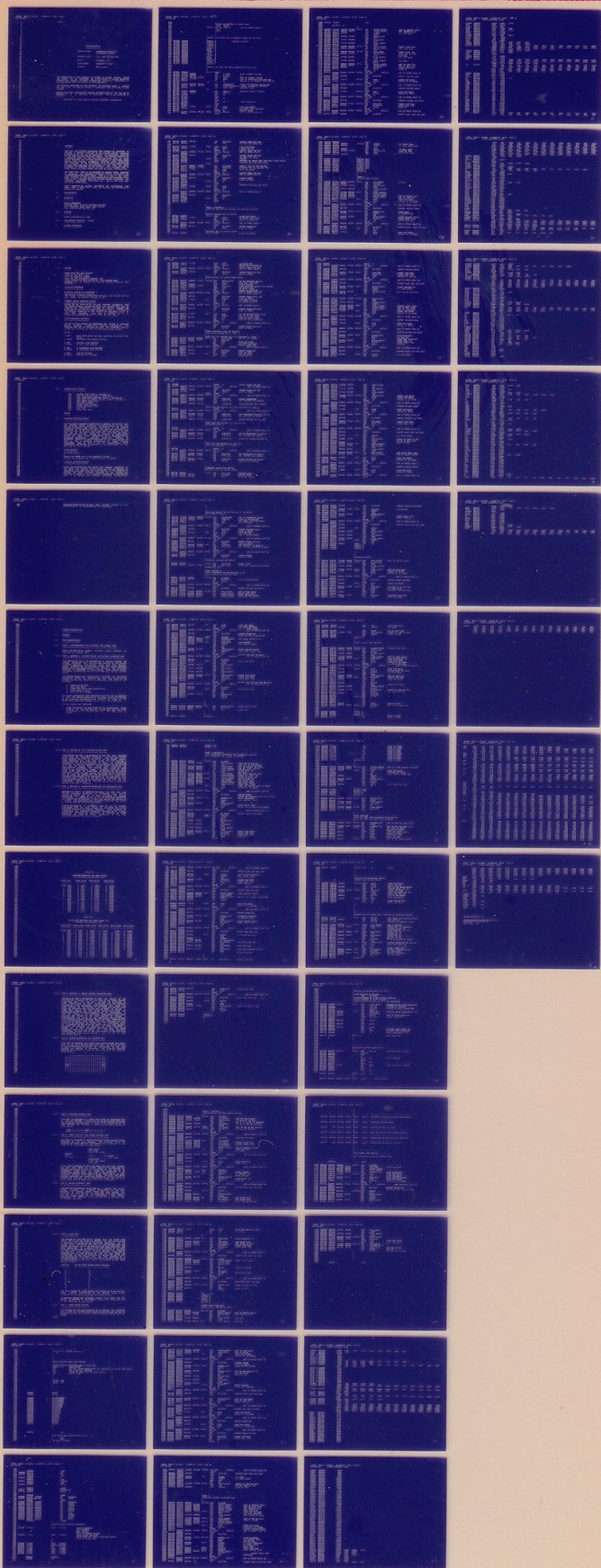


LP11

LINE PRINTER TEST
MD-11-DZLPA-B

EP DZLPA-B DL
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IDENTIFICATION

PRODUCT CODE: MAINDEC-11-DZLPA-B²
SUPERCEDES 11-D2CA
PRODUCT NAME: LP11 LINE PRINTER TEST
DATE: DECEMBER, 1975
MAINTAINER: DIAGNOSTIC GROUP
AUTHOR: EARL HAIGHT

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1. ABSTRACT

THE LP11 LINE PRINTER DIAGNOSTIC TEST PROGRAM IS DESIGNED TO PROVIDE A THOROUGH CHECK-OUT OF THE PRINTER CONTROL INTERFACE ELECTRONICS AS WELL AS THE ELECTRONIC AND MECHANICAL PORTIONS OF THE LINE PRINTER MECHANISM ITSELF. THE PROGRAM CONSISTS OF A SERIES OF SEVEN (7) TEST AND DRIVE ROUTINES, EACH OF WHICH CAN BE SELECTED AND OPERATED INDEPENDENTLY OF THE OTHERS USING SPECIAL ENTRY POINTS. INTERNALLY DETECTED ERROR CONDITIONS ARE DISPLAYED ON THE TELEPRINTER WHILE DETAILED DESCRIPTIONS OF EACH ERROR AND WHAT WAS HAPPENING AT THE TIME THE ERROR OCCURRED, IS PRESENTED IN THE LISTING. PRINT PATTERNS USED IN THESE TESTS HAVE BEEN CHOSEN FOR EASE OF VISUAL VERIFICATION.

THE FIRST TEST (TEST 1) IS COMPOSED OF SEVERAL TESTS DESIGNED TO CHECK-OUT THE PROCESSOR INTERFACE CONTROL ELECTRONICS AND INTERCOMMUNICATIONS DATA PATHS. TEST 2, 3, AND 4 USE WORST CASE PATTERNS TO TEST PRINTER PERFORMANCE AND ENDURANCE WHILE TESTS 5 AND 6 PROVIDE DRIVE FOR PRINTER HAMMER ALIGNMENT AND INTENSITY ADJUSTMENT PROCEDURES AND A TEST OF THE PAPER SLEN AND CLUTCH OPERATIONS.

TEST 7 CONSISTS OF SEVERAL SUB-TESTS AND MAINTENANCE AIDS AMONG THEM A SCOPE DRIVE TEST, FOR HELPING THE TECHNICIAN TO DEBUG THE HARDWARE.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 PROCESSOR
TELETYPE MODEL 33 ASCII KEYBOARD PRINTER
DATA PRODUCTS, MODEL 2310, LINE PRINTER
LP11 LINE PRINTER CONTROL UNIT

2.2 STORAGE

MEMORY LOCATION 0 TO 7000

2.3 PRELIMINARY PROGRAMS (NONE)

3. LOADING PROCEDURE

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3.1 METHOD

POWER DOWN THE LINE PRINTER
POWER UP THE PDP-11 ONLY
LOAD THE ABSOLUTE LOADER
LOAD THE LP11 DIAGNOSTIC PROGRAM TAPE
AFTER LOADING HAS BEEN COMPLETED, LOAD ADDRESS 0200
DEPRESS STANT AND PROCEED WITH THE LINE PRINTER POWER-UP TEST SEQUENCE.

4. STARTING PROCEDURE

4.1 STARTING ADDRESS OR ADDRESSES

THE INITIAL STARTING ADDRESS FOR THE LP11 LINE PRINTER TEST IS LOC. 0200. THE RESTART ADDRESS IS 600.

4.2 PROGRAM AND/OR OPERATOR ACTION

DURING INITIAL START-UP OF THE LINE PRINTER DIAGNOSTIC TEST THE HEADER MESSAGE "MAINDEC-11-02CA LINE PRINTER TEST" WILL BE TYPED ON THE TELEPRINTER FOLLOWED BY RESTART ADDRESS 600 EXECUTION OF THE PRINTER READY PORTION OF TEST 1. PRINTING OF THE MESSAGE "POWER-UP" ON THE TELEPRINTER INDICATES START OF THIS TEST SEQUENCE. THIS TEST IS CARRIED OUT BY AN INTERACTIVE EXCHANGE BETWEEN THE TEST AND THE USER.

5. SWITCH REGISTER SETTINGS

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

SWITCH

15 SET	HALT AFTER ERROR PRINTOUT (OPTIONAL IN STATIC TEST ONLY)
15 RESET	CONTINUE AFTER ERROR PRINTOUT
14 SET	132 COL. LINE PRINTER
14 RESET	80 COL. LINE PRINTER
13 SET	96 CHARACTER LINE PRINTER
13 RESET	64 CHARACTER LINE PRINTER
12 SET	LOOP ON ROUTINE
12 RESET	CONTINUE TO THE NEXT

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5.2 ADDRESS ENTRY POINTS

600 CONTROL TEST (TEST 1, SECTION 1)
610 TEST DATA PATHS (TEST 1, SECTION 2)
614 TEST CHARACTER GENERATOR (TEST 1, SECTION 3)
620 TEST ZONE AND FORMAT CONTROL (TEST 1, SECTION 4)
624 TEST WORST CASE NOISE
630 ROTATING PATTERN
634 DOUBLE WEDGE PATTERN
640 HAMMER ALIGNMENT TEST
644 SLEW TEST
650 SCOPE LOOP TEST

6. ERRORS

6.1 COMPUTER DETECTED ERRORS

THE FOLLOWING DISCUSSION DESCRIBES IN GENERAL THE METHOD USED FOR INTERNAL ERROR DETECTION AND ERROR DISPLAY BY THE LINE PRINTER DIAGNOSTIC TEST PROGRAM. MONITORING OF THE CURRENT CONDITION OF THE READY LINE (BIT 7 OF LPS) AND THE ERROR FLAG FLIP-FLOP (BIT 15 OF LPS) AFTER EACH OPERATION AS WELL AS TIME TIME OUT OF THE PRINT CYCLE (PRT TIM), LINE FEED (LF TIME), AND FORM FEED (FF TIM), CYCLES IS CARRIES ON CONTINUOUSLY DURING ALL TESTS WHERE APPROPRIATE AND IS DESCRIBED IN THE FOLLOWING PARAGRAPHS. HOWEVER, ADDITIONAL TESTING IS PERFORMED ESPECIALLY DURING EXECUTION OF THE FIRST SEGMENT OF TEST 1. FOR A COMPLETE DESCRIPTION OF THESE TESTING PROCEDURES USED IN TEST 1 AND THE CORRESPONDING ERROR CONDITIONS, THE READER IS REFERRED TO THE DESCRIPTION OF THE TEST AND THE TEST LISTING.

6.2 ERROR REPORTS

XXX ERROR COUNT
/
EQUALS THE ERROR TAG IN THE ASSEMBLY LISTING.
CONSULT THE ASSEMBLY FOR A DEFINITION OF THE ERROR.

6.3 VISUALLY DETECTED ERRORS

SINCE THE COMPUTER CAN ONLY DETECT THE CURRENT CONDITION OF THE READY AND DEMAND RETURN LINES AND DOES NOT RECEIVE ANY ADDITIONAL DATA BACK FROM THE LINE PRINTER, IT IS NECESSARY TO EXAMINE THE PRINT PATTERNS PRODUCED BY THE VARIOUS TEST ROUTINES OR RESORT TO MANUAL SCOPING PROCEDURES AS PROVIDED BY TEST 7 TO DETECT AND DIAGNOSE ADDITIONAL DIFFICULTIES.

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DETAILED DESCRIPTIONS OF EACH TEST PATTERN APPEARS IN THE
DESCRIPTION OF THE CORRESPONDING TEST ROUTINES.

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7. PROGRAM DESCRIPTION

7.1 GENERAL

7.2 TEST DESCRIPTIONS

7.2.1 TEST 1 COMPREHENSIVE DATA TRANSFER AND CONTROL TEST

TEST 1 IS MADE UP OF SEVERAL SECTIONS LINKED TOGETHER AND EXECUTED AS A SINGLE TEST.

7.2.1.1 TEST 1, SECTION 1 COMMAND DECODE AND CONTROL INTERFACE TEST

THIS PORTION OF TEST 1 IS DESIGNED AS A COMMAND DECODE AND CONTROL INTERFACE TEST AND INCLUDES CHECKOUT OF THE PRINTER INTERRUPT FACILITY. UPON INITIAL ENTRY INTO THIS ROUTINE, MANUAL INTERVENTION IS REQUIRED TO TEST THE VARIOUS TESTABLE ERROR (NON-READY) CONDITIONS OF THE PRINTER. THE OPERATING SEQUENCE IS DESCRIBED IN DETAIL BELOW. AFTER INITIAL ENTRY, THE MANUAL INTERVENTION PART OF THIS TEST WILL NOT BE ENTERED AGAIN.

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

- A. PAPER OUT OR TORN.
- B. DRUM GATE OPEN.
- C. PAPER FEED MOTOR OVER-TEMPERATURE.
- D. POWER SUPPLY FAULT.
- E. DRUM NOT UP TO SPEED.

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

INITIAL MANUAL TEST SEQUENCE:

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

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7.2.1.2 TEST 1, SECTION 2 DATA TRANSFER PATHS TEST

THIS PORTION OF TEST 1 IS DESIGNED TO TEST THE DATA TRANSFER PATHS FROM THE PROCESSOR INTERFACE, THRU THE LINE PRINTER INPUT REGISTER AND INTO THE PRINTER'S 8 X 20 BUFFER MEMORY. SINCE PRINTING WILL ALSO TAKE PLACE, THIS TEST PROVIDES A PRELIMINARY TEST OF THAT FUNCTION AS WELL. AN ALTERNATING STRING OF "0" AND "9" CHARACTERS IS TRANSMITTED TO THE PRINTER ON A FULL 80 COLUMN BASIS. SINCE THESE CHARACTERS ARE COMPLIMENTARY BITWISE, THEY PROVIDE BOTH A ONES AND ZEROS CHECK OF ALL TRANSMISSION LINES. AUTOMATIC PRINTING TAKES PLACE AFTER EACH 20 CHARACTERS IS RECEIVED BY THE PRINTER PROVIDING A CHECK ON ZONE ADVANCE AND HAMMER DRIVER SWITCHING. END OF LINE IS SENSED WITH THE PROCESSOR AND A "LINE FEED" CHARACTER TRANSMITTED AFTER COMPLETION OF THE LAST PRINT CYCLE FOR EACH LINE. PRINTING OF THE TEST LINE IS REPEATED TEN (10) TIMES ALTERNATING THE COLUMN POSITIONS OF THE "0" AND "9" CHARACTERS. COMPLETION OF THIS SECTION OF TEST 1 INITIATES SECTION 3 OF TEST 1 DIRECTLY.

7.2.1.3 TEST 1, SECTION 3 CHARACTER GENERATOR AND COMPARATOR TEST

SECTION 3 OF TEST 1 IS DESIGNED PRIMARILY TO TEST THE LINE PRINTER CHARACTER GENERATOR AND COMPARATOR LOGIC AND ITS ABILITY TO DETECT AND ACT ON BOTH PRINTABLE AND ILLEGAL CHARACTERS. A SERIES OF ALL 64 (OR 96) PRINTABLE CHARACTERS ARE TRANSMITTED IN SEQUENCE TO THE LINE PRINTER AND PRINTED ON A SINGLE LINE BEGINNING WITH THE SPACE CHARACTER (SEE TABLES II AND III FOR THE CHARACTER SEQUENCE).

THIS IS FOLLOWED BY AN ALTERNATE LINE OF ALL 64 ILLEGAL CHARACTERS EACH OF WHICH SHOULD BE CONVERTED TO A SPACE CHARACTER PRODUCING NO VISIBLE PRINTING. THIS SEQUENCE OF ALTERNATING ALL PRINTABLE CHARACTERS FOLLOWED BY ALL ILLEGAL CHARACTERS (NON-PRINTING CHARACTER) IS REPEATED 10 TIMES PRODUCING 20 LINES OF PRINT. COMPLETION OF THIS TEST INITIATES SECTION 4 OF TEST 1 DIRECTLY.

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TABLE II

CHARACTER SEQUENCE AND ASCII CODES
 FOR STANDARD 64-CHARACTER DRUM

ROWS 1-16 -----	ROWS 17-32 -----	ROWS 33-48 -----	ROWS 49-64 -----
SPACE (40)	0 (60)	0 (100)	P (120)
! (41)	1 (61)	A (101)	Q (121)
" (42)	2 (62)	B (102)	R (122)
# (43)	3 (63)	C (103)	S (123)
\$ (44)	4 (64)	D (104)	T (124)
% (45)	5 (65)	E (105)	U (125)
& (46)	6 (66)	F (106)	V (126)
' (47)	7 (67)	G (107)	W (127)
((48)	8 (70)	H (110)	X (130)
) (51)	9 (71)	I (111)	Y (131)
* (52)	! (72)	J (112)	Z (132)
+ (53)	! (73)	K (113)	[(133)
, (54)	4 (74)	L (114)	^ (134)
- (55)	= (75)	M (114)] (135)
. (56)	> (76)	N (116)	~ (136)
/ (57)	? (77)	O (117)	(137)

TABLE III

CHARACTER SEQUENCE AND ASCII CODES FOR
 OPTIONAL 96-CHARACTER DRUM

ROWS 1-16 -----	ROWS 17-32 -----	ROWS 33-48 -----	ROWS 49-64 -----	ROWS 65-80 -----	ROWS 81-96 -----
SPACE (40)	0 (60)	0 (100)	P (120)	(140)	P (160)
! (41)	1 (61)	A (101)	Q (121)	A (141)	Q (161)
" (42)	2 (62)	B (102)	R (122)	B (142)	R (162)
# (43)	3 (63)	C (103)	S (123)	C (143)	S (163)
\$ (44)	4 (64)	D (104)	T (124)	D (144)	T (164)
% (45)	5 (65)	E (105)	U (125)	E (145)	U (165)
& (46)	6 (66)	F (106)	V (126)	F (146)	V (166)
' (47)	7 (67)	G (107)	W (127)	G (147)	W (167)
((48)	8 (70)	H (110)	X (130)	H (150)	X (170)
) (51)	9 (71)	I (111)	Y (131)	I (151)	Y (171)
* (52)	! (72)	J (112)	Z (132)	J (152)	Z (172)
+ (53)	! (73)	K (113)	[(133)	K (153)	(173)
, (54)	4 (74)	L (114)	^ (134)	L (154)	(174)
- (55)	= (75)	M (115)] (135)	M (155)	(175)
. (56)	> (76)	N (116)	(136)	N (156)	(176)
/ (57)	? (77)	O (117)	(137)	O (157)	(177)

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7.2.1.4 TEST 1, SECTION 4 FORMAT CONTROL CHARACTER TEST

SECTION 4 OF TEST 1 IS DESIGNED TO TEST THE ABILITY OF THE LINE PRINTER TO DETECT AND ACT UPON EACH OF THE FORMAT CONTROL CHARACTERS, "CR", "LF", AND "FF". THE TEST IS PERFORMED BY FIRST TRANSMITTING 20 SPACE CHARACTERS (ONE FULL SEGMENT) FOLLOWED BY A "CR" CHARACTER. THIS SEQUENCE WILL CAUSE THE FIRST SEGMENT OF THE PRINTER TO BE LOADED AND PRINTED AFTER WHICH THE PRINTER'S ZONE COUNTER WILL BE RESET TO COLUMN 1. PAPER FEED SHOULD NOT TAKE PLACE DURING THIS CYCLE. THE PRECEDING STRING IS THEN FOLLOWED BY 20 "A" CHARACTERS, A "CR" AND FINALLY A "FF" CHARACTER. THIS SHOULD AGAIN CAUSE PRINTING AND RETURN OF THE ZONE COUNTER TO COLUMN 1 OVER-PRINTING THE "A"'S ON THE PREVIOUSLY PRINTED SPACES. THIS SEQUENCE OF FIRST PRINTING SPACES AND THEN OVER-PRINTING "A"'S IS CONTINUED 4 MORE TIMES, EACH TIME INCREASING THE LINE LENGTH BY AN ADDITIONAL 20 "SPACE" AND "A" CHARACTERS UNTIL ALL 4 SEGMENTS OF THE 80 COLUMN PRINT LINE HAVE BEEN COVERED. THE WHOLE TEST SEQUENCE IS REPEATED 10 TIMES PRODUCING A SERIES OF 10 LEFT TRIANGLES EXTENDING DOWN THE PAPER APPARENTLY MADE UP OF THE LETTER "A". THE FINAL CHARACTER TRANSMITTED IN THIS TEST TO THE LINE PRINTER IS THE FORM FEED (FF) CHARACTER WHICH SHOULD PRODUCE A SLEW TO TOP OF PAGE TERMINATING TEST 1.

7.2.2 TEST 2 SINGLE CHARACTER, ALL COLUMNS TEST

THIS TEST IS DESIGNED AS A WORST CASE HAMMER DRIVER AND SUPPLY TEST AS WELL AS A PRINTER ENDURANCE TEST. 80 COLUMNS OF EACH OF THE 64 PRINTABLE CHARACTERS IS TRANSMITTED TO THE LINE PRINTER AND PRINTED IN ROTATION. THE COMPLETE CHARACTER SEQUENCE IS AS SHOWN IN TABLE II AND A SAMPLE OF THE PRINTOUT SHOWN BELOW.

```

- - - - -
|||| - - - - - |||
-- - - - - ----
-- - - - - ----
-- - - - - ----
AAAA - - - - - AAA
BBBB - - - - - BBB
-- - - - - --
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7.2.3 TEST 3 ROTATING PATTERN TEST

THIS TEST IS DESIGNED AS A WORST CASE NOISE AND ENDURANCE TEST OF THE LINE PRINTER. A ROTATING, 68 COLUMN PATTERN FOLLOWING THE CHARACTER SEQUENCE SHOWN IN TABLE II IS TRANSMITTED TO THE LINE PRINTER AND PRINTED. A SAMPLE OF THE PRINT PATTERN IS SHOWN BELOW:

```

  |"08- - - - - - - -ABC- - - - - - - -)|
  |"09- - - - - - - -ABC- - - - - - - -)|
  
```

7.2.4 TEST 4 RIGHT AND LEFT HAND WEDGE PATTERN TEST

THIS TEST IS DESIGNED TO DETECT SPURIOUS HAMMER FIRINGS DURING OPERATION OF THE LINE PRINTER. THE PATTERNS WHICH ARE PRODUCED ARE RIGHT AND LEFT HAND WEDGES EACH COMPOSED OF 80 LINES OF "?" CHARACTERS AS SHOWN BELOW:

```

  PRINTED AREA
  " ? " CHAN.
  -----
  LEFT-HAND CYCLE (80 LINES)
  -----
  FULL CYCLE (160 LINES)
  -----
  RIGHT-HAND CYCLE (80 LINES)
  -----
  
```

A FULL CYCLE CONSISTS OF BOTH THE RIGHT AND LEFT HAND WEDGES. THE LEFT HAND WEDGE IS FORMED SIMPLY BY TRANSMITTING AND PRINTING DECREASING NUMBERS OF CHARACTERS TO THE PRINTER ON SUCCESSIVE LINES UNTIL THE NUMBER OF CHARACTERS TO BE TRANSMITTED BECOMES ZERO. EACH LINE IS TERMINATED BY A "LF" CHARACTER CAUSING PAPER FEED TO OCCUR. THE RIGHT HAND WEDGE HOWEVER, REQUIRES THAT INCREASING NUMBERS OF LEADING SPACES BE TRANSMITTED FOLLOWED BY "?" CHARACTERS TO FILL OUT THE LINE. AGAIN, EACH LINE IS TERMINATED WITH A "LF" CHARACTER.

7.2.5 TEST 5 HAMMER ALIGNMENT TEST

THIS ROUTINE IS DESIGNED TO BE USED AS A DRIVER FOR MANUAL HAMMER ALIGNMENT AND INTENSITY ADJUSTMENTS OF THE LINE PRINTER. NO INTERNAL ERROR TESTS ARE MADE DURING THE EXECUTION OF THIS ROUTINE. IN OPERATION, THIS TEST PRINTS A FULL 80 COLUMN LINES OF "E" CHARACTERS. MORE DETAIL CONCERNING THE OPERATION OF THE ROUTINE MAY BE OBTAINED FROM THE PROGRAM LISTINGS.

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7.2.6 TEST 6 SLEN TEST

THE PURPOSE OF THIS TEST IS TO INSURE THAT THE PAPER FEED DRIVE AND CLUTCH ARE OPERATING PROPERLY AND THAT THE FUNCTION OF MULTIPLE LINE SLEWS CAN BE PERFORMED CORRECTLY. IN THE LATTER CASE, THE DEMAND LINE FROM THE LINE PRINTER GOES HIGH BEFORE THE ACTUAL END OF THE PREVIOUS LINE FEED OPERATION HAS BEEN COMPLETED. IF A SECOND LINE FEED APPEARS AS THE FIRST CHARACTER TRANSMITTED FOR THE NEW LINE, SLEWING WILL CONTINUE TO THE NEXT LINE WITHOUT A STOP IN BETWEEN. THIS MODE OF OPERATION WILL IN FACT CONTINUE AS LONG AS LINE FEEDS ARE TRANSMITTED AS THE FIRST CHARACTER AND BEFORE THE END OF SLEW HAS OCCURRED FOR THE CURRENT LINE. THE TEST CONSISTS OF A ROUTINE TO PRINT A LINE OF E'S FOLLOWED BY MULTIPLE LINE SLEWS AS DETERMINED BY A LINE SLEW TABLE. THE ENTRIES IN THE TABLE ARE AS FOLLOWS:

LINE NO.	NO. OF LINES SLEWED AFTER PRINTING
-----	-----
1	3
2	2
3	10
4	14
5	6
6	3
7	8
8	4
9	5
10	5
11	3

THE TOTAL NUMBER OF LINES SLEWED AND PRINTED IS 63 OR ONE FULL PAGE. CAREFUL EXAMINATION OF THE PRINTED LINES SHOULD DETERMINE IF ANY CLUTCH SLIPPAGE IS TAKING PLACE.

NO INTERNAL ERRORS ARE DETECTED DURING THIS TEST AND THE READER IS REFERRED TO THE PROGRAM LISTING FOR FURTHER DETAILS ON THE OPERATION OF THE ROUTINE.

7.2.7 TEST 7 SCOPE DRIVE ROUTINE

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

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511      /
512      /*****LP11 PRINTER TEST*****/
513      /
514      /
515      /
516      /
517      /
518      /DATA PRODUCTS 2310 LINE PRINTER
519      /
520      /LIST OF SWITCH SETTINGS USED IN THIS TEST
521      /SWITCH NO.      DESCRIPTION
522      /15             SET HALT AFTER ERROR PRINT OUT (OPTIONAL IN STATIC TEST ONLY).
523      /14             SET = 132 COL. PRINTER.
524      /13             "DOWN" 64 CHAR./"UP"-96 CHAR OPTION
525      /12             LOOP ON TEST
526      /
527      /
528      /
529      /ENABL  ABS
530      /ENABL  AMA
531      /
532      /
533      /
534      /
535      /
536      000007      PC=17
537      000006      SP=16
538      /
539      100000      BIT15=100000
540      040000      BIT14=40000
541      020000      BIT13=20000
542      010000      BIT12=10000
543      004000      BIT11=4000
544      002000      BIT10=2000
545      001000      BIT9=1000
546      000400      BIT8=400
547      000200      BIT7=200
548      000100      BIT6=100
549      000040      BIT5=40
550      000020      BIT4=20
551      000010      BIT3=10
552      000004      BIT2=4
553      000002      BIT1=2
554      000001      BIT0=1
555      /
556      /
557      /
558      /
559      000000      .=0
560      /
561      /THE FIRST 100 LOCATIONS WILL HAVE
562      /      .+2
563      /      HALT
564      /AS TRAP CATCHERS

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565
566
567 000030 000030 .030
568 000032 000746 TYP
569 000042 000340 340
570 000042 000042 .042
571 000046 000000 0
572 000046 000046 .046
573 000052 000424 LOGICAL
574 000052 040000 .052
575 BIT14
576
577 000174 000174 .0174
578 000176 000000 DISPREG: 0
579 000176 000000 SWREG: 0
580
581 000200 000200 .0200
582 000204 012706 001000 MOV #1000,X6
583 000204 000137 001056 JMP SETUP
584 000600 000600 .0600
585 000604 012706 001000 MOV #1000,X6
586 000604 000137 002074 JMP TEST2A
587 000610 000137 002422 JMP TEST2B
588 000614 000137 003240 JMP TEST3
589 000620 000137 003732 JMP SNGCHR
590 000624 000137 004304 JMP ROTATE
591 000630 000137 005052 JMP TST6
592 000634 000137 006110 JMP HAMALN
593 000640 000137 006254 JMP SLWTSY
594 000644 000137 007514 JMP SCGPE
595 000650 000137 001316 JMP TEST1
596
597
598
599 001000 177514 .01000
600
601
602
603 001002 177516
604
605
606
607
608 001004 177570
609 001006 177570
610 001010 177776
611 001012 177566
612 001014 177562
613 001016 177564
614 001020 177560
615
616 000240
617 000000
618
  
```

```

;
;LINE PRINTER HARDWARE REGISTERS
;
LPS: 177514 ;STATUS REGISTER
;BIT 15=ERROR
;BIT 7=READY
;BIT 6=INTERRUPT ENABLE
LPB: 177516 ;DATA BUFFER REGISTER
;BITS 0-6=7 BIT ASCII CHARACTER BUFFER
;BITS 7-15=NOT USED
;
;
SWR: 177570
DISPLAY: 177570
PS: 177776
TPB: 177566
TKB: 177562
TPS: 177564
TKS: 177560
NOP=240
N=0
  
```

MI

```

619                                     ;
620                                     ;MACRO FOR SETTING UP ERROR COUNT
621                                     .MACR   ERROR X
622   ERR'X': MOV BX, ERCOUNT           ;SET UP ERROR COUNT X
623                                     N=N+1
624                                     .ENDM
625                                     ;
626                                     ;
627                                     ;
628   ;MEMORY LOCATIONS USED AS PROGRAM FLAGS AND COUNTERS
629   ;
630   001022  000000  SEGCNT: 0           ;SEGMENT COUNTER
631   001024  000000  CHRCNT: 0
632   001026  000000  CHRGEN: 0
633   001030  000000  LINCNT: 0
634   001032  000000  CYCCNT: 0
635   001034  000000  ERNO: 0
636   001036  000000  TSTNO: 0
637   001040  000000  LOCAL: 0
638   001042  000000  TSTSW: 0
639   001044  000000  WORK: 0
640   001046  000000  SAVE: 0
641   001050  000000  ERCOUNT: 0
642   001052  000000  WIDTH: 0
643   001054  000000  SEGMNT: 0
644   ;
645   ;ROUTINE TO TEST THE MECH. OPERATION OF THE 1310
646   ;
647   ;
648   001056  000005  SETUP:  RESET
649   001060  013746  000004  MOV     4, -(SP)      ;SAVE CURRENT VECTORS
650   001064  013746  000006  MOV     6, -(SP)
651   001070  012737  021104  000004  MOV     @18, 4
652   001076  005777  177702  TST    @SWR
653   001102  000407  BR      28          ;TRY TO REFERENCE HARDWARE SWR
654   001104  ;
655   001104  012737  000176  001004  BR      19;         ;BRANCH IF NO TIMEOUT TRAP OCCURS
656   001112  012737  000174  001006  MOV     @SWREG, SWR    ;POINT TO SOFTWARE SWITCH REG
657   001120  022626  MOV     @DISPREG, DISPLAY ;POINT TO DISPLAY REGISTER
658   001122  ;
659   001122  012637  000004  CMP     (SP)+, (SP)+  ;RESTORE STACK
660   001126  012637  000006  MOV     (SP)+, 4
661   001132  104000  MOV     (SP)+, 6
662   001134  007230  ENT     @0
663   001136  104000  ENT     MES1
664   001140  007276  ENT     @0
665   001142  104000  ENT     MES2
666   001144  007323  ENT     @0
667   001146  000000  ENT     MES3
668   001150  005777  177624  HALT
669   001154  100006  STP1:  TST    @LPS
670   001156  012737  000000  001050  BPL    STP2
671   001156  000001  ERROR: MOV    @0, ERCOUNT ;TEST FOR ERROR
672                                     ;NO ERROR TEST FOR READY
673                                     ;REPORT ERROR
674                                     ;SET UP ERROR COUNT 0

```

AZ

```

673 001164 004537 007152          JSR    X5,STAER      ;REPORT ERROR BIT SET
674 001170 000767          BR     STP1          ;GO TEST FOR ERROR NOT
675
676 001172 105777 177602          STP2:  TSTB    0LPS      ;TEST FOR READY
677 001176 100406          BMI    STP3          ; READY SET OK
678 001200          ERROR    \N          ;REPORT READY NOT SET
679 001200 012737 000001 001050  ERR1:  MOV 01, ERCOUNT  ;SET UP ERROR COUNT 1
680          000002          N=N+1
681 001206 004537 007152          JSR    X5,STAER      ;REPORT READY NOT SET
682 001212 000767          BR     STP2          ;GO TEST FOR READY
683 001214 104000          STP3:  EMT    +0      ;REPORT
684 001216 007352          MESS   \N          ;PRINTER OK "READY SET" TRY TORN PAPER SWITCH
685 001220 000000          HALT                    ;DEPRESS CONTINUE WHEN READY
686
687 001222 012777 000014 177552          MOV    014,0LPS      ;SEND A "FF" TO THE PRINTER
688 001230 012777 000015 177544          MOV    015,0LPS      ;ATTEMPT "FF" BY SENDING "CR"
689 001236 005777 177536          TST    0LPS          ;TEST FOR ERROR
690 001242 100406          BMI    STP5          ;
691 001244          ERROR    \N          ;REPORT ERROR NOT SET
692 001244 012737 000002 001050  ERR2:  MOV 02, ERCOUNT  ;SET UP ERROR COUNT 2
693          000003          N=N+1
694 001252 004537 007152          JSR    X5,STAER      ;REPORT ERROR
695 001256 000767          BR     STP4          ;LOOP ON ERROR
696 001260 104000          STP5:  EMT    +0      ;
697 001262 007414          MESS   \N          ;
698 001264 000000          HALT                    ;DEPRESS CONTINUE WHEN READY
699 001266 005777 177506          STP6:  TST    0LPS      ;
700 001272 100406          BMI    STP7          ;
701 001274          ERROR    \N          ;
702 001274 012737 000003 001050  ERR3:  MOV 03, ERCOUNT  ;SET UP ERROR COUNT 3
703          000004          N=N+1
704 001302 004537 007152          JSR    X5,STAER      ;
705 001306 000767          BR     STP6          ;
706 001310 104000          STP7:  EMT    +0      ;
707 001312 007457          MESS   \N          ;
708 001314 000000          HALT                    ;
709
710          ;
711          ;TEST 1, SECTION 1
712          ;PERFORMS PRELIMINARY COMMAND AND REGISTER TESTING.
713          ;
714          ;
715          ;IS THE PRINTER FREE OF ERRORS
716 001316 000005          TEST1:  RESET                    ;CLEAR THE WORLD
717 001320 005777 177454          TST    0LPS          ;IS ERROR FLAG CLEAR
718 001324 100006          BPL    TEST1A        ;ERROR IS CLEAR OK
719 001326          ERROR    \N          ;
720 001326 012737 000004 001050  ERR4:  MOV 04, ERCOUNT  ;SET UP ERROR COUNT 4
721          000005          N=N+1
722 001334 004537 007152          JSR    X5,STAER      ;REPORT ERROR SET
723 001340 000766          BR     TEST1         ;LOOP ON ERROR
724          ;
725          ;IS READY SET (NO ERRORS EXIST)
726 001342 000005          TEST1A:  RESET                    ;CLEAR THE WORLD

```

B2


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727 001344 105777 177430          TSTB  0LPS          /IS READY SET
728 001350 100406          BMI   TEST1B      /READY SET! PRINTER OK
729 001352          ERROR  \N        /REPORT READY NOT SET
730 001352 012737 000005 001050 ERR5:  MOV 05, ERCOUNT  /SET UP ERROR COUNT 5
731          000006          N=N+1
732 001360 004537 007152          JSR   %5,STAER    /REPORT READY NOT SET
733 001364 000766          BR    TEST1A      /LOOP ON ERROR
734
735          /
736          /DOES LOADING THE BUFFER RESET READY
737 001366 032777 040000 177410 TEST1B: BIT 0BIT14,0SWR  /IS THE PRINTER 132 COL
738 001374 001043          BNE   TEST1C      /YES SKIP THIS TEST
739 001376 005037 001044          CLR   WORK        /CLEAR COUNTER
740 001402 012777 000015 177372          MOV 015,0LPB     /LOAD CARRIAGE RETURN INTO BUFFER
741 001410 105777 177364          TSTB  0LPS          /IS READY CLEAR
742 001414 100006          BPL   LP1         /READY TO CLEAR OK!
743 001416          ERROR  \N        /REPORT READY STILL SET
744 001416 012737 000006 001050 ERR6:  MOV 06, ERCOUNT  /SET UP ERROR COUNT 6
745          000007          N=N+1
746 001424 004537 007152          JSR   %5,STAER    /REPORT READY STILL SET
747 001430 000756          BR    TEST1B      /LOOP ON ERROR
748 001432 005777 177342          LP1:  TST  0LPS     /IS THERE AN ERROR
749 001436 100006          BPL   LP2         /NO ERROR CONTINUE
750 001440          ERROR  \N
751 001440 012737 000007 001050 ERR7:  MOV 07, ERCOUNT  /SET UP ERROR COUNT 7
752          000010          N=N+1
753 001446 004537 007152          JSR   %5,STAER    /REPORT ERROR OCCURRED
754 001452 000745          BR    TEST1B      /LOOP ON ERROR
755
756 001454 105777 177320          LP2:  TSTB  0LPS     /IS THE PRINTER STILL BUSY
757 001460 100411          BMI   TEST1C      /NO! GO TO NEXT TEST
758 001462 005237 001044          INC   WORK        /YES! GO CHECK FLAGS
759 001466 001361          BNE   LP1         /PRINTER STILL BUSY WAIT
760 001470          ERROR  \N
761 001470 012737 000010 001050 ERR10: MOV 010, ERCOUNT  /SET UP ERROR COUNT 10
762          000011          N=N+1
763 001476 004537 007152          JSR   %5,STAER    /ERROR REPORT TIME OUT
764 001502 000731          BR    TEST1B      /LOOP ON ERROR
765
766          /
767          /CHECK INTERRUPT LEVEL OF PRINTER
768          /THE PRINTER SHOULD BE AT LEVEL 4
769          /
770          /TEST THAT THE PRINTER WILL NOT INTERRUPT AT LEVEL 7
770 001504 012737 001740 000200 TEST1C: MOV 0INT1C,200  /SET UP INT VECTOR
771 001512 012737 000340 000202          MOV 0340,202
772 001520 005777 177254          TST  0LPS          /TEST FOR ERROR
773 001524 100006          BPL   LP3         /NO ERROR CONTINUE
774 001526          ERROR  \N        /REPORT ERROR SET
775 001526 012737 000011 001050 ERR11: MOV 011, ERCOUNT  /SET UP ERROR COUNT 11
776          000012          N=N+1
777 001534 004537 007152          JSR   %5,STAER    /REPORT ERROR SET
778 001540 000761          BR    TEST1C      /LOOP ON ERROR
779 001542 105777 177232          LP3:  TSTB  0LPS     /TST FOR READY
780 001546 100406          BMI   LP3X        /READY SET OK

```

```

701 001550          ERROR  \N          ;REPORT READY NOT SET
702 001550 012737 000P12 001050 ERR12: MOV #12,          ERCOUNT          ;SET UP ERROR COUNT 12
703          000013          NON+1
704 001556 004537 007152          JSR  X5,STAER          ;REPORT READY NOT SET
705 001562 000750          BR  TEST1C          ;LOOP ON ERROR
706 001564          LPSX:  ERROR  \N
707 001564 012737 000013 001050 ERR13: MOV #13,          ERCOUNT          ;SET UP ERROR COUNT 13
708          000014          NON+1
709 001572 012777 000340 177210      MOV  #340,0PS          ;LOCKUP PROCESSOR
710 001600 052777 000100 177172      BIS  #100,0LPS          ;SET PRINTER INTO ENABLE
711 001606 000240          NOP
712 001610 042777 000100 177162      BIC  #100,0LPS          ;CLEAR PRINTER INT. ENABLE
713
714          ;
715          ;TEST THAT THE PRINTER WILL NOT INTERRUPT AT LEVEL 6
716 001616 012737 000014 001050 ERR14: MOV #14,          ERCOUNT          ;SET UP ERROR COUNT 14
717          000015          NON+1
718 001624 012777 000300 177156      MOV  #300,0PS          ;SET PROCESSOR PRIORITY LEVEL 6
719 001632 052777 000100 177140      BIS  #100,0LPS          ;SET PRINTER INT ENABLE
720 001640 000240          NOP
721 001642 042777 000100 177130      BIC  #100,0LPS          ;CLEAR PRINTER INT. ENABLE
722
723          ;
724          ;TEST THAT THE PRINTER WILL NOT INT. AT
725          ;PROCESSOR LEVEL 5
726          ;
727 001650          ERROR  \N
728 001650 012737 000015 001050 ERR15: MOV #15,          ERCOUNT          ;SET UP ERROR COUNT 15
729          000016          NON+1
730 001656 012777 000240 177124      MOV  #240,0PS          ;SET UP PROCESSOR TO LEVEL 5
731 001664 052777 000100 177106      BIS  #100,0LPS          ;SET PRINTER INT ENABLE
732 001672 000240          NOP
733 001674 042777 000100 177076      BIC  #100,0LPS          ;CLEAR INT ENABLE PRINTER OK
734
735          ;
736          ;TEST THAT THE PRINTER WILL NOT INT
737          ;WHEN THE PROCESSOR IS AT LEVEL 4
738          ;
739 001702          ERROR  \N
740 001702 012737 000016 001050 ERR16: MOV #16,          ERCOUNT          ;SET UP ERROR COUNT 16
741          000017          NON+1
742 001710 012777 000200 177072      MOV  #200,0PS          ;SET PROCESSOR TO LEVEL 4
743 001716 052777 000100 177054      BIS  #100,0LPS          ;SET PRINTER INT. ENABLE
744 001724 000240          NOP
745 001726 042777 000100 177044      BIC  #100,0LPS          ;CLEAR PRINTER INT ENABLE
746 001734 000137 001752          JMP  TEST1D          ;PRINTER OK CONTINUE
747
748          ;
749          ;
750          ;INTERRUPT HANDLE FOR TEST1C
751          ;RESTORE STACK AND REPORT ERROR
752          ;
753 001740 022626          INT1C: CMP  (6)+,(6)+          ;RESTORE STACK
754 001742 004537 007152          JSR  X5,STAER          ;REPORT ERROR
755 001746 000137 001504          JMP  TEST1C          ;RE-ENTER TEST1C

```

D2

```

035
036
037
038
039      ;TEST THE ABILITY OF THE PRINTER TO INTERRUPT
040      ;AT PRIORITY LEVEL 4
041
042      TEST10:  MOV     @INT10,200      ;SET UP INTERRUPT VECTOR
043              MOV     @340,202      ;LOCK UP PRIORITIES
044              TST     @LPS          ;IS THERE A PRINTER ERROR
045              BPL     LPS          ;NO! CONTINUE
046              ERROR   \N
047      ERR17:  MOV     @17,          ERCOUNT      ;SET UP ERROR COUNT 17
048              N=N+1
049              JSR     X5,STAER      ;REPORT PRINTER ERROR
050              BR     TEST10        ;LOOP ON ERROR
051      LP4:    TST     @LPS          ;IS READY SET
052              BHI     LPS          ;YES - PRINTER READY
053              ERROR   \N
054      ERR20:  MOV     @20,          ERCOUNT      ;SET UP ERROR COUNT 20
055              N=N+1
056              JSR     X5,STAER      ;REPORT READY NOT SET
057              BR     TEST10        ;LOOP ON ERROR
058      LPS:    MOV     @140,@PS       ;SET PRIORITY TO LEVEL 3
059              BIS     @100,@LPS     ;SET PRINTER INTERRUPT ENABLE
060              NOP
061              ERROR   \N
062      ERR21:  MOV     @21,          ERCOUNT      ;SET UP ERROR COUNT 21
063              N=N+1
064              JSR     X5,STAER      ;REPORT ERROR
065              BR     TEST10        ;LOOP ON ERROR
066
067      ;
068      ;INTERRUPT HANDLER FOR TEST10
069      INT10:  CMP     (6)+,(6)+      ;RESET STACK
070              BIC     @100,@LPS     ;CLEAR INT. ENABLE FOR PRINTER
071      ;ENTER NEXT TEST
072
073      ;TEST1 SECTION 2
074      ;TESTS INTERFACE AND PRINTER DATA PATHS
075      ;WITH ALTERNATING ONES AND ZEROS
076
077      TEST2A: JSR     X7,SIZE        ;INITIALIZE PRINTER
078              JSR     X5,PRINT
079              BR     TST2AX
080              ERROR   \N
081      ERR22:  MOV     @22,          ERCOUNT      ;SET UP ERROR COUNT 22
082              N=N+1
083              JSR     X5,STAER      ;REPORT PRINTER NOT READY
084              HALT
085      TST2AX: MOV     @-41,CYCCNT     ;SET UP PASS COUNT
086              MOV     WIDTH,LINCNT  ;RESET ZONE COUNT
087              MOV     SEGMENT,SEGCNT ;RESET SEGMENT COUNT
088              MOV     SCHRSH,CHARSW ;SET CHAR. SWITCH TO 0
  
```

```

000 002152 005777 176622          T3A:  TST      0LPB
001 002156 100006                BPL      LP2B
002 002160                ERROR    \N
003 002160 012737 000023 001050 ERR23: MOV #23,   ERCOUNT      ISET UP ERROR COUNT 23
004 002160 000024                N=N+1
005 002166 004537 007152          JSR      X5,STAER      IREPORT ERROR SET
006 002172 000000                HALT
007 002174 000177 000214          LP2B:  JMP      0CHARSW      IOPERATOR MUST TAKE ACTION
008 002200 013737 002416 002414 T1A:  MOV      SCHARSW,CHARSW  ISET CHAR, SWITCH TO 0
009 002206 012737 000100 001046 MOV      #100,SAVE
010 002214 013777 001046 176560 T5A:  MOV      SAVE,0LPB    ILOAD BUFFER
011 002222 005237 001022          INC      SEGCNT      IINC SEGMENT COUNT
012 002226 001401                BEQ      ,+4
013 002230 000750                BR       T3A
014 002232 013737 001054 001022 MOV      SEGMNT,SEGCNT  IRESET SEGMENT COUNT
015 002240 004537 006632          JSR      X5,PRTHM      ITEST CHAR, PRINT TIME
016 002244 000405                BR       LPSA
017 002246                ERROR    \N
018 002246 012737 000024 001050 ERR24: MOV #24,   ERCOUNT      IREPORT TOO LONG TO PRINT
019 002246 000025                N=N+1      ISET UP ERROR COUNT 24
020 002254 004537 007152          JSR      X5,STAER
021 002260 005237 001030          LPSA:  INC      LINCNT      IINC. ZONE COUNT
022 002264 001414                BEQ      XLINF
023 002266 032777 040000 176510 BIT      @BIT14,@SWR
024 002274 001726                BEQ      T3A
025 002276 022737 177777 001030 CMP      @-1,LINCNT
026 002300 001322                BNE     T3A
027 002306 012737 177760 001022 MOV      @-12,,SEGCNT
028 002314 000716                BR       T3A
029 002316 013737 001052 001030 XLINF: MOV      WIDTH,LINCNT  IRESET ZONE COUNT
030 002324 012777 000012 176450 MOV      #12,0LPB    IISSUE LINE FEED
031 002332 004537 006642          JSR      X5,SLWTIM    ICHECK SLEW TIME
032 002336 000405                BR       LPSB
033 002340                ERROR    \N
034 002340 012737 000025 001050 ERR25: MOV #25,   ERCOUNT      IREPORT TOO LONG OF TIME FOR SLOW
035 002340 000026                N=N+1      ISET UP ERROR COUNT 25
036 002346 004537 007152          JSR      X5,STAER
037 002352 005237 001032          LPSB:  INC      CYCCNT      IINC CYCLE COUNT
038 002356 001401                BEQ      ,+4
039 002360 000674                BR       T3A
040 002362 032777 010000 176414 BIT      @BIT12,@SWR
041 002370 001241                BNE     TEST2A
042 002372 000413                BR       TEST2B
043
044
045
046 002374 013737 002420 002414 T2A:  MOV      RCHARSW,CHARSW  IRESET CHAR, SWITCH
047 002402 012737 000077 001046 MOV      #77,SAVE
048 002410 000137 002214          JMP      T5A          ILOAD CHAR.
049
050
051
052 002414 000000          CHARSW: 0

```

943	002416	002374				SCHR5W: T2A
944	002420	002200				RCHR5W: T1A
945]
946						
947						ITEST 1, SECTION 3
948						ITEST CHARACTER COMPARATOR WITH ALTERNATE LINES OF
949						ALL CHARACTERS AND ILLEGAL CHARACTERS
950]
951]
952	002422	004737	006566			TEST20: JSR X7,SIZE
953	002426	032777	020000	176350		BIT @BIT13,@SHR ITEST FOR 96 CHR SW,
954	002434	001412				BEQ LP2C I NOT 96 = 64 CHARACTERS
955	002436	012737	177766	001032		MOV @-12,CYCCNT ISET 10 CYCLES, 30 LINES
956	002444	012737	002624	003234		MOV @T207,NOCHRS ISET NO. CHAR. SWITCH
957	002452	012737	177640	003236		MOV @-96.,LEGCHR ISTORE CHAR. CNT
958	002460	000411				BR T200 IGO PRINT
959	002462	012737	177761	001032	LP2C:	MOV @-17,CYCCNT ISET CYCLE FOR 30 LINES
960	002470	012737	002720	003234		MOV @T202,NOCHRS IRESET NO. CHAR. SW.
961	002476	012737	177700	003236		MOV @-64.,LEGCHR ISTORE 64 CHAR. CNT
962	002504	013737	001052	001030	T200:	MOV WIDTH,LINCNT ISET UP LINE CNT
963	002512	012737	000040	001026		MOV @40,CHRGEN ISET FIRST CHAR.
964	002520	013737	003236	001024		MOV LEGCHR,CHRCNT ISET CHAR: COUNT
965	002526	013737	001054	001022		MOV SEGMENT,SEGCNT IRESET SEG. COUNT
966	002534	005777	176240		T201:	TST @LPS IDOES THE PRINTER HAVE AN ERROR
967	002540	100006				BPL LP2E IBRANCH IF NO ERROR
968	002542					ERROR \N
969	002542	012737	000026	001050	ERR26:	MOV @26, ERCOUNT ISET UP ERROR COUNT 26
970		000027				N=N+1
971	002550	004537	007152			JSR X5,STAER IREPORT ERROR
972	002554	000000				HALT IERROR SET OPERATOR MUST TAKE ACTION
973	002556	013777	001026	176216	LP2E:	MOV CHRGEN,@LPS IPRINT CHARACTER
974	002564	005237	001022			INC SEGCNT IINC. SEGMENT COUNT
975	002570	001053				BNE T202
976	002572	013737	001054	001022		MOV SEGMENT,SEGCNT
977	002600	004537	006632			JSR X5,PRTH ICHECK PRINT TIME
978	002604	000405				BR LP2F IBRANCH IF NO PRINT TIME ERROR
979	002606					ERROR \N
980	002606	012737	000027	001050	ERR27:	MOV @27, ERCOUNT ISET UP ERROR COUNT 27
981		000030				N=N+1
982	002614	004537	007152			JSR X5,STAER IREPORT PRINT TIME ERROR
983	002620	000177	000410		LP2F:	JMP @NOCHRS
984	002624	005237	001030		T207:	INC LINCNT
985	002630	001414				BEQ REFIL
986	002632	032777	040000	176144		BIT @BIT14,@SHR
987	002640	001427				BEQ T202
988	002642	022737	177777	001030		CMP @-1,LINCNT
989	002650	001023				BNE T202
990	002652	012737	177764	001022		MOV @-12.,SEGCNT
991	002660	000417				BR T202
992	002662	013737	001052	001030	REFIL:	MOV WIDTH,LINCNT IRESET LINE COUNT
993	002670	012777	000012	176104		MOV @12,@LPS IISSUE LINE FEED
994	002676	004537	006642			JSR X5,SLWTIM ICHECK SLEW TIME
995	002702	000406				BR T202 ITIME OK
996	002704					ERROR \N

G2

997	002704	012737	000030	001050	ERR30:	MOV #30,	ERCOUNT	1SET UP ERROR COUNT 30
998		000031				NON+1		
999	002712	004537	007152			JSR	X5,STAER	1REPORT SLEW TIME TOO LONG
1000	002716	000000				HALT		
1001	002720	005237	001026		T202:	INC	CHRGEN	1SET UP NEXT CHARACTER
1002	002724	005237	001024			INC	CHRCNT	1INC. CHAR. COUNT
1003	002730	001301				BNE	T201	
1004	002732	012777	000012	176042		MOV	#12,PLPB	1ISSUE LINE FEED
1005	002740	004537	006642			JSR	X5,SLWTIM	1CHECK SLEW TIME
1006	002744	000406				BR	LP2H	1SLEW TIME OK
1007	002746					ERROR	\N	
1008	002746	012737	000031	001050	ERR31:	MOV #31,	ERCOUNT	1SET UP ERROR COUNT 31
1009		000032				NON+1		
1010	002754	004537	007152			JSR	X5,STAER	1REPORT TIME TOO LONG
1011	002760	000000				HALT		
1012	002762	013737	001054	001022	LP2H:	MOV	SEGMNT,SEGCNT	1RESET SEGMENT COUNT
1013	002770	012737	000200	001024		MOV	#200,CHRCNT	
1014	002776	063737	003236	001024		ADD	LEGCHR,CHRCNT	1SETUP # OF ILLEGAL CHARACTERS
1015	003004	005137	001024			COM	CHRCNT	
1016	003010	005237	001024			INC	CHRCNT	
1017								
1018	003014	005777	175760		T203:	TST	#LPB	1TEST FOR ERROR
1019	003020	100006				BPL	LDCH	1BRANCH IF NO ERROR
1020	003022					ERROR	\N	
1021	003022	012737	000032	001050	ERR32:	MOV #32,	ERCOUNT	1SET UP ERROR COUNT 32
1022		000033				NON+1		
1023	003030	004537	007152			JSR	X5,STAER	1REPORT ERROR SET
1024	003034	000000				HALT		
1025	003036	013777	001026	175736	LDCH:	MOV	CHRGEN,#LPB	1TRANSMIT CHARACTER
1026	003044	005237	001022			INC	SEGCNT	1+1 SEGMENT COUNT
1027	003050	001014				BNE	T204	
1028	003052	013737	001054	001022		MOV	SEGMNT,SEGCNT	1RESET SEGMENT COUNT
1029	003060	004537	006632			JSR	X5,PRTTM	1CHECK PRINT TIME
1030	003064	000406				BR	T204	
1031	003066					ERROR	\N	
1032	003066	012737	000033	001050	ERR33:	MOV #33,	ERCOUNT	1SET UP ERROR COUNT 33
1033		000034				NON+1		
1034	003074	004537	007152			JSR	X5,STAER	1PRINT TOOK TOO LONG
1035	003100	000000				HALT		
1036	003102	005237	001024		T204:	INC	CHRCNT	1+1 CHARACTER COUNT
1037	003106	001422				BEO	T205	
1038	003110	005237	001026			INC	CHRGEN	
1039	003114	042737	177600	001026		BIC	#177600,CHRGEN	
1040	003122	022737	000012	001026		CHP	#12,CHRGEN	1TEST FOR LINE FEED
1041	003130	001764				BEO	T204	
1042	003132	022737	000014	001026		CHP	#14,CHRGEN	1TEST FOR SLEW
1043	003140	001760				BEO	T204	
1044	003142	022737	000015	001026		CHP	#15,CHRGEN	1TEST FOR CARRIAGE RETURN
1045	003150	001754				BEO	T204	
1046	003152	000720				BR	T203	1LOAD CHARACTER
1047					/			
1048					/			
1049					/			
1050	003154	012777	000012	175620	T205:	MOV	#12,PLPB	1ISSUE LINE FEED

1051	003162	004537	006642			JSR	X5,SLWTIM	ICHECK SLEW TIME
1052	003166	000406				BR	LP20X	
1053	003170					ERROR	\N	
1054	003170	012737	000034	001050	ERR34:	MOV #34,	ERCOUNT	IBET UP ERROR COUNT 34
1055		000035				NON#1		
1056	003176	004537	007152			JSR	X5,STAER	ISLEW TIME TOO LONG
1057	003202	000000				HALT		
1058	003204	005237	001032		LP20X:	INC	CYC CNT	
1059	003210	001402				BEG	.+6	
1060	003212	000137	002504			JMP	T200	
1061	003216	032777	010000	175560		BIT	0BIT12,08WR	ICHECK TO LOOP ON TEST
1062	003224	001402				BEG	.+6	
1063	003226	000137	002422			JMP	TEST20	
1064	003232	000402				BR	TEST3	
1065								
1066	003234	000000			NOCHR3:	0		
1067	003236	000000			LEGCHR:	0		
1068					/			
1069					/			
1070					/			
1071					/			

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1072
1073
1074
1075
1076 003240 004737 006566
1077 003244 013737 003716 003720
1078 003252 032777 040000 175524
1079 003260 001404
1080 003262 012737 000007 003730
1081 003270 000403
1082 003272 012737 000005 003730
1083 003300 004537 006700
1084 003304 000406
1085 003306
1086 003306 012737 000035 001050
1087 000036
1088 003314 004537 007152
1089 003320 000000
1090 003322 012737 177777 003722
1091 003330 012737 003506 003724
1092 003336 012737 003422 003726
1093 003344 012737 177777 001032
1094 003352 013737 001054 001022
1095 003360 005777 175414
1096 003364 100006
1097 003366
1098 003366 012737 000036 001050
1099 000037
1100 003374 004537 007152
1101 003400 000000
1102 003402 105777 175372
1103 003406 100403
1104 003410
1105 003410 012737 000037 001050
1106 000040
1107 003416 000177 000304
1108 003422 012777 000040 175352
1109 003430 005237 001022
1110 003434 001351
1111 003436 013737 001054 001022
1112 003444 004537 006632
1113 003450 000406
1114 003452
1115 003452 012737 000040 001050
1116 000041
1117 003460 004537 007152
1118 003464 000000
1119 003466 005237 001032
1120 003472 001352
1121 003474 013737 003722 001032
1122 003502 000177 000216
1123 003506 012737 003550 003724
1124 003514 012737 003540 003726
1125 003522 012777 000015 175252

)
)TEST 1, SECTION 4
)TESTS PRINTER ZONE AND FORMAT CONTROL
)
TEST3: JSR X7,SIZE
MOV XN,T3NCNT )SET UP CYCLE COUNT
BIT 0BIT14,08HR )IS PRINTER 132 COL.
BEQ Z00Z )NO IT IS AN 80 COL PRINTER
MOV 07,ZCOUNT )IT IS AN 132 COL PRINTER
BR FORMF
Z00Z: MOV 05,ZCOUNT )SET UP FOR 80 COL PRINTER
FORMF: JSR X5,PRINT )INITIALIZE PRINTER
BR T9
ERROR \N
ERR35: MOV 035, ERCOUNT )SET UP ERROR COUNT 35
NON+1
JSR X5,STAER )PRINTER NOT READY
HALT
T9: MOV 0-1,CYCTST )
MOV 0T8,PHFLG )PRESET PHASE FLAG
MOV 0T5,SPCFLG )PRESET SPACE FLAG
MOV 0-1,CYCCNT
MOV SEGMENT,SEGCNT )SET UP SEGMENT COUNT
T1: TST 0LPS )TEST FOR ERROR
BPL XT1A )NO ERROR
ERROR \N
ERR36: MOV 036, ERCOUNT )SET UP ERROR COUNT 36
NON+1
JSR X5,STAER
HALT
XT1A: TST 0LPS )TEST FOR READY
BMI T1X )READY SET
ERROR \N
ERR37: MOV 037, ERCOUNT )SET UP ERROR COUNT 37
NON+1
T1X: JMP 0SPCFLG
T5: MOV 040,0LPB )LOAD A SPACE
T5X: INC SEGCNT )+1 SEGMENT CNT
BNE T1 )TEST FOR END
MOV SEGMENT,SEGCNT
JSR X5,PRTTM )CHECK PRINT OUT
BR INCCY )TIME OK
ERROR \N
ERR40: MOV 040, ERCOUNT )SET UP ERROR COUNT 40
NON+1
JSR X5,STAER )IT TOOK TOO LONG TO PRINT
HALT
INCCY: INC CYCCNT
BNE T1
MOV CYCTST,CYCCNT
T0: JMP 0PHFLG
MOV 0T7,PHFLG )SET PHASE FLAG
MOV 0T4,SPCFLG )SET SPACE FLAG
MOV 015,0LPB )LOAD CARRIAGE RETURN

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1126 003530 105777 175244          TSTB  PLPB          ;WAIT FOR SEGMENT DIODES
1127 003534 100375          BPL    -4          ;TO SETTLE
1128 003536 000710          BR     T1
1129
1130
1131 003540 012777 000101 175234 T4:  MOV    0101,PLPB  ;LOAD CHARACTER "A"
1132 003546 000730          BR     TSX
1133 003550 012737 003506 003724 T7:  MOV    0T0,PHFLG  ;SET PHASE FLAG
1134 003556 012737 003422 003726  MOV    0T5,SPCFLG ;SET SPACE /A FLAG
1135 003564 012777 000012 175210  MOV    012,PLPB   ;ISSUE LINE FEED
1136 003572 004537 006642          JSR    25,SLWTIM  ;CHECK SLEW TIME
1137 003576 000405          BR     LPT7X
1138 003600
1139 003600 012737 000041 001050 ERR41: MOV 041,      ERCOUNT      ;SET UP ERROR COUNT 41
1140 000042
1141 003606 004537 007152          JSR    25,STAER  ;REPORT SLEW TOOK TOO LONG
1142
1143 003612 005337 003722          LPT7X: DEC    CYCTST
1144 003616 013737 003722 001032  MOV    CYCTST,CYCCNT ;RESET CYCLE COUNT
1145 003624 013737 003722 001044  MOV    CYCTST,WORK
1146 003632 063737 003730 001044  ADD    ZCOUNT,WORK
1147 003640 001247          BNE    T1
1148 003642 005237 003720          INC    T3NCNT      ;TEST ALL CYCLES
1149 003646 001225          BNE    T0
1150 003650 012777 000014 175124  MOV    014,PLPB
1151 003656 004537 006502          JSR    25,FRPTIM ;CHECK FORM FEED
1152 003662 000406          BR     XLPX2
1153 003664
1154 003664 012737 000042 001050 ERR42: MOV 042,      ERCOUNT      ;SET UP ERROR COUNT 42
1155 000043
1156 003672 004537 007152          JSR    25,STAER  ;FORM FEED TOOK TOO LONG
1157 003676 000000          HALT
1158 003700 032777 010000 175076 XLPX2: BIT    0BIT12,0SWR ;CHECK TO LOOP ON TEST
1159 003706 001402          BEQ    -6
1160 003710 000137 003240          JMP    TEST3
1161 003714 000406          BR     8NGCHR
1162
1163 003716 177764          ;
1164 003720 000000          XN:    -14
1165 003722 000000          T3NCNT: 0
1166 003724 000000          CYCTST: 0
1167 003726 000000          PHFLG:  0
1168 003730 000000          SPCFLG: 0
1169 000000          ZCOUNT: 0
1170
1171          ;WORST CASE NOISE TEST
1172          ;SINGLE CHAR. ACROSS ALL COLS.
1173 003732 004737 006566          ;
1174 003736 013737 001054 001022 8NGCHR: JSR    27,SIZE
1175 003744 032777 020000 175032  MOV    SEGMENT,SEGCNT ;SET UP SEGMENT COUNT
1176 003752 001404          BIT    0BIT13,0SWR ;TEST FOR 96 CHAR.
1177 003754 012737 177640 001024  BEQ    82
1178 003762 000403          MOV    0-96,,CHRCNT ;96 CHAR.
1179 003764 012737 177700 001024 82:  BR     -10
1179 003764 012737 177700 001024 82:  MOV    0-64,,CHRCNT ;64 CHAR.

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K2

1180	003772	013737	001052	001030		MOV	WIDTH,LINCNT	;/SET UP LINE COUNT
1181	004000	012737	000040	001026		MOV	040,CHRGEN	;/SET UP SPACE
1182	004006	005777	174766		S1:	TST	0LPS	;/TEST FOR ERRORS
1183	004012	100006				BPL	X51X	;/BRANCH IF NO ERRORS
1184	004014					ERROR	\N	
1185	004014	012737	000043	001050	ERR43:	MOV 043,	ERCOUNT	;/SET UP ERROR COUNT 43
1186		000044				N=N+1		
1187	004022	004537	007152			JSR	X5,STAER	;/REPORT ERROR
1188	004026	000000				HALT		;/HALT ON ERROR
1189	004030	013777	001026	174744	X51X:	MOV	CHRGEN,0LPS	;/LOAD PRINTER BUFFER
1190	004036	005237	001022			INC	SEGCNT	
1191	004042	001361				BNE	S1	
1192	004044	013737	001054	001022		MOV	SEGMNT,SEGCNT	;/SET UP NEW SEGMENT CNT
1193	004052	005237	001030			INC	LINCNT	;/+1 LINE COUNT
1194	004056	001424				BEQ	S4	;/END OF LINE
1195	004060	032777	040000	174716		BIT	0BIT14,0SHR	
1196	004066	001407				BEQ	LINPT	
1197	004070	022737	177777	001030		CMF	0-1,LINCNT	
1198	004076	001003				BNE	LINPT	
1199	004100	012737	177764	001022		MOV	0-12,,SEGCNT	
1200	004106	004537	006632		LINPT:	JSR	X5,PRTTM	;/PRINT SEGMENT
1201	004112	000735				BR	S1	;/FETCH NEXT SEGMENT
1202	004114					ERROR	\N	
1203	004114	012737	000044	001050	ERR44:	MOV 044,	ERCOUNT	;/SET UP ERROR COUNT 44
1204		000045				N=N+1		
1205	004122	004537	007152			JSR	X5,STAER	;/REPORT PRINT TIME TOO LONG
1206	004126	000000				HALT		
1207								
1208	004130	013737	001052	001030	S4:	MOV	WIDTH,LINCNT	;/SET UP LINE COUNT
1209	004136	004537	006632			JSR	X5,PRTTM	;/END OF LINE PRINT
1210	004142	000406				BR	S4X	;/PRINT TIME OK
1211	004144					ERROR	\N	
1212	004144	012737	000045	001050	ERR45:	MOV 045,	ERCOUNT	;/SET UP ERROR COUNT 45
1213		000046				N=N+1		
1214	004152	004537	007152			JSR	X5,STAER	;/REPORT TOO LONG TO PRINT
1215	004156	000000				HALT		
1216	004160	005777	174614		S4X:	TST	0LPS	;/TEST FOR ERROR
1217	004164	100006				BPL	S4X1	;/BRANCH IF NO ERROR
1218	004166					ERROR	\N	
1219	004166	012737	000046	001050	ERR46:	MOV 046,	ERCOUNT	;/SET UP ERROR COUNT 46
1220		000047				N=N+1		
1221	004174	004537	007152			JSR	X5,STAER	;/REPORT ERROR SET
1222	004200	000000				HALT		
1223	004202	105777	174572		S4X1:	TSTB	0LPS	;/TEST FOR READY
1224	004206	100406				BMI	S4X2	;/BRANCH IF READY SET
1225	004210					ERROR	\N	
1226	004210	012737	000047	001050	ERR47:	MOV 047,	ERCOUNT	;/SET UP ERROR COUNT 47
1227		000050				N=N+1		
1228	004216	004537	007152			JSR	X5,STAER	;/REPORT READY NOT SET
1229	004222	000000				HALT		
1230	004224	012777	000012	174550	S4X2:	MOV	012,0LPS	;/ISSUE LINE FEED
1231	004232	004537	006642			JSR	X5,SLWTIM	;/CHECK SLEW TIME
1232	004236	000406				BR	S7	
1233	004240					ERROR	\N	

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1234 004240 012737 000050 001050 ERR50: MOV #50,          ERCOUNT          ISET UP ERROR COUNT 50
1235                                000051          NON#1
1236 004246 004537 007152          JSR          $5,STAER          IREPORT SLEW TOOK TOO LONG
1237 004252 000000          HALT
1238 004254 005237 001026          S7: INC          CHRGEN          I+1 CHAR.
1239 004260 005237 001024          INC          CHRcnt          I+1 CHAR. COUNT
1240 004264 001401          BEQ          LPS7
1241 004266 000647          BR          $1
1242 004270 032777 010000 174506 LPS7: BIT          @BIT12,@SWR          ICHECK TO LOOP ON TEST
1243 004276 001402          BEQ          .+6          IDO NOT LOOP ON TEST
1244 004300 000137 003732          JMP          @NGCHR          ILOOP ON TEST
1245                                ;
1246                                ;
1247
1248                                ;
1249                                ITEST 3
1250                                IROTATING PATTERN CHARACTER TEST
1251                                ;
1252                                ;
1253 004304 004737 006566          ROTATE: JSR          $7,SIZE
1254 004310 013737 001054 001022          MOV          SEGMENT,SEGCNT          ISET UP SEGMENT COUNT
1255 004316 013737 001052 001030          MOV          WIDTH,LINcnt          ISET UP LINE COUNT
1256 004324 013737 005036 005032          MOV          RSSGFL,SEGFLG          ISET SEGMENT FLAG
1257 004332 013737 005044 005040          MOV          RSLNFL,LINFLG          ISET LINE FLAG
1258 004340 032777 020000 174436 ROT3: BIT          @BIT13,@SWR          ITEST FOR 96 CHAR.
1259 004346 001404          BEQ          ROT7          I64 CHAR. PRINTER
1260 004350 012737 177640 005050          MOV          @-96,@STRcnt          ISET UP FOR 96 CHAR.
1261 004356 000403          BR          .+10
1262 004360 012737 177700 005050 ROT7: MOV          @-64,@STRcnt          ISET UP FOR 64 CHAR.
1263 004366 012737 000040 005046          MOV          @40,@STRCHR          IFETCH A SPACE
1264 004374 013737 005046 001026 ROT11: MOV          STRCHR,CHRGEN
1265 004402 013737 005050 001024          MOV          STRcnt,CHRcnt
1266 004410 005777 174364          ROT1: TST          @LPS
1267 004414 100006          BPL          ROT112
1268 004416          ERROR          \N
1269 004416 012737 000051 001050 ERR51: MOV #51,          ERCOUNT          ITEST FOR ERROR
1270                                000052          IBRANCH IF NO ERROR
1271 004424 004537 007152          JSR          $5,STAER          IREPORT PRINTER ERROR
1272 004430 000000          HALT          ISET UP ERROR COUNT 51
1273 004432 013777 001026 174342 ROT112: MOV          CHRGEN,@LPB          ILOAD CHARACTER
1274 004440 005237 001022          INC          SEGCNT          I+1 SEGMENT COUNT
1275 004444 001425          BEQ          ROT8          IEND OF SEG.
1276 004446 005237 001026          ROT9: INC          CHRGEN          I+1 CHAR. GENERATOR
1277 004452 005237 001024          INC          CHRcnt          I+1 CHAR. COUNT
1278 004456 001454          BEQ          ROT10          IROLL OVER
1279 004460 000177 000354          ROT4: JMP          @LINFLG          ITEST LINE FLAG
1280 004464 000177 000342          ROT5: JMP          @SEGFLG          ITEST SEGMENT FLAG
1281 004470 013737 005036 005032 ROT2: MOV          RSSGFL,SEGFLG
1282 004476 004537 006632          JSR          $5,PRTHM
1283 004502 000742          BR          ROT1          ICHECK PRINT TIME
1284 004504          ERROR          \N          ICONTINUE
1285 004504 012737 000052 001050 ERR52: MOV #52,          ERCOUNT          ISET UP ERROR COUNT 52
1286 004510 000053          NON#1
1287 004512 004537 007152          JSR          $5,STAER          IREPORT PRINT TIME TOO LONG

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M2

1342	004776	000000				HALT			
1343	005000	005237	005046		ROT6X3:	INC	STRCHR		I+1 START CHAR.
1344	005004	005237	005050			INC	STRCNT		I+1 CTR. CHAR. CNT.
1345	005010	001402				BEG	.+6		
1346	005012	000137	004374			JMP	ROT11		INO ROLL OVER
1347	005016	032777	010000	173760		BIT	0BIT12,08HR		ILOOP ON TEST
1348	005024	001412				BEG	TST6		INO DO NOT LOOP
1349	005026	000137	004340			JMP	ROT5		
1350									
1351									
1352	005032	004410				SEGFLG:	ROT1		
1353	005034	004470				STSGFL:	ROT2		
1354	005036	004410				RSSGFL:	ROT1		
1355	005040	004464				LINFLG:	ROT5		
1356	005042	004464				STLNFL:	ROT6		
1357	005044	004464				RSLNFL:	ROT5		
1358	005046	000000				STRCHR:	0		
1359	005050	000000				STRCNT:	0		
1360									
1361									
1362									
1363									
1364									
1365	005052	012737	000077	001026		TST6:	MOV	077,CHRGEN	IFETCH?
1366	005060	004737	006566				JSR	X7,SIZE	
1367	005064	032777	040000	173712			BIT	0BIT14,08HR	
1368	005072	001404					BEG	X66X	
1369	005074	012737	177574	006106			MOV	0-132.,T6LNLC	
1370	005102	000403					BR	.+10	
1371	005104	012737	177660	006106	X66X:		MOV	0-00.,T6LNLC	
1372	005112	013737	006106	006102			MOV	T6LNLC,T6LNCT	
1373	005120	013737	001054	001022			MOV	SEGMNT,SEGCNT	ISET UP SEGMENT CNT
1374	005126	013737	001052	001030			MOV	WIDTH,LINCNT	ISET UP LINE CNT
1375	005134	005777	173640		T61:		TST	0LPS	ITEST FOR ERROR
1376	005140	100006					BPL	T61Z	IBRANCH IF NO ERROR
1377	005142						ERROR	\N	
1378	005142	012737	000057	001050	ERR57:		MOV #57,	ERCOUNT	ISET UP ERROR COUNT 57
1379		000060					NON+1		
1380	005150	004537	007152				JSR	X5,STAER	IREPORT PRINTED ERROR
1381	005154	000000					HALT		
1382	005156	013777	001026	173616	T61Z:		MOV	CHRGEN,0LPB	ILOAD CHAR.
1383	005164	005237	001022				INC	SEGCNT	I+1 SEGMENT CNT
1384	005170	001013					BNE	T65	
1385	005172	013737	001054	001022			MOV	SEGMNT,SEGCNT	IRESET SEGMENT COUNT
1386	005200	004537	006632				JSR	X5,PRTTM	ICHECK PRINT TIME
1387	005204	000405					BR	T65	IPRINT TIME OK
1388	005206						ERROR	\N	
1389	005206	012737	000060	001050	ERR60:		MOV #60,	ERCOUNT	ISET UP ERROR COUNT 60
1390		000061					NON+1		
1391	005214	004537	007152				JSR	X5,STAER	IREPORT PRINT TIME TOO LONG
1392	005220	005237	006102		T65:		INC	T6LNCT	
1393	005224	001343					BNE	T61	
1394	005226	005777	173546				TST	0LPS	ITEST FOR ERROR
1395	005232	100006					BPL	T65X	IBRANCH IF NO ERROR

1396	005234					ERROR	\N		
1397	005234	012737	000061	001050	ERR61:	MOV #61,		ERCOUNT	ISET UP ERROR COUNT 61
1398		000062				NON+1			
1399	005242	004537	007152			JSR	X5,STAER		IREPORT PRINTER ERROR
1400	005246	000000				HALT			
1401	005250	012777	000012	173524	T65X:	MOV	012,0LPB		IISSUE LINE FEED
1402	005256	004537	006642			JSR	X5,8LWTIM		ICHECK SLEW TIME
1403	005262	000406				BR	T65Z		I BRANCH IF TIME OK
1404	005264					ERROR	\N		
1405	005264	012737	000062	001050	ERR62:	MOV #62,		ERCOUNT	ISET UP ERROR COUNT 62
1406		000063				NON+1			
1407	005272	004537	007152			JSR	X5,STAER		IREPORT SLEW TIME TOO LONG
1408	005276	000000				HALT			
1409	005300	013737	001054	001022	T65Z:	MOV	SEGMNT,SEGCNT		I RESET SEGMENT CNT
1410	005306	005237	006106			INC	T6LNLG		I+1 LINE LENGTH
1411	005312	001405				BEG	T6PT2		
1412	005314	013737	006106	006102		MOV	T6LNLG,T6LNCT		ISET UP NEW LINE CNT
1413	005322	000137	005134			JMP	T61		
1414									
1415									
1416	005326	032777	040000	173450	T6PT2:	BIT	0BIT14,0SHR		
1417	005334	001404				BEG	X80X		
1418	005336	012737	177574	001032		MOV	0-132,,CYCCNT		
1419	005344	000403				BR	X80X+6		
1420	005346	012737	177660	001032	X80X:	MOV	0-80,,CYCCNT		IPRESET CYCLE COUNT
1421	005354	013737	001054	001022		MOV	SEGMNT,SEGCNT		ISET UP SEG. COUNT
1422	005362	013737	001052	001030		MOV	WIDTH,LINCNT		ISET UP LINE COUNT
1423	005370	005777	173404		T66:	TST	0LPS		ICHECK FOR ERROR
1424	005374	100006				BPL	T66X		I BRANCH IF NO ERROR
1425	005376					ERROR	\N		
1426	005376	012737	000063	001050	ERR63:	MOV #63,		ERCOUNT	ISET UP ERROR COUNT 63
1427		000064				NON+1			
1428	005404	004537	007152			JSR	X5,STAER		IREPORT PRINTER ERROR
1429	005410	000000				HALT			
1430	005412	105777	173362		T66X:	TSTB	0LPS		ITEST FOR READY
1431	005416	100406				BMI	T66Z		I BRANCH IF READY
1432	005420					ERROR	\N		
1433	005420	012737	000064	001050	ERR64:	MOV #64,		ERCOUNT	ISET UP ERROR COUNT 64
1434		000065				NON+1			
1435	005426	004537	007152			JSR	X5,STAER		IREPORT PRINTER NOT READY
1436	005432	000000				HALT			
1437	005434	013777	001026	173340	T66Z:	MOV	CHRGEN,0LPB		ILOAD CHARACTER
1438	005442	005237	001022			INC	SEGCNT		I+1 SEG. CNT
1439	005446	001350				BNE	T66		ILOAD NEXT CHARACTER
1440	005450	013737	001054	001022		MOV	SEGMNT,SEGCNT		I RESET SEG. CNT
1441	005456	004537	006632			JSR	X5,PRYTM		ICHECK PRINT TIME
1442	005462	000406				BR	T66Z:		ITIME OK
1443	005464					ERROR	\N		
1444	005464	012737	000065	001050	ERR65:	MOV #65,		ERCOUNT	ISET UP ERROR COUNT 65
1445		000066				NON+1			
1446	005472	004537	007152			JSR	X5,STAER		IREPORT PRINT TIME TOO LONG
1447	005476	000000				HALT			
1448	005500	005237	001030		T66Z1:	INC	LINCNT		I+1 LINE COUNT
1449	005504	001414				BEG	T66Z1X		

1450	005506	032777	040000	173270		BIT	0BIT14,08HR	
1451	005514	001729				BEQ	T66	
1452	005516	022737	177777	001030		CMP	0-1,LINCNT	
1453	005524	001321				BNE	T66	
1454	005526	012737	177764	001022		MOV	0-12,,SEGCNT	
1455	005534	000715				BR	T66	
1456	005536	013737	001052	001030	T66Z1X1	MOV	WIDTH,LINCNT	I RESET LINE COUNT
1457	005544	005777	173230			TST	0LPS	I CHECK FOR ERROR
1458	005550	100006				BPL	T70	I BRANCH IF NO ERROR
1459	005552					ERROR	\N	
1460	005552	012737	000066	001050	ERR661	MOV 066,	ERCOUNT	I SET UP ERROR COUNT 66
1461		000067				N=N+1		
1462	005560	004537	007152			JSR	25,STAER	I REPORT PRINTER ERROR
1463	005564	000000				HALT		
1464	005566	105777	173206		T701	TSTB	0LPS	I TEST FOR READY
1465	005572	100406				BMI	T70X	I BRANCH IF READY
1466	005574					ERROR	\N	
1467	005574	012737	000067	001050	ERR671	MOV 067,	ERCOUNT	I SET UP ERROR COUNT 67
1468		000070				N=N+1		
1469	005602	004537	007152			JSR	25,STAER	I REPORT PRINTER NOT READY
1470	005606	000000				HALT		
1471	005610	012777	000012	173164	T70X1	MOV	012,0LPS	I ISSUE LINE FEED
1472	005616	004537	006642			JSR	25,SLWTIM	I CHECK SLEW TIME
1473	005622	000406				BR	T71	
1474	005624					ERROR	\N	
1475	005624	012737	000070	001050	ERR701	MOV 070,	ERCOUNT	I SET UP ERROR COUNT 70
1476		000071				N=N+1		
1477	005632	004537	007152			JSR	25,STAER	I REPORT SLEW TOOK TOO LONG
1478	005636	000000				HALT		
1479	005640	005237	001032		T711	INC	CYCCNT	I +1 CYCLE COUNT
1480	005644	001006				BNE	T72	
1481	005646	032777	010000	173130		BIT	0BIT12,08HR	I CHECK TO LOOP ON TEST
1482	005654	001515				BEQ	NAMALN	I NO GO TO NEXT TEST
1483	005656	000137	005052			JMP	TST6	I LOOP ON TEST
1484	005662	013737	001054	001022	T721	MOV	SEGMNT,SEGCNT	
1485	005670	032777	040000	173106		BIT	0BIT14,08HR	
1486	005676	001404				BEQ	T72X	
1487	005700	012737	000204	006104		MOV	0132,,T6SPCT	
1488	005706	000403				BR	0+10	
1489	005710	012737	000120	006104	T72X1	MOV	000,,T6SPCT	I GET CYCLE COUNT AND
1490	005716	063737	001032	006104		ADD	CYCCNT,T6SPCT	I DERIVE SPACE COUNTER
1491								
1492	005724	005777	173050		T691	TST	0LPS	I TEST FOR ERROR
1493	005730	100006				BPL	T69X	I BRANCH IF NO ERROR
1494	005732					ERROR	\N	
1495	005732	012737	000071	001050	ERR711	MOV 071,	ERCOUNT	I SET UP ERROR COUNT 71
1496		000072				N=N+1		
1497	005740	004537	007152			JSR	25,STAER	I REPORT PRINTER ERROR
1498	005744	000000				HALT		
1499	005746	105777	173026		T69X1	TSTB	0LPS	I TEST FOR READY
1500	005752	100406				BMI	T69Z	I BRANCH IF READY
1501	005754					ERROR	\N	
1502	005754	012737	000072	001050	ERR721	MOV 072,	ERCOUNT	I SET UP ERROR COUNT 72
1503		000073				N=N+1		

1504	005762	004537	007152			JSR	Z5,STAER		IREPORT PRINTER NOT READY
1505	005766	000000				HALT			
1506	005770	012777	000040	173004	T602I	MOV	040,0LPB		ILOAD SPACE
1507	005776	005237	001022			INC	SEGCNT		
1508	006002	001032				BNE	T60X		
1509	006004	013737	001054	001022		MOV	SEGMNT,SEGCNT		
1510	006012	004537	006632			JSR	Z5,PRTTM		I CHECK PRINT TIME
1511	006016	000406				BR	T60		I PRINT TIME OK
1512	006020					ERROR	\N		
1513	006020	012737	000073	001050	ERR73I	MOV #73,	ERCOUNT		ISET UP ERROR COUNT 73
1514		000074				NON+1			
1515	006026	004537	007152			JSR	Z5,STAER		IREPORT PRINT TIME TOO LONG
1516	006032	000000				HALT			
1517	006034	005237	001030		T60I	INC	LINCNT		
1518	006040	001416				BEQ	T60Z		
1519	006042	032777	040000	172734		BIT	0BIT14,0SWR		
1520	006050	001407				BEQ	T60X		
1521	006052	022737	177777	001030		CHP	0-1,LINCNT		
1522	006060	001003				BNE	T60X		
1523	006062	012737	177764	001022		MOV	0-12,,SEGCNT		
1524	006070	005337	006104		T60XI	DEC	T60PCT		
1525	006074	001313				BNE	T60		
1526	006076	000137	005370		T60ZI	JMP	T60		
1527	006102	000000			T6LNCTI	0			
1528	006104	000000			T6SPCTI	0			
1529	006106	000000			T6LNLGI	0			
1530									
1531									
1532									
1533									
1534									
1535									
1536	006110	012737	177702	006252	HAMALNI	MOV	0-76,HAMCNT		ISET UP FOR 63 LINES
1537	006116	032777	040000	172660	HAMIXI	BIT	0BIT14,0SWR		
1538	006124	001404				BEQ	HAM1		
1539	006126	012737	177574	001030		MOV	0-132,,LINCNT		
1540	006134	000403				BR	HAM2		
1541	006136	012737	177660	001030	HAM1I	MOV	0-80,,LINCNT		ISET UP LINE COUNT
1542	006144	005777	172630		HAM2I	TST	0LPS		I CHECK FOR ERROR
1543	006150	100006				BPL	XHAM1		I BRANCH IF NO ERROR
1544	006152					ERROR	\N		
1545	006152	012737	000074	001050	ERR74I	MOV #74,	ERCOUNT		ISET UP ERROR COUNT 74
1546		000075				NON+1			
1547	006160	004537	007152			JSR	Z5,STAER		IREPORT ERROR OCCURRED
1548	006164	000000				HALT			
1549	006166	105777	172606		XHAM1I	TSTB	0LPS		I CHECK FOR READY
1550	006172	100375				BPL	0-4		
1551	006174	012777	000105	172600	XHAMIXI	MOV	0105,0LPB		I TRANSMIT E TO PRINTER
1552	006202	005237	001030			INC	LINCNT		I+1 LINE COUNT
1553	006206	001356				BNE	HAM2		I TRANSMIT ANOTHER CHAR.
1554	006210	105777	172564			TSTB	0LPS		
1555	006214	100375				BPL	0-4		
1556	006216	012777	000012	172556		MOV	012,0LPB		I TRANSMIT LINE FEED
1557	006224	105777	172550			TSTB	0LPS		I TEST FOR READY


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1558 006230 100375          BPL      .-4          IWAIT FOR READY
1559 006232 005237 006252  INC      HAMCNT      I+1 COUNT
1560
1561 006236 001327          BNE      HAMIX          IGO DO NEXT LINE
1562 006240 032777 010000 172536  BIT      @BIT12,@SWR    ICHECK TO LOOP ON TEST
1563 006246 001320          BNE      HAMALN         ILOOP ON TEST
1564 006250 000401          BR
1565 006252 000000          HAMCNT: 0
1566
1567
1568          ITEST 4, SLEW TEST ROUTINE
1569
1570
1571 006254 012737 006454 006450  SLWTST: MOV      @TABSTR,TBPTR  IPRESET LINE COUNT
1572 006262 032777 040000 172514  SLWIX:  BIT      @BIT14,@SWR
1573 006270 001404          BEQ      SLW1-6
1574 006272 012737 177574 001030  MOV      @-132,,LINCNT
1575 006300 000403          BR      SLW1
1576 006302 012737 177660 001030  MOV      @-80,,LINCNT  ISET UP LINE LENGTH
1577 006310 012777 000105 172464  SLW1:  MOV      @105,@LPS  ILOAD CHARACTER "E"
1578 006316 005777 172456          TST      @LPS          ITEST FOR ERROR
1579 006322 100203          BPL      @SLW1         IBRANCH IF NO ERROR
1580 006324          ERROR  \N          IAN ERROR OCCURRED
1581 006326 012737 000075 001050  ERR75: MOV @75,      ERCOUNT  ISET UP ERROR COUNT 75
1582          NON+1
1583 006332 105777 172442          XSLW1: TSTR      @LPS          ITEST FOR READY
1584 006336 100367          BPL      SLW1+6        IBRANCH BACK NOT READY
1585 006340 005237 001030  INC      LINCNT        I+1 LINE COUNT
1586 006344 001361          BNE      SLW1
1587 006346 017737 000076 006452  MOV      @TBPTR,SLWCNT  ISET UP SLEW CNT
1588 006350 012777 000012 172420  SLEW:  MOV      @12,@LPS  IISSUE LINE FEED
1589 006362 105777 172412          TSTR      @LPS          ITEST FOR READY
1590 006366 100375          BPL      .-4
1591 006370 005237 006452  INC      SLWCNT
1592 006374 001367          BNE      SLEW          IISSUE NEXT SLEW
1593 006376 023727 006450 006500  CMP      TBPTR,@TABEND  I
1594 006404 001015          BNE      INCSLW
1595 006406 032777 010000 172370  BIT      @BIT12,@SWR    ICHECK TO LOOP ON TEST
1596 006414 001317          BNE      SLWTST        IYES LOOP ON TEST
1597 006416 013700 000042  MOV      @042,@X0
1598 006422 001404          BEQ      INCSLW-4
1599 006424 004710          LOGICAL:JSR      @X7,(0)
1600 006426 000240          NOP
1601 006430 000240          NOP
1602 006432 000240          NOP
1603 006434 000137 001316  JMP      TEST1
1604 006440 062737 000002 006450  INCSLW: ADD      @2,TBPTR  IRECYCLE TEST
1605 006446 000705          BR      SLWIX          ISET UP NEW SLEW CNT
1606
1607
1608 006450 000000          TBPTR:  0
1609 006452 000000          SLWCNT: 0
1610 006454 177775          TABSTR: -3
1611 006456 177776                   -2
          ISLEW 3 LINES
          ISLEW 2 LINES
  
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1612	006460	177766			-12			/SLEW 12 LINES
1613	006462	177762			-16			/SLEW 16 LINES
1614	006464	177772			-6			/SLEW 6 LINES
1615	006466	177775			-3			/SLEW 3 LINES
1616	006470	177770			-10			/SLEW 10 LINES
1617	006472	177774			-4			/SLEW 4 LINES
1618	006474	177773			-5			/SLEW 5 LINES
1619	006476	177773			-5			/SLEW 5 LINES
1620	006500	177775			-3			/SLEW 3 LINES
1621						TABEND1		
1622						/		
1623						/		
1624	006502	013737	006556	006564	FRFTIM1	MOV	FFTIMU,FFCNT2	/SET UP TIMER ASSUME /SINC/SEC
1625	006510	013737	006560	006562		MOV	FFTIML,FFCNT1	
1626	006516	105777	172256		FFRDY1	TSTB	OLPS	/TEST FOR READY
1627	006522	100001				BPL	.08	/PRINTER NOT READY
1628	006524	000205				RTS	X5	/EXIT HERE IF READY SEC
1629	006526	005237	006562			INC	FFCNT1	
1630	006532	001371				BNE	FFRDY	
1631	006534	013737	006560	006562		MOV	FFTIML,FFCNT1	
1632	006542	005237	006564			INC	FFCNT2	
1633	006546	001363				BNE	FFRDY	
1634	006550	062705	000002			ADD	02,X5	/EXIT TIME TOO LONG
1635	006554	000205				RTS	X5	
1636						/		
1637	006556	177210			FFTIMU1	-570		
1638	006560	177210			FFTIML1	-570		
1639	006562	000000			FFCNT11	0		
1640	006564	000000			FFCNT21	0		
1641					/			
1642	006566	032777	040000	172210	SIZE1	BIT	0BIT14,0SWR	
1643	006574	001407				BEQ	COL00	
1644	006576	012737	177750	001054		MOV	0-24,,SEGMENT	
1645	006604	012737	177772	001052		MOV	0-6,WIDTH	
1646	006612	000207				RTS	X7	
1647	006614	012737	177754	001054	COL001	MOV	0-20,,SEGMENT	
1648	006622	012737	177774	001052		MOV	0-4,WIDTH	
1649	006630	000207				RTS	X7	
1650					/			
1651					/			
1652					/MISC. ROUTINE			
1653					/WAIT 144 MSEC. FOR CHARACTER TO BE PRINTED			
1654					/WAIT 136 MSEC FOR SLEW TO BE EXECUTED			
1655					/			
1656	006632	012737	140000	001044	PRTTM1	MOV	0140000,WORK	/SET UP FOR 144 MSEC COUNT
1657	006640	000403				BR	PTIMU	/
1658	006642	012737	140000	001044	SLWTIM1	MOV	0140000,WORK	/SET UP FOR 136 MSEC COUNT
1659	006650	005777	172124		PTIMU1	TST	OLPS	/IS THERE AN ERROR
1660	006654	100406				BMI	PITML	/BRANCH IF ERROR
1661	006656	105777	172116			TSTB	OLPS	/TEST FOR READY COND.
1662	006662	100405				BMI	PTIML	/BRANCH IF READY
1663	006664	005237	001044			INC	WORK	/WAIT FOR FLAG
1664	006670	001367				BNE	PTIMU	/NO FLAG WAIT
1665	006672	062705	000002		PITML1	ADD	02,X5	/SET UP FOR ERROR REPORT

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1666 006676 000205          PTIML: RTS      X5          )EXIT
1667                               )
1668                               )
1669                               )
1670                               )
1671                               )
1672                               )
1673                               )
1674                               )
1675 006700 105777 172074    )ROUTINE TO INITIALIZE PRINTER
1676 006704 100403          )ENTER FROM JSR X5, PRINT
1677 006706 062705 000002    )
1678 006712 000205          )
1679 006714 012777 000014 172060  )
1680 006722 105777 172052    )
1681 006726 100003          )
1682 006730 062705 000012    )
1683 006734 000205          )
1684 006736 105777 172036    )
1685 006742 100375          )
1686 006744 000205          )
1687                               )
1688                               )
1689                               )
1690                               )
1691                               )
1692                               )
1693                               )
1694                               )
1695 006746 011600          )SUBROUTINE TO OUTPUT ASCII MESSAGES ON TELETYPE PRINTER
1696 006750 062716 000002    )
1697 006754 011000          )
1698                               )
1699 006756 112037 007066    )
1700 006762 122737 000100 007066 )
1701 006770 001001          )
1702 006772 000002          )
1703 006774 122737 000045 007066 )
1704 007002 001416          )
1705 007004 122737 000042 007066 )
1706 007012 001417          )
1707 007014 004737 007022    )
1708 007020 000756          )
1709 007022 113777 007066 171762 )
1710 007030 105777 171762    )
1711 007034 100375          )
1712 007036 000207          )
1713 007040 112737 000015 007066 )
1714 007046 004737 007022    )
1715 007052 112737 000012 007066 )
1716 007060 004737 007022    )
1717 007064 000734          )
1718 007066 000000          )
1719                               )

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1721
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1729 007070 013537 007150
1730 007074 012501
1731 007076 012502
1732 007100 060201
1733 007102 013703 007150
1734 007106 042703 177770
1735 007112 062703 000060
1736 007116 110341
1737 007120 000241
1738 007122 006037 007150
1739 007126 000241
1740 007130 006037 007150
1741 007134 000241
1742 007136 006037 007150
1743 007142 005302
1744 007144 001356
1745 007146 000205
1746
1747 007150 000000
1748
1749
1750
1751
1752
1753
1754
1755
1756 007152 004537 007070
1757 007156 001050
1758 007160 007210
1759 007162 000003
1760 007164 104000
1761 007166 007206
1762 007170 104000
1763 007172 007210
1764 007174 005777 171604
1765 007200 100001
1766 007202 000000
1767 007204 000205
1768
007206 040049
007210 020040 020040 051105

/
/ROUTINE TO CONVERT OCTAL TO ASCII
/
/ENTER ROUTINE AS FOLLOWS
/ JSR X5,CONV
/XXXXXXXX=ADDRESS OF NUMBER TO BE CONVERTED
/XXXXXXXX=ADDRESS OF ASCII MESSAGE
/XXXXXXXX=NUMBER OF OCTAL NO.'S TO BE CONVERTED
/
CONV: MOV 0(S)+,ACNVX /ADDRESS OF NO. TO BE CONVERTED
      MOV (S)+,X1 /ADDRESS OF MESSAGE
      MOV (S)+,X2 /NUMBER OF ASCII CHARACTERS
      ADD X2,X1
ACVNI: MOV ACNVX,X3 /ISOLATE LEAST SIGNIFICANT BIT
      BIC 0177770,X3
      ADD 060,X3 /SET UP ASCII CHARACTER
      MOVB X3,-(1) /STORE CHARACTER
      CLC
      ROR ACNVX
      CLC
      ROR ACNVX
      CLC
      ROR ACNVX
      DEC X2 /-1 FROM ASCII CHAR. CNT
      ONE ACVN /CONVERT NEXT CHARACTER
      RTS X5 /EXIT! CONVERSION DONE

/
ACNVX: 0 /WORK REGISTER
/
/
/
/
/ROUTINE TO REPORT ERROR COUNT
/
STAER: JSR X5,CONV /CONVERT OCTAL TO ASCII
        ERCOUNT
        MED1
        3
        EMT +0 /PRINT MESSAGE
        MEDIA
        EMT +0
        MED1
        TST 08WR /TEST FOR HALT ON ERROR
        BPL +4
        HALT
        RTS X5
        MEDIA: .ASCII /X0/
/
/
MED1: .ASCII / ERROR COUNT0/
/

```

```

    /
    /
    /
007230 046445 044501 042116 MESS1 .ASCII /%MAINDEC-11-DZLPA-B LINE PRINTER TEST%/
    /
007276 051045 051505 040524 MESS2 .ASCII /%RESTART ADDRESS 6000%/
    /
007323 045 047520 042527 MESS3 .ASCII /%POWER ON-TURN ON LINE%/
    /
007352 047445 020116 044514 MESS4 .ASCII /%ON LINE OK-TRY TORN PAPER SWITCH%/
    /
007414 042445 051122 051117 MESS5 .ASCII /%ERROR SET OK-TRY DRUM GATE SWITCH%/
    /
007457 045 051105 047522 MESS6 .ASCII /%ERROR SET OK-TURN ON LINE %/
    /
    /
    /

```

```

    /LP11 SCOPE LOOP ROUTINE
    /SET CHARACTER IN SWITCH REGISTER 5-0.
    /

```

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                                007514                                .EVEN
1769 007514 004737 006566                                SCOPE: JSR    X7,SIZE
1770 007520 017737 171260 001046                                MOV    08WR,SAVE            %FETCH SWITCHES
1771 007526 013737 001054 001022                                MOV    SEGMENT,SEGCNT
1772 007534 013737 001052 001030                                MOV    WIDTH,LINCNT
1773 007542 042737 177600 001046                                BIC    0177600,SAVE        %MASK CHARACTER
1774 007550 105777 171224                                LDLPX: TSTB  0LPB           %TEST FOR READY
1775 007554 100375                                BPL    =4                   %WAIT FOR READY
1776 007556 013777 001046 171216                                MOV    SAVE,0LPB           %LOAD PRINTER BUFFER
1777 007564 005777 171210                                TST   0LPB                 %TEST FOR ERROR
1778 007570 100006                                BPL    LPSCOPE             %BRANCH IF NO ERROR
1779 007572                                ERROR \N
1780 007572 012737 000076 001050 ERR76: MOV 076,    ERCOUNT            %SET UP ERROR COUNT 76
1781                                M0N+1
1782 007600 004537 007152                                JSR    X5,STAER            %REPORT ERROR SET
1783 007604 000000                                HALT                       %OPERATOR MUST TAKE ACTION
1784 007606 005237 001022                                LPSCOPE: INC  SEGCNT
1785 007612 001356                                BNE   0LPX
1786 007614 013737 001054 001022                                MOV    SEGMENT,SEGCNT
1787 007622 005237 001030                                INC   LINCNT
1788 007626 001414                                BEQ   LOSCOP
1789 007630 032777 040000 171146                                BIT   0BIT14,08WR
1790 007636 001744                                BEQ   0LPX

```

```
1791 007640 022737 177777 001030      CMP      0-1,LINCNT
1792 007646 001340      BNE      LOLPX
1793 007650 012737 177764 001022      MOV      0-12,,SEGCNT
1794 007656 000734      BR       LOLPX
1795 007660 013737 001052 001030  LOSCOP:  MOV      WIDTH,LINCNT
1796 007666 012777 000012 171106      MOV      012,0LPB
1797 007674 105777 171100      TSTB    0LPB      ;TEST FOR READY
1798 007700 100375      BPL      =-4      ;WAIT FOR READY
1799 007702 017737 171076 007150  SRCHAN:  MOV      @BWR,ACNVX
1800 007710 042737 177600 007150      BIC      @177600,ACNVX
1801 007716 023737 007150 001046      CMP      ACNVX,SAVE ;HAS SR CHANGED
1802 007724 001273      BNE      SCOPE    ;NEW SR
1803 007726 000674      BR       SCOPE+4  ;SR HAS NOT CHANGED
1804
1805
1806
1807
1808
1809
1810      000001      .END
```

ACNVX	007150	17290	1733	17380	17400	17420	17470	17990	18000	1801				
ACVN	007102	17330	1744											
BIT0	000001	5540												
BIT1	000002	5530												
BIT10	002000	5440												
BIT11	004000	5430												
BIT12	010000	5420	929	1061	1150	1242	1347	1401	1562	1595				
BIT13	020000	5410	953	1175	1250	1306								
BIT14	040000	5400	974	737	912	906	1070	1195	1296	1367	1416	1450	1489	1519
		1537	1572	1642	1709									
BIT15	100000	5390												
BIT2	000004	5520												
BIT3	000010	5510												
BIT4	000020	5500												
BIT5	000040	5490												
BIT6	000100	5480												
BIT7	000200	5470												
BIT8	000400	5460												
BIT9	001000	5450												
CHARSM	002414	8000	896	8970	9360	9420								
CHRCNT	001024	6310	9640	10020	10130	10140	10150	10160	10360	11770	11790	12390	12650	12770
		13000	13100											
CHRGEN	001026	6320	9630	973	10010	1025	10300	10390	1040	1042	1044	11010	1109	12300
		12600	1273	12760	13050	13050	1302	1437						
COL00	006614	1643	16470											
CONV	007070	17290	1756											
CYCCNT	001032	6340	8050	9260	9550	9590	10500	10930	11190	11210	11440	14100	14200	14790
		1490												
CYCTST	003722	10900	1121	11430	1144	1145	11650							
DISPLA	001006	6090	6560											
DISPRE	000174	5770	656											
ERCOUN	001050	6410	6710	6790	6920	7020	7200	7300	7440	7510	7610	7750	7820	7870
		7960	8070	8190	8470	8540	8620	8810	8920	9070	9230	9690	9800	9970
		10000	10210	10320	10540	10860	10980	11050	11150	11390	11540	11850	12030	12120
		12190	12260	12340	12690	12850	13170	13240	13310	13390	13700	13890	13970	14050
		14260	14330	14440	14600	14670	14750	14950	15020	15130	15450	15810	1757	17800
ERNO	001034	6350												
ERRP	001156	6710												
ERR1	001200	6790												
ERR10	001470	7610												
ERR11	001526	7750												
ERR12	001550	7820												
ERR13	001564	7870												
ERR14	001616	7960												
ERR15	001650	8070												
ERR16	001702	8190												
ERR17	001774	8470												
ERR2	001244	6920												
ERR20	002016	8540												
ERR21	002050	8620												
ERR22	002106	8810												
ERR23	002160	8920												
ERR24	002246	9070												
ERR25	002340	9230												

ERR26	002542	9690			
ERR27	002606	9800			
ERR3	001274	7020			
ERR30	002700	9970			
ERR31	002746	10000			
ERR32	003022	10210			
ERR33	003066	10320			
ERR34	003170	10540			
ERR35	003306	10860			
ERR36	003366	10980			
ERR37	003410	11050			
ERR4	001326	7200			
ERR40	003452	11150			
ERR41	003600	11390			
ERR42	003664	11540			
ERR43	004014	11850			
ERR44	004114	12030			
ERR45	004144	12120			
ERR46	004166	12190			
ERR47	004210	12260			
ERR5	001352	7300			
ERR50	004240	12340			
ERR51	004416	12690			
ERR52	004504	12850			
ERR53	004670	13170			
ERR54	004712	13240			
ERR55	004734	13310			
ERR56	004764	13390			
ERR57	005142	13780			
ERR6	001416	7440			
ERR60	005206	13890			
ERR61	005234	13970			
ERR62	005264	14050			
ERR63	005376	14260			
ERR64	005420	14330			
ERR65	005464	14440			
ERR66	005552	14600			
ERR67	005574	14670			
ERR7	001440	7510			
ERR70	005624	14750			
ERR71	005732	14950			
ERR72	005754	15020			
ERR73	006020	15130			
ERR74	006152	15450			
ERR75	006324	15810			
ERR76	007572	17000			
FFCNT1	006562	16250	16290	16310	16390
FFCNT2	006564	16240	16320	16400	
FFRDY	006516	16260	1630	1633	
FFTIML	006560	1625	1631	16380	
FFTIMU	006556	1624	16370		
FORMP	003300	1001	10030		
FRFTIM	006502	1151	16240		
HAMALN	006110	591	1402	15360	1563

M3

HAMCNT	006252	1536	1559	1565										
HAM1	006136	1530	1541											
HAM1X	006116	1537	1561											
HAM2	006144	1540	1542	1593										
MED1	007210	1750	1763	1760										
MEDIA	007206	1761	1760											
INCCY	003466	1113	1119											
INCLW	006440	1594	1598	1604										
INTIC	001740	770	832											
INTID	002064	842	869											
LDCH	003036	1019	1025											
LDLPX	007550	1774	1785	1790	1792	1794								
LEGCHR	003236	957	961	964	1014	1067								
LINCNT	001030	633	886	910	914	918	962	984	988	992	1100	1193	1197	1200
		1255	1298	1298	1302	1374	1422	1448	1452	1456	1517	1521	1539	1541
		1552	1574	1576	1585	1772	1787	1791	1795					
LINPLG	005040	1257	1279	1303	1312	1355								
LINPT	004106	1196	1198	1200										
LOCA	001040	637												
LOGICA	006424	572	1599											
LOSCOP	007660	1788	1795											
LPB	001002	693	687	688	740	899	919	973	993	1004	1025	1050	1100	1125
		1131	1135	1150	1189	1230	1273	1335	1382	1401	1437	1471	1506	1551
		1556	1577	1588	1679	1776	1796							
LPS	001000	599	668	676	689	699	717	727	741	748	756	772	779	790
		792	799	801	810	812	822	824	844	851	859	870	889	966
		1010	1095	1102	1126	1182	1216	1223	1266	1321	1328	1375	1394	1423
		1430	1457	1464	1492	1499	1542	1549	1554	1557	1578	1583	1589	1626
		1659	1661	1675	1680	1684	1774	1777	1797					
LPSCOP	007606	1778	1784											
LPS7	004270	1240	1242											
LPT7X	003612	1137	1143											
LP1	001432	742	748	759										
LP2	001454	749	756											
LP20	002174	890	896											
LP20X	003204	1052	1058											
LP2C	002462	954	959											
LP2E	002556	967	973											
LP2F	002620	978	983											
LP2H	002762	1006	1012											
LP3	001542	773	779											
LP3X	001564	780	786											
LP4	002010	845	851											
LP5	002032	852	858											
LP5A	002260	905	910											
LP5B	002352	921	926											
ME81	007230	662	1768											
ME82	007276	664	1768											
ME83	007323	666	1768											
ME84	007352	684	1768											
ME85	007414	697	1768											
ME86	007457	707	1768											
N	000077	617	670	672	678	680	691	693	701	703	719	721	729	731
		743	745	750	752	760	762	774	776	781	783	786	788	799

		7970	806	8080	810	8200	846	8480	853	8550	861	8630	880	8820
		891	8930	906	9080	922	9240	968	9700	979	9810	996	9980	1007
		10090	1020	10220	1031	10330	1053	10550	1085	10870	1097	10990	1104	11060
		1114	11160	1130	11400	1153	11550	1184	11860	1202	12040	1211	12130	1210
		12200	1229	12270	1233	12350	1268	12700	1284	12860	1316	13180	1323	13250
		1330	13320	1330	13400	1377	13790	1388	13900	1396	13980	1404	14060	1425
		14270	1432	14340	1443	14450	1459	14610	1466	14680	1474	14760	1494	14960
		1501	15030	1512	15140	1544	15460	1580	15820	1779	17810			
		9560	9600	983	10660									
NOCHR3	003234													
NOP	000240	6160												
NTRDY	006736	1681	16840											
PC	0000007	5360												
PHFLG	003724	10910	1122	11230	11330	11660								
PITML	006672	1660	16650											
PRTINT	006780	878	1083	16750										
PRTTM	006632	904	977	1020	1112	1200	1209	1202	1314	1386	1441	1510	16560	
PS	001010	6100	7890	7980	8090	8210	8580							
PTIML	006676	1662	16660											
PTIMU	006650	1657	16590	1664										
RCHRSH	002420	936	9440											
RDYCK	006714	1676	16790											
REFIL	002662	985	9920											
ROTATE	004304	509	12530											
ROT1	004410	12660	1283	1352	1354									
ROT10	004610	1278	13050											
ROT11	004374	12640	1346											
ROT11Z	004432	1267	12730											
ROT2	004470	12810	1353											
ROT3	004340	12580	1349											
ROT4	004460	12790	1311											
ROT5	004464	12800	1355	1357										
ROT6	004646	13120	1356											
ROT6X	004704	1315	13210											
ROT6X1	004726	1322	13280											
ROT6X2	004750	1329	13350											
ROT6X3	005000	1337	13430											
ROT7	004360	1259	12620											
ROT8	004520	1275	12920											
ROT8X	004572	1295	13020											
ROT9	004446	12760	1297	1299	1301	1304								
RSLNFL	005044	1257	1312	13570										
RSSOFL	005036	1256	1281	1313	13540									
SAVE	001046	6400	8980	899	9370	17700	17730	1776	1801					
SCHRSH	002416	888	897	9430										
SCOPE	007514	593	17690	1802	1803									
SEGCNT	001022	6300	8870	9000	9930	9160	9650	9740	9760	9900	10120	10260	10280	10940
		11090	11110	11740	11900	11920	11990	12540	12740	12920	13000	13730	13830	13890
		14090	14210	14380	14400	14540	14840	15070	15090	15230	17710	17840	17860	17930
SEGFLG	005032	12560	1280	12810	12930	13130	13520							
SEGMENT	001054	6430	887	903	965	976	1012	1020	1094	1111	1174	1192	1294	1292
		1373	1385	1409	1421	1440	1484	1509	16440	16470	1771	1786		
SETUP	001056	502	6480											
SIZE	006566	877	952	1076	1173	1253	1366	16420	1769					
BLEW	006354	15000	1592											

BLWCNT	006452	1507*	1591*	1609*											
BLWTIM	006642	920	994	1005	1051	1136	1231	1336	1402	1472	16500				
BLWTST	006254	592	15710	1596											
BLWI	006310	1573	1575	1577*	1584	1506									
BLWIX	006262	1572*	1605												
SNBCMR	003732	500	1161	1173*	1244										
SP	0000006	537*	649*	650*	657	659	660								
SPCFLG	003726	1092*	1107	1124*	1134*	1167*									
SRCHAN	007702	1799*													
STAER	007152	673	681	694	704	722	732	746	753	763	777	784	833	849	
		856	864	883	894	909	925	971	982	999	1010	1023	1034	1056	
		1088	1100	1117	1141	1156	1187	1205	1214	1221	1220	1236	1271	1287	
		1319	1326	1333	1341	1380	1391	1399	1407	1420	1435	1446	1462	1469	
		1477	1497	1504	1515	1547	1756*	1782							
STLNFL	005042	1303	1356*												
STP1	001150	668*	674												
STP2	001172	669	676*	682											
STP3	001214	677	683*												
STP4	001222	686*	695												
STP5	001260	690	696*												
STP6	001266	699*	705												
STP7	001310	700	706*												
STRCHR	005046	1263*	1264	1343*	1350*										
STRCNT	005050	1260*	1262*	1265	1344*	1359*									
STSCPL	005034	1293	1353*												
SHR	001004	600*	652	655*	737	912	929	953	986	1061	1078	1150	1175	1195	
		1242	1250	1296	1306	1347	1367	1416	1450	1481	1485	1510	1537	1562	
		1572	1595	1642	1764	1770	1789	1799							
SHREG	000176	578*	655												
S1	004006	1182*	1191	1201	1241										
S2	003764	1176	1179*												
S4	004130	1194	1208*												
S4X	004160	1210	1216*												
S4X1	004202	1217	1223*												
S4X2	004224	1224	1230*												
S7	004254	1232	1238*												
TABEND	006500	1593	1620*												
TABSTR	006454	1571	1610*												
TOPTR	006450	1571*	1587	1593	1604*	1600*									
TEST1	001316	594	716*	723	1693										
TEST1A	001342	710	726*	733											
TEST1B	001366	720	737*	747	754	764									
TEST1C	001504	738	757	770*	778	785	834								
TEST1D	001752	825	842*	850	857	865									
TEST2A	002074	585	877*	930											
TEST2B	002422	586	931	952*	1063										
TEST3	003240	587	1064	1076*	1160										
TKB	001014	612*													
TKS	001020	614*													
TPB	001012	611*	1709*												
TPS	001016	613*	1710												
TSTNO	001036	636*													
TSTSN	001042	638*													
TST2AX	002122	879	885*												

TST6	005052	590	1340	13650	1403																
TYP	006746	567	16950																		
TYPA	006756	16990	1700	1717																	
TYPC	006774	1701	17030																		
TYPD	007022	1707	17090	1714	1716																
TYPDAT	007066	16990	1700	1703	1705	1709	17130	17150	17180												
TYPF	007040	1704	17130																		
TYPG	007052	1706	17150																		
T1	003360	10950	1110	1120	1120	1147															
T1A	002200	8970	944																		
T1X	003416	1103	11070																		
T2A	002374	9360	943																		
T200	002504	958	9620	1060																	
T201	002534	9660	1003																		
T202	002720	960	975	987	989	991	995	10010													
T203	003014	10100	1046																		
T204	003102	1027	1030	10360	1041	1043	1045														
T205	003154	1037	10500																		
T207	002624	956	9840																		
T3A	002152	8890	902	913	915	917	920														
T3NCNT	003720	10770	11400	11640																	
T4	003540	1124	11310																		
T5	003422	1092	11000	1134																	
T5A	002214	8990	930																		
T5X	003430	11090	1132																		
T6LNCY	006102	13720	13920	14120	15270																
T6LNLO	006106	13690	13710	1372	14100	1412	15290														
T6PT2	005326	1411	14160																		
T6SPCT	006104	14070	14090	14000	15240	15280															
T61	005134	13750	1393	1413																	
T61Z	005156	1376	13020																		
T65	005220	1304	1307	13920																	
T65X	005250	1395	14010																		
T65Z	005300	1403	14090																		
T66	005370	14230	1439	1451	1453	1455	1526														
T66X	005412	1424	14300																		
T66Z	005434	1431	14370																		
T66Z1	005500	1442	14480																		
T66Z1X	005536	1449	14560																		
T68	006034	1511	15170																		
T68X	006070	1500	1520	1522	15240																
T68Z	006076	1510	15260																		
T69	005724	14920	1525																		
T69X	005746	1493	14990																		
T69Z	005770	1500	15060																		
T7	003550	1123	11330																		
T70	005566	1450	14640																		
T70X	005610	1465	14710																		
T71	005640	1473	14790																		
T72	005662	1480	14840																		
T72X	005710	1486	14890																		
T8	003506	1091	11230	1133																	
T9	003322	1004	10900	1149																	
WIDTH	001052	6420	886	910	962	992	1100	1200	1255	1302	1374	1422	1456	16450							

WORK	001044	1648*	1772	1795																
XNAM1	006166	6390	7390	750*	1145*	1146*	1656*	1658*	1663*											
XNAM1X	006174	1543	15490																	
XLINF	002316	15510	911	9180																
XLPX2	003700	1152	11500																	
XN	003716	1077	11630																	
XBLW1	006332	1579	15830																	
X81X	004030	1103	11090																	
X71A	003402	1096	11020																	
X66X	005104	1368	13710																	
X88X	005346	1417	1419	14200																
ZCOUNT	003730	1000*	1002*	1146	11600															
Z80Z	003272	1079	10820																	
.	007730	5590	5660	5690	5710	5730	5760	5800	5830	5950	901	927	1050	1062						
		1127	1159	1170	1243	1261	1307	1309	1345	1370	1400	1550	1550	1550						
		1564	1590	1627	1685	1711	1765	17600	1775	1790										

ERROR	6210	670	670	691	701	719	729	743	750	760	774	781	786	795	806
	810	846	853	861	880	891	906	922	960	979	996	1007	1020	1031	1033
	1085	1097	1104	1114	1130	1153	1184	1202	1211	1218	1225	1233	1260	1284	1316
	1323	1330	1330	1377	1380	1396	1404	1425	1432	1443	1459	1466	1474	1494	1501
	1512	1544	1580	1779											

ADD	1014	1146	1490	1604	1634	1665	1677	1682	1696	1732	1735				
BEG	901	911	913	927	954	985	987	1037	1041	1043	1045	1059	1062	1079	1199
	1176	1194	1196	1240	1243	1259	1275	1278	1295	1297	1307	1345	1348	1368	1411
	1417	1449	1451	1482	1486	1518	1520	1538	1573	1598	1643	1704	1706	1708	1798
BIC	792	801	812	824	870	1039	1734	1773	1800						
BIS	798	799	818	822	859										
BIT	737	912	929	953	986	1061	1078	1158	1175	1195	1242	1258	1296	1306	1347
	1367	1416	1498	1481	1485	1519	1537	1562	1572	1595	1642	1789			
BMI	677	698	708	728	757	788	852	1183	1224	1329	1431	1465	1508	1668	1662
	1676														
BNE	738	759	915	938	975	989	1003	1027	1118	1120	1147	1149	1191	1198	1299
	1384	1393	1439	1453	1488	1508	1522	1525	1553	1561	1563	1586	1592	1594	1596
	1638	1633	1664	1701	1744	1785	1792	1802							
BPL	669	718	742	749	773	845	898	967	1019	1096	1127	1183	1217	1267	1322
	1376	1395	1424	1458	1493	1543	1558	1555	1558	1579	1584	1598	1627	1681	1685
	1711	1765	1775	1778	1798										
BR	653	674	682	695	705	723	733	747	754	764	778	785	858	857	865
	879	902	985	917	921	928	931	958	978	991	995	1086	1038	1046	1052
	1064	1081	1084	1113	1128	1132	1137	1152	1161	1178	1201	1218	1232	1241	1261
	1283	1381	1384	1389	1311	1315	1337	1378	1387	1483	1419	1442	1455	1473	1488
	1511	1548	1564	1575	1685	1657	1788	1717	1794	1883					
CLC	1737	1739	1741												
CLR	739														
CMP	657	832	869	914	988	1040	1042	1044	1197	1298	1452	1521	1593	1791	1801
CMPB	1788	1783	1785												
COM	1815														
DEC	1143	1524	1743												
EMT	661	663	665	683	696	786	1768	1762							
HALT	566	667	685	698	788	884	895	972	1000	1011	1024	1035	1057	1089	1181
	1118	1157	1188	1206	1215	1222	1229	1237	1272	1288	1328	1327	1334	1342	1381
	1408	1488	1429	1436	1447	1463	1478	1478	1498	1585	1516	1548	1766	1783	
INC	758	988	918	926	974	984	1001	1002	1016	1026	1036	1038	1058	1109	1119
	1148	1198	1193	1238	1239	1274	1276	1277	1294	1343	1344	1383	1392	1418	1438
	1448	1479	1507	1517	1552	1559	1585	1591	1629	1632	1663	1784	1787		
JMP	582	585	586	587	588	589	598	591	592	593	594	825	834	896	938
	983	1068	1063	1187	1122	1168	1244	1279	1288	1346	1349	1413	1483	1526	1683
JSR	673	681	694	784	722	732	746	753	763	777	784	833	849	856	864
	877	878	883	894	984	989	928	925	952	971	977	982	994	999	1085
	1018	1023	1029	1034	1051	1056	1076	1083	1088	1188	1112	1117	1136	1141	1151
	1156	1173	1187	1288	1285	1289	1214	1221	1228	1231	1236	1253	1271	1282	1287
	1314	1319	1326	1333	1336	1341	1366	1388	1386	1391	1399	1482	1487	1428	1435
	1441	1446	1462	1469	1472	1477	1497	1584	1518	1515	1547	1599	1787	1714	1716
	1756	1769	1782												
MOV	581	584	689	658	651	655	656	659	668	671	679	687	688	692	782
	728	738	748	744	751	761	778	771	775	782	787	789	796	798	887
	889	819	821	842	843	847	854	858	862	881	885	886	887	888	892
	897	898	899	983	987	916	918	919	923	936	937	955	956	957	959
	968	961	962	963	964	965	969	973	976	988	998	992	993	997	1084
	1088	1012	1013	1021	1025	1028	1032	1058	1054	1077	1088	1082	1086	1098	1091
	1092	1093	1094	1098	1105	1108	1111	1115	1121	1123	1124	1125	1131	1133	1134
	1135	1139	1144	1145	1158	1154	1174	1177	1179	1188	1181	1185	1189	1192	1199
	1283	1288	1212	1219	1226	1238	1234	1254	1255	1256	1257	1268	1262	1263	1264
	1265	1269	1273	1281	1285	1292	1293	1388	1382	1383	1385	1388	1318	1312	1313
	1317	1324	1331	1335	1339	1365	1369	1371	1372	1373	1374	1378	1382	1385	1389

	1397	1401	1405	1409	1412	1418	1420	1421	1422	1426	1433	1437	1440	1444	1454
	1456	1460	1467	1471	1475	1484	1487	1489	1495	1502	1506	1509	1513	1523	1536
	1539	1541	1545	1551	1556	1571	1574	1576	1577	1581	1587	1588	1597	1624	1625
	1631	1644	1645	1647	1648	1656	1658	1679	1695	1697	1729	1730	1731	1733	1770
	1771	1772	1776	1780	1786	1793	1795	1796	1799						
MOV8	1699	1709	1713	1715	1736										
NOP	791	808	811	823	868	1600	1601	1602							
RESET	648	716	726												
ROR	1738	1740	1742												
RTI	1702														
RTS	1620	1635	1646	1649	1666	1678	1683	1686	1712	1745	1767				
TST	652	668	689	699	717	748	772	844	889	966	1018	1095	1102	1216	1266
	1321	1375	1394	1423	1457	1492	1542	1578	1659	1764	1777				
TST8	676	727	741	756	779	851	1102	1126	1223	1328	1430	1464	1499	1549	1554
	1557	1583	1589	1626	1661	1675	1680	1684	1710	1774	1797				
.ASCII	1768														
.ENABL	529	530													
.END	1810														
.EVEN	1768														
.LIST	566	1768													
.MACR	621														
.NLIST	566	1768													
.PAGE	511														
.REPT	1	566													

ERRORS DETECTED: 0

.DZLPAB,DZLPAB,DZLPAB.SRC/CRF/SOL
 RUN-TIME: 0 15 2 SECONDS
 CORE USED: 12K