

IDENTIFICATION

Product Code: DEC-09-PHAØ-D  
Product Name: HRI Mode Puncher  
Date Created: March 13, 1968  
Maintainer: Software Services Group



2. ABSTRACT

The HRI Mode Puncher will Punch out a tape in Hardware-Read-In Mode format for use with the READ-IN switch on the PDP-9 console. Versions are available which can reside in either the low or high end of memory.

3. REQUIREMENTS

3.1 Storage

The low version occupies registers 100-165.

The high version occupies registers 17400-17465.

3.2 Subprograms and/or Subroutines.

None

3.3 Equipment

Standard PDP-9

4. USAGE

4.1 Loading

4.1.1 Place the proper Hardware Read-In-Mode tape in the reader.

Set the ADDRESS switches to 100 (low version) or (1) 7400 (high version) and press the READ-IN switch.

4.2 Calling Sequence (Not Applicable)

4.3 Switch Settings

ACO= 1 will terminate a block with channel 7 punched.  
(See 6.1.1)

4.4 Start-Up and/or Entry

4.4.1 The starting address of the program is 100 (low version) or (1)7400 (High version) which is a HLT.

4.4.2 Put the first address of the block to be punched into the AC switches.

4.4.3 Press CONTINUE

4.4.4. When the computer halts, put the last address of the block to be punched into the AC switches.

4.4.5 Setting ACSO = 1 causes the program to punch a seventh hole on the last location punched. This location is executed when the tape is read via the READ-IN switch. Press CONTINUE.

4.5 Errors in Usage

None

4.6 Recovery from Such Errors (Not Applicable)

5. RESTRICTIONS (None)

6. DESCRIPTION

6.1 Discussion

6.1.1 General

This program, when given the first and final addresses of an area in core memory, punches the data contained in that area onto paper tape in Hardware Read-In format.

Hardware Read-In format devotes three 8-bit lines on tape to each 18-bit register. Channel 8 of each line is always punched. Channel 7 is punched on the third line only when the 18-bit word represented by the three line triplet is to be executed as an instruction in core memory immediately after it is read in. Such a word is usually a HLT or JMP instruction terminating the punched area. Channels 6-11 contain the magnitude bits of the particular register being punched.

The HRI Puncher is so constructed that if ACSO=1, the last register to be punched will have channel 7 of the last line punched. At readin time the location is executed by the computer.

Two versions of the program are available; one residing in lower memory; and one in upper memory.

6.1.2 PUNHRI

Program entry is made at this point, causing an immediate halt. Initial entry may be made to PUNHRI + 1 if so desired. The lower address of the area to be punched is entered into the ACS at this point. Continuance from this point saves the low address in THSN. The high address is picked up after a subsequent halt and saved in FINAL.

6.1.3 PUN1

The program checks THSN against FINAL to determine if the current register is also the last to be punched. If so, transfer is to PUN3.

## 6.1.4 PUN2

The contents of the current register to be punched are obtained from memory. This word is rotated to right justify the six high-order bits, all other bits being cleared. The quantity 200 (channel 8) is added and the result punched on tape as the first line of the triplet. The six middle-order bits are similarly treated and punched as the second line. The six low-order bits are right justified and added to the quantity 300 if the current word is the last word. If ACSO=0 or if the current word is to be followed by others, the right justified six low-order bits are added to 200. In either case, the contents of the AC are punched as the final line in the triplet. The pointer to the current word is updated by indexing and its prior contents checked for equality with the contents of FINAL. If equal, the program terminates with a jump to the HLT at PUNHRI; if unequal, the program branches to PUN1 to process the next register.

## 6.1.5 PUN3

Program control is to PUN3 when the logic at PUN1 finds that the word about to be punched is the last word in the punch area. ACSO is checked, and, if found equal to 1, the program sets ENDRUN to produce channel 7 as well as 8 when the third line is output to tape.

## 7. METHODS

(See Description, Section 6)

## 8. FORMAT

(See Description, Section 6)

## 9. EXECUTION TIME (Not Applicable)

## 10. PROGRAM

## 10.1 Core Map (None)

## 10.2 Dimension List (None)

## 10.3 Parameter List (Low Version)

## HRI PUNCHER - LOW VERSION

C1ØØ	160
C17777	162
C2ØØ	161
C77	157
ENDRUN	164
FINAL	165
OTY	152
PUNHRI	1ØØ
PUN1	111
PUN2	114
PUN3	144
THSN	163

PUNHRI	1ØØ
PUN1	111
PUN2	114
PUN3	144
OTY	152
C77	157
C1ØØ	16Ø
C2ØØ	161
C17777	162
THSN	163
ENDRUN	164
FINAL	165

HRI PUNCHER - LOW VERSION

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100/
PUNHRI.  HLT:CLA
          LAS
          DAC THSN  /SAVE FIRST ADDRESS OF BLOCK
          HLT
          LAS
          AND C17777
          DAC FINAL /SAVE FINAL ADDRESS OF BLOCK
          LAC C200
          DAC FNDRUN
PUN1.    LAC THSN
          SAA FINAL
          JMP PUN3
PUN2.    LAC I THSN  /SET UP TO PUNCH LAST REGISTER
          RAL
          RTL      RTL  /GET REGISTER TO BE PUNCHED
          AND C77
          XOR C200    /ADD CHANNEL 8
          JMS OTY    /PUNCH FIRST OF THREE LINES
          LAC I THSN
          RTR      RTR  RTR
          AND C77
          XOR C200    /ADD CHANNEL 8
          JMS OTY    /PUNCH SECOND OF THREE LINES
          LAC I THSN
          AND C77
          XOR FNDRUN  /ADD CHANNEL 8 OR CHANNELS 7 AND 8
          JMS OTY    /PUNCH LAST OF THREE LINES
          LAC THSN
          ISZ THSN   /POINT TO NEXT ADDRESS IN BLOCK
          SAA FINAL
          JMP PUNHRI /END OF BLOCK
          JMP PUN1   /GO PUNCH ANOTHER REGISTER

PUN3.    LAS
          SPA:CLA    /SKIPS IF LAST REGISTER EXECUTION
                    /NOT REQUESTED, IE, AC0=0.

          LAC C100
          ADD C200
          DAC FNDRUN
          JMP PUN2

/OUTPUT PUNCHING ROUTINE
TY,      0
          PLS
          PSF
          JMP -1
          JMP I OTY

C77,     77
C100.    100
C200.    200
C17777.  17777
THSN.    0
FNDRUN.  0

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FINAL, JMP PUNHRI

START PUNHRI