IDENTIFICATION

PRODUCT CODE:	MAINDEC-08-DIKL8-A-D
PRODUCT NAME:	KL8-JA TELETYPE TEST
DATE CREATED:	OCTOBER 8, 1973
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	BRUCE HANSEN

1. ABSTRACT

THIS PROGRAM CONSISTS OF A PACKAGE OF TEST PROGRAMS FOR TESTING THE TELETYPE,ONLY ONE TELETYPE MAY BE TESTED AT A TIME, THE TELETYPES THAT CAN BE TESTED ARE LT33-CC, LT33-DD LT33-CC,LT33-CD,LT35-CC,LT35-CD, OR KSR37,

THE TEST PROGRAMS ARE;

PRG0-READER TEST
PRG1-PRINTER TEST
PRG2-PUNCH TEST
PRG3-KEYBOARD TEST
PRG4-COMBINED TEST
PRG5-READER EXERCISER, BINARY COUNT PATTERN
PRG6-PRINTER EXERCISER
PRG7-BINARY COUNT TAPE GENERATOR

2. REQUIREMENTS

2.1 EQUIPMENT

A, PDP-8/E FAMILY PROCESSOR WITH AT LEAST 4K OF MEMORY
   OR A PDP-8,8I OR 8L WITH 4K OF MEMORY AND A DW8E-N
   OR A DW8E-P BUS COVERTER,
B, LT33'S,LT35-CC,LT35-CD OR KSR37 TO TEST A 110 BAUD CURRENT OPTION,
C, KL8-JA(M8655) TERMINAL CNTRL/DATA INTERFACE,

2.2 STORAGE

LOCATIONS 0000 THROUGH 5400 ARE USED,

2.3 PRELIMINARY PROGRAMS

THE SYSTEM MUST BE CAPABLE OF RUNNING ALL BASIC PROCESSOR DIAGNOSTICS AND THE KL8-JA LOOP BACK TEST,MAINDEC-08-DIKLA,

3, LOADING PROCEDURE

3.1 METHOD

THE PROGRAM IS LOADED USING THE STANDARD BINARY LOADER TECHNIQUE AND THE PROGRAM MUST RESIDE IN FIELD 0,

4. TEST PROCEDURE

4.1 DEVICE CODE SELECTION

BEFORE ANY PROGRAM CAN BE RUN, THE PROGRAM MUST HAVE THE FOLLOWING INFORMATION:

1, TYPE OF TELETYPE (33, 35, OR 37)
2, DEVICE CODES ASSIGNED.

TO PROVIDE THIS INFORMATION, PROCEED AS FOLLOWS:

A, SET LOCATION 0020 TO:

1, 0000 FOR LT33'S TELETYPE
2, 0001 FOR LT35-CC OR LT35-CD TELETYPE
3, 0002 FOR KSR 37 TELETYPE

B, SET LOCATION 0021 AS FOLLOWS:

1, LOAD ADDRESS 0021,
2, SET SR 0 THROUGH 5 TO THE DEVICE CODE OF THE KEY-BOARD/READER TO BE TESTED,
(EG: READER CODE OF 03, SR0-5=03;
3, SET SR 6 THROUGH 11 TO THE DEVICE CODE OF THE PRINTER/PUNCH TO BE TESTED,
(EG: PRINTER CODE OF 04, SR6-11=04,
4, PRESS DEPOSIT,

C, REFER TO INDIVIDUAL PROGRAM TEST PROCEDURE.

4.2 PRG0 TEST PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE; REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON-LINE;

C. LOAD BINARY COUNT PATTERN TEST TAPE IN READER.

D. TURN ON READER.

E. LOAD ADDRESS 0200.

F. SET SR TO 0000.

G. PRESS CLEAR AND CONTINUE.

H. PROGRAM HALTS AT LOCATION 0227 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS. NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG0 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC.
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 THROUGH SR11.
SR2=1 LOOP PROGRAM.
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED.

I. PROGRAM IS EXECUTED AND HALTS AT LOCATION 0271 PROGRAM END HALT, IF NO "LOOP" OPTIONS ARE SET, AND IF NO ERRORS OCCUR.

4.3 PRG1 TEST PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE; REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON LINE.

C. LOAD ADDRESS 0200.

D. SET SR TO 0001.

(4.3 CONT'D)

E. PRESS CLEAR AND CONTINUE.

F. PROGRAM HALTS AT LOCATION 0227 TO PERMIT SETTING OF SR OPTIONS. SET ANY DESIRED OPTIONS, NORMAL RUN IS WITH SR=0000. PRESS CONTINUE.

PRG1 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC:
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11.
SR2=1 LOOP PROGRAM.
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED.

G. PROGRAM IS EXECUTED AND HALTS AT LOCATION 0271, PROGRAM END HALT IF NO "LOOP" OPTIONS ARE SET, AND IF NO ERRORS OCCUR.

4.4 PRG2 TEST PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. TURN ON TELETYPE PUNCH.

C. WITH TELETYPE OFF-LINE, PUNCH A SECTION OF BLANK LEADER ABOUT 6 INCHES LONG. RETURN TO ON-LINE POSITION.

D. LOAD LEADER IN READER, LEAVING VERY LITTLE SLACK BETWEEN PUNCH AND READER.

E. TURN ON READER.

F. LOAD ADDRESS 0200.

G. SET SR TO 0002.

H. PRESS CLEAR AND CONTINUE.

I. PROGRAM BEGINS EXECUTION. SET SR5 TO A 1 IF YOU WISH TO STOP ON ERROR. SR5 SET TO A 0 WILL CAUSE PROGRAM TO HALT AT END OF DATA BLOCK IF ERRORS OCCURRED. THE AC WILL CONTAIN THE ERROR COUNT.

J. THE PROGRAM RUNS CONTINUOUSLY, UNTIL STOPPED BY USER.

4.5 PRG3 TEST PROCEDURE

A, PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE, REFER TO SECTION 4,1,

B, INSURE TELETYPE IS ON-LINE,

C, MAKE SURE THAT THE TELETYPE "PROCEED" LIGHT IS ON, IF TESTING A KSR37 KEYBOARD,

D, LOAD ADDRESS 0200,

E, SET SR TO 0003,

F, PRESS CLEAR AND CONTINUE,

G, PROGRAM TITLE IS TYPED, AND PROGRAM HALTS AT LOC 0427 TO PERMIT SETTING OF SR OPTIONS, SET ANY DESIRED OPTIONS, NORMAL RUN IS WITH SR=0000, PRESS CONTINUE,

PRG3 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC,
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 - SR11,
SR2=1 LOOP PROGRAM,
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED,

H, FOLLOW TYPED INSTRUCTIONS,

I, WHEN PROGRAM IS COMPLETED, AND PROVIDED THAT NO SR OPTIONS PREVENT IT, THE PROGRAM STOPS AT PROGRAM END HALT AT LOC 0271,

NOTE

CORRECT OPERATION OF KEYBOARD IS VERIFIED BY USER CHECKING THAT THE PRINTED CHARACTERS MATCH WITH THE CHARACTERS KEYED,

4.6 PRG4 TEST PROCEDURE

A, PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE, REFER TO SECTION 4,1,

B, TURN ON TELETYPE PUNCH,

C, WITH TELETYPE OFF-LINE, PUNCH A SECTION OF BLANK LEADER ABOUT 6 INCHES LONG, RETURN TELETYPE TO ON-LINE POSITION,

D, LOAD LEADER IN READER, LEAVING VERY LITTLE SLACK BETWEEN PUNCH AND READER,

E, TURN ON READER,

F, LOAD ADDRESS 0200,

G, SET SR TO 0004,

H, PRESS CLEAR AND CONTINUE,

I, PROGRAM HALTS AT LOC 0227 TO PERMIT SETTING OF SR OPTIONS, SET ANY DESIRED OPTIONS, NORMAL RUN IS WITH SR=0100, TO HALT ON ERROR, PRESS "CONTINUE", DO NOT PRESS "CLEAR",

PRG4 SR OPTIONS:

SR0=1 HALT AT END OF ROUTINE, ROUTINE NUMBER IN AC,
SR1=1 SELECT ROUTINE WHOSE NUMBER IS SET IN SR6 THROUGH SR11,
SR2=1 LOOP PROGRAM,
SR5=1 HALT ON ERROR, BAD CHARACTER IN AC,
SR5=0 HALT AT END OF DATA BLOCK IF ERRORS OCCURRED, ERROR COUNT IN AC,
SR6 THROUGH SR11 ROUTINE NUMBER TO BE SELECTED,

J, PROGRAM IS EXECUTED AND HALTS AT PROGRAM END HALT AT LOC 0271 UNLESS PREVENTED FROM ENDING, BY SR OPTIONS, OR IF ERRORS OCCUR,

4.7 PRG5 TEST PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. INSURE THAT TELETYPE IS ON-LINE.

C. LOAD BINARY COUNT PATTERN TEST TAPE IN READER.

D. TURN ON READER.

E. LOAD ADDRESS 0200.

F. SET SR TO 0005.

G. PRESS CLEAR AND CONTINUE.

H. PROGRAM RUNS CONTINUOUSLY UNTIL STOPPED BY USER. THE FOLLOWING SR OPTIONS MAY BE SET AT ANY TIME.

SR0=1	PROGRAM HALTS WITH ACCUMULATED ERROR COUNT IN AC.
SR3=1	PROGRAM READS TAPE AT FULL SPEED.
SR3=0	PROGRAM READS TAPE WITH RANDOM STALLS BETWEEN CHARACTERS.
SR5=1	HALT ON ERROR. PROGRAM HALTS IF READ ERROR OCCURS. BAD CHARACTER IS DISPLAYED IN AC.
SR6=0	NO HALT ON ERROR.

4.8 PRG6 TEST PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. MAKE SURE THAT TELETYPE IS ON-LINE, AND IF KSR37, THAT KEYBOARD "PROCEED" LIGHT IS ON.

C. LOAD ADDRESS 0200.

D. SET SR TO 0006.

E. PRESS CLEAR AND CONTINUE.

F. THE PROGRAM IDENTIFIES ITSELF, AND REQUESTS DATA TO BE TYPED.

G. TYPE IN DATA AS FOLLOWS:

1. TYPE THE 3 CHARACTERS TO BE TYPED AND A DELETE CODE (RUBOUT) IF YOUR WISH NOT TO STALL BETWEEN CHARACTERS OR,

2. TYPE THE 3 CHARACTERS TO BE TYPED AND ANY OTHER CHARACTER OTHER THAN THE DELETE CODE TO STALL BETWEEN CHARACTERS.

(4.8 CONT'D)

H. THE PROGRAM WILL CONTINUOUSLY TYPE LINES CONTAINING THE THREE DESIRED CHARACTERS.

I. TO CHANGE THE CHARACTER TO BE TYPED, SET SR0 TO A 1. THE PROGRAM WILL REQUEST NEW DATA WHEN THE CURRENT LINE IS COMPLETED. TYPE IN THE DATA AS IN STEP G.

4.9 PRG7 TEST PROCEDURE

A. PERFORM DEVICE SELECTION IF NOT PREVIOUSLY DONE. REFER TO SECTION 4.1.

B. INSURE TELETYPE IS ON-LINE.

C. TURN OFF TELETYPE READER.

D. LOAD BLANK TAPE IN PUNCH.

E. TURN ON PUNCH.

F. LOAD ADDRESS 0200.

G. SET SR TO 0007.

H. PRESS CLEAR AND CONTINUE.

I. PROGRAM PUNCHES BINARY COUNT PATTERN TEST TAPE UNTIL STOPPED BY USER.

5. PROGRAM AND/OR OPERATOR ACTION

5.1 NORMAL HALTS

LOC 0227	SR SET HALT. OCCURS TO PERMIT SETTING OF DESIRED OPTIONS. PRESS CONTINUE AFTER SETTING DESIRED OPTIONS. (PRG0,PRG1,PRG3,PRG4).
LOC 0271	PROGRAM END HALT. OCCURS AT END OF PROGRAM, IF NO "LOOP" TYPE OPTION IS SET. SET DESIRED OPTIONS AND PRESS CONTINUE. THIS HALT REOCCURS IF NO OPTIONS ARE SET. (PRG0,PRG1,PRG3,PRG4).
LOC 0315	ROUTINE END HALT. THIS HALT OCCURS AT END OF A TEST ROUTINE IF SR0 IS SET TO A 1. THE AC CONTAINS THE NUMBER OF ROUTINE JUST COMPLETED. (PRG0,PRG1,PRG3,PRG4)

6. ERRORS

6.1 ERROR HALTS AND DESCRIPTION

ALL OTHER ERROR HALTS WHICH ARE NOT DESCRIBED BELOW, REFER TO THE LISTING FOR EXPLANATION.

LOC 2130 — PRG0, ROUTINE 0, ERROR HALT A, READ ERROR, BAD CHARACTER IN AC. PRESS CONTINUE.

LOC 2133 — PRG0, ROUTINE 0, ERROR HALT B, FOLLOW UP HALT, EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TEST.

LOC 2162 — PRG0, ROUTINE 1, ERROR HALT A, READ ERROR, BAD CHARACTER IN AC. PRESS CONTINUE.

LOC 2165 — PRG0, ROUTINE 1, ERROR HALT B, FOLLOW UP HALT, EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TEST.

LOC 2227 — PRG0, ROUTINE 2, ERROR HALT A, READ ERROR, BAD CHARACTER IN AC. PRESS CONTINUE.

LOC 2232 — PRG0, ROUTINE 2, ERROR HALT B, FOLLOW UP HALT, EXPECTED CHARACTER IN AC. PRESSING CONTINUE RESUMES TEST.

LOC 3215 — PRG3, ROUTINE 0, KSF COMMAND FAILED TO SKIP ON KEYBOARD FLAG, PRESS CONTINUE TO ENTER SCOPE LOOP THAT SKIPS ON FLAG CONTINUOUSLY.

LOC 3507 — PRG5, READ ERROR HALT A, BAD CHARACTER IN AC. PRESS CONTINUE, HALT OCCURS IF SR#1.

LOC 3512 — PRG5, READ ERROR HALT B, FOLLOW UP HALT TO PRG5 READ ERROR HALT A, EXPECTED CHARACTER IS DISPLAYED IN AC, TO PROCEED, PRESS CONTINUE.

LOC 3517 — PRG5, ERROR COUNT HALT, HALT OCCURS WHENEVER SR0 IS SET TO A 1, THE AC THEN CONTAINS THE ACCUMULATED ERROR COUNT, IF ANY, TO PROCEED, PRESS CONTINUE.

7. MISCELLANEOUS

7.1 EXECUTION TIME (MINUTES:SECONDS)

NOTE: THE TIMES LISTED BELOW ARE ONLY APPROXIMATE, THE EXECUTION TIMES MAY VARY FROM PROCESSOR TO PROCESSOR AND FROM ONE TYPE OF MEMORY TO ANOTHER TYPE OF MEMORY.

PRG0: 18:00

PRG1: 20:00

PRG2: CONTINUOUS

PRG3: USER DEP.

PRG4: 40:00

PRG5: CONTINUOUS

PRG6: USER DEP.

PRG7: CONTINUOUS

7.2 TEST TAPES

IF A BINARY COUNT TEST TAPE IS NOT AVAILABLE ON SITE, USE PRG7 TO GENERATE A BINARY COUNT TEST TAPE.
FOR CONVENIENCE OF USE, A TAPE LOOP SHOULD BE MADE, MAKING SURE THAT THE PATTERN IS MATCHED AT THE SPLICE POINT.

8. PROGRAM DESCRIPTION

8.1 PRG0 = READER TEST

THIS PROGRAM CONTAINS 3 ROUTINES NUMBERED FROM 0 TO 2.

RTN0: READS 4095 CHARACTERS OF BINARY COUNT PATTERN, FULL SPEED.

RTN1: READS 2000 CHARACTERS OF BINARY COUNT PATTERN WITH RANDOM STALLS BETWEEN CHARACTERS.

RTN2: READS 100 RANDOM LENGTH CHARACTER BLOCKS. FIXED STALL BETWEEN CHARACTERS IN A BLOCK. THE STALL CHANGES FOR EACH BLOCK AND IS DETERMINED AT RANDOM.

8.2 PRG1 = PRINTER TEST

THIS PROGRAM CONTAINS 41 ROUTINES NUMBERED FROM 0 TO 50 (OCTAL).

RTN0: CARRIAGE RETURN TEST. CHECKS ABILITY OF CARRIAGE RETURN TO PRINT POSITION 1 FROM ALL OTHER PRINT POSITIONS. NO PRINTING SHOULD OCCUR IN ANY PRINT POSITION OTHER THAN POSITION 1.

RTN1: RIGHT MARGIN TEST. THIS TEST SHOWS WHEN THE RIGHT MARGIN IS NOT CORRECTLY ADJUSTED. THE TEST PRINTS 16 GROUPS OF ----I FOLLOWED BY CHARACTERS I=.

RTN2: SPACE TEST. THE TEST PRINTS / IN ALTERNATE POSITIONS OF THE LINE. AFTER A DOUBLE CARRIAGE RETURN IT SPACES TO THE BLANK POSITIONS AND PRINTS A LEFT SLANT SLASH. A DOUBLE CARRIAGE RETURN IS ISSUED AFTER PRINTING EACH LEFT SLANT SLASH.

RTN3: LINE FEED TEST. THE TEST PRINTS A LEFT SLANT SLASH FOLLOWED BY A LINE FEED, FOLLOWED BY A RANDOM DELAY UNTIL 72 SLASHES HAVE BEEN PRINTED. THE RESULT SHOULD APPEAR TO BE A LEFT SLANTED LINE FROM POSITION 1 TO 72. VERTICAL SPACING VARIATIONS SHOULD BE APPARENT IF ADJUSTMENT IS REQUIRED.

NOTE: KSR37 WILL PRINT 81 SLASHES. THE RESULT SHOULD APPEAR TO BE A LEFT SLANTED LINE FROM POSITION 1 TO 81.

(8,2 CONT'D)

ROUTINES 4 THROUGH 41 TYPES LINES CONTAINING 3 CHARACTERS AT FULL SPEED AS FOLLOWS:

RTN4: ABC (CAPITALS)
RTN5: DEF "
RTN6: GHI "
RTN7: JKL "
RTN10: MNO "
RTN11: PQR "
RTN12: STU "
RTN13: VWX "
RTN14: YZ0 "
RTN15: 123
RTN16: 456
RTN17: 789
RTN20: !"#
RTN21: $%&
RTN22: '()
RTN23: *+,
RTN24: -./
RTN25: :;<
RTN26: =>?
RTN27: @[\
RTN30:]↑ AND LEFT ARROW
RTN31: ABC (LOWER CASE) (KSR37 ONLY)
RTN32: DEF " "
RTN33: GHI " "
RTN34: JKL " "
RTN35: MNO " "
RTN36: PQR " "
RTN37: STU " "
RTN40: VWX " "
RTN41: YZ AND CODE 340 "

RTN42: TYPES LINE OF 4 CHARACTERS WHOSE CODE IS 373, 374, 375, AND 376 (KSR37 ONLY).

RTN43: TYPES 2 LINES OF ALL CHARACTERS, FIRST LINE IS TYPED AT FULL SPEED, AND THE 2ND LINE WITH RANDOM STALLS BETWEEN CHARACTERS.

RTN44: TYPES 12 LINES OF LT33 PRINTER WORST CASE PATTERN, ALTERNATE LINES ARE TYPED WITH RANDOM STALLS BETWEEN CHARACTERS, ROUTINE RUNS ONLY IF A LT33 IS PRESENT.

THE LT33 WORST CASE PATTERN USED IS 'LEFT ARROW W/W LEFT ARROW.

(8,2 CONT'D)

RTN45: TYPES 12 LINES OF LT35 PRINTER WORST CASE PATTERN, ALTERNATE LINES ARE TYPED WITH RANDOM STALLS BETWEEN CHARACTERS, ROUTINE RUNS ONLY IF LT35-CO OR LI35-CO IS PRESENT,

THE LI35 WORST CASE PATTERN USED IS '[?C!C

RTN46: TYPES 12 LINES OF KSR37 PRINTER WORST CASE PATTERN, ALTERNATE LINES ARE TYPED WITH RANDOM STALLS BETWEEN CHARACTERS, ROUTINE RUNS ONLY IF KSR37 IS PRESENT,

THE KSR 37 WORST CASE PATTERN USED IS:

CAPITAL N, LOWER CASE Q, CAPITAL A, SWING DASH, CAPITAL A, LOWER CASE Q,

RTN47: TAB TEST, EXECUTED FOR 37 OR 35 TELETYPE ONLY, THE TEST IS RUN AFTER ROUTINE 3,

RTN50: BACKSPACE TEST, EXECUTED FOR KSR37 TELETYPE ONLY, THIS TEST IS RUN AFTER ROUTINE 47,

8,3 PRG2 - PUNCH TEST

THIS PROGRAM TESTS THE PUNCH WITH A SPECIAL BINARY COUNT PATTERN, EVERY BINARY COUNT CHARACTER PUNCHED IS FOLLOWED BY ITS 1'S COMPLEMENT CHARACTER,

THE TEST SEQUENCE IS AS FOLLOWS:

A) PUNCH LEADER (CODE 376)
B) PUNCH SYNC CHARACTER (CODE 377)
C) PUNCH DATA BLOCK AT FULL SPEED (512 CHARACTERS)
D) PUNCH TRAILER (CODE 376)
E) SYNC THE READER
F) READ AND CHECK DATA BLOCK
G) PUNCH LEADER (CODE 376)
H) PUNCH SYNC CHARACTER (CODE 377)
I) PUNCH DATA BLOCK WITH STALLS, (512 CHARACTERS)
J) PUNCH TRAILER (CODE 376)
K) SYNC THE READER
L) READ AND CHECK DATA BLOCK
M) REPEAT, (GO TO STEP A)

8.4 PRG3 = KEYBOARD TEST

THIS PROGRAM CONTAINS 3 ROUTINES NUMBERED FROM 0 TO 2,

RTN0: CHECKS THAT KSF COMMAND SKIPS WHEN FLAG=1, TEST IS DONE 1000 TIMES,

RTN1: ECHO TEST. ANY CHARACTERS READ FROM KEYBOARD ARE TYPED, CORRECT OPERATION VERIFICATION IS DONE VISUALLY BY USER, READING A RUBOUT CHARACTER ENDS THE TEST,

RTN2: OCTAL EQUIVALENCE TEST, THE OCTAL EQUIVALENT OF ANY CHARACTERS KEYED IS TYPED, READING A RUBOUT ENDS THE TEST,

8.5 PRG4 = COMBINED READER, PRINT, PUNCH TEST

THIS PROGRAM CONTAINS 25 ROUTINES NUMBERED FROM 0 TO 34 (OCTAL), ALL ROUTINES USE THE FOLLOWING TEST SEQUENCE:

A) FILL CORE WITH DATA TO BE PUNCHED/PRINTED,
B) PUNCH LEADER,
C) PUNCH SYNC CHARACTER,
D) PUNCH DATA BLOCK (NO DELAY BETWEEN CHARACTERS,)
D) SYNC THE READER,
F) READ/CHECK DATA BLOCK (RANDOM DELAY BETWEEN CHARACTERS),
G) PUNCH DATA BLOCK (RANDOM DELAY BETWEEN CHARACTERS),
H) READ DATA BLOCK (NO DELAY BETWEEN CHARACTERS),
I) PUNCH TRAILER,
J) WAIT FOR READER TO COMPLETE READING DATA BLOCK,
K) END OF TEST SEQUENCE,

(8,5 CONT'D)

RTN0: PUNCH/PRINT AND READ CHECK BLOCK OF ABC
RTN1: PUNCH/PRINT AND READ CHECK BLOCK OF DEF
RTN2: PUNCH/PRINT AND READ CHECK BLOCK OF GHI
RTN3: PUNCH/PRINT AND READ CHECK BLOCK OF JKL
RTN4: PUNCH/PRINT AND READ CHECK BLOCK OF MNO
RTN5: PUNCH/PRINT AND READ CHECK BLOCK OF PQR
RTN6: PUNCH/PRINT AND READ CHECK BLOCK OF STU
RTN7: PUNCH/PRINT AND READ CHECK BLOCK OF VWX
RTN10: PUNCH/PRINT AND READ CHECK BLOCK OF YZ0
RTN11: PUNCH/PRINT AND READ CHECK BLOCK OF 123
RTN12: PUNCH/PRINT AND READ CHECK BLOCK OF 456
RTN13: PUNCH/PRINT AND READ CHECK BLOCK OF 789
RTN14: PUNCH/PRINT AND READ CHECK BLOCK OF !"#
RTN15: PUNCH/PRINT AND READ CHECK BLOCK OF $%&
RTN16: PUNCH/PRINT AND READ CHECK BLOCK OF '()
RTN17: PUNCH/PRINT AND READ CHECK BLOCK OF **,
RTN20: PUNCH/PRINT AND READ CHECK BLOCK OF -./
RTN21: PUNCH/PRINT AND READ CHECK BLOCK OF :;<
RTN22: PUNCH/PRINT AND READ CHECK BLOCK OF =>?
RTN23: PUNCH/PRINT AND READ CHECK BLOCK OF @[\
RTN24: PUNCH/PRINT AND READ CHECK BLOCK OF]↑←
RTN25: PUNCH/PRINT AND READ CHECK BLOCK OF ALL PRINTABLE CHARACTERS
RTN26: PUNCH/PRINT AND READ CHECK BLOCK OF LT33 PRINTER
WORST CASE PATTERN (←W/)
RTN27: PUNCH/PRINT AND READ CHECK BLOCK OF LT35 PRINTER
WORST CASE PATTERN, (E?C)
RTN30: PUNCH/PRINT AND READ CHECK BLOCKS OF SPACE, RUBOUT (DATA: ALL 1'S, ALL 1'S, ALL 0'S);

8.6 PRG5 - READER EXERCISER, BINARY COUNT PATTERN

THE PROGRAM READS AND CHECKS A BINARY COUNT PATTERN TEST TAPE, WITH PROGRAM RUNNING SETTING SR0 TO A 1 CAUSES PROGRAM TO HALT AND DISPLAY THE ACCUMULATED ERROR COUNT IN AC, SR3 SET TO A 1 GIVES FULL SPEED READING, SR3 SET TO A 0 CAUSES STALLS BETWEEN CHARACTERS, SR5 SET TO A 1 WILL HALT THE PROGRAM WHEN AN ERROR OCCURS, THE BAD CHARACTER IS THEN DISPLAYED IN THE AC, PRESSING CONTINUE DISPLAYS THE EXPECTED CHARACTER.

8.7 PRG6 - PRINTER EXERCISER

THIS PROGRAM CONTINUOUSLY TYPES LINES OF ANY 3 CHARACTERS KEYED BY USER, ON PROGRAM REQUEST THE USER KEYS IN THE 3 CHARACTERS TO BE TYPED, FOLLOWED BY A DELETE CODE IF FULL SPEED TYPING IS DESIRED, OR BY ANY OTHER CHARACTER IF RANDOM STALLS AFTER EACH CHARACTER ARE DESIRED.

8.8 PRG7 - TAPE GENERATOR - BINARY COUNT PATTERN

PUNCHES BINARY COUNT PATTERN TEST TAPE.

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                    /KL8=JA TELETYPE TEST,  MAINDEC-08-DIKLB-A-L
                    /
                    /COPYRIGHT 1973 DIGITAL EQUIPMENT CORPORATION, MAYNARD, MASS, 01754
                    /
                    /PROGRAMMER: BRUCE HANSEN
                    /
                    /PRG0=READER TEST
                    /PRG1=PRINTER TEST
                    /PRG2=PUNCH TEST
                    /PRG3=KEYBOARD TEST
                    /PRG4=COMBINED TEST
                    /PRG5=READER EXERCISER, BINARY COUNT PATTERN,
                    /PRG6=PRINTER EXERCISER,
                    /PRG7=TAPE GENERATOR, BINARY COUNT PATTERN,
                    /
                    /
                    /*****************************************************
                    /0110 BAUD      11 BITS @ 9.09 MSEC = 100 MSEC
                    /*****************************************************
                    /
              6001  ION=6001                        /TURN INTRRRUPT ON,
              6002  IOF=6002                        /TURN INTERRUPT OFF,
              6030  KCR=6030                        /CLEAR KBRD FLAG BUT DO NOT SET RDR RUN
              6031  KSF=6031                        /SKIP IF KEYBOARD/READER FLAG = 1,
              6032  KCC=6032                        /CLEAR AC AND KBRD/READER FLAG, SET READER RUN,
              6034  KRS=6034                        /READ KEYBOARD/READER BUFFER STATIC
              6035  KIE=6035                        /ENABLE TTY INTERRUPT WHEN AC11 EQUALS 1
              6036  KRB=6036                        /CLEAR AC, READ KEYBOARD BUFFER, CLEAR
                                                    /KEYBOARD FLAGS,
              6040  SPF=6040                        /SET PRINTER FLAG
              6041  TSF=6041                        /SKIP IF TELEPRINTER/PUNCH FLAG = 1,
              6042  TCF=6042                        /CLEAR TELEPRINTER/PUNCH FLAG,
              6044  TPC=6044                        /LOAD TELEPRINTER/PUNCH BUFFER
                                                    /SELECT AND PRINT,
              6045  SPI=6045                        /SKIP IF TTY INTERRUPT
              6046  TLS=6046                        /LOAD TELEPRINTER/PUNCH BUFFER,
                                                    /SELECT AND PRINT AND CLEAR
                                                    /TELEPRINTER/PUNCH FLAG,

              7200  CLA=7200
              7402  HLT=7402
              7604  LAS=7604

              0000  OPEN=0                          /PROGRAM MODIFYBLE,
              4577  BSW=JMS I [SIMBSW
              4576  SETLOC=JMS I [STCTR
              4575  DELAY=JMS I [DLYMS
              4574  CRLF=JMS I [CRALF
              4573  MOVE=JMS I [MOVVE
              4572  TYPE=JMS I [TYPSTG
              4571  UKSF=JMS I [XKSF
              4570  UKCC=JMS I [XKCC
              4567  UKRS=JMS I [XKRS
              4566  UKRB=JMS I [XKRB
              4565  SUKRB=JMS I [SXKRB
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              4564  UTSF=JMS I [XTSF
              4563  UTCF=JMS I [XTCF
              4562  UTPC=JMS I [XTPC
              4561  UTLS=JMS I [XTLS
              4560  UKCR=JMS I [XKCR
              4557  UKIE=JMS I [XKIE
              4556  USPF=JMS I [XSPF
              4555  USPI=JMS I [XSPI
              4554  STALL=JMS I [STAL
              4553  CKSR37=JMS I [CK37
              4552  CKSR33=JMS I [CK33
              4551  CKSR35=JMS I [CK35
              4376  BLOCKA=.END
              4400  BLOCK1=BLOCKA+2
              4510  BLOCKB=BLOCKA+112
              4521  BLKBB=BLOCKA+123
              4512  BLOCK2=BLOCKA+114
              4523  BLK2=BLOCKA+125
              4622  BLOCKC=BLOCKA+224
              4633  BLKCC=BLOCKA+235
              5376  DBLK=BLOCKA+1000
              7631  M147=-147                       /-100 DECIMAL,
              0304  RRPP=0304

              0000  *0
        0000  0000        0000
        0001  5001        JMP 1
        0002  0002        2
        0003  0003        3
              0005  *5
        0005  5402        JMP I 2
        0006  0000        0
              0016  *16
        0016  0000        OPEN            /AUTO INDEX,
              0020  *20
        0020  0000  TTYTYP, OPEN            /TYPE OF TELETYPE
        0021  0304  TTYIOT, RRPP            /CONSTANT TO DETERMINE IOT CODE
                                            /PRESET FOR 03 READER AND 04 PUNCH,
                                            /TO CHANGE IOT CODE SET THIS LOCATION
                                            /TO: "RRPPP"  WHERE RR IS FOR
                                            /THE READER AND PP IS FOR THE PUNCH,
        0022  0000  KSTART, OPEN            /USER PROGRAM START,
        0023  0000  DELAYM, OPEN
        0024  0254  CHAIN,  CHAINN          /CHAIN RIN ENTRY,
        0025  1365  KBFLAG, KFLAG
        0026  0474  DLCNT1, DLCNT
        0027  2012  S100,   S100I
        0030  2000  S4000,  S4000I
        0031  2005  S200,   S200I
        0032  2033  TLCALL, TLCALI
        0033  2041  TLC37,  TLC37I
        0034  2051  FBF,    FBFI
        0035  0000  PRGNUM, OPEN
        0036  2100  PRGTAB, PRG0
        0037  2234        PRG1
```

```
0040  3074          PRG2
0041  3140          PRG3
0042  3265          PRG4
0043  3451          PRG5
0044  3522          PRG6
0045  3564          PRG7
0046  0000  TEMP,   OPEN            /WORK
0047  0000  TEMP1,  OPEN            /LOCATIONS
0050  0000  CURTST, OPEN            /FOR CURRENT TEST ADDRESS
0051  0000  RTNNO,  OPEN            /FOR CURRENT TEST NUMBER
0052  0000  NXTST,  OPEN            /FOR NEXT TEST ADDRESS
0053  0000  MSCTR,  OPEN            /MILLISECONDS COUNTER
0054  0000  MILCTR, OPEN
0055  7372  MIL1,   7372            /7372 FOR 110 BAUD,
0056  0000  CTRA,   OPEN            /COUNTER A,
0057  0000  CTRB,   OPEN            /COUNTER B,
0060  0000  STLID,  OPEN
0061  0521  SYNC,   SYNK            /ENTRY TO SYNC TAPE RTN,
0062  0436  INPATT, IBIN            /ENTRY TO INITIATE PATTERN
0063  0444  GETPT,  GTBIN           /ENTRY TO GET PATTERN CHAR,
0064  0504  CHECK,  CHCK
0065  0000  PFLAG,  0
0066  1291  UOUT,   OUT
0067  1615  UTPLN3, TYPLN3
0070  2017  UPUNCH, PUNCH
0071  0600  UMOVE,  MOVVE
0072  0000  RBUSY,  0
0073  0000  AC,     0
0074  0000  LINK,   0
0075  0000  BLKCNT, 0
0076  0000  DELAYS, 0
0077  0000  ERROR,  0
0100  0000  UTEMP,  0
0101  0000  UTEMP1, 0
0102  0000  UTEMP2, 0
0103  0215  CR,     215             /CARRIAGE RETURN
0104  0212  LF,     212             /LINE FEED
0105  0277  DLYMSK, 277
0106  0000  WTS6A,  OPEN
0107  0000  TEMP0,  OPEN

              /CONTROL ROUTINE
        0200  *200
0200  7610  START,  SKP CLA
0201  7402          HLT             /INCORRECT PROGRAM NUMBER
0202  4777'         JMS SETRND      /SET UP RANDOM NUMBERS
0203  7604  BDRET,  LAS             /READ SR
0204  0150          AND C7          /PROGRAM MASK = 7
0205  1147          TAD C=7         /PROGRAM LIMIT = -7
0206  7540          SMA SZA         /VALID PROGRAM NUMBER?
0207  5201          JMP START+1     /NO,
0210  7604          LAS             /YES, READ SR,
0211  0150          AND C7
0212  3035          DCA PRGNUM      /SAVE PROGRAM NUMBER,
```



```
0213  1035          TAD PRGNUM      /DEVELOP PROGRAM START
0214  1146          TAD CPRGTAB     /ADDRESS AND STORE AT
0215  3046          DCA TEMP        /PRGADR,
0216  1446          TAD I TEMP
0217  3226          DCA PRGADR
0220  4776'         JMS DVCSEL      /PERFORM IOT SELECTION
0221  4471          JMS I UMOVE     /INITIALIZE
0222  0005          5               /INTERRUPT,
0223  0001          1               /AREA,
0224  7776          -2
0225  5626          JMP I .+1
0226  0000  PRGADR, OPEN
0227  7602  SRSET,  HLT CLA
0230  7200  GETRDY, CLA
0231  1022          TAD KSTART      /SET ADDRESS OF 1ST ROUTINE
0232  3052          DCA NXTST       /STORE AT NXTST
0233  4273          JMS FORWD
0234  7604          LAS             /READ SR
0235  7004          RAL
0236  7700          SMA CLA         /ROUTINE SELECT (SR1)
0237  5450          JMP I CURTST    /NO,  START WITH 1ST RTN
0240  7604          LAS             /YES
0241  0145          AND C77         /SR 6-11 ENABLE MASK,
0242  7041          CIA
0243  1051          TAD RTNNO
0244  7650          SNA CLA         /IS IT THIS RTN?
0245  5450          JMP I CURTST    /YES,  GO DO IT
0246  1052          TAD NXTST       /NO
0247  7001          IAC             /IS THIS LAST RTN?
0250  7640          SZA CLA         /NO
0251  5233          JMP GETRDY+3
0252  7402  INCRTN, HLT             /YES,  INCORRECT ROUTINE NO.
0253  5230          JMP GETRDY

0254  4310  CHAINN, JMS SHALT       /HALT? (SW0)
0255  7604          LAS             /READ SR
0256  7006          RTL
0257  7630          SZL CLA         /SELECT ROUTINE? (SR1)
0260  5230          JMP GETRDY      /YES
0261  1052          TAD NXTST
0262  7001          IAC
0263  7640          SZA CLA         /LAST ROUTINE?
0264  5233          JMP GETRDY+3    /NO,
0265  7604          LAS
0266  7006          RTL
0267  7710          SPA CLA         /LOOP PROGRAM? (SR2)
0270  5230          JMP GETRDY      /YES
0271  7402  PRGEND, HLT             /END OF PROGRAM HALT
0272  5254          JMP CHAINN

0273  0000  FORWD,  0
0274  7300          CLA CLL
0275  1452          TAD I NXTST     /GET NEXT MIN NO
0276  3051          DCA RTNNO       /STORE AT MINNO
0277  2052          ISZ NXTST
```

```
02300  1052           TAD NXTST       /SET CURRENT
02301  3046           DCA TEMP        /RTN NUMBER
02302  2052           ISZ NXTST
02303  1052           TAD NXTST       /SET CURRENT
02304  3050           DCA CURTST      /RTN ADDR,
02305  1446           TAD I TEMP      /SET NEXT
02306  3052           DCA NXTST       /RTN ADDR,
02307  5673           JMP I FORWD     /EXIT

02310  0000    SHALT, 0
02311  7604           LAS             /READ SR
02312  7700           SMA CLA         /HALT? (SR0)
02313  5710           JMP I SHALT
02314  1051           TAD RTNNO
02315  7402           HLT             /UNCONDITIONAL HALT (SR0 = 1)
02316  5710           JMP I SHALT     /EXIT,

02317  0000    STCTR, 0
02320  7200           CLA
02321  1717           TAD I STCTR     /GET CTR ADDR
02322  3046           DCA TEMP        /AND SAVE AT TEMP
02323  2317           ISZ STCTR
02324  1717           TAD I STCTR     /GET COUNT AND
02325  3446           DCA I TEMP      /STORE PER C(TEMP)
02326  2317           ISZ STCTR
02327  5717           JMP I STCTR     /EXIT

02330  0000    DLYMS, 0
02331  7300           CLA CLL
02332  1023           TAD DELAYM      /GET MS COUNT
02333  3053           DCA MSCTR       /STORE IN MSCTR
02334  1055           TAD MIL1        /GET CONSTANT
02335  3054           DCA MILCTR      /STORE IN MILCTR
02336  2054           ISZ MILCTR      /DELAY FINISHED?
02337  5336           JMP .-1
02340  2053           ISZ MSCTR       /DONE DELAYING
02341  5334           JMP .-5
02342  5730           JMP I DLYMS     /EXIT
02343  0000    CK33,  OPEN            /SUB TO CHECK FOR 33 TTY
02344  7200           CLA
02345  1020           TAD TTYTYP      /GET TTY TYPE
02346  7650           SNA CLA         /33?
02347  2343           ISZ CK33        /YES,
02350  5743           JMP I CK33

02351  0000    CK35,  OPEN            /SUB TO CHECK FOR 35 TTY
02352  7240           CLA CMA
02353  1020           TAD TTYTYP      /GET TTY TYPE
02354  7650           SNA CLA         /35?
02355  2351           ISZ CK35        /YES,
02356  5751           JMP I CK35

02357  0000    CK37,  OPEN            /SUB TO CHECK FOR 37 TTY
02360  7344           CLA CLL CMA RAL /-2
02361  1020           TAD TTYTYP      /GET TTY TYPE,
```



```
02362  7650           SNA CLA         /37?
02363  2357           ISZ CK37        /YES,
02364  5757           JMP I CK37
02376  3600
02377  1741
       0400           PAGE


       0400           PAGE
02400  0000    RGNA,  OPEN            /RANDOM NUMBER SUB A,
02401  7300           CLA CLL
02402  1215           TAD RP1A
02403  7006           RTL
02404  1216           TAD RP2A
02405  3215           DCA RP1A
02406  1215           TAD RP1A
02407  7006           RTL
02410  1216           TAD RP2A
02411  7006           RTL
02412  3216           DCA RP2A
02413  1215           TAD RP1A
02414  5600           JMP I RGNA      /EXIT RGNA SUB.
02415  1233    RP1A,  1233
02416  7622    RP2A,  7622

02417  0000    RGNB,  OPEN            /RANDOM NUMBER SUB B,
02420  7300           CLA CLL
02421  1234           TAD RP1B
02422  7006           RTL
02423  1235           TAD RP2B
02424  3234           DCA RP1B
02425  1234           TAD RP1B
02426  7006           RTL
02427  1235           TAD RP2B
02430  7006           RTL
02431  3235           DCA RP2B
02432  1234           TAD RP1B
02433  5617           JMP I RGNB      /EXIT RGNB SUB
02434  1233    RP1B,  1233
02435  7622    RP2B,  7622

               /SUBROUTINE TO INITIALIZE BINARY COUNT PATTERN
02436  0000    IBIN,  0
02437  7200           CLA             /SET PT0 = 0
02440  3242           DCA PT0
02441  5636           JMP I IBIN      /EXIT
02442  0000    PT0,   0
02443  0000    PT1,   0

               /SUBROUTINE TO PROVIDE NEXT BINARY COUNT PATTERN CHARACTER (IN AC)
02444  0000    GTBIN, 0
02445  7200           CLA
02446  1242           TAD PT0         /GET PT0
02447  3243           DCA PT1         /STORE AT PT1
02450  1243           TAD PT1         /GET PT1
```

```
 2451  7001           IAC             /INCREMENT ACCUMULATOR
 2452  0144           AND C377        /LIMIT TO 8 BITS
 2453  3242           DCA PT0         /STORE AT PT0
 2454  1243           TAD PT1         /GET PT1
 2455  5644           JMP I GTBIN     /EXIT

                /SUBROUTINE TO GENERATE RANDOM CHARACTER COUNT,  (NOT MORE THAN 77(8))
 2456  0000    CHRCNT, 0
 2457  4200           JMS RGNA        /GO GENERATE RANDOM NUMBER
 2460  0145           AND C77         /REMOVE HIGH ORDER 6 BITS
 2461  7450           SNA
 2462  5257           JMP CHRCNT+1
 2463  7041           CIA             /2'S COMPLEMENT IT
 2464  3273           DCA SCNT
 2465  1656           TAD I CHRCNT
 2466  3046           DCA TEMP
 2467  1273           TAD SCNT
 2470  3446           DCA I TEMP      /STORE AT SPECIFIED ADDRESS
 2471  2256           ISZ CHRCNT      /SET UP EXIT
 2472  5656           JMP I CHRCNT    /EXIT
 2473  0000    SCNT,   OPEN

                /SUBROUTINE TO GENERATE RANDOM DELAY COUNT (NOT MORE THAN 3777(8)).
 2474  0000    DLCNT,  0
 2475  4200           JMS RGNA        /GO GENERATE RANDOM NUMBER
 2476  0105           AND DLYMSK      /MASK OUT UNDESIRED BITS.
 2477  7450           SNA             /ZERO?
 2500  5275           JMP DLCNT+1     /YES, GET ANOTHER NUMBER
 2501  7041           CIA             /2'S COMPLEMENT IT
 2502  3023           DCA DELAYM
 2503  5674           JMP I DLCNT     /EXIT

                /SUBROUTINE TO COMPARE C(AC) TO CONTENTS STORED AT CALL+1
 2504  0000    CHCK,   0
 2505  3320           DCA WCHK        /STORE AC AT WCHK
 2506  1704           TAD I CHCK      /GET COMPARE DATA
 2507  7041           CIA             /2'S COMPLEMENT IT
 2510  1320           TAD WCHK        /ADD C(WCHK)
 2511  2304           ISZ CHCK        /SET UP FOR UNEQUAL EXIT
 2512  7640           SZA CLA         /EQUAL (AC = 0)
 2513  5316           JMP .+3         /NO
 2514  2304           ISZ CHCK        /YES,  SET UP FOR EQUAL EXIT
 2515  5704           JMP I CHCK      /EQUAL EXIT
 2516  1320           TAD WCHK        /RESTORE AC
 2517  5704           JMP I CHCK      /UNEQUAL EXIT
 2520  0000    WCHK,   0

                /SYNC ON TAPE SUBROUTINE
 2521  0000    SYNK,   0
 2522  4576           SETLOC          /SET COUNTER
 2523  0541           CTSK            /-256 (DEC) IN
 2524  7400           -400            /CTSK
 2525  4570    SYNKA,  UKCC            /CLEAR AC AND FLAG
 2526  4571           UKSF            /READY?
 2527  5326           JMP .-1         /NO, TEST AGAIN
```



```
 2530  4567           UKRS            /YES, READ
 2531  1143           TAD C-377
 2532  7640           SZA CLA         /377?
 2533  7410           SKP
 2534  5721           JMP I SYNK      /YES,  EXIT
 2535  2341           ISZ CTSK        /BUMP CHAR CTR +1
 2536  5325           JMP SYNKA       /GO READ AGAIN
 2537  7402           HLT             /256 CHARS READ,  CAN'T SYNC
 2540  5322           JMP SYNK+1      /GO TO SYNC

 2541  0000    CTSK,   0              /CHAR COUNTER
 2542  0000    STAL,   OPEN
 2543  7200           CLA
 2544  1060           TAD STLID
 2545  7700           SMA CLA         /STALL?
 2546  5742           JMP I STAL      /NO, EXIT
 2547  4274           JMS DLCNT       /YES SET STALL COUNT
 2550  4575           DELAY           /STALL
 2551  5742           JMP I STAL      /EXIT
 2552  0000    CRCTR,  OPEN

 2553  0000    CRALF,  OPEN
 2554  7200           CLA
 2555  1753           TAD I CRALF
 2556  3352           DCA CRCTR
 2557  2353           ISZ CRALF
 2560  4572           TYPE
 2561  4047           CARLF
 2562  2352           ISZ CRCTR
 2563  5360           JMP .+3
 2564  5753           JMP I CRALF
       0600           PAGE


       0600           PAGE
                /SUBROUTINE TO MOVE VARIABLE LENGTH DATA FIELDS
 2600  0000    MOVVE,  0
 2601  7200           CLA
 2602  1620           TAD I MOVVE     /GET "FROM ADDR" AND
 2603  3223           DCA FADDR       /STORE AT FADDR
 2604  2200           ISZ MOVVE
 2605  1600           TAD I MOVVE     /GET "TO ADDR" AND
 2606  3224           DCA TADDR       /STORE AT TADDR,
 2607  2200           ISZ MOVVE
 2610  1600           TAD I MOVVE     /GET "MOVE COUNT" AND
 2611  3225           DCA MCTR        /STORE AT MCTR,
 2612  2200           ISZ MOVVE       /SET UP FOR EXIT,
 2613  7200    MOVEA,  CLA
 2614  1623           TAD I FADDR     /GET "FROM" WORD
 2615  3624           DCA I TADDR     /STORE AT "TO" LOCATION
 2616  2223           ISZ FADDR       /+1 TO "FROM" ADDR
 2617  2224           ISZ TADDR       /+1 TO "TO" ADDR,
 2620  2225           ISZ MCTR        /ALL WORDS MOVED?
 2621  5213           JMP MOVEA       /NO, GO MOVE AGAIN
 2622  5600           JMP I MOVVE     /YES, EXIT
```

```
0623  0000  FADDR,  0
0624  0000  TADDR,  0
0625  0000  MCTR,   0

            /TYPE CHARACTER STRING SUBROUTINE
0626  0000  TYPSTG, 0
0627  7200        CLA
0630  1626        TAD I TYPSTG    /GET AND STORE
0631  3314        DCA TEMQ        /INITIAL ADDRESS
0632  3316        DCA FLAG        /CLEAR FLAG,
0633  2226        ISZ TYPSTG      /SET UP EXIT
0634  1714  TSC1, TAD I TEMQ     /PICK UP DATA
0635  4577        BSW
0636  4243        JMS TSC2        /GO TYPE 1ST CHARACTER
0637  1714        TAD I TEMQ      /PICK UP DATA
0640  4243        JMS TSC2        /GO TYPE 2ND CHARACTER
0641  2314        ISZ TEMQ        /EVEN STRING ADDRESS
0642  5234        JMP TSC1        /GO BACK FOR MORE
0643  0000  TSC2,  0
0644  0145        AND C77         /MASK OFF 6 BITS
0645  3315        DCA TEMR        /SAVE CHARACTER
0646  1316        TAD FLAG        /TEST "SPECIAL" FLAG,
0647  7640        SZA CLA
0650  5260        JMP TYPSP       /SET TYPE SPECIAL
0651  1315        TAD TEMR        /NO, REGULAR CHARACTER
0652  7450        SNA             /ZERO?
0653  5256        JMP .+3         /YES, SET FLAG,
0654  4271  TYPAT, JMS PRINT      /NO, PRINT IT,
0655  5643        JMP I TSC2      /RETURN,
0656  2316        ISZ FLAG        /SET "SPECIAL" FLAG,
0657  5643        JMP I TSC2      /EXIT
0660  3316  TYPSP, DCA FLAG       /CLEAR FLAG,
0661  1315        TAD TEMR        /TEST FOR @,
0662  7450        SNA             /@?
0663  5643        JMP I TSC2      /IGNORE IT,
0664  1377        TAD (-77
0665  7650        SNA CLA         /77?
0666  5626        JMP I TYPSTG    /YES, EXIT CODE,
0667  1315        TAD TEMR
0670  5254        JMP TYPAT

0671  0000  PRINT, OPEN
0672  1376        TAD (-45
0673  7640        SZA CLA         /IS IT 42?
0674  5300        JMP .+4         /NO,
0675  1103        TAD CR          /YES, PRINT CR
0676  4470        JMS I UPUNCH
0677  5671        JMP I PRINT
0700  1315        TAD TEMR
0701  1375        TAD (-43
0702  7640        SZA CLA         /IS IT 43?
0703  5306        JMP .+3         /NO,
0704  1104        TAD LF          /YES, TYPE LF
0705  5276        JMP PRINT+5
0706  1315        TAD TEMR
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0707  1374        TAD (-40
0710  7510        SPA
0711  1142        TAD C100
0712  1141        TAD C240
0713  5276        JMP PRINT+5
0714  0000  TEMQ,  OPEN
0715  0000  TEMR,  OPEN
0716  0000  FLAG,  OPEN

0717  0000  XKSF,  OPEN            /SUB TO ISSUE KSF,
0720  6031        KSF             /KSF
0721  5717        JMP I XKSF      /NO SKIP
0722  2317        ISZ XKSF        /SKIP
0723  5717        JMP I XKSF

0724  0000  XKCC,  OPEN            /SUB TO ISSUE KCC,
0725  6032        KCC
0726  5724        JMP I XKCC      /EXIT
0727  7402        HLT             /KCC SKIPPED,

0730  0000  XKRS,  OPEN            /SUB TO ISSUE KRS,
0731  6034        KRS
0732  5730        JMP I XKRS      /EXIT
0733  7402        HLT             /KRS SKIPPED,

0734  0000  XKRB,  OPEN            /SUB TO ISSUE KRB,
0735  6036        KRB
0736  5734        JMP I XKRB      /EXIT
0737  7402        HLT             /KRB SKIPPED,

0740  0000  XTSF,  OPEN            /SUB TO ISSUE TSF,
0741  6041        TSF             /TSF
0742  5740        JMP I XTSF      /NO SKIP,
0743  2340        ISZ XTSF        /SKIP,
0744  5740        JMP I XTSF

0745  0000  XTCF,  OPEN            /SUB TO ISSUE TCF,
0746  6042        TCF
0747  5745        JMP I XTCF      /EXIT
0750  7402        HLT             /TCF SKIPPED,

0751  0000  XTLS,  OPEN            /SUB TO ISSUE TLS
0752  6046        TLS
0753  5751        JMP I XTLS      /EXIT
0754  7402        HLT             /TLS SKIPPED,

0755  0000  XKCR,  OPEN            /SUB TO ISSUE KCR,
0756  6030        KCR
0757  5755        JMP I XKCR      /EXIT
0760  7402        HLT             /KCR SKIPPED,

0761  0000  XKIE,  OPEN            /SUB TO ISSUE KIE,
0762  6035        KIE
0763  5761        JMP I XKIE      /EXIT,
0764  7402        HLT             /KIE SKIPPED,
```

```
0765  0000    XSPI,   OPEN            /SUB TO ISSUE SPI,
0766  6045            SPI             /
0767  5765            JMP I XSPI      /NO SKIP
0770  2365            ISZ XSPI
0771  5765            JMP I XSPI      /EXIT

0774  7740
0775  7735
0776  7733
0777  7701
      1000            PAGE


      1000    PAGE
1000  0000    STBF,   OPEN            /SUB TO SET UP BUFFER AREA,
1001  4573            MOVE            /CRLF TO BLOCKA,
1002  0103            CR
1003  4376            BLOCKA
1004  7776            -2
1005  4553            CKSR37          /KSR37?
1006  5220            JMP ST33B       /NO,
1007  4573            MOVE            /CRLF TO BLKBB
1010  0103            CR
1011  4521            BLKBB
1012  7776            -2
1013  4573            MOVE            /CRLF TO BLKCC,
1014  0103            CR
1015  4633            BLKCC
1016  7776            -2
1017  5600            JMP I STBF      /EXIT STBF

1020  4573    ST33B,  MOVE            /CRLF TO BLOCKB,
1021  0103            CR
1022  4510            BLOCKB
1023  7776            -2
1024  4573            MOVE            /CRLF TO BLOCKC,
1025  0103            CR
1026  4622            BLOCKC
1027  7776            -2
1030  5600            JMP I STBF      /EXIT STBF,

1031  0000    FBF3,   OPEN            /SUB TO FILL CHAR BUFFER WITH
1032  7200            CLA             /3 CHARACTERS SPECIFIED AT CALL+1,
1033  1631            TAD I FBF3
1034  3237            DCA ,+3
1035  2231            ISZ FBF3
1036  4573            MOVE
1037  0000            OPEN
1040  4400            BLOCK1
1041  7775            -3
1042  4553            CKSR37          /37?
1043  5255            JMP FBF33       /NO,
1044  4573            MOVE            /YES,
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1045  4400            BLOCK1
1046  4403            BLOCK1+3
1047  7662            -116
1050  4573            MOVE
1051  4400            BLOCK1
1052  4523            BLK2
1053  7657            -121
1054  5631            JMP I FBF3      /EXIT FBF3,
1055  4573    FBF33,  MOVE
1056  4400            BLOCK1
1057  4403            BLOCK1+3
1060  7673            -105
1061  4573            MOVE
1062  4400            BLOCK1
1063  4512            BLOCK2
1064  7670            -110
1065  5631            JMP I FBF3      /EXIT FBF3,

1066  0000    FBALL,  OPEN            /FILL BUFFER WITH ALL CHARACTERS
1067  4553            CKSR37          /KSR37?
1070  5302            JMP FBA33       /NO,
1071  4573            MOVE            /YES,
1072  3706            A
1073  4400            BLOCK1
1074  7657            -121
1075  4573            MOVE
1076  4400            BLOCK1
1077  4523            BLK2
1100  7657            -121
1101  5666            JMP I FBALL     /EXIT FBALL,
1102  4573    FBA33,  MOVE
1103  3706            A
1104  4400            BLOCK1
1105  7701            -77
1106  4573            MOVE
1107  3706            A
1110  4477            BLOCK1+77
1111  7767            -11
1112  4573            MOVE
1113  4400            BLOCK1
1114  4512            BLOCK2
1115  7670            -110
1116  5666            JMP I FBALL     /EXIT FBALL

1117  0000    FW336,  0
1120  4573            MOVE            /MOVE 6 CHARACTERS LT33 PRINTER
1121  3664            A33WP3          /WORST CASE PATTERN TO
1122  4400            BLOCK1          /BLOCK1
1123  7772            -6
1124  4573            MOVE            /FILL BLOCK3 WITH PATTERN
1125  4400            BLOCK1
1126  4406            BLOCK1+6
1127  7676            -102
1130  4573            MOVE
1131  4400            BLOCK1
```

```
1132  4512          BLOCK2
1133  7670          -110
1134  5717          JMP I FW336     /EXIT

1135  0000  FW356,  0
1136  4573          MOVE            /MOVE 6 CHARACTER LT35 PRINTER
1137  3672          A35WP3          /WORST CASE PATTERN TO BLOCK1
1140  4400          BLOCK1
1141  7772          -6
1142  4573          MOVE            /FILL BUFFER WITH PATTERN
1143  4400          BLOCK1
1144  4406          BLOCK1+6
1145  7676          -102
1146  4573          MOVE
1147  4400          BLOCK1
1150  4512          BLOCK2
1151  7670          -110
1152  5735          JMP I FW356     /EXIT

1153  0000  FW376,  OPEN            /MOVE 6 CHARACTER KSR37 PRINTER
1154  4573          MOVE            /WORST CASE PATTERN TO BLOCK1,
1155  3700          A37WP3
1156  4400          BLOCK1
1157  7772          -6
1160  4573          MOVE            /FILL BUFFER WITH PATTERN
1161  4400          BLOCK1
1162  4406          BLOCK1+6
1163  7665          -113
1164  5753          JMP I FW376     /EXIT

1165  0000  XSPF,   OPEN            /SUB TO ISSUE SPF
1166  6040          SPF
1167  5765          JMP I XSPF      /EXIT
1170  7402          HLT             /SPF SKIPPED,

1171  0000  XTPC,   OPEN            /SUB TO ISSUE TPC
1172  6044          TPC
1173  5771          JMP I XTPC      /EXIT
1174  7402          HLT             /TPC SKIPPED,

      1200          PAGE



      1200          PAGE
                /PUNCH 70 (CODE 376) CHARACTERS SUBROUTINE
1200  0000  PLTLR,  0
1201  4576          SETLOC          /SET P40CTR TO -70
1202  1211          P40CTR
1203  7672          -106
1204  1377          TAD (376        /GET 376 CODE
1205  4470          JMS I UPUNCH    /GO PUNCH IT
1206  2211          ISZ P40CTR      /ALL CHARACTERS PUNCHED?
1207  5204          JMP .-3         /NO, REPEAT,
1210  5600          JMP I PLTLR     /YES, EXIT,
```



```
1211  0000  P40CTR, 0

                /PUNCH SYNC CHARACTER SUBROUTINE (NULOUT)
1212  0000  PSYNC,  0
1213  7240          CLA CMA         /SET AC TO 7777
1214  4470          JMS I UPUNCH    /PUNCH A NULOUT
1215  5612          JMP I PSYNC     /EXIT,

                /SYNC READER SUBROUTINE
1216  0000  RSYNC,  0
1217  4576          SETLOC          /SET RSCTR TO -145
1220  1232          RSCTR
1221  7557          -221
1222  4343          JMS RRDY        /WAIT FOR READER NOT BUSY
1223  7240          CLA CMA         /READER NOT BUSY,
1224  3072          DCA RBUSY       /SET READER BUSY INDICATOR
1225  4576          SETLOC          /SET READER INTERRUPT
1226  1267          VCTR            /SERVICE RETURN ADDRESS,
1227  1233          RSSERV
1230  6001          ION             /ENABLE INTERRUPT
1231  5616          JMP I RSYNC     /EXIT
1232  0000  RSCTR,  0

1233  6036  RSSERV, KRB             /READ
1234  1143          TAD C-377       /ADD MINUS NULOUT
1235  7640          SZA CLA         /IS IT A NULOUT?
1236  5245          JMP .+7         /NO,
1237  3072          DCA RBUSY       /YES, CLEAR READER BUSY,
1240  7300          CLA CLL
1241  1074          TAD LINK
1242  7004          RAL             /RESTORE LINK
1243  1073          TAD AC          /RESTORE AC
1244  5400          JMP I 0         /RETURN
1245  2232          ISZ RSCTR       /145 CHARACTER READ?
1246  5466          JMP I UOUT      /NO,
1247  7602          HLT CLA         /YES, NO SYNC,
1250  4576          SETLOC          /SET RSCTR TO -145
1251  1232          RSCTR
1252  7557          -221
1253  5466          JMP I UOUT      /RETURN

1254  3073  INTSVC, DCA AC          /SAVE AC
1255  7010          RAR
1256  3074          DCA LINK        /SAVE LINK
1257  6041  INTSF,  TSF             /PUNCH/PRINTER?
1260  5264          JMP .+4         /NO,
1261  6042  INTCF,  TCF             /YES, CLEAR FLAG,
1262  3065          DCA PFLAG       /CLEAR PFLAG
1263  5271          JMP OUT         /RETURN
1264  6031  INKSF,  KSF             /READER/KYBD?
1265  5270          JMP .+3         /NO ERROR,
1266  5667          JMP I .+1       /GO SERVICE READER
1267  0000  VCTR,   0
1270  7402          HLT             /UNEXPECTED INTERRUPT
1271  7300  OUT,    CLA CLL
```

```
1272  1074          TAD LINK
1273  7004          RAL             /RESTORE LINK
1274  1073          TAD AC          /RESTORE AC,
1275  6001          ION             /ENABLE INTERRUPT
1276  5400          JMP I 0         /RETURN

1277  0000  PSTUP, 0               /PUNCH SETUP
1300  4576          SETLOC          /SET DATA ADDR
1301  1342          PADDR
1302  4376          BLOCKA
1303  4573          MOVE            /SET BLOCK LENGTH
1304  0075          BLKCNT
1305  1341          PCTR
1306  7777          =1
1307  5677          JMP I PSTUP     /EXIT

1310  0000  PDCR,   0               /PUNCH  DATA CHAR SUB,
1311  7200          CLA
1312  1742          TAD I PADDR     /GET DATA
1313  2342          ISZ PADDR       /UPDATE PADDR,
1314  4470          JMS I UPUNCH    /GO PUNCH/PRINT DATA
1315  5710          JMP I PDCR      /EXIT

1316  0000  PBLK,   0               /PUNCH DATA BLOCK FULL SPEED
1317  4277          JMS PSTUP
1320  4310          JMS PDCR        /GO PUNCH CHARACTER
1321  2341          ISZ PCTR        /ALL CHARS PUNCHED?
1322  5320          JMP .=2         /NO, REPEAT
1323  5716          JMP I PBLK      /YES, EXIT

1324  0000  PBLKR,  0               /PUNCH DATA BLOCK RANDOM STALLS,
1325  4277          JMS PSTUP       /GO DO SET UP
1326  4776'         JMS RGNB        /GET A RANDOM NUMBER
1327  0105          AND DLYMSK      /REMOVE EXCESS BITS
1330  7450          SNA             /ZERO?
1331  5326          JMP .=3         /YES, GET ANOTHER NUMBER
1332  7041          CIA             /NO, 2'S COMPLEMENT IT,
1333  3023          DCA DELAYM      /PUT NUMBER IN DELAYM
1334  4575          DELAY           /DELAY,
1335  4310          JMS PDCR        /GO PUNCH CHARACTER
1336  2341          ISZ PCTR        /ALL CHARS PUNCHED?
1337  5326          JMP PBLKR+2     /NO, REPEAT
1340  5724          JMP I PBLKR     /YES, EXIT,
1341  0000  PCTR,   0
1342  0000  PADDR,  0

1343  0000  RRDY,   0               /WAIT FOR RDR NOT BUSY SUB,
1344  7200          CLA
1345  1072          TAD RBUSY       /FETCH RBUSY,
1346  7640          SZA CLA         /READER BUSY?
1347  5345          JMP .=2         /YES, TRY AGAIN
1350  5743          JMP I RRDY      /NO,EXIT

1351  0000  RSTUP,  0
1352  4343          JMS RRDY        /WAIT FOR RDR NOT BUSY
```



```
1353  2072          ISZ RBUSY       /SET RBUSY INDICATOR
1354  4576          SETLOC          /SET DATA ADDR
1355  1416          RADDR
1356  4376          BLOCKA
1357  4573          MOVE            /SET DATA BLOCK LENGTH
1360  0075          BLKCNT
1361  1417          RBCTR
1362  7777          =1
1363  3775'         DCA ERRCTR      /CLEAR ERROR COUNTER
1364  5751          JMP I RSTUP     /EXIT,

                /ROUTINE TO SET KEYBOARD FLAG,

1365  0000  KFLAG,  OPEN
1366  4570          UKCC
1367  4571          UKSF
1370  5367          JMP .=1
1371  5765          JMP I KFLAG     /EXIT WITH KEYBOARD FLAG SET,

1375  3521
1376  0417
1377  0376
      1400          PAGE



      1400          PAGE
1400  0000  RDBLK,  0               /READ DATA BLOCK, FULL SPEED
1401  4777'         JMS RSTUP       /GO DO SETUP
1402  4576          SETLOC          /SET READER SERVICE
1403  1267          VCTR            /ADDRESS,
1404  1430          RDSRV
1405  6001          ION             /ENABLE INT,
1406  5600          JMP I RDBLK

1407  0000  RDBLKR, 0               /READ DATA BLOCK,RANDOM STALLS
1410  4777'         JMS RSTUP       /GO DO SETUP,
1411  4576          SETLOC          /SET READER SERVICE
1412  1267          VCTR            /ADDRESS,
1413  1420          RDRSRV
1414  6001          ION             /ENABLE INT,
1415  5607          JMP I RDBLKR    /EXIT
1416  0000  RADDR,  0
1417  0000  RBCTR,  0

                /READER SERVICE ROUTINES
1420  7200  RDRSRV, CLA
1421  4776'         JMS RGNA        /GET A RANDOM NUMBER
1422  0105          AND DLYMSK      /REMOVE EXCESS BITS
1423  7450          SNA             /ZERO?
1424  5221          JMP .=3         /YES, GET ANOTHER NUMBER
1425  7041          CIA             /NO, 2'S COMPLEMENT IT,
1426  3076          DCA DELAYS      /STORE RANDOM NUMBER IN DELAYS,
1427  4274          JMS DLMSR       /STALL,
1430  1616  RDSRV,  TAD I RADDR     /GET EXPECTED CHARACTER
```

```
1431  3235          DCA SB          /STORE AT SB
1432  2216          ISZ RADDR       /UPDATE RADDR
1433  6036  IN0,    KRB             /READ CHARACTER
1434  4464          JMS I CHECK     /GO CHECK IT.
1435  0000  SB,     0
1436  5240          JMP ERROR       /ERROR
1437  5256          JMP RUDONE      /GOOD.

1440  3077  ERROR,  DCA ERRCR       /STORE BAD CHARACTER
1441  2775'         ISZ ERRCTR      /INCREMENT ERROR COUNTER
1442  5245          JMP .+3
1443  7240          CLA CMA         /OFLOW, 7777 TO AC
1444  3775'         DCA ERRCTR      /RESTORE TO 7777.
1445  7604          LAS             /READ SR
1446  0142          AND C100
1447  7650          SNA CLA         /HALT ON ERROR(SR5)
1450  5256          JMP RUDONE      /NO.
1451  1077          TAD ERRCR       /YES, GET BAD CHARACTER
1452  7402          HLT             /ERROR HALT, BAD CHAR IN AC
1453  7200          CLA
1454  1235          TAD SB
1455  7402          HLT             /GOOD CHAR IN AC
1456  2217  RUDONE, ISZ RBCTR       /ALL DONE?
1457  5466          JMP I UOUT      /NO, TO MAINLINE
1460  7200          CLA             /YES.
1461  1775'         TAD ERRCTR      /GET C(ERRCTR)
1462  7650          SNA CLA         /ANY ERRORS?
1463  5266          JMP .+3         /NO.
1464  1775'         TAD ERRCTR      /YES.
1465  7402          HLT             /NUMBER OF ERRORS IN AC.
1466  7300          CLA CLL
1467  3072          DCA RBUSY       /CLEAR RBUSY INDICATOR
1470  1074          TAD LINK
1471  7004          RAL             /RESTORE LINK
1472  1073          TAD AC          /TO MAINLINE
1473  5400          JMP I 0

1474  0000  DLMSR,  0
1475  7300          CLA CLL
1476  1076          TAD DELAYS      /GET AND STORE MSEC
1477  3311          DCA RCTRA       /DELAY COUNT
1500  5701          JMP I .+1
1501  1502          .+1
1502  1055          TAD MIL1        /GET AND STORE
1503  3312          DCA RCTRB       /1MS CONSTANT
1504  2312          ISZ RCTRB       /DELAYED 1 MS?
1505  5304          JMP .-1         /NO.
1506  2311          ISZ RCTRA       /YES, DONE DELAYING?
1507  5300          JMP .-7         /NO.
1510  5674          JMP I DLMSR     /YES, EXIT
1511  0000  RCTRA,  0
1512  0000  RCTRB,  0

              /ROUTINE TO SIMULATE A BYTE SWAP
```



```
1513  0000  SIMBSW, 0
1514  3327          DCA     TEMP2
1515  7012          RTR
1516  7012          RTR
1517  7012          RTR
1520  1327          TAD     TEMP2
1521  0330          AND     L7700
1522  1327          TAD     TEMP2
1523  7006          RTL
1524  7006          RTL
1525  7006          RTL
1526  5713          JMP  I  SIMBSW

1527  0000  TEMP2,  OPEN
1530  7700  L7700,  7700


              /PUNCH TEST NORMAL TEST SEQUENCE ROUTINE
1531  0000  NTST,   0
1532  7200          CLA             /CLEAR RBUSY
1533  3072          DCA RBUSY
1534  1731          TAD I NTST      /SELECT PUNCH MODE
1535  3340          DCA NTSTA
1536  4774'         JMS PLTLR       /PUNCH LEADER
1537  4773'         JMS PSYNC       /PUNCH SYNC CHARACTER
1540  0000  NTSTA,  0
1541  4772'         JMS RSYNC       /SYNC READER
1542  4200          JMS RDBLK       /READ DATA BLOCK
1543  4774'         JMS PLTLR       /PUNCH TRAILER
1544  4771'         JMS RRDY        /WAIT FOR RDR NOT BUSY
1545  5424          JMP I CHAIN     /CHAIN

1546  0000  SXKRB,  0
1547  6036          KRB
1550  0370          AND     (177
1551  1367          TAD     (200
1552  5746          JMP  I  SXKRB

1553  5555  RM33A,  TEXT    '-=--!@?'
1554  5555
1555  1100
1556  7700


1567  0200
1570  0177
1571  1343
1572  1216
1573  1212
1574  1200
1575  3521
1576  0400
1577  1351
      1600          PAGE
```

```
                1600            PAGE
                        /COMBINED TEST NORMAL TEST SEQUENCE
1600  0000      CNTST,  0
1601  7200              CLA               /CLEAR RBUSY
1602  3072              DCA RBUSY
1603  4777'             JMS PLTLR         /PUNCH LEADER
1604  4776'             JMS PSYNC         /PUNCH SYNC CHARACTER
1605  4775'             JMS PBLK          /PUNCH DATA BLOCK (NO STALLS)
1606  4774'             JMS RSYNC         /SYNC READER
1607  4773'             JMS RDBLKR        /READ DATA BLOCK (STALLS)
1610  4772'             JMS PBLKR         /PUNCH DATA BLOCK (STALLS)
1611  4771'             JMS RDBLK         /READ DATA BLOCK (NO STALLS)
1612  4777'             JMS PLTLR         /PUNCH TRAILER
1613  4770'             JMS RRDY          /WAIT FOR READER NOT BUSY
1614  5424              JMP I CHAIN       /CHAIN

                        /TYPE LINE OF 3 CHARACTERS (NO DELAY)
1615  0000      TYPLN3, 0
1616  7200              CLA
1617  3060              DCA STLID         /CLEAR STLID
1620  1615              TAD I TYPLN3      /SET AND STORE
1621  3224              DCA .+3           /ADDRESS OF DATA
1622  2215              ISZ TYPLN3
1623  4767'             JMS FBF3          /GO FILL BUFFER WITH 3 CHARACTERS
1624  0000              0
1625  4227              JMS TYPLN         /GO TYPE LINE
1626  5615              JMP I TYPLN3      /EXIT

                        /TYPE LINE OF ASCII PRINTABLE CHARACTERS
1627  0000      TYPLN,  0
1630  4553              CKSR37            /KSR37?
1631  1140              TAD C11           /NO,
1632  1137              TAD C=125         /YES,
1633  3247              DCA TCTR          /=76, OR =85
1634  4576              SETLOC            /SET FETCH TO ADDRESS
1635  1646              FETCH             /OF BLOCKA,
1636  4376              BLOCKA
1637  4554      TYPEA,  STALL
1640  1646              TAD I FETCH       /YES, SET CHARACTER
1641  4470              JMS I UPUNCH      /GO PRINT CHARACTER
1642  2246              ISZ FETCH         /SET UP FOR NEXT CHARACTER
1643  2247              ISZ TCTR          /DONE?
1644  5237              JMP TYPEA         /NO, REPEAT
1645  5627              JMP I TYPLN       /YES, EXIT.
1646  0000      FETCH,  0
1647  0000      TCTR,   0

1650  0000      ASCCN,  0
1651  1650              TAD I ASCCN
1652  3305              DCA WASC
1653  2250              ISZ ASCCN
1654  1650              TAD I ASCCN
1655  3306              DCA SASC
```



```
1656  2250              ISZ ASCCN
1657  1366              TAD (7700
1660  0705              AND I WASC
1661  7100              CLL
1662  4577              BSW
1663  4272              JMS CNV
1664  2306              ISZ SASC
1665  1366              TAD (7700
1666  7040              CMA
1667  0705              AND I WASC
1670  4272              JMS CNV
1671  5650              JMP I ASCCN
1672  0000      CNV,    0
1673  3307              DCA ASCT
1674  1307              TAD ASCT
1675  7006              RTL
1676  7004              RAL
1677  0365              AND (707
1700  1307              TAD ASCT
1701  0365              AND (707
1702  1364              TAD (6060
1703  3706              DCA I SASC
1704  5672              JMP I CNV
1705  0000      WASC,   0
1706  0000      SASC,   0
1707  0000      ASCT,   0

1710  0000      SINPT,  OPEN                      /SUB TO INITIALIZE SGET SUB.
1711  7200              CLA
1712  3315              DCA SPT0                  /ZERO SPT0
1713  3317              DCA SPIND                 /ZERO SPIND
1714  5710              JMP I SINPT               /EXIT
1715  0000      SPT0,   OPEN
1716  0000      SPT1,   OPEN
1717  0000      SPIND,  OPEN
1720  0000      SGET,   OPEN                      /"SPECIAL" BINARY COUNT
1721  7320              CLA STL                   /PATTERN SUBROUTINE.
1722  2317              ISZ SPIND
1723  7340              CLA CMA CLL
1724  3317              DCA SPIND
1725  1315              TAD SPT0
1726  7420              SNL
1727  5332              JMP .+3
1730  7041              CIA
1731  7410              SKP
1732  7040              CMA
1733  3315              DCA SPT0
1734  1144              TAD C377
1735  0315              AND SPT0
1736  3316              DCA SPT1
1737  1316              TAD SPT1
1740  5720              JMP I SGET                /EXIT SGET SUB.

                        /SUBROUTINE TO INITIALIZE RANDOM NUMBER GENERATORS.
```

```
1741  0000  SETRND, OPEN
1742  1363        TAD (1233
1743  3762'       DCA RP1A
1744  1363        TAD (1233
1745  3761'       DCA RP1B
1746  1360        TAD (7622
1747  3757'       DCA RP2A
1750  1360        TAD (7622
1751  3756'       DCA RP2B
1752  5741        JMP I SETRND    /EXIT, AC=0

1756  0435
1757  0416
1760  7622
1761  0434
1762  0415
1763  1233
1764  6060
1765  0707
1766  7700
1767  1031
1770  1343
1771  1400
1772  1324
1773  1407
1774  1216
1775  1316
1776  1212
1777  1200
      2000        PAGE

                  /ROUTINE TO SET CTRA EQUAL TO -7640  (-4000 DECIMAL).

2000  0000  S4000I, OPEN
2001  4576        SETLOC          /SET COUNT OF
2002  0056        CTRA            /-4000 DECIMAL
2003  0140        -7640           /IN CTRA.
2004  5600        JMP I S4000I    /EXIT, AC=0.

                  /ROUTINE TO SET DELAYM TO -310,  (-200 DECIMAL).

2005  0000  S200I,  OPEN
2006  4576        SETLOC          /SET COUNT OF
2007  0023        DELAYM          /-200 DECIMAL
2010  7470        -310            /IN DELAYM.
2011  5605        JMP I S200I     /EXIT WITH AC=0.


                  /ROUTINE TO SET CTRA EQUAL TO -144  (-100 DECIMAL).

2012  0000  S100I,  OPEN
2013  4576        SETLOC          /SET COUNT OF
2014  0056        CTRA            /-100 DECIMAL
```



```
2015  7634        -144            /IN CTRA.
2016  5612        JMP I S100I     /EXIT, AC=0.


2017  0000  PUNCH,  OPEN
2020  2065        ISZ PFLAG       /SET PFLAG.
2021  6046  OUT0,   TLS            /PUNCH/PRINT.
2022  7200        CLA
2023  1065        TAD PFLAG       /GET C(PFLAG).
2024  7650        SNA CLA         /FLAG RESET?
2025  5230        JMP OUT2        /YES
2026  6041  OUT1,   TSF            /NO, FLAG UP?
2027  5223        JMP .-4         /NO.
2030  6042  OUT2,   TCF            /YES, CLEAR PRINTER FLAG.
2031  3065        DCA PFLAG       /CLEAR PFLAG.
2032  5617        JMP I PUNCH     /EXIT, AC=0.


                  /ROUTINE TO CONTROL THE CHARACTERS TO BE TYPED ON ALL TTY'S.

2033  0000  TLCALI, OPEN
2034  1633        TAD I TLCALI            /GET FIRST LETTER TO BE TYPED
2035  3237        DCA .+2                 /SAVE IT.
2036  4467        JMS I UTPLN3            /GO TYPE SAVED LETTER + NEXT 2.
2037  0000        OPEN                    /FIRST LETTER TO BE TYPED.
2040  5424        JMP I CHAIN             /CHAIN

                  /ROUTINE TO CONTROL THE CHARACTER TO BE TYPED ON A "37".

2041  0000  TLC37I, OPEN                  /GET FIRST LETTER TO BE TYPED
2042  1641        TAD I TLC37I
2043  3247        DCA .+4                 /SAVE IT.
2044  4553        CKSR37                  /IS IT A "37"?
2045  5424        JMP I CHAIN             /NO, CHAIN
2046  4467        JMS I UTPLN3            /YES, GO TYPE LETTER + NEXT 2
2047  0000        OPEN                    /FIRST LETTER TO BE TYPED.
2050  5424        JMP I CHAIN             /CHAIN

                  /CONTROL ROUTINE TO FILL A BUFFER WITH CHARACTERS.

2051  0000  FBFI,   OPEN                  /GET DATA
2052  7300        CLA CLL
2053  1651        TAD I FBFI
2054  3256        DCA .+2                 /SAVE IT
2055  4777'       JMS FBF3                /GO FILL A BUFFER-
2056  0000        OPEN                    /WITH THIS +NEXT 2 CHAR
2057  4776'       JMS CNTST               /GO TO COMBINED TEST SEQUENCE

                  /ROUTINE TO CONTROL TYPING A LINE WITHOUT STALLS
                  /AND THEN ONE WITH STALLS.

2060  0000  WOSWS,  OPEN
2061  3060        DCA STLID               /ZERO STALL INDICATOR.
```

```
2062  4775'          JMS TYPLN              /TYPE LINE WITHOUT STALLS
2063  7240           CLA CMA                /7777
2064  3060           DCA STLID              /SET STALL INDICATOR
2065  4775'          JMS TYPLN              /TYPE LINE WITH STALLS
2066  5660           JMP I WOSWS            /EXIT,

                /SUBROUTINE TO MARK TAB POSITIONS,

2067  0000  MTABP,  OPEN
2070  3056          DCA CTRA
2071  4572          TYPE                   /MARK TAB POSITIONS
2072  4077          TBMRK
2073  4572          TYPE
2074  4105          TBMRK1
2075  2056          ISZ CTRA
2076  5273          JMP .-3
2077  5667          JMP I MTABP            /EXIT.



                /PROGRAM 0, LT33/35 TELETYPE READER TEST, CHECKS ABILITY OF READER
                /TO CORRECTLY READ AT FULL SPEED AND WITH RANDOM STALLS.
2100  4576  PRG0,   SETLOC                /SET KSTART TO INITIAL
2101  0022          KSTART                 /ROUTINE ADDRESS,
2102  2105          P0TS0
2103  5704          JMP I .+1              /GO START TEST
2104  0227          SRSET
                /READ 4095 CHARACTERS, AT FULL SPEED, MATCHING EACH CHARACTER
                /READ AGAINST COUNT PATTERN
                /
2105  0000  P0TS0,  0
2106  2135          P0TS1
2107  4461          JMS I SYNC             /GO SYNC TAPE
2110  4576          SETLOC                 /SET COUNT OF
2111  0056          CTRA                   /-4095(DEC) IN
2112  0001          -7777                  /CTRA
2113  4570          UKCC                   /START READER
2114  4462          JMS I INPATT           /GO INITIALIZE PATTERN
2115  4463  P0TS0A, JMS I GETPT            /GET PATTERN CHARACTER
2116  3323          DCA SB0                /STORE AT SB0
2117  4571          UKSF                   /READY?
2120  5317          JMP .-1                /NO,  TEST AGAIN
2121  4566          UKRB                   /YES,  READ CHARACTER
2122  4464          JMS I CHECK            /GO CHECK FOR CORRECT MATCH
2123  0000  SB0,    0                      /CORRECT CHAR HERE
2124  5330          JMP P0E0               /ERROR,  GO TO P0E0
2125  2056  P0T0B,  ISZ CTRA               /OK,  ALL DONE?
2126  5315          JMP P0TS0A             /NO,  REPEAT
2127  5424          JMP I CHAIN            /YES,  CHAIN
2130  7402  P0E0,   HLT                    /TST0 ERR HALT:  AC CONTAINS
                                           /CHAR THAT DID NOT MATCH
                                           /AGAINST PATTERN,  DEPRESS
                                           /KEY CONTINUE
2131  7200          CLA
```



```
2132  1323          TAD SB0                /GET CORRECT CHARACTER
2133  7402          HLT                    /AC CONTAINS THE EXPECTED CHARACTER
2134  5325          JMP P0T0B



                /READ 2000 CHARACTERS WITH RANDOM DELAY BETWEEN CHARACTERS,
                /MATCH EACH CHARACTER READ AGAINST COUNT PATTERN
                /
2135  0001  P0TS1,  1
2136  2200          P0TS2
2137  4461          JMS I SYNC             /TO SYNC TAPE
2140  4576          SETLOC                 /SET COUNT OF
2141  0056          CTRA                   /-2000 (DEC) IN
2142  4060          -3720                  /CTRA
2143  4570          UKCC                   /START READER
2144  4462          JMS I INPATT           /INITIALIZE PATTERN
2145  4463  P0TS1A, JMS I GETPT            /GET PATTERN CHARACTER
2146  3355          DCA SB1                /STORE AT SB1
2147  4426          JMS I DLCNT1           /GENERATE RANDOM DELAY
2150  4575          DELAY                  /DELAY
2151  4571          UKSF                   /READY?
2152  5351          JMP .-1                /NO,  TEST AGAIN
2153  4566          UKRB                   /YES,  READ CHARACTER
2154  4464          JMS I CHECK            /GO CHECK FOR CORRECT MATCH

2155  0000  SB1,    0                      /CORRECT CHAR HERE
2156  5362          JMP P0E1               /ERROR,  GO TO P0E1
2157  2056  P0T1B,  ISZ CTRA               /OK,  ALL DONE?
2160  5345          JMP P0TS1A             /NO,
2161  5424          JMP I CHAIN            /YES,  CHAIN
2162  7402  P0E1,   HLT                    /TST1 ERR HALT:  AC CONTAINS
                                           /CHARACTER THAT DID NOT MATCH
                                           /AGAINST PATTERN,  DEPRESS
                                           /KEYCONTINUE
2163  7200          CLA
2164  1355          TAD SB1                /GET CORRECT CHARACTER
2165  7402          HLT                    /AC CONTAINS THE EXPECTED
                                           /CHARACTER
2166  5357          JMP P0T1B

2175  1627
2176  1600
2177  1031
      2200          PAGE



                /READ WITH RANDOM STALL BETWEEN RANDOM CHARACTER GROUPS
                /100 GROUPS READ,
                /
2200  0002  P0TS2,  2
2201  7777          7777
2202  4461          JMS I SYNC             /GO SYNC TAPE
```

```
2203  4427          JMS I S100      /SET UP TO DO TEST 100 TIMES.
2204  4570          UKCC            /START READER
2205  4462          JMS I INPATT    /INITIALIZE PATTERN
2206  4426  P0TS2A, JMS I DLCNT1    /SET RANDOM DELAY
2207  4777'         JMS CHRCNT      /SET RANDOM CHARACTER
2210  0057          CTRB            /COUNT IN CTRB
2211  4463  P0TS2B, JMS I GETPT     /GET PATTERN CHARACTER
2212  3220          DCA SB2         /AND STORE AT SB2
2213  4575          DELAY           /GO DELAY NO OF
2214  4571          UKSF            /READY?
2215  5214          JMP .-1         /NO, TEST AGAIN
2216  4566          UKRB            /READ CHARACTER
2217  4464          JMS I CHECK     /CHECK FOR CORRECT MATCH
2220  0000  SB2,    0               /AGAINST SB2 CONTENTS
2221  5227          JMP P0E2        /ERROR,  GO TO P0E2
2222  2057          ISZ CTRB        /OK,  ALL CHARS FOR GROUP DONE?
2223  5211          JMP P0TS2B      /NO
2224  2056  P0T2C,  ISZ CTRA        /YES,  ALL GROUPS DONE?
2225  5206          JMP P0TS2A      /NO
2226  5424          JMP I CHAIN     /YES,  CHAIN


2227  7402  P0E2,   HLT             /TST2 ERROR HALT,  AC CONTAINS CHAR THAT
                                    /DID NOT MATCH AGAINST PATTERN,  DEPRESS KEY
                                    /CONTINUE
2230  7200          CLA
2231  1220          TAD SB2         /GET CORRECT CHARACTER
2232  7402          HLT             /AC CONTAINS THE EXPTECTED CHARACTER
2233  5224          JMP P0T2C


              /PROGRAM 1.


2234  4776'  PRG1,   JMS STBF        /SET UP BUFFER AREA
2235  4576          SETLOC          /SET KSTART TO INITIAL
2236  0022          KSTART          /ROUTINE ADDRESS
2237  2242          P1TS0
2240  5641          JMP I .+1       /GO START PROGRAM
2241  0227          SRSET
              /CARRIAGE RETURN TEST
2242  0000  P1TS0,  0
2243  2275          P1TS1
2244  4553          CKSR37          /KSR37?
2245  1140          TAD C11         /NO,
2246  1375          TAD (-122       /YES
2247  3107          DCA     TEMP0   /SAVE THE NUMBER
2250  4572          TYPE            /PRINT TEST TITLE
2251  4126          CRTST
2252  1136          TAD C334        /GET "\" CODE
2253  4470          JMS I UPUNCH    /PRINT IT
2254  1107          TAD     TEMP0   /GET THE NUMBER
2255  3100          DCA UTEMP
2256  2100  CRTSTA, ISZ UTEMP       /ALL DONE?
2257  7410          SKP             /NO
```



```
2260  5424          JMP I CHAIN     /YES, CHAIN
2261  1100  CRTSTB, TAD UTEMP
2262  3101          DCA UTEMP1      /UTEMP TO UTEMP1
2263  1141          TAD C240        /GET "SPACE" CODE
2264  4470          JMS I UPUNCH    /PRINT IT
2265  2101          ISZ UTEMP1      /SPACED NO. OF TIMES IN UTEMP1?
2266  5263          JMP .-3         /NO, SO SPACE AGAIN
2267  1103          TAD CR          /YES, GET "CR" CODE,
2270  4470          JMS I UPUNCH    /PRINT IT,
2271  4470          JMS I UPUNCH    /DUMMY CYCLE,
2272  1135          TAD C257        /SET "/" CODE
2273  4470          JMS I UPUNCH    /PRINT IT
2274  5256          JMP CRTSTA      /GO TO CRTSTA


              /RIGHT MARGIN TEST
2275  0001  P1TS1,  1
2276  2325          P1TS2
2277  7200          CLA
2300  1134          TAD C-16
2301  3107          DCA     TEMP0
2302  1133          TAD CRM33B
2303  3323          DCA RMB
2304  4553          CKSR37          /KSR37?
2305  5312          JMP .+5         /NO,
2306  1132          TAD C-17        /YES,
2307  3107          DCA     TEMP0
2310  1131          TAD CRM37A
2311  3323          DCA RMB
2312  4572          TYPE            /PRINT TEST TITLE
2313  4136          RMTST
2314  1107          TAD     TEMP0
2315  3100          DCA UTEMP
2316  4572  RMTSTA, TYPE            /PRINT -"-" I
2317  1553          RM33A
2320  2100          ISZ UTEMP       /DONE TIMES?
2321  5316          JMP RMTSTA      /NO, SO DO IT AGAIN
2322  4572          TYPE            /YES, PRINT  -1-
2323  0000  RMB,    OPEN
2324  5424          JMP I CHAIN     /CHAIN


              /SPACE TEST
2325  0002  P1TS2,  2
2326  2400          P1TS3
2327  4572          TYPE            /PRINT TEST TITLE
2330  4153          SPTST
2331  4553          CKSR37          /KSR37?
2332  1130          TAD C5          /NO
2333  1127          TAD C-51        /YES
2334  3100          DCA UTEMP       /-36 TO UTEMP
2335  4572  SPTSTA, TYPE            /PRINT \' SPACE
2336  4123          SPTSTC
2337  2100          ISZ UTEMP       /DONE 36 TIMES?
```

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2340  5335          JMP SPTSTA      /NO, SO DO IT AGAIN,
2341  4553          CKSR37          /KSR37?
2342  1126          TAD [4          /NO
2343  1125          TAD [-50        /YES
2344  3100          DCA UTEMP       /-36 TO UTEMP
2345  1374          TAD (-1         /GET -1
2346  3101  SPTSTB, DCA UTEMP1      /AC TO UTEMP1
2347  1101          TAD UTEMP1      /UTEMP1
2350  3102          DCA UTEMP2      /TO UTEMP2
2351  1103          TAD CR          /GET "CR" CODE
2352  4470          JMS I UPUNCH    /PRINT IT
2353  4470          JMS I UPUNCH    /DUMMY CYCLE
2354  1141          TAD [240        /GET "SPACE" CODE
2355  4470          JMS I UPUNCH    /PRINT IT
2356  2102          ISZ UTEMP2      /DONE SPACING?
2357  5354          JMP .-3         /NO,
2360  1135          TAD [257        /GET "/" CODE
2361  4470          JMS I UPUNCH    /PRINT IT
2362  2100          ISZ UTEMP       /DONE 36 TIMES?
2363  7410          SKP             /NO,
2364  5424          JMP I CHAIN     /YES, CHAIN
2365  7344          CLA CLL CMA RAL /-2 TO AC
2366  1101          TAD UTEMP1      /ADD C(UTEMP1)
2367  5346          JMP SPTSTB      /GO TO SPTSTB

2374  7777
2375  7656
2376  1000
2377  0456
      2400          PAGE


                /LINE FEED TEST
2400  0003    P1TS3,  3
2401  2722            P1TS47
2402  7240            CLA CMA         /SET STALL
2403  3060            DCA STLID       /INDICATOR
2404  4572            TYPE            /PRINT TEST TITLE
2405  4165            LFTST
2406  4553            CKSR37          /KSR37?
2407  1140            TAD [11         /NO,
2410  1377            TAD (-121       /YES,

2411  3100            DCA UTEMP
2412  1136    LFTSTA, TAD [334        /GET "\" CODE
2413  4470            JMS I UPUNCH    /PRINT IT
2414  1104            TAD LF          /GET "LF" CODE
2415  4470            JMS I UPUNCH    /PRINT IT
2416  2100            ISZ UTEMP       /DONE?
2417  7410            SKP             /NO,
2420  5424            JMP I CHAIN     /YES, CHAIN
2421  4554            STALL
2422  5212            JMP LFTSTA      /GO TO LFTSTA
```



```
                /TYPE LINE OF CHARACTERS ABC
2423  0004    P1TS4,  4
2424  2431            P1TS5
2425  4572            TYPE            /PRINT TITLE
2426  4175            CHRTST
2427  4432            JMS I TLCALL    /PRINT LINE
2430  3706            A


                /TYPE LINE OF CHARACTERS DEF
2431  0005    P1TS5,  5
2432  2435            P1TS6
2433  4432            JMS I TLCALL
2434  3711            D


                /TYPE LINE OF CHARACTERS GHI
2435  0006    P1TS6,  6
2436  2441            P1TS7
2437  4432            JMS I TLCALL
2440  3714            G
                /TYPE LINE OF CHARACTERS JKL
2441  0007    P1TS7,  7
2442  2445            P1TS10
2443  4432            JMS I TLCALL
2444  3717            J
                /TYPE LINE OF CHARACTERS MNO
2445  0010    P1TS10, 10
2446  2451            P1TS11
2447  4432            JMS I TLCALL
2450  3722            M
                /TYPE LINE OF CHARACTERS PQR
2451  0011    P1TS11, 11
2452  2455            P1TS12
2453  4432            JMS I TLCALL
2454  3725            P
                /TYPE LINE OF CHARACTERS STU
2455  0012    P1TS12, 12
2456  2461            P1TS13
2457  4432            JMS I TLCALL
2460  3730            S
                /TYPE LINE OF CHARACTERS VWX
2461  0013    P1TS13, 13
2462  2465            P1TS14
2463  4432            JMS I TLCALL
2464  3733            V
                /TYPE LINE OF CHARACTERS YZ0
2465  0014    P1TS14, 14
2466  2471            P1TS15
2467  4432            JMS I TLCALL
2470  3736            Y
                /TYPE LINE OF CHARACTERS 123
2471  0015    P1TS15, 15
2472  2475            P1TS16
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2473  4432          JMS I TLCALL
2474  3741          ONE
                    /TYPE LINE OF CHARACTERS 456
2475  0016    P1TS16, 16
2476  2501          P1TS17
2477  4432          JMS I TLCALL
2500  3744          FOUR
                    /TYPE LINE OF CHARACTERS 789
2501  0017    P1TS17, 17
2502  2505          P1TS20
2503  4432          JMS I TLCALL
2504  3747          SEVEN
                    /TYPE LINE OF CHARACTERS !"#
2505  0020    P1TS20, 20
2506  2511          P1TS21
2507  4432          JMS I TLCALL
2510  3752          C241
                    /TYPE LINE OF CHARACTERS $%&
2511  0021    P1TS21, 21
2512  2515          P1TS22
2513  4432          JMS I TLCALL
2514  3755          C244
                    /TYPE LINE OF CHARACTERS '()
2515  0022    P1TS22, 22
2516  2521          P1TS23
2517  4432          JMS I TLCALL
2520  3760          C247
                    /TYPE LINE OF CHARACTERS **,
2521  0023    P1TS23, 23
2522  2525          P1TS24
2523  4432          JMS I TLCALL
2524  3763          C252
                    /TYPE LINE OF CHARACTERS -.(
2525  0024    P1TS24, 24
2526  2531          P1TS25
2527  4432          JMS I TLCALL
2530  3766          C255
                    /TYPE LINE OF CHARACTERS /;<
2531  0025    P1TS25, 25
2532  2535          P1TS26
2533  4432          JMS I TLCALL
2534  3771          C272
                    /TYPE LINE OF CHARACTERS =>?
2535  0026    P1TS26, 26
2536  2541          P1TS27
2537  4432          JMS I TLCALL
2540  3774          C275
                    /TYPE LINE OF CHARACTERS @ [\
2541  0027    P1TS27, 27
2542  2545          P1TS30
2543  4432          JMS I TLCALL
2544  3777          C300
                    /TYPE LINE OF CHARACTERS ]↑ AND ←
2545  0030    P1TS30, 30
2546  2551          P1TS31
```



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2547  4432          JMS I TLCALL
2550  4002          C335

                    /TYPE LINE OF SMALL A, B, AND C
2551  0031    P1TS31, 31
2552  2555          P1TS32
2553  4433          JMS I TLC37
2554  4005          SA
                    /TYPE LINE OF SMALL D, E, AND F
2555  0032    P1TS32, 32
2556  2561          P1TS33
2557  4433          JMS I TLC37
2560  4010          SD


                    /TYPE LINE OF SMALL G, H, AND I
2561  0033    P1TS33, 33
2562  2600          P1TS34
2563  4433          JMS I TLC37
2564  4013          SG

2577  7657
      2600          PAGE


                    /TYPE LINE OF SMALL J, K, AND L
2600  0034    P1TS34, 34
2601  2604          P1TS35
2602  4433          JMS I TLC37
2603  4016          SJ



                    /TYPE LINE OF SMALL M, N, AND O
2604  0035    P1TS35, 35
2605  2610          P1TS36
2606  4433          JMS I TLC37
2607  4021          SM
                    /TYPE LINE OF SMALL P, Q, AND R
2610  0036    P1TS36, 36
2611  2614          P1TS37
2612  4433          JMS I TLC37
2613  4024          SP
                    /TYPE LINE OF SMALL S, T, AND U
2614  0037    P1TS37, 37
2615  2620          P1TS40
2616  4433          JMS I TLC37
2617  4027          SS
                    /TYPE LINE OF SMALL V, W, AND X
2620  0040    P1TS40, 40
2621  2624          P1TS41
2622  4433          JMS I TLC37
2623  4032          SV
                    /TYPE LINE OF SMALL Y, AND Z, ANY CODE 340 CHARACTER,
2624  0041    P1TS41, 41
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2625  2630            P1TS42
2626  4433            JMS I TLC37
2627  4035            SY
                  /TYPE LINE OF CHARACTERS WHOSE CODE IS 373, 374, 375, 376.
2630  0042    P1TS42, 42
2631  2647            P1TS43
2632  4553            CKSR37          /KSR37?
2633  5424            JMP I CHAIN     /NO, BYPASS TEST
2634  4573            MOVE
2635  4040            C373
2636  4400            BLOCK1
2637  7774            =4
2640  4573            MOVE
2641  4400            BLOCK1
2642  4404            BLOCK1+4
2643  7663            =115
2644  3060            DCA STLID
2645  4777'           JMS TYPLN
2646  5424            JMP I CHAIN

                  /TYPE 2 LINES OF ALL CHARACTERS, 1ST LINE NO DELAY, 2ND LINE WITH STALLS.
2647  0043    P1TS43, 43
2650  2654            P1TS44
2651  4776'           JMS FBALL       /FILL BUFFER WITH ALL CHARS.
2652  4775'           JMS WOSWS
2653  5424            JMP I CHAIN     /CHAIN

                  /TYPE 12 LINES OF LT33 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
2654  0044    P1TS44, 44
2655  2672            P1TS45
2656  4572            TYPE            /PRINT TITLE
2657  4211            WCPTST
2660  4552            CKSR33          /33?
2661  5424            JMP I CHAIN     /NO
2662  4774'           JMS FW336       /PATTERN TO BUFFER
2663  4576            SETLOC          /=0 TO CTRA
2664  0056            CTRA
2665  7772            =6
2666  4775'   P1T44A, JMS WOSWS
2667  2056            ISZ CTRA
2670  5266            JMP P1T44A      /NO, REPEAT
2671  5424            JMP I CHAIN     /YES, CHAIN

                  /TYPE 12 LINES OF ASR35 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
2672  0045    P1TS45, 45
2673  2706            P1TS46
2674  4551            CKSR35          /35?
2675  5424            JMP I CHAIN     /NO,
2676  4773'           JMS FW356       /PATTERN TO BUFFER
2677  4576            SETLOC          /=0 TO CTRA
2700  0056            CTRA
2701  7772            =6
2702  4775'   P1T45A, JMS WOSWS
2703  2056            ISZ CTRA        /ALL LINES TYPED?
2704  5302            JMP P1T45A      /NO, REPEAT
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2705  5424            JMP I CHAIN     /YES, CHAIN

                  /TYPE 12 LINES OF KSR37 WORST CASE PATTERN, ALTERNATE LINES WITH STALLS.
2706  0046    P1TS46, 46
2707  7777            7777
2710  4553            CKSR37          /37?
2711  5424            JMP I CHAIN     /NO, BYPASS TEST.
2712  4772'           JMS FW376       /YES, PATTERN TO BUFFER
2713  4576            SETLOC          /=6 TO CTRA
2714  0056            CTRA
2715  7772            =6
2716  4775'   P1T46A, JMS WOSWS
2717  2056            ISZ CTRA        /ALL LINES TYPED?
2720  5316            JMP P1T46A      /NO, REPEAT
2721  5424            JMP I CHAIN     /YES, CHAIN


                  /KSR37, LT35=CC, OR LT35=CD TAB TEST
2722  0047    P1TS47, 47
2723  3031            P1TS50
2724  4553            CKSR37          /KSR37?
2725  5346            JMP TBTB        /NO,
2726  4572            TYPE            /YES, TYPE TITLE
2727  4066            TBTST
2730  1124            TAD [=11        /=9 TO CTRA
2731  4771'           JMS MTABP       /GO TO SUB TO MARK TAB POSITIONS.
2732  1370            TAD (=12        /SET TAB COUNT
2733  3340            DCA TBCNT       /TO =10
2734  1367    TBTA,   TAD (=7         /YES, =7 TO CTRA
2735  3056            DCA CTRA
2736  3361            DCA SPCNT       /0 TO SPACE COUNT
2737  4766'           JMS TABP        /GO TAB AND PRINT SLASH 9 TIMES.
2740  0000    TBCNT,  OPEN            /TAB COUNT,
2741  2056            ISZ CTRA        /DONE?
2742  7410            SKP             /NO,
2743  5424            JMP I CHAIN     /YES, CHAIN
2744  2361            ISZ SPCNT       /INCREMENT SPACE COUNT
2745  5337            JMP TBTA+3      /REPEAT
2746  4551    TBTB,   CKSR35          /LT35=CC/LT33=CD?
2747  5424            JMP I CHAIN     /NO, BYPASS TEST
2750  4572            TYPE            /YES, TYPE TITLE
2751  4066            TBTST
2752  1367            TAD (=7         /=7 TO CTRA
2753  4771'           JMS MTABP       /GO TO SUB TO MARK TAB POSITIONS.
2754  4572            TYPE            /YES,
2755  4100            TBMRK+1
2756  1124            TAD [=11        /SET TAB COUNT
2757  3340            DCA TBCNT       /TO =9
2760  5334            JMP TBTA
2761  0000    SPCNT,  OPEN
2762  0000    SPCTR,  OPEN

2766  3001
2767  7771
2770  7766
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2771  2067
2772  1153
2773  1135
2774  1117
2775  2060
2776  1066
2777  1627
      3000          PAGE


3000  0000  TABCTR, OPEN
3001  0000  TABP,   OPEN
3002  1601          TAD I TABP        /SET TABVIM
3003  3200          DCA TABCTR
3004  2201          ISZ TABP
3005  4574          CRLF              /CRLF ONVE
3006  7777          -1
3007  1777' SPAC,   TAD SPCNT         /GET SPAVE COUNT
3010  7450          SNA               /0?
3011  5220          JMP TABPA         /YES, DON'T SPACE
3012  7041          CIA               /NO, NEGATE COUNT
3013  3776'         DCA SPCTR
3014  1141          TAD [240          /SPACE
3015  4470          JMS I UPUNCH
3016  2776'         ISZ SPCTR         /DONE SPACING?
3017  5214          JMP .-3           /NO, SPAVE AGAIN
3020  1140  TABPA,  TAD [11          /GET TAB CODE
3021  4470          JMS I UPUNCH      /OUTPUT IO TELEPRINTER
3022  4470          JMS I UPUNCH      /DUMMY CYCLE,
3023  4470          JMS I UPUNCH      /DUMMY CYCLE
3024  1135          TAD [257          /GET "/" CODE
3025  4470          JMS I UPUNCH      /AND TYPE IT
3026  2200          ISZ TABCTR        /DONE?
3027  5207          JMP SPAC          /NO, REPEAT
3030  5601          JMP I TABP        /YES, EXIT


              /KSR37 BACKSPACE TEST,
3031  0050  P1TS50, 50
3032  2423          P1TS4
3033  4553          CKSR37            /KSR37?
3034  5424          JMP I CHAIN       /NO
3035  4572          TYPE              /YES, TYPE TITLE
3036  4052          BKSPT
3037  1127          TAD [-51          /-41 TO VIMA
3040  3056          DCA CTRA
3041  4572          TYPE              /TYPE ALTERNATE U'S,
3042  4373          BKSU
3043  2056          ISZ CTRA          /DONE?
3044  5241          JMP .-3           /NO,
3045  1375          TAD (-47          /-39 TO VIMA
3046  3056          DCA CTRA
3047  4263          JMS BKSPC         /BACKSPAVE IMAGE
3050  7776          -2
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3051  1774'         TAD C252          /TYPE "*"
3052  4470          JMS I UPUNCH
3053  4263          JMS BKSPC         /BACKSPAVE IMAGE
3054  7775          -3
3055  1774'         TAD C252          /TYPE "*"
3056  4470          JMS I UPUNCH
3057  2056          ISZ CTRA          /DONE 39 TIMES?
3060  5253          JMP .-5           /NO,
3061  5424          JMP I CHAIN       /YES, CHAIN
3062  0000  BKSCTR, OPEN

3063  0000  BKSPC,  OPEN
3064  1663          TAD I BKSPC       /GET BACKSPACE COUNT
3065  3262          DCA BKSCTR        /AND STORE AT BKSCTR
3066  2263          ISZ BKSPC         /SET UP EXIT
3067  1373          TAD (210          /GET BACKSPACE CODE
3070  4470          JMS I UPUNCH      /OUTPUT IO TELEPRINTER
3071  2262          ISZ BKSCTR        /DONE BACKSPACING?
3072  5267          JMP .-3           /NO, REPEAT
3073  5663          JMP I BKSPC       /YES, EXIT


              /PROGRAM 2, PUNCH TEST
3074  4576  PRG2,   SETLOC           /SET INTERRUPT SERVICE ADDRESS
3075  0002          2                 /TO INTSVC
3076  1254          INTSVC
3077  4576          SETLOC            /SET DATA BLOCK
3100  0075          BLKCNT            /LENGTH IO
3101  7000          -1000             /-512
3102  4570          UKCC
3103  1372          TAD (BLOCKA       /SET UP ADDRESS TO
3104  3100          DCA UTEMP         /STORE DATA,
3105  1371          TAD (-1000        /-512 TO CTRA
3106  3056          DCA CTRA
3107  4770'         JMS SINPT         /INITIALIZE SPECIAL COUNT PATTERN
3110  4767'         JMS SGET          /GET CHARACTER
3111  3500          DCA I UTEMP       /STORE IT
3112  2100          ISZ UTEMP         /INCREMENT POINTER,
3113  2056          ISZ CTRA          /DONE 512 CHARACTERS?
3114  5310          JMP .-4           /NO, REPEAT
3115  4571          UKSF
3116  5315          JMP .-1
3117  7200  PRG2A,  CLA               /YES, CLEAR READY BUSY
3120  3072          DCA RBUSY
3121  4766'         JMS PLTLR         /PUNCH LEADER
3122  4765'         JMS PSYNC         /PUNCH SYNC CHARACTER
3123  4764'         JMS PBLK          /PUNCH DATA BLOCK FULL SPEED,
3124  4766'         JMS PLTLR         /PUNCH TRAILER
3125  4763'         JMS RSYNC         /SYNC READER
3126  4762'         JMS RDBLK         /READ DATA BLOCK
3127  4761'         JMS RRDY          /WAIT FOR READER NOT BUSY
3130  4766'         JMS PLTLR         /PUNCH LEADER
3131  4765'         JMS PSYNC         /PUNCH SYNC CHARACTER
3132  4760'         JMS PBLKR         /PUNCH DATA BLOCK (WITH STALLS),
3133  4766'         JMS PLTLR         /PUNCH TRAILER
```

```
3134  4763'          JMS RSYNC       /SYNC READER
3135  4762'          JMS RDBLK       /READ DATA BLOCK
3136  4761'          JMS RRDY        /WAIT FOR READER NOT BUSY
3137  5317           JMP PRG2A       /REPEAT.

                /PROGRAM 3, KEYBOARD TEST
3140  4576    PRG3,  SETLOC          /SET KSTART TO INITIAL
3141  0022           KSTART          /ROUTINE ADDRESS
3142  3200           P3T0
3143  4572           TYPE            /PRINT
3144  4231           KMSG1
3145  5746           JMP I .+1
3146  0227           SRSET

3160  1324
3161  1343
3162  1400
3163  1216
3164  1316
3165  1212
3166  1200
3167  1720
3170  1710
3171  7000
3172  4376
3173  0210
3174  3763
3175  7731
3176  2762
3177  2761
      3200           PAGE


                /CLEAR AC AND FLAG (KCC), WAIT FOR FLAG TO SET, WITH FLAG SET, SKIP
                /ON FLAG 4000 TIMES, KSF SHOULD SKIP EVERY TIME.
3200  0000    P3T0,  0
3201  3221           P3T1
3202  4430           JMS I S4000
3203  4570           UKCC            /CLEAR AC AND FLAG
3204  4572           TYPE
3205  4242           KMSG2
3206  4571           UKSF            /READY?
3207  5206           JMP .-1         /WAIT
3210  4571           UKSF            /READY, SKIP ON FLAG
3211  5215           JMP P3E0        /NO SKIP, ERROR
3212  2056           ISZ CTRA        /ALL DONE?
3213  5210           JMP .-3         /NO, REPEAT
3214  5424           JMP I CHAIN     /YES, CHAIN

3215  7602    P3E0,  HLT CLA         /KSF FAILURE
3216  4571           UKSF            /SCOPE LOOP
3217  5216           JMP .-1         /SKIPS ON FLAG
3220  5216           JMP .-2         /CONTINUOUSLY
```



```
                /ECHO TEST CHARACTER RECEIVED FROM KEYBOARD IS TYPED, THE
                /CHARACTER TYPED SHOULD MATCH CHARACTER KEYED, RUBOUT CHARCTER
                /ENDS ROUTINE.
3221  0001    P3T1,  1
3222  3240           P3T2
3223  4570           UKCC            /CLEAR AC AND FLAG
3224  4572           TYPE
3225  4253           KMSG3
3226  4571    P3T1A, UKSF            /READY?
3227  5226           JMP .-1         /WAIT
3230  4565           SUKRB           /READ CHARACTER
3231  4561           UTLS            /PRINT IT
3232  4564           UTSF            /PRINTER READY?
3233  5232           JMP .-1         /NO, WAIT
3234  1143           TAD [-377
3235  7440           SZA             /IS IT RUBOUT?
3236  5226           JMP P3T1A       /NO
3237  5424           JMP I CHAIN     /YES, CHAIN



                /OCTAL EQUIVALENT TEST, THE OCTAL EQUIVALENT OF ANY
                /CHARACTER KEYED IS PRINTED, RUBOUT ENDS ROUTINE.
3240  0002    P3T2,  2
3241  7777           7777
3242  4570           UKCC            /CLEAR AC AND FLAG
3243  4572           TYPE            /PRINT TITLE AND
3244  4320           KMSG4           /INSTRUCTION
3245  4572           TYPE
3246  4261           KMSG3A
3247  4571    P3T2A, UKSF            /FLAG 1?
3250  5247           JMP .-1         /NO, WAIT
3251  4565           SUKRB           /YES, READ KEYBOARD
3252  3106           DCA WTS6A       /STORE CHARACTER
3253  4777'          JMS ASCCN       /CONVERT CHARACTER
3254  0106           WTS6A           /TO PRINTABLE OCTAL.
3255  4340           OCTEQV
3256  4572           TYPE            /PRINT CHARACTER
3257  4336           KMSG5
3260  1106           TAD WTS6A
3261  1143           TAD [-377
3262  7640           SZA CLA         /WAS IT A RUBOUT?
3263  5247           JMP P3T2A       /NO.
3264  5424           JMP I CHAIN     /YES, CHAIN

                /PROGRAM 4, COMBINED READER, PRINTER, PUNCH TEST.
3265  4576    PRG4,  SETLOC          /SET INTERRUPT SERVICE
3266  0002           2               /ADDRESS TO INISVC
3267  1254           INTSVC
3270  4576           SETLOC          /SET DATA BLOCK LENGTH
3271  0075           BLKCNT          /TO -190
```

```
3272  7552            =226
3273  4425            JMS I KBFLAG
3274  4776'           JMS STBF        /SET UP BUFFER AREA
3275  4576            SETLOC          /SET KSTART TO INITIAL
3276  0022            KSTART          /ROUTINE ADDRESS
3277  3302            P4T0
3300  5701            JMP I .+1       /START PROGRAM
3301  0227            SRSET

3302  0000  P4T0,     0
3303  3306            P4T1
3304  4434            JMS I FBF       /DATA! ABC
3305  3706            A
3306  0001  P4T1,     1
3307  3312            P4T2
3310  4434            JMS I FBF       /DATA! DEF
3311  3711            D
3312  0002  P4T2,     2
3313  3316            P4T3
3314  4434            JMS I FBF       /DATA! GHI
3315  3714            G
3316  0003  P4T3,     3
3317  3322            P4T4
3320  4434            JMS I FBF       /DATA! JKL
3321  3717            J
3322  0004  P4T4,     4
3323  3326            P4T5
3324  4434            JMS I FBF       /DATA! MNO
3325  3722            M
3326  0005  P4T5,     5
3327  3332            P4T6
3330  4434            JMS I FBF       /DATA! PQR
3331  3725            P
3332  0006  P4T6,     6
3333  3336            P4T7
3334  4434            JMS I FBF       /DATA! STU
3335  3730            S
3336  0007  P4T7,     7
3337  3342            P4T10
3340  4434            JMS I FBF       /DATA! VWX
3341  3733            V
3342  0010  P4T10,    10
3343  3346            P4T11
3344  4434            JMS I FBF       /DATA! YZ@
3345  3736            Y
3346  0011  P4T11,    11
3347  3352            P4T12
3350  4434            JMS I FBF       /DATA! [\]
3351  3741            ONE
3352  0012  P4T12,    12
3353  3356            P4T13
3354  4434            JMS I FBF       /DATA! ^_`
3355  3744            FOUR
3356  0013  P4T13,    13
3357  3362            P4T14
```



```
3360  4434            JMS I FBF       /DATA! 789
3361  3747            SEVEN
3362  0014  P4T14,    14
3363  3366            P4T15
3364  4434            JMS I FBF       /DATA! :;<
3365  3792            C241
3366  0015  P4T15,    15
3367  3372            P4T16
3370  4434            JMS I FBF       /DATA! =>?
3371  3755            C244
3372  0016  P4T16,    16
3373  3400            P4T17
3374  4434            JMS I FBF       /DATA! !"
3375  3760            C247

3376  1000
3377  1650
      3400            PAGE

3400  0017  P4T17,    17
3401  3404            P4T20
3402  4434            JMS I FBF       /DATA! #$%
3403  3763            C252
3404  0020  P4T20,    20
3405  3410            P4T21
3406  4434            JMS I FBF       /DATA! &'(
3407  3766            C255

3410  0021  P4T21,    21
3411  3414            P4T22
3412  4434            JMS I FBF       /DATA! )*+
3413  3771            C272
3414  0022  P4T22,    22
3415  3420            P4T23
3416  4434            JMS I FBF       /DATA! ,-.
3417  3774            C275
3420  0023  P4T23,    23
3421  3424            P4T24
3422  4434            JMS I FBF       /DATA! /0\
3423  3777            C300
3424  0024  P4T24,    24
3425  3430            P4T25
3426  4434            JMS I FBF       /DATA! 12 AND LEFT ARROW
3427  4002            C335
3430  0025  P4T25,    25
3431  3434            P4T26
3432  4777'           JMS FBALL       /DATA! ALL PRINTABLE ASCII
3433  4776'           JMS CNTST


3434  0026  P4T26,    26
3435  3440            P4T27
3436  4775'           JMS FW336       /DATA! L120 PRINTER WORST CASE
3437  4776'           JMS CNTST       /PATTERN
```

```
3440  0027    P4T27,  27
3441  3444            P4T30
3442  4774'           JMS FW356       /DATA; LIKE PRINTER WORST CASE
3443  4776'           JMS CNTST       /PATTERN
3444  0030    P4T30,  30
3445  7777            7777
3446  4773'           JMS FBF3        /DATA; 1'S AND 0'S
3447  4044            C377
3450  4776'           JMS CNTST

                /PROGRAM 5,  READS COUNT PATTERN:

3451  4461    PRG5,   JMS I SYNC      /SYNC TAPE
3452  3321            DCA ERRCTR      /CLEAR ERROR COUNTER
3453  4462            JMS I INPATT    /INITIALIZE PATTERN,
3454  4570            UKCC            /START READER
3455  7604    SRT0A,  LAS             /READ SR
3456  0123            AND C400
3457  7650            SNA CLA         /STALL? (SR3=0)
3460  7040            CMA             /YES
3461  3060            DCA STLID       /NO

3462  4463    SRT0B,  JMS I GETPT     /GET PATTERN CHAR,
3463  3273            DCA SBSP        /STORE AT SBSP:
3464  4554            STALL           /STALL
3465  4571            UKSF            /READY?
3466  5265            JMP .=1         /TEST AGAIN;
3467  4566            UKRB            /READ, CLEAR AC AND FLAG,
3470  3077            DCA ERRCR
3471  1077            TAD ERRCR
3472  4464            JMS I CHECK     /GO CHECK CHARACTER WORD,
3473  0000    SBSP,   0               /
3474  7410            SKP             /ERROR, NO MATCH, GO INC, ERRCNT
3475  5313            JMP HLTTST      /OK,
3476  2321    ERRCNT, ISZ ERRCTR      /INCREMENT ERROR COUNTER
3477  5302            JMP .+3
3500  7240            CLA CMA         /OFLOW, RESET TO 7777,
3501  3321            DCA ERRCTR
3502  7604            LAS             /READ SR:
3503  0142            AND C100
3504  7650            SNA CLA         /HALT ON ERROR? (SR5)
3505  5313            JMP HLTTST      /NO,
3506  1077            TAD ERRCR       /YES, GET BAD CHAR,
3507  7402            HLT
3510  7200            CLA
3511  1273            TAD SBSP        /GET GOOD CHARACTER
3512  7402            HLT
3513  7604    HLTTST, LAS             /READ SR
3514  7700            SMA CLA         /HALT? (SR0)
3515  5255            JMP SRT0A       /NO,
3516  1321            TAD ERRCTR      /GET ERROR COUNT
3517  7402            HLT             /HALT, ERROR COUNT IN AC
3520  5255            JMP SRT0A
3521  0000    ERRCTR, 0               /ERROR COUNTER
```



```
                /PROGRAM 6, PRINTER EXERCISER, TYPES LINES OF ANY 3 CHARACTERS
                /WITH STALLS, OR FULL SPEED, KEYBOARD CONTROLLED.

3522  4772'   PRG6,   JMS STBF
3523  4572            TYPE
3524  4345            P11MG1
3525  1371    PRG6A,  TAD (BLOCK1-1
3526  3016            DCA 16
3527  4572            TYPE
3530  4361            P11MG2
3531  4353            JMS GKBCR
3532  3416            DCA I 16
3533  4353            JMS GKBCR
3534  3416            DCA I 16
3535  4353            JMS GKBCR
3536  3416            DCA I 16
3537  4353            JMS GKBCR
3540  1143            TAD C=377
3541  7640            SZA CLA                 /STALL?
3542  7240            CLA CMA                 /YES,
3543  3060            DCA STLID               /NO;
3544  4773'           JMS FBF3                /SET UP LINE,
3545  4400            BLOCK1
3546  4770'           JMS TYPLN               /TYPE LINE OF CHARACTERS
3547  7604            LAS                     /READ SR,
3550  7700            SMA CLA                 /CHANGE DATA? (SR0=1)
3551  5346            JMP .=3                 /NO,
3552  5325            JMP PRG6A               /YES,
3553  0000    GKBCR,  OPEN                    /SUB TO GET KEYBOARD CHARACTER,
3554  4571            UKSF                    /WAIT FOR FLAG,
3555  5354            JMP .=1
3556  4565            SUKRB                   /READ CHARACTER,
3557  3107            DCA     TEMP0           /STORE CHARACTER,
3560  1107            TAD     TEMP0           /GET IT BACK,
3561  4470            JMS I UPUNCH            /ECHO IT,
3562  1107            TAD     TEMP0           /GET CHARACTER AGAIN,
3563  5753            JMP I GKBCR             /EXIT

                /PROGRAM 7, PUNCHES BINARY COUNT PATTERN,

3564  4462    PRG7,   JMS I INPATT    /INITIALIZE BINARY COUNT PATTERN
3565  4463            JMS I GETPT     /GET BINARY COUNT CHARACTER,
3566  4470            JMS I UPUNCH    /PUNCH CHARACTER
3567  5365            JMP .=2         /REPEAT,

3570  1627
3571  4377
3572  1000
3573  1031
3574  1135
3575  1117
3576  1600
3577  1066
      3600            PAGE
```

```
3600  0000  DVCSEL, OPEN                  /DEVICE CODE SELECT ROUTINE,
3601  1122        TAD CINTAB              /GET START ADDR OF INPUT IOT TABLE,
3602  3046        DCA TEMP                /AND SAVE AT TEMP,
3603  1021        TAD TTYIOT              /OBTAIN NEW INPUT IOT AND
3604  7012        RTR                     /STORE AT UTEMP,
3605  7010        RAR
3606  0121        AND C0770
3607  3100        DCA UTEMP
3610  4222        JMS DVCOM               /PERFORM INPUT IOT SELECTION,
3611  1120        TAD COUTTAB             /GET START ADDR OF OUTPUT IOT TABLE,
3612  3046        DCA TEMP                /AND OBTAIN NEW OUTPUT IOT AND
3613  1021        TAD TTYIOT              /OBTAIN NEW OUTPUT IOT AND
3614  7006        RTL                     /STORE AT UTEMP,
3615  7004        RAL
3616  0121        AND C0770
3617  3100        DCA UTEMP
3620  4222        JMS DVCOM               /PERFORM OUTPUT IOT SELECTION,
3621  5600        JMP I DVCSEL            /EXIT DVCSEL,
3622  0000  DVCOM, OPEN                   /COMMON SUB TO SELECT IOTS,
3623  1446        TAD I TEMP
3624  7450        SNA                     /07
3625  5622        JMP I DVCOM             /YES, EXIT
3626  3101        DCA UTEMP1
3627  1501        TAD I UTEMP1
3630  0117        AND C7007               /REMOVE OLD DEVICE CODE,
3631  1100        TAD UTEMP               /INSERT NEW DEVICE CODE,
3632  3501        DCA I UTEMP1            /PUT BACK NEW IOT CODE,
3633  2046        ISZ TEMP                /SET UP FOR NEXT IOT CODE,
3634  5223        JMP DVCOM+1



3635  0720  INTAB,  XKSF+1
3636  0725          XKCC+1
3637  0731          XKRS+1
3640  0735          XKRB+1
3641  1547          SXKRB+1
3642  0756          XKCR+1
3643  0762          XKIE+1
3644  1233          RSSERV
3645  1264          INKSF
3646  1433          IN0
3647  0000          0
3650  0741  OUTTAB, XTSF+1
3651  0746          XTCF+1
3652  1172          XTPC+1
3653  0752          XTLS+1
3654  1166          XSPF+1
3655  0766          XSPI+1
3656  1261          INTCF
3657  1257          INTSF
3660  2021          OUT0
```



```
3661  2026          OUT1
3662  2030          OUT2
3663  0000          0
3664  0247  A33WP3, 0247           /"1"
3665  0337          0337           /LEFT ARROW
3666  0327          0327           /"W"
3667  0257          0257           /"/"
3670  0327          0327           /"W"
3671  0337          0337           /LEFT ARROW
3672  0247  A35WP3, 0247           /"1"
3673  0333          0333           /"E"
3674  0277          0277           /"?"
3675  0303          0303           /"C"
3676  0277          0277           /"?"
3677  0333          0333           /"E"
3700  0316  A37WP3, 0316           /BIG N
3701  0361          0361           /SMALL Q
3702  0301          0301           /BIG A
3703  0376          0376           /SWUNG DASH
3704  0301          0301           /BIG A
3705  0361          0361           /SMALL Q

3706  0301  A,      301
3707  0302          302
3710  0303          303
3711  0304  D,      304
3712  0305          305
3713  0306          306
3714  0307  G,      307
3715  0310          310
3716  0311          311
3717  0312  J,      312
3720  0313          313
3721  0314          314
3722  0315  M,      315
3723  0316          316
3724  0317          317
3725  0320  P,      320
3726  0321          321
3727  0322          322
3730  0323  S,      323
3731  0324          324
3732  0325          325
3733  0326  V,      326
3734  0327          327
3735  0330          330
3736  0331  Y,      331
3737  0332          332
3740  0260          260
3741  0261  ONE,    261
3742  0262          262
3743  0263          263
3744  0264  FOUR,   264
3745  0265          265
3746  0266          266
```

```
3747  0267    SEVEN,  267
3750  0270            270
3751  0271            271
3752  0241    C241,   241
3753  0242            242
3754  0243            243
3755  0244    C244,   244
3756  0245            245
3757  0246            246
3760  0247    C247,   247
3761  0250            250
3762  0251            251
3763  0252    C252,   252
3764  0253            253
3765  0254            254
3766  0255    C255,   255
3767  0256            256
3770  0257            257
3771  0272    C272,   272
3772  0273            273
3773  0274            274
3774  0275    C275,   275
3775  0276            276
3776  0277            277
3777  0300    C300,   300
4000  0333            333
4001  0334            334
4002  0335    C335,   335
4003  0336            336
4004  0337            337
4005  0341    SA,     341
4006  0342            342
4007  0343            343
4010  0344    SD,     344
4011  0345            345
4012  0346            346
4013  0347    SG,     347
4014  0350            350
4015  0351            351
4016  0352    SJ,     352
4017  0353            353
4020  0354            354
4021  0355    SM,     355
4022  0356            356
4023  0357            357
4024  0360    SP,     360
4025  0361            361
4026  0362            362
4027  0363    SS,     363
4030  0364            364
4031  0365            365
4032  0366    SV,     366
4033  0367            367
4034  0370            370
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```
4035  0371    SY,     371
4036  0372            372
4037  0340            340
4040  0373    C373,   373
4041  0374            374
4042  0375            375
4043  0376            376
4044  0377    C377,   377
4045  0000            000
4046  0377            377

4047  4543    CARLF,  TEXT    '%#@?'
4050  0077
4051  0000
4052  4543    BKSPT,  TEXT    '%##BACKSPACE TEST%##@?!
4053  4302
4054  0103
4055  1323
4056  2001
4057  0305
4060  4024
4061  0523
4062  2445
4063  4343
4064  0077
4065  0000
4066  4543    TBTST,  TEXT    '%##TAB TEST%##@?!
4067  4324
4070  0102
4071  4024
4072  0523
4073  2445
4074  4343
4075  0077
4076  0000
4077  4040    TBMRK,  TEXT    '       /@?'
4100  4040
4101  4040
4102  4040
4103  5700
4104  7700
4105  4040    TBMRK1, TEXT    '       /@?'
4106  4040
4107  4040
4110  4057
4111  0077
4112  0000
4113  5511    RM33B,  TEXT    '-1-@?'
4114  5500
4115  7700
4116  5555    RM37A,  TEXT    '-@--I-I@?!
4117  5555
4120  1155
4121  1100
4122  7700
```

```
4123  3440    SPTSTC, TEXT    '\ @?'
4124  0077
4125  0000
4126  4543    CRTST,  TEXT    '%##CR TEST%##@?'
4127  4303
4130  2240
4131  2405
4132  2324
4133  4543
4134  4300
4135  7700
4136  4543    RMTST,  TEXT    '%##RIGHT MARGIN TEST%##@?'
4137  4322
4140  1107
4141  1024
4142  4015
4143  0122
4144  0711
4145  1640
4146  2405
4147  2324
4150  4543
4151  4300
4152  7700
4153  4543    SPTST,  TEXT    '%##SPACE TEST%##@?'
4154  4323
4155  2001
4156  0305
4157  4024
4160  0523
4161  2445
4162  4343
4163  0077
4164  0000
4165  4543    LFTST,  TEXT    '%##LF TEST%##@?'
4166  4314
4167  0640
4170  2405
4171  2324
4172  4543
4173  4300
4174  7700
4175  4543    CHRTST, TEXT    '%##CHARACTER TEST%##@?'
4176  4303
4177  1001
4200  2201
4201  0324
4202  0522
4203  4024
4204  0523
4205  2423
4206  4543
4207  4300
4210  7700
4211  4543    WCPTST, TEXT    '%##WORST CASE PATTERN TEST%##@?'
```



```
4212  4327
4213  1722
4214  2324
4215  4003
4216  0123
4217  0540
4220  2001
4221  2424
4222  0522
4223  1640
4224  2405
4225  2324
4226  4543
4227  4300
4230  7700
4231  4543    KMSG1,  TEXT    '%##KYBD TEST%#@?'
4232  4313
4233  3102
4234  0440
4235  2405
4236  2324
4237  4543
4240  0077
4241  0000
4242  4543    KMSG2,  TEXT    '%#PRESS A KEY%#@?'
4243  2022
4244  0523
4245  2340
4246  0140
4247  1305
4250  3145
4251  4300
4252  7700
4253  4543    KMSG3,  TEXT    '%#ECHO TEST'
4254  0503
4255  1017
4256  4024
4257  0523
4260  2400
4261  4543    KMSG3A, TEXT    '%#CHARACTER KEYED WILL BE TYPED.'
4262  0310
4263  0122
4264  0103
4265  2405
4266  2240
4267  1305
4270  3105
4271  0440
4272  2711
4273  1414
4274  4002
4275  0540
4276  2431
4277  2005
4300  0456
```

```
4301  0000
4302  4543            TEXT    '%#RUBOUT ENDS RUUTINE;%##@?'
4303  2225
4304  0217
4305  2524
4306  4005
4307  1604
4310  2340
4311  2217
4312  2524
4313  1116
4314  0536
4315  4543
4316  4300
4317  7700
4320  4543    KMSG4,  TEXT    '%##OCTAL EQUIVALENT TEST@?'
4321  4317
4322  0324
4323  0114
4324  4005
4325  2125
4326  1126
4327  0114
4330  0516
4331  2440
4332  2405
4333  2324
4334  0077
4335  0000
4336  4543    KMSG5,  TEXT    '%#'
4337  0000
4340  4040    OCTEQV, TEXT    '    %#@?'
4341  4040
4342  4543
4343  0077
4344  0000
4345  4543    P11MG1, TEXT    '%#PRINTER EXERCISER%#@?'
4346  2022
4347  1116
4350  2405
4351  2240
4352  0530
4353  0522
4354  0311
4355  2305
4356  2245
4357  4300
4360  7700
4361  4543    P11MG2, TEXT    '%#TYPE IN DATA !@?!
4362  2431
4363  2005
4364  4011
4365  1640
4366  0401
4367  2401
```



```
4370  4072
4371  0077
4372  0000
4373  2540    BKSU,   TEXT    'U @?'
4374  0077
4375  0000
4376  0000    END,    0              /BEG OF 1000 WORD BUFFER

                $

0117  7007
0120  3650
0121  0770
0122  3635
0123  0400
0124  7767
0125  7730
0126  0004
0127  7727
0130  0005
0131  4116
0132  7761
0133  4113
0134  7762
0135  0257
0136  0334
0137  7653
0140  0011
0141  0240
0142  0100
0143  7401
0144  0377
0145  0077
0146  0036
0147  7771
0150  0007
0151  0351
0152  0343
0153  0357
0154  0542
0155  0765
0156  1165
0157  0761
0160  0755
0161  0751
0162  1171
0163  0745
0164  0740
0165  1546
0166  0734
0167  0730
0170  0724
0171  0717
0172  0626
0173  0600
0174  0553
```

```
        0175  0330
        0176  0317
        0177  1513
```



```
0000  11110110  00000010  11111111  11111111  11111111  11111111  11111111  11111111
0100  11111111  00000001  11111111  11111111  11111111  11111111  11111111  11111111

0200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0300  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00000011

0400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0500  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00000000

0600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
0700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11001111

1000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1100  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111000

1200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11000111

1400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1500  11111111  11111111  11111111  11111111  11111111  11111110  00000001  11111111

1600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
1700  11111111  11111111  11111111  11111111  11111111  11100011  11111111  11111111

2000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2100  11111111  11111111  11111111  11111111  11111111  11111111  11111110  00000111

2200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  00001111

2400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2500  11111111  11111111  11111111  11111111  11111111  11111111  11111000  00000001

2600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
2700  11111111  11111111  11111111  11111111  11111111  11111111  11100011  11111111

3000  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3100  11111111  11111111  11111111  11111111  11111110  00000000  11111111  11111111

3200  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3300  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

3400  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3500  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

3600  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
3700  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
```

```
4ØØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
41ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111

42ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  11111111
43ØØ  11111111  11111111  11111111  11111111  11111111  11111111  11111111  1111111Ø

44ØØ
45ØØ

46ØØ
47ØØ


5ØØØ
51ØØ

52ØØ
53ØØ

54ØØ
55ØØ

56ØØ
57ØØ


6ØØØ
61ØØ

62ØØ
63ØØ

64ØØ
65ØØ

66ØØ
67ØØ


7ØØØ
71ØØ

72ØØ
73ØØ

74ØØ
75ØØ

76ØØ
77ØØ
```



```
A        37Ø6     CRLF     4574     INTCF    1261     PØTØB    2125
A33WP3   3664     CRTST    4126     INTSF    1257     PØT1B    2157
A35WP3   3672     CRTSTA   2256     INTSVC   1254     PØT2C    2224
A37WP3   37ØØ     CRTSTB   2261     IOF      6ØØ2     PØTSØ    21Ø5
AC       ØØ73     CTRA     ØØ56     ION      6ØØ1     PØTSØA   2115
ASCCN    165Ø     CTRB     ØØ57     J        3717     PØTS1    2135
ASCT     17Ø7     CTSK     Ø541     KBFLAG   ØØ25     PØTS1A   2145
BDRET    Ø2Ø3     CURTST   ØØ5Ø     KCC      6Ø32     PØTS2    22ØØ
BKSCTR   3Ø62     D        3711     KCR      6Ø3Ø     PØTS2A   22Ø6
BKSPC    3Ø63     DBLK     5376     KFLAG    1365     PØTS2B   2211
BKSPT    4Ø52     DELAY    4575     KIE      6Ø35     P11MG1   4345
BKSU     4373     DELAYM   ØØ23     KMSG1    4231     P11MG2   4361
BLK2     4523     DELAYS   ØØ76     KMSG2    4242     P1T44A   2666
BLKBB    4521     DLCNT    Ø474     KMSG3    4253     P1T45A   27Ø2
BLKCC    4633     DLCNT1   ØØ26     KMSG3A   4261     P1T46A   2716
BLKCNT   ØØ75     DLMSR    1474     KMSG4    432Ø     P1TSØ    2242
BLCCK1   44ØØ     DLYMS    Ø33Ø     KMSG5    4336     P1TS1    2275
BLCCK2   4512     DLYMSK   Ø1Ø5     KRB      6Ø36     P1TS1Ø   2445
BLCCKA   4376     DVCOM    3622     KRS      6Ø34     P1TS11   2451
BLCCKB   451Ø     DVCSEL   36ØØ     KSF      6Ø31     P1TS12   2455
BLCCKC   4622     END      4376     KSTART   ØØ22     P1TS13   2461
BSW      4577     ERRCNT   3476     L77ØØ    153Ø     P1TS14   2465
C241     3752     ERRCR    ØØ77     LAS      76Ø4     P1TS15   2471
C244     3755     ERRCTR   3521     LF       Ø1Ø4     P1TS16   2475
C247     376Ø     ERROR    144Ø     LFTST    4165     P1TS17   25Ø1
C252     3763     FADDR    Ø623     LFTSTA   2412     P1TS2    2325
C255     3766     FBA33    11Ø2     LINK     ØØ74     P1TS2Ø   25Ø5
C272     3771     FBALL    1Ø66     M        3722     P1TS21   2511
C275     3774     FBF      ØØ34     M147     7631     P1TS22   2515
C32Ø     3777     FBF3     1Ø31     MCTR     Ø625     P1TS23   2521
C335     4ØØ2     FBF33    1Ø55     MIL1     ØØ55     P1TS24   2525
C373     4Ø4Ø     FBFI     2Ø51     MILCTR   ØØ54     P1TS25   2531
C377     4Ø44     FETCH    1646     MOVE     4573     P1TS26   2535
CARLF    4Ø47     FLAG     Ø716     MOVEA    Ø613     P1TS27   2541
CHAIN    ØØ24     FORWD    Ø273     MOVVE    Ø6ØØ     P1TS3    24ØØ
CHAINN   Ø254     FOUR     3744     MSCTR    ØØ53     P1TS3Ø   2545
CHCK     Ø5Ø4     FW336    1117     MTABP    2Ø67     P1TS31   2551
CHECK    ØØ64     FW356    1135     NTST     1531     P1TS32   2555
CHRCNT   Ø456     FW376    1153     NTSTA    154Ø     P1TS33   2561
CHRTST   4175     G        3714     NXTST    ØØ52     P1TS34   26ØØ
CK33     Ø343     GETPT    ØØ63     OCTEQV   434Ø     P1TS35   26Ø4
CK35     Ø351     GETRDY   Ø23Ø     ONE      3741     P1TS36   261Ø
CK37     Ø357     GKBCR    3553     OPEN     ØØØØ     P1TS37   2614
CKSR33   4552     GTBIN    Ø444     OUT      1271     P1TS4    2423
CKSR35   4551     HLT      74Ø2     OUTØ     2Ø21     P1TS4Ø   262Ø
CKSR37   4553     HLTTST   3513     OUT1     2Ø26     P1TS41   2624
CLA      72ØØ     IBIN     Ø436     OUT2     2Ø3Ø     P1TS42   263Ø
CNTST    16ØØ     INØ      1433     OUTTAB   365Ø     P1TS43   2647
CNV      1672     INCRTN   Ø252     P        3725     P1TS44   2654
CR       Ø1Ø3     INKSF    1264     PØEØ     213Ø     P1TS45   2672
CRALF    Ø553     INPATT   ØØ62     PØE1     2162     P1TS46   27Ø6
CRCTR    Ø552     INTAB    3635     PØE2     2227     P1TS47   2722
```

P1TS5	2431	PRG7	3564	2B2	2220	TBTA	2734
P1TS5Ø	3031	PRGADR	0226	2BSP	3473	TBTB	2746
P1TS6	2435	PRGEND	0271	2CNI	0473	TBTST	4066
P1TS7	2441	PRGNUM	0035	2D	4010	TCP	6042
P3E0	3215	PRGTAB	0036	2ELLOC	4576	TCTR	1647
P3T0	3200	PRINT	0671	2ETHND	1741	TEMP	0046
P3T1	3221	PSTUP	1277	2EVEN	3747	TEMP0	0107
P3T1A	3226	PSYNC	1212	2G	4013	TEMP1	0047
P3T2	3240	PT0	0442	2GET	1720	TEMP2	1527
P3T2A	3247	PT1	0443	2HALT	0310	TEMQ	0714
P4CCTR	1211	PUNCH	2017	2IMBSW	1513	TEMR	0715
P4T0	3302	RADDR	1416	2INRI	1710	TLC37	0033
P4T1	3306	RBCTR	1417	2J	4016	TLC37I	2041
P4T10	3342	RBUSY	0072	2M	4021	TLCALI	2033
P4T11	3346	RCTRA	1511	2P	4024	TLCALL	0032
P4T12	3352	RCTRB	1512	2PAC	3007	TLS	6046
P4T13	3356	RDBLK	1400	2PCNT	2761	TPC	6044
P4T14	3362	RDBLKR	1407	2PCTR	2762	TSC1	0634
P4T15	3366	RDRSRV	1420	2PF	6040	TSC2	0643
P4T16	3372	RDSRV	1430	2PI	6045	TSF	6041
P4T17	3400	RGNA	0400	2PIND	1717	TTYIOT	0021
P4T2	3312	RGNB	0417	2PT0	1715	TTYTYP	0020
P4T20	3404	RM33A	1553	2PT1	1716	TYPAT	0654
P4T21	3410	RM33B	4113	2PTST	4153	TYPE	4572
P4T22	3414	RM37A	4116	2PTSTA	2335	TYPEA	1637
P4T23	3420	RMR	2323	2PTSTB	2346	TYPLN	1627
P4T24	3424	RMTST	4136	2PTSTC	4123	TYPLN3	1615
P4T25	3430	RMTSTA	2316	2RSET	0227	TYPSP	0660
P4T26	3434	RP1A	0415	2RTBA	3455	TYPSTG	0626
P4T27	3440	RP1B	0434	2RTBB	3462	UKCC	4570
P4T3	3316	RP2A	0416	2S	4027	UKCR	4560
P4T30	3444	RP2B	0435	2TSTB	1020	UKIE	4557
P4T4	3322	RRDY	1343	2TAL	0542	UKRB	4566
P4T5	3326	RRPP	0304	2TALL	4554	UKRS	4567
P4T6	3332	RSCTR	1232	2TANI	0200	UKSF	4571
P4T7	3336	RSSERV	1233	2TBF	1000	UMOVE	0071
PADDR	1342	RSTUP	1351	2TCTR	0317	UOUT	0066
PBLK	1316	RSYNC	1216	2TLIO	0060	UPUNCH	0070
PBLKR	1324	RTNNO	0051	2UKRB	4565	USPF	4556
PCTR	1341	RUDONE	1456	2V	4032	USRI	4555
PUCR	1310	S	3730	2XKRB	1546	UTCF	4563
PFLAG	0045	S100	0027	2Y	4035	UTEMP	0100
PLTLR	1200	S100I	2012	2YNC	0061	UTEMP1	0101
PRG0	2100	S200	0031	2YNK	0521	UTEMP2	0102
PRG1	2234	S200I	2005	2YNKA	0525	UTLS	4561
PRG2	3074	S4000	0030	IAHCTR	3000	UTPC	4562
PRG2A	3117	S4000I	2000	IAHP	3001	UTPLN3	0067
PRG3	3140	SA	4005	IAHPA	3020	UTSF	4564
PRG4	3265	SASC	1706	IADDR	0624	V	3733
PRG5	3491	SB	1435	IBUNI	2740	VCTR	1267
PRG6	3522	SB0	2123	IBMHK	4077	WASC	1705
PRG6A	3525	SB1	2155	IBMHK1	4105	WCWK	0520

WCRTST	4211
WQSWS	2060
WTS6A	0106
XKCC	0724
XKCR	0755
XKIE	0761
XKRB	0734
XKRS	0730
XKSF	0717
XSPF	1165
XSRI	0765
XTCF	0745
XTLS	0751
XTPC	1171
XTSF	0740
Y	3736

ERRORS DETECTED: 0

LINKS GENERATED: 82

RUN-TIME: 12 SECONDS

3K CORE USED