;POSITION FOR INDEXING
013124 016000 013144        MOV     STRPAD(R0), R0  ;;INDEX TO TABLE
013130 000200                    RTS     R0             ;;GO TO ROUTINE

;THIS IS USE TO HANDLE THE "GETPRI" MACRO

013132 011646                    STRAP2: MCV     (SP), -(SP)    ;;MOVE THE PC DOWN
013134 016666 000004 000002  MOV     4(SP), 2(SP)     ;;MOVE THE PSW DOWN
013140 000002                    RTI                    ;;RESTORE THE PSW

.SBTTL TRAP TABLE
;THIS TABLE CONTAINS THE STARTING ADDRESSES OF THE ROUTINES CALLED
;BY THE "TRAP" INSTRUCTION.
;
;      ROUTINE
;      -----
;STRPAD: .WORD    STRAP2
013144 013132                    STYPE   ;;CALL=TYPE      TRAP+1(104401)  TTY TYPEOUT ROUTINE
013146 010242                    STYPOC  ;;CALL=TYPOC    TRAP+2(104402)  TYPE OCTAL NUMBER (WITH LEADING ZEROS)
013150 010632                    STYPOS  ;;CALL=TYPOS    TRAP+3(104403)  TYPE OCTAL NUMBER (NO LEADING ZEROS)
013152 010606                    STYPON  ;;CALL=TYPON    TRAP+4(104404)  TYPE OCTAL NUMBER (AS PER LAST CALL)
013154 010646                    STYPDS  ;;CALL=TYPDS    TRAP+5(104405)  TYPE DECIMAL NUMBER (WITH SIGN)

013160 011662                    SRDCHR  ;;CALL=RDCHR    TRAP+6(104406)  TTY TYPEIN CHARACTER ROUTINE
013162 012002                    SRDLIN  ;;CALL=RDLIN    TRAP+7(104407)  TTY TYPEIN STRING ROUTINE
013164 012276                    SPDDEC  ;;CALL=RDDEC    TRAP+10(104410) READ A DECIMAL NUMBER FROM TTY
013166 010146                    SAVREG  ;;CALL=SAVREG    TRAP+11(104411) SAVE R0-R5 ROUTINE
013170 010204                    RESREG  ;;CALL=RESREG    TRAP+12(104412) RESTORE R0-R5 ROUTINE
013172 011546                    SPRHDR  ;;CALL=PRTHDR    TRAP+13(104413) PRINT TEST HEADER
013174 011502                    SPRINT  ;;CALL=PRINT    TRAP+14(104414) PRINT ROUTINE
013176 011034                    SLOAD   ;;CALL=LOAD    TRAP+15(104415) LOAD CHAR ROUTINE
013200 011400                    SMLoad  ;;CALL=MLOAD    TRAP+16(104416) MULTIPLE CHAR LOAD
013202 011410                    SCNLD   ;;CALL=CNLOAD    TRAP+17(104417) LOAD CONVERTED NUMBER
  
```

013204 007052 \$CHECK ;;CALL=CHECK TRAP+20(104420) CHECK FOR KYBD OR SW REG CONTROL
 013206 007112 \$HOLD ;;CALL=HOLD TRAP+21(104421) WAIT FOR OPERATOR ACTION
 000044 \$TERM=-STRPAD

```

.SBTTL POWER DOWN AND UP ROUTINES
;*****
;POWER DOWN ROUTINE
013210 012737 013350 000024 $PWRDN: MOV #SILLUP,@#PWRVEC ;;SET FOR FAST UP
013216 012737 000340 000026 MOV #340,@#PWRVEC+2 ;;PRIO:7
013224 010046 MOV R0,-(SP) ;;PUSH R0 ON STACK
013226 010146 MOV R1,-(SP) ;;PUSH R1 ON STACK
013230 010246 MOV R2,-(SP) ;;PUSH R2 ON STACK
013232 010346 MOV R3,-(SP) ;;PUSH R3 ON STACK
013234 010446 MOV R4,-(SP) ;;PUSH R4 ON STACK
013236 010546 MOV R5,-(SP) ;;PUSH R5 ON STACK
013240 017746 165676 MOV @SWR,-(SP) ;;PUSH @SWR ON STACK
013244 010637 013354 MOV SP,$SAVR6 ;;SAVE SP
013250 012737 013262 000024 MOV #SPWRUP,@#PWRVEC ;;SET UP VECTOR
013256 000000 HALT
013260 000776 BR --2 ;;HANG UP
;*****
;POWER UP ROUTINE
013262 012737 013350 000024 $PWRUP: MOV #SILLUP,@#PWRVEC ;;SET FOR FAST DOWN
013270 013706 013354 MOV $SAVR6,SP ;;GET SP
013274 005037 013354 CLR $SAVR6 ;;WAIT LOCP FOR THE TTY
013300 005237 013354 15: INC $SAVR6 ;;WAIT FOR THE INC
013304 001375 PNE 15 ;;CF WORD
013306 012677 165630 MOV (SP)+,@SWR ;;POP STACK INTO @SWR
013312 012605 MOV (SP)+,R5 ;;POP STACK INTO R5
013314 012604 MOV (SP)+,R4 ;;POP STACK INTO R4
013316 012603 MOV (SP)+,R3 ;;POP STACK INTO R3
013320 012602 MOV (SP)+,R2 ;;POP STACK INTO R2
013322 012601 MOV (SP)+,R1 ;;POP STACK INTO R1
013324 012600 MOV (SP)+,R0 ;;POP STACK INTO R0
013326 012737 013210 000024 MOV $PWRDN,@#PWRVEC ;;SET UP THE POWER DOWN VECTOR
013334 012737 000340 000026 MOV #340,@#PWRVEC+2 ;;PRIO:7
013342 104401 TYPE ;;REPORT THE POWER FAILURE
013344 115215 $PWRMG: .WORD PWRMSG ;;POWER FAIL MESSAGE POINTER
013346 000002 RTI
013350 000000 SILLUP: HALT ;;THE POWER UP SEQUENCE WAS STARTED
013352 000776 EP --2 ;; BEFORE THE POWER DOWN WAS COMPLETE
013354 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

//

013356	0C2254	TAT:	TEST0	
013360	003072		TEST1	
013362	003262		TEST2	
013364	000000		0	;TEST3
013366	000000		0	;TEST4
013370	000000		0	;TEST5
013372	000000		0	;TEST6
013374	000000		0	;TEST7
013376	000000		0	;TEST10
013400	000000		0	;TEST11
013402	000000		0	;TEST12
013404	000000		0	;TEST13
013406	000000		0	;TEST14
013410	000000		0	;TEST15
013412	000000		0	;TEST16
013414	000000		0	;TEST17
013416	0C3614		TEST20	
013420	003662		TEST21	
013422	003772		TEST22	
013424	004060		TEST23	
013426	004114		TEST24	
013430	004406		TEST25	
013432	004770		TEST26	
013434	005062		TEST27	
013436	005200		TEST30	
013440	005226		TEST31	
013442	177777		-1	;TEST32
013444	000000		0	;TEST33
013446	000000		0	;TEST34
013450	000000		0	;TEST35
013452	000000		0	;TEST36
013454	000000		0	;TEST37
013456	000000		0	;TEST40
013460	000000		0	;TEST41
013462	000000		0	;TEST42
013464	000000		0	;TEST43
013466	000000		0	;TEST44
013470	000000		0	;TEST45
013472	000000		0	;TEST46
013474	000000		0	;TEST47
013476	0C534C		TEST50	
013500	000000		0	;TEST51
013502	000000		0	;TEST52
013504	000000		0	;TEST53
013506	000000		0	;TEST54

013510	000000	0	;TEST55
013512	000000	0	;TEST56
013514	000000	0	;TEST57
013516	0C554C	TEST60	
013520	005654	TEST61	
013522	005766	TEST62	
013524	006050	TEST63	
013526	006174	TEST64	
013530	000000	0	;TEST65
013532	000000	0	;TEST66
013534	000000	0	;TEST67
013536	000000	0	;TEST70
013540	000000	0	;TEST71
013542	000000	0	;TEST72
013544	000000	0	;TEST73
013546	000000	0	;TEST74
013550	000000	0	;TEST75
013552	006514	TEST76	
013554	006534	TEST77	

//

.SBTTL ERROR MESSAGE ADDRESS TABLE

//

013556	013632	EMAT:	ERP1
013560	013661		ERR2
013562	013700		ERR3
013564	013744		ERR4
013566	014000		ERR5
013570	014032		ERR6
013572	014070		ERP7
013574	014117		ERR10
013576	014144		ERR11
013600	014170		ERP12
013602	014232		ERR13
013604	014266		ERR14
013606	014324		ERR15
013610	014360		ERR16
013612	014414		ERR17
013614	014451		ERP20
013616	014503		ERR21
013620	014537		ERR22
013622	014573		ERP23
013624	014632		ERR24
013626	014671		ERR25
013630	014713		ERP26

////////////////////////////////////
 .SBTTL ERRCR MESSAGES
 //////////////////////////////////////

013632	051105	047522	020122	ERR1:	.ASCIZ	/ERRCR CLEAR, PCWER CFF/
013640	046103	040505	026122			
013646	050040	053517	051105			
013654	047440	043106	000			
013661	122	040505	054504	ERR2:	.ASCIZ	/READY SET, POWER OFF/
013666	051440	052105	020054			
013674	047520	042527	020122			
013702	043117	000106				
013706	051105	047522	020122	ERR3:	.ASCIZ	/ERRCR CLEAR, PRINTER CFF LINE/
013714	046103	040505	026122			
013722	050040	044522	052116			
013730	051105	047440	043106			
013736	046040	047111	000105			
013744	042522	042101	020131	ERR4:	.ASCIZ	/READY SET, PPINTER OFF LINE/
013752	042523	026124	050040			
013760	044522	052116	051105			
013766	047440	043106	046040			
013774	047111	000105				
014000	051105	047522	020122	ERR5:	.ASCIZ	/ERRCR SET, PRINTER ON LINE/
014006	042523	026124	050040			
014014	044522	052116	051105			
014022	047440	020116	044514			
014030	042516	000				
014033	122	040505	054504	ERR6:	.ASCIZ	/READY CLEAR, PRINTER ON LINE/
014040	041440	042514	051101			
014046	020054	051120	047111			
014054	042524	020122	047117			
014062	046040	047111	000105			
014070	051105	047522	020122	ERR7:	.ASCIZ	/ERRCR CLEAR, PAPER CUT/
014076	046103	040505	026122			
014104	050040	050101	051105			
014112	047440	052125	000			
014117	122	040505	054504	ERR10:	.ASCIZ	/READY SET, PAPER CUT/
014124	051440	052105	020054			
014132	040520	042520	020122			
014140	052517	000124				
014144	051105	047522	020122	ERR11:	.ASCIZ	/ERRCR DID NOT CLEAR/
014152	044504	020104	047516			
014160	020124	046103	040505			
014166	000122					
014170	042522	042101	020131	ERR12:	.ASCIZ	/READY NOT SET AFTER ERRCR CLEARED/
014176	047516	020124	042523			
014204	020124	043101	042524			
014212	020122	051105	047522			
014220	020122	046103	040505			
014226	042522	000104				
014232	051105	047522	020122	ERR13:	.ASCIZ	/ERRCR SET AFTER RESET INSTR/
014240	042523	020124	043101			
014246	042524	020122	042522			
014254	042523	020124	047111			

014262	052123	000122				
014266	042522	042101	020131	ERR14:	.ASCIZ	/READY CLEAR AFTER RESET INSTR/
014274	046103	040505	020122			
014302	043101	042524	020122			
014310	042522	042523	020124			
014316	047111	052123	000122			
014324	042522	042101	020131	ERR15:	.ASCIZ	/READY SET AFTER CHAR LOADED/
014332	042523	020124	043101			
014340	042524	020122	044103			
014346	051101	046040	040517			
014354	042504	000104				
014360	051105	047522	020122	ERR16:	.ASCIZ	/ERRCR SET AFTER CHAR LOADED/
014366	042523	020124	043101			
014374	042524	020122	044103			
014402	051101	046040	040517			
014410	042504	000104				
014414	042522	042101	020131	ERR17:	.ASCIZ	/READY NEVER SET, CHAR LOADED/
014422	042516	042526	020122			
014430	042523	026124	041440			
014436	040510	020122	047514			
014444	042101	042105	000			
014451	105	051122	051117	ERR20:	.ASCIZ	/ERRCR SET, INTERRUPT TEST/
014456	051440	052105	020054			
014464	047111	042524	051122			
014472	050125	020124	042524			
014500	052123	000				
014503	122	040505	054504	ERR21:	.ASCIZ	/READY CLEAR, INTERRUPT TEST/
014510	041440	042514	051101			
014516	020054	047111	042524			
014524	051122	050125	020124			
014532	042524	052123	000			
014537	120	044522	052116	ERR22:	.ASCIZ	/PRINTER INTER ABOVE LEVEL 3/
014544	051105	044440	052116			
014552	051105	040440	047502			
014560	042526	046040	053105			
014566	046105	031440	000			
014573	116	020117	051120	ERR23:	.ASCIZ	/NO PRINTER INTER BELOW LEVEL 4/
014600	047111	042524	020122			
014606	047111	042524	020122			
014614	042502	047514	020127			
014622	042514	042526	020114			
014630	000064					
014632	051120	047111	042524	ERR24:	.ASCIZ	/PRINTER ERROR BEFORE CHAR LOAD/
014640	020122	051105	047522			
014646	020122	042502	047506			
014654	042522	041440	040510			
014662	020122	047514	042101			
014670	000					
014671	120	044522	052116	ERR25:	.ASCIZ	/PRINTER NOT READY/
014676	051105	047040	052117			
014704	051040	040505	054504			
014712	000					
014713	120	044522	052116	ERR26:	.ASCIZ	/PRINTER ERROR AFTER CHAR LOAD/
014720	051105	042440	051122			
014726	051117	040440	052106			
014734	051105	041440	040510			

014742 020122 047514 042101
014750 000

////////////////////////////////////
_SBTTL PROGRAM MESSAGES
////////////////////////////////////

014751 200 020043 047503 COLUMN: .ASCIZ <CRLF>/# COLUMNS = /
014756 052514 047115 020123
014764 020075 000
014767 200 042523 042514 SELTST: .ASCIZ <CRLF>/SELECT TEST # /
014774 052103 052040 051505
015002 020124 020043 020040
015010 000
015011 012 052012 051505 TSTNC: .ASCIZ <LF><LF>/TEST NUMBER /
015016 020124 052516 041115
015024 051105 020040 000
015031 040 041440 046117 COLMN: .ASCIZ / COLUMNS/<LF>
015036 046525 051516 000012
015044 052200 051505 020124 ETSTNC: .ASCIZ <CRLF>/TEST #/
015052 000043
015054 020054 050040 036503 PCMSG: .ASCIZ /, PC=/
015062 000
015063 054 020040 051105 ERR: .ASCIZ /, ERROR #/
015070 047522 020122 000043
015076 020054 000040 ERRS: .ASCIZ /, /

015102 042412 042116 047440 PASMSG: .ASCIZ <LF>/END OF PASS #/
015110 020106 040520 051523
015115 020040 000043
015122 051600 051127 036440 DSMSG1: .ASCIZ <CRLF>/SWR = /
015130 000040
015132 020040 047040 053505 DSMSG2: .ASCIZ / NEW = /
015140 036440 000040
015144 040527 052111 047111 WTMSG: .ASCIZ /WAITING, TYP SPACE TO CONTINUE/<CRLF>
015152 026107 020040 054524
015160 020120 050123 041501
015166 020105 047524 041440
015174 047117 044524 052516
015202 100105 000
015205 103 040510 020122 TCHAR: .ASCIZ /CHAR = /
015212 020075 000
015215 200 047520 042527 PWRMSG: .ASCIZ <CRLF>/POWER/<CRLF>
015222 100122 000
015225 012 047516 041440 NCMSG: .ASCIZ <LF>/NO CONSOLE TERMINAL/<LF>
015232 047117 047523 042514
015240 052040 051105 044515
015246 040516 005114 000
015253 120 044522 052116 MANMSG: .ASCIZ /PRINT SPEED MANUAL TIMING/<CRLF>
015260 051440 042520 042105
015266 046440 047101 040525
015274 020114 044524 044515
015270 043516 200
015305 120 052125 051440 .ASCIZ /PUT SWITCH 12 UP TO START TIMING/<CRLF>
015312 044527 041524 020110
015320 031061 052440 020120
015326 047524 051440 040524
015334 052122 052040 046511
015342 047111 100107
015346 052520 020124 053523 .ASCIZ /PUT SWITCH 12 DOWN AT END OF 1 MINUTE/<CRLF>
015354 052111 044103 030440
015362 020062 047504 047127
015370 040440 020124 047105
015376 020104 043117 030440
015404 046440 047111 052125
015412 100105 000
015415 105 052116 051105 T64MSG: .ASCIZ /ENTER PATTERN PER LISTING OR DOCUMENT/<CRLF>
015422 050040 052101 042524
015430 047122 050040 051105
015436 046040 051511 044524
015444 043516 047440 020122
015452 047504 052503 042515
015460 052116 000200
015464 003407 000200 TWOBEL: .ASCIZ <?><?><CRLF>
015470 050200 044522 052116 PRSP1: .ASCIZ <CRLF>/PRINT SPEED IS /
015476 051440 042520 042105
015504 044440 020123 000
015511 101 050120 047522 PRSP2: .ASCIZ /APPROX. /
015516 027130 000040
015527 020040 044514 042516 PRSP3: .ASCIZ / LINES/<?>/MINUTE , WITH /
015530 027523 044515 052516
015536 042524 026040 053440
015544 052111 020110 000

015551	C40	041440	C40510	PRSP4: .ASCII7 / CHARS<57>/LINE<CRLF>
015556	051522	046057	047111	
015564	100105	000		
015567	124	051125	020116	TOMSG0: .ASCIZ /TURN POWER OFF & SET OFF LINE/<CRLF>
C15574	C47520	042527	C20122	
015602	043117	020106	020046	
015610	042523	020124	043117	
015616	020106	044514	042516	
C15624	000200			
015626	045517	020054	052524	TOMSG1: .ASCIZ /OK, TURN POWER ON/<CRLF>
015634	047122	050040	053517	
015642	051105	047440	100116	
C15650	000			
015651	117	026113	051440	TOMSG2: .ASCIZ /OK, SET PRINTER TO ON-LINE/<CRLF>
015656	052105	050040	044522	
015664	052116	051105	052040	
C15672	020117	047117	C46055	
015700	047111	100105	000	
015705	117	026113	052040	TOMSG3: .ASCIZ /OK, TRY PAPER OUT SWITCH/<CRLF>
015712	054522	050040	050101	
015720	051105	047440	052125	
015726	051440	044527	041524	
015734	100110	000		
015737	117	026113	051040	TOMSG4: .ASCIZ /OK, RESTORE PRINTER TO ON-LINE/<CRLF>
015744	051505	047524	C42522	
015752	050040	044522	052116	
015760	051105	052040	020117	
015766	047117	046055	047111	
C15774	100105	000		
015777	055	026455	026455	TIMSG1: .ASCIZ /----- /
016004	000040			
016006	044440	041516	020110	TIMSG2: .ASCIZ / INCH FORM FEED -----<CR>
016014	C47500	046522	C43040	
016022	042505	020104	026455	
016030	026455	006455	000	
016035	123	052105	043040	TIMSG3: .ASCIZ /SET FORM FEED SWITCH TO /
C16042	C51117	020115	042506	
016050	042105	051440	044527	
016056	041524	020110	047524	
016064	020040	000		
C16067	C40	044440	C41516	TIMSG4: .ASCII7 / INCHES & DEPRESS TOF RESET SWITCH/<CRLF>
016074	042510	020123	020046	
016102	042504	051120	051505	
016110	020123	047524	020106	
C16116	042522	042523	C20124	
016124	053523	052111	044103	
016132	000200			
016134	047516	046440	052105	T2EM: .ASCIZ /NO METHGD OF TIMING AVAILABLE/<CRLF>
C16142	047510	020104	C43117	
016150	052040	046511	047111	
016156	020107	053101	044501	
016164	040514	046102	100105	
C16172	000			
016174				.EVEN

016174	047531	020125	047506	TABL64: .ASCIZ /YOU FORGOT TO ENTER DATA; CTL-SPACE/<LF>
016202	043522	052117	052040	
016210	020117	047105	042524	
016216	020122	040504	040524	
016224	020073	052103	C26514	
016232	050123	041501	005105	
016240	000			

!OPEN-ENDED TABLE FOR TEST 64 DATA.

000001

.END

ACCEPT 006210	EMAT 013556	NXTADR 011142	STRONE 001152	TEST64 006174
ACTFST 001130	EMTVEC= 000030	PASCNT 005652	SVTST 011660	TEST76 006514
BITC = CCCC031	ENDADR 006512	PASMSG C15102	SWR 001142	TEST77 006534
BIT00 = 000001	ERR 015063	PCMSG 015054	SWRFG 000176	TKB 001102
BIT01 = 000002	ERRS 015076	PIRG = 177772	SW0 = 000001	TKS 001100
BIT02 = CCCC04	ERRVEC= 000004	PIRQVE= C00240	SW00 = 000001	TKVEC = 000060
BIT03 = 000010	ERR1 013632	PLKS 001134	SW01 = 000002	TLOOP 001154
BIT04 = 000020	ERR10 014117	LOAD 011044	SW02 = 000004	TORTN 006610
BIT05 = CCCC4C	ERR11 014144	PRINT = 104414	SW03 = 000010	TPB 001106
BIT06 = 000100	ERR12 014170	PRPAT 006424	SW04 = 000020	TPS 001104
BIT07 = 000200	ERR13 014232	PRPAT 006466	SW05 = 000040	TPVEC = 000004
BIT08 = 000400	ERR14 014266	PRSP1 C15470	SW06 = 0001C0	TRAPVE= 000034
BIT09 = 001000	ERR15 014324	PRSP2 015511	SW07 = 000200	TRONE 001153
BIT1 = 000002	ERR16 014360	PRSP3 015522	SW08 = 000400	TPTVEC= 000014
BIT10 = 002000	ZRR17 014414	PRSP4 C15551	SW09 = 001000	TSEL 007510
BIT11 = 004000	ERR2 013661	PRTHDR= 104413	SW1 = 000002	TSTNG 015011
BIT12 = 010000	ERR20 014451	PRTSET 005442	SW10 = 002000	TWOBEL 015464
BIT13 = 020000	ERR21 014503	PRC = 000000	SW11 = 004000	TYPDS = 104405
BIT14 = C4CC00	ZRR22 014537	PR1 = 000040	SW12 = 010000	TYPE = 104401
BIT15 = 100000	ERR23 014573	PR2 = 000100	SW13 = 020000	TYPCO = 104402
BIT2 = 000004	ERR24 014632	PR3 = 000140	SW14 = 040000	TYPCN = 104404
BIT3 = CCCC10	ERR25 014671	PR4 = 000200	SW15 = 100000	TYPOS = 104403
BIT4 = 000020	EPR26 014713	PR5 = 000240	SW2 = 000004	TOMSG0 015567
BIT5 = 000040	ERR3 013706	PR6 = 000300	SW3 = 000010	TOMSG1 015626
BIT6 = C0C100	EPR4 013744	PR7 = 000340	SW4 = 000020	TOMSG2 015651
BIT7 = 000200	ERR5 014000	PS = 177776	SW5 = 000040	TOMSG3 015705
BIT8 = 000400	ERR6 014033	PSW = 177776	SW6 = 000100	TOMSG4 015737
BIT9 = C01C00	EPR7 014070	PWRMSG C15215	SW7 = 000200	TOMSG5 015777
BPTVEC= 000014	ETSTND 015044	PWRVEC= C00024	SW8 = 000400	TIMSG2 016006
CHACTR 006510	ZXIT 006644	CU01 001764	SW9 = 001000	TIMSG3 016035
CHECK = 1C4420	FF = C00014	GU2 C02032	TABLE4 016174	TIMSG4 016067
CHLD 005440	FSTPAD 001126	RDCR = 104406	TAT 013356	T2EM 016134
CKFLAG 001155	FSTSD 001124	RDFC = 104410	TBLTVE= 000014	T2SP 003400
CNLCAD= 1C4417	HOLD = 1C4421	RDLIN = 104407	TCHAR 015205	T50M1 005424
CNTP 006606	HT = 000011	RFPRT 010044	TERP 006164	T50M2 005430
COLCTR 006506	IOTVEC= 000020	RESPEG= 104412	TEST0 002254	T50PCT 005422
CCLMN 015C31	KYBDF 007140	RESTR 001210	TEST1 003072	T64MSG 015415
COLUMN 014751	KYBDST 007442	RESVEC= 000010	TEST2 003262	WIDTH 001150
CNTRL 001220	LPTPR 011040	RSTADR 011316	TEST20 003614	WTMSG 015144
CR = 000015	LF = 000012	K6 = *C00006	TEST21 003662	XBELL 001156
CRLF = 000200	LKS 001140	P7 = *000007	TEST22 003772	CHECK 007052
CSBR 001136	LKSRV 006566	SAVREG= 104411	TEST23 004060	SCNLD 011410
CTLA 000346	LOAD = 104415	SELETC C06752	TEST24 004114	SCNTLG 012247
CTLE 0C6262	LPP 001116	SELTST 014767	TEST25 004406	SCNTLU 012242
DCI 006556	LPCTR 001132	SERSW 001120	TEST26 004770	SCR 001164
DDISP = 177570	LPKB 001112	SLDAD 011206	TEST27 005062	SCRLF 001161
DISPLA 0C1144	LPKS 0C1110	SPD 003500	TEST30 005200	DBLK 010576
DISPRE 000174	LPS 001114	SP3 005434	TEST31 005226	DB2D 012454
DSMSG1 015122	MANMSG 015253	SRUCI 006614	TEST50 005340	DB2C 012704
DSMSG2 015132	MINCNT 006612	STACK = C01100	TEST60 005540	DECVL 012634
DSWP = 177570	MLDAD = 104416	START 001174	TEST61 005654	DDAGN 005332
DUNCOL 006454	NCMMSG 015225	STARTX 001226	TEST62 005766	DBTL 010566
DUNPAT C06446	NUMLP 001122	STKLMT= 177774	TEST63 006050	SENDAD 005322

\$ENDCT 005306	\$LOAD 011034	\$QUES 001160	\$SWP = 162000	\$TTYIN 012236
\$EOP 005262	\$MLCAD 011400	\$RDCHR 011662	\$TERM = 000044	\$TYPDS 01C362
\$EOPCT 005300	\$MNEW 012265	\$PDDC 012276	\$TKP 001102	\$TYPE 010242
\$ERROR 007744	\$MSWR 012254	\$PDLIN 012002	\$TKS 001100	\$TYPEC 010344
\$ERRPC 010040	\$NULL 001170	\$RDSZ = 000004	\$TN = 000000	\$TYPCO 010632
\$FF 001166	\$OCNT 011030	\$SPSRE C10204	\$TNPWR 012564	\$TYPCN 010646
\$FILLC 001172	\$OCTVL 013006	\$RTNAD 005334	\$TPB 001106	\$TYPOS 010606
\$FILLS 001171	\$SOMOE 011032	\$SAVRE 010146	\$TPFLG 001173	\$SGFT4= 000000
\$GET4? 0C5312	\$PASS 005336	\$SAVRE C13354	\$TPS 001104	\$OFILL 011031
\$HD = 000000	\$PRHDR 011546	\$SB2D 012650	\$TRAP 013060	= 016241
\$HOLD 007112	\$PRINT 011502	\$SB20 013024	\$TRAP2 013132	
\$ILLUP C13250	\$PWRNG 013210	\$SETUP= C00034	\$TRP = 000022	
\$ITEMB 010042	\$PWRPG 013344	\$STUP = 177777	\$TRPAD 013144	
\$LF 001162	\$PWPUP 013262	\$SVPC = 000200	\$TSTNM 001140	

. AFS. 016241 000

ERRORS DETECTED: 0
 DEFAULT GLOBALS GENERATED: 0

DZLAE, DZLAE.SEG/SOL/ML:SEQ=DZLAE.P11
 RUN-TIME: 16 9 .3 SECONDS
 RUN-TIME RATIO: 642/26=24.3
 CORE USED: 18K (36 PAGES)