UNIVAC
DATA PROCESSING DIVISION
1050
CARD SYSTEM

INPUT/OUTPUT ROUTINES

CARD PUNCH ROUTINES

REFERENCE MANUAL

UP-3915-2.02

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1. INTRODUCTION

1.1. SCOPE

This document provides the programmer with the information necessary to make use of the 4K card system and expanded card system card punch routines. It discusses the area requirements, specialization, and the entrances to the routines. Section 2.4 is devoted to upward and downward compatibility and describes the procedure for conversion. The error condition recovery procedures are described in the last section.

1.2. GENERAL DESCRIPTION

The card punch routines are distributed in source code with a comment card containing the name in columns 19 to 24. These routines control the operation of the card punch when punching cards. Each routine has three entrances, one each for the initialize, execute, and close functions.

Each routine addresses an output area, the name of which is preassigned for the 4K routines, and programmer assigned for the expanded system routines. The reserve areas, aligned consecutively in storage, are addressed through an index register (see Table 1), which contains the relative address of the current card image area. This address is relative to the beginning of the output area.

The following table summarizes the general characteristics of each routine.

ROUTINE NAME	DESCRIPTION	MIN. SIZE SYS.	ENTRANCES			IR	ROUTINE SIZE	OUTPUT AREA		TOTAL SIZE
			INITIALIZE	EXECUTE	CLOSE			NAME	SIZE	
PH9L	90 col. with lockout	4K	XIH	XXH	XCH	2	175	XAH	237	412
PHTL	80 col. translated with lockout	4K	XIH	XXH	XCH	2	155	XAH	208	363
PHUL	80 col. untranslated with lockout	4K	XIH	XXH	XCH	2	155	XAH	352	507
PH9	90 col. with overlapped processing	4K	XIH	XXH	XCH	2	215	XAH	327	542
PHT	80 col. translated with overlapped processing	4K	XIH	XXH	XCH	2	200	XAH	288	488
PHU	80 col. untranslated with overlapped processing	4K	XIH	XXH	XCH	2	195	XAH	480	675
PUN	80 col.	8K	XINPH	XCTPH	XCLPH	*	401	*	336†	737†
PUN9	90 col. (with row reader)	8K	XINPH	XCTPH	XCLPH	*	401	*	346†	747†
PNS9	90 col. (with column reader)	8K	XINPH	XCTPH	XCLPH	*	430	*	365†	795†

**Programmer assigned in the specialization procedure (Section 2.1)*

†Minimum

Table 1. Punch Routine Characteristics

2. PROGRAMMING PROCEDURES

2.1. PROGRAM SPECIALIZATION

Specialization provides the source code card punch routine with certain labels and constants, and designates optional modes of operation.

No specialization is required for the 4 K card punch routines. The label of the output area (XAH), number of reserve areas, and the index register containing the relative area address are already assigned (see Table 1).

Specialization for the expanded system card punch routines is accomplished through the use of the EQU directive, as follows:

CE INS 6	LABEL 7 — 11	OPERATION 13 — 18	OPERANDS 19 — 30 — 40
	label	EQU	Definition

The label field contains the predefined label, and the operands field contains the required definition, as listed below.

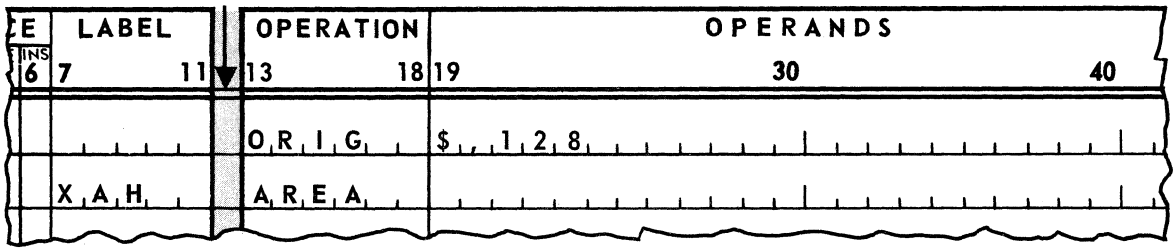
LABEL	DEFINITION
X1H$	Label of AREA associated with the routine.
X2H$	Number of reserve areas, 3 to 21.
X3H$	Storage address of index register to contain the relative area address.
X4H$	8 if translated punch desired, 0 for untranslated punch.

2.2. OUTPUT AREA

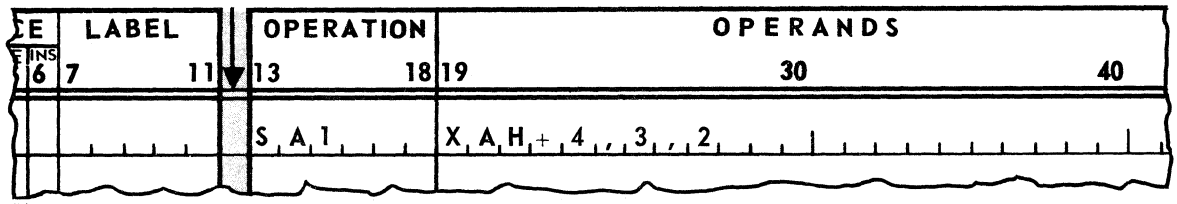
When defining the output area for all 80 column card punch routines, and the 90 column card punch routine PUN9, the first character position must be a multiple of 64.

When defining the output area for the 90 column card punch routine PH9L, PH9, and PNS9, the first character position must be a multiple of 128.

To ensure the proper location of the input area, use the origin statement as in the following example:



As described in the general description (Section 1.1), the worker program must address the output area through an index register. For example, to store the three least significant characters of AR1 into columns 3–5 of a card image to be punched by the 4 K routine PHT,



Additional area is available for use by the worker program within the 4 K punch routine output area. These areas are defined in the following table:

ROUTINE	TOTAL AREA AVAILABLE	NUMBER OF CHARACTERS AVAILABLE IN ONE SEQUENCE	ADDRESS OF THE FIRST LOCATION
PH9L	38	19 19	XAH + 109 XAH + 173
PHTL	48	48	XAH + 80
PHUL	32	32	XAH + 160
PH9	57	19 19 19	XAH + 45 XAH + 109 XAH + 173
PHT	48	48	XAH + 80

Table 2. Areas Available Within Defined Areas

Use of these areas is not recommended because it complicates upward compatibility. The ORIG cards included in the assembly deck of a program making use of these areas would then have to be removed allowing the locations so defined to follow in the sequence of locations assigned to the worker program.

2.3. ENTRANCES

2.3.1. Initialize

The initialize section must be entered before attempting to edit data to be punched, or punching a card. This is accomplished by performing a Jump Return (JR) to XIH with a 4 K punch routine, or XINPH with an expanded system routine.

Initialization clears all the punch reserve areas to spaces (those areas between the punch reserve areas are not altered), and sets all indicators, counters, and variable connectors to their initial conditions.

For the 4 K punch routines initialization places the base address of the first punch reserve area (relative to XIH) in index register 2. The channel interrupt entry is not affected by initialization, having been established at the time of loading.

For the expanded system routines initialization places the base address of the first punch reserve area in the index register specified by the programmer in specialization. Also, the channel interrupt entry is set to its appropriate value.

2.3.2. Execute

The execute section is entered when the worker program has finished editing data and wants it punched. This is accomplished by performing a Jump Return to XXH with a 4 K punch routine, or to XCTPH with an expanded system routine.

For a 4 K punch routine, a punch instruction is issued, and the base address of the next area available to the worker program is placed in index register 2. The contents of arithmetic registers and tetrads 16 to 19 are destroyed.

For an expanded system punch routine, a punch order is issued if the previous one has been completed, and the base address of the next reserve area available to the worker program is placed in the index register specified by the programmer in specialization.

2.3.3. Close

The close section is entered to close the routine. Its purpose is to retain control until the last card is punched. This is accomplished by performing a Jump Return to XCH with a 4K punch routine, or XCLPH with an expanded system routine.

The close section issues a feed card instruction to send the last card punched through to the output stacker.

2.4. COMPATIBILITY

2.4.1. Upward Compatibility

The 4 K input/output routines are designed to be used in a manner analogous to the corresponding expanded system routines. They are constructed in a manner that allows programs using them to be reassembled with an expanded card or tape system routine with minimum alteration.

To convert a program using a 4 K card punch routine to use an expanded system routine,

(1) Remove from the card deck the source 4 K card punch routine.

(2) Define the output area for the expanded system routine, specifying the name as XAH.

(3) If the tape assembler is to be used, insert the appropriate call to the PAL library specifying that the index register to be used is index register 2, and the output area name is XAH.

If the card assembler is to be used, insert the appropriate specializing EQU cards, specifying index register 2, and the output area as XAH, followed by the expanded system card punch routine source deck.

(4) Insert the below EQU cards, equating the entrance labels of the 4K routine to the corresponding labels of the replacement routine, in front of the worker program but following the I/O deck.

E INS 6	LABEL 7 11	OPERATION 13 18	OPERANDS 19 30 40
	XIH	EQU	XINPH
	XXH	EQU	XCTPH
	XCH	EQU	XCLPH

The assembly procedure is described in Section 3 of the Card System Assembler manual UP-3915–1.01.

2.4.2. Downward Compatibility

A program using an expanded system card punch routine can be converted to use a 4 K card punch routine if the expanded system routine uses index register 2. To convert proceed as follows:

(1) Remove the expanded system card punch routine source deck and specializing EQU cards, or, if a tape system reader routine is used, the PAL library punch routine call.

(2) Insert the following set of EQU cards followed by the required 4 K card punch routine:

E INS 6	LABEL 7 11	OPERATION 13 18	OPERANDS 19 30 40
	XAH	EQU	card output area label
	XINPH	EQU	XIH
	XCTPH	EQU	XXH
	XCLPH	EQU	XCH

The assembly procedure is described in Section 3 of the Card System Assembly manual UP-3915–1.01.

3. ERROR STOPS AND PROCEDURES

If a card punch error condition occurs, the computer will be brought to an orderly stop with the following stop display:

30 120000 60

The recovery procedures are described in the table below.

REASON FOR STOP	PUNCH UNIT PANEL LIGHT	RESULTING CONDITION	RECOVERY PROCEDURE	NO. OF CARDS THAT SHOULD BE IN ERROR STACKER AT STOP
Read check	Read check	Recoverable	Depress the READY and PROGRAM START buttons.	1
Stacker full	Stacker full	Recoverable	Depress READY and PROGRAM START after emptying stacker.	0
Hopper empty	Hopper empty	Recoverable	Load hopper with cards depress the READY and PROGRAM START buttons.	0
Offline	Offline	Recoverable	Depress the OFFLINE, READY and PROGRAM START buttons.	0 – initially 1 – if it occurs while punching
All others	SKEW A & B ENTRY A & B EXIT A & B JAM POWER LOSS	Non-recoverable*	See Note Below	1 or 0

*It is possible to recover from these errors at the risk of duplicating or losing a maximum of two images depending upon conditions. However, the recovery attempt will usually be successful for jam type errors (i.e., SKEW, ENTRY, EXIT, and JAM). The punch track must be cleared and blank cards manually fed through all stations. Then depress the READY and PROGRAM START buttons. A read check error will occur and the procedure for recovering from a read check error should then be followed.

Table 3. Error Condition Recovery Procedures

If the last card punched before accessing the close section causes a read check error, it will be repunched. The card remaining in the punch unit will not be blank, as is usually the case. This remaining card must be removed before the punch is used again. For this reason it is good practice to manually feed a few blank cards through the punch before using it.

1234 SEGJP line

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