UNIVAC
DATA PROCESSING DIVISION

1050
CARD SYSTEM

INPUT/OUTPUT ROUTINES

CARD READER ROUTINES

REFERENCE MANUAL

UP-3915-2.01

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1. INTRODUCTION

1.1. SCOPE

This document provides the programmer with the information necessary to make use of both the 4K card system and expanded card system card reader routines. It describes the area requirements, specialization, and the entrances to the routines. Section 2.4 is devoted to describing upward and downward compatibility between the 4K and expanded system routines. Reader error condition recovery is described in Section 3.

1.2. GENERAL DESCRIPTION

The card reader 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 reader. Every routine has at least three entrances; one each for the initialize, execute, and close functions.

Each routine addresses an input area, the name of which is preassigned for 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 input area.

The following table summarizes the general characteristics of each routine.

ROUTINE NAME	DESCRIPTION	MIN. SIZE SYS.	INTRANCES			IR	ROUTINE SIZE	INPUT AREA		TOTAL SIZE
			INITIALIZE	EXECUTE	CLOSE			NAME	SIZE	
RD9L	90 col. with lockout	4K	XIR	XXR	XCR	1	100	XAR	109	209
RDTL	80 col. translated with lockout	4K	XIR	XXR	XCR	1	85	XAR	80	165
RDUL	80 col. untranslated with lockout	4K	XIR	XXR	XCR	1	85	XAR	160	245
RD9	90 col. with overlapped processing	4K	XIR	XXR	XCR	1	148	XAR	199	347
RDT	80 col. translated with overlapped processing	4K	XIR	XXR	XCR	1	143	XAR	160	303
RDU	80 col. untranslated with overlapped processing	4K	XIR	XXR	XCR	1	143	XAR	320	463
REA	80 col. row reader	8K	XINRD	XCTRD	XCLRD	*	437	*	336†	773†
REA9	90 col. row reader	8K	XINRD	XCTRD	XCLRD	*	437	*	346†	783†
RES	80 col. column reader	8K	XINRD	XCTRD	XCLRD	*	373	*	208†	581
RES9	90 col. column reader	8K	XINRD	XCTRD	XCLRD	*	388	*	237†	625

* Programmer assigned in the specialization procedure (Section 2.1)

† Minimum

Table 1. Reader Routine Characteristics

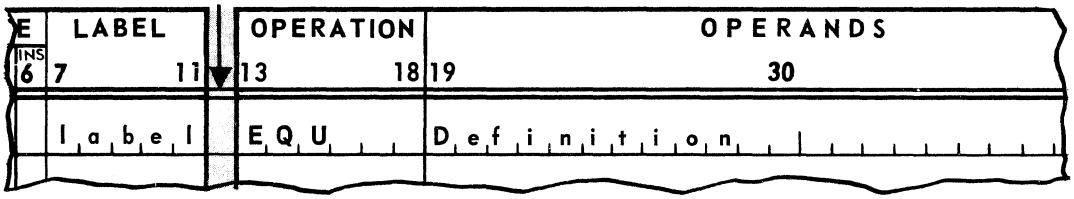
2. PROGRAMMING PROCEDURES

2.1. PROGRAM SPECIALIZATION

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

No specialization is required for the 4K card reader routines. The label of the input area (XAR), 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 reader routines is accomplished through the use of the EQU directive as follows:



The label field contains the predefined label as listed in the table below and the operands field contains the definition, as listed below:

LABEL	DEFINITION
X1R$	Label of input AREA associated with the routine, as defined in worker program.
X2R$	Number of reserve areas: 3 to 21 for the row reader, 2 to 21 for the column reader.
X3R$	Storage address of index register to contain the relative area address.
X4R$†	64 if translated read desired, 0 for untranslated read.
X5R$†	256 for 72 column scan, 0 for 80 column scan.

† These labels are defined for 80 column read routines only.

2.2. INPUT AREA

When defining the input area for all 80 column card reader routines, and the 90 column card reader routine REA9, the first character position must be a multiple of 64.

When defining the input area for the 90 column card reader routines RD9L, RD9, and RES9, the first character position must be a multiple of 128.

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

E INS 6	LABEL 7–11	OPERATION 13–18	OPERANDS 19–30
		ORIG	$,128
	XAR	AREA	199

As described in the general description (Section 1), the worker program must address the input area through an index register. Thus to bring columns 3 to 5 of an image read by the 4K routine RDT to AR1,

E INS 6	LABEL 7–11	OPERATION 13–18	OPERANDS 19–30
		BA1	XAR+4,3,1

Additional area is available for use by the worker program within the RD9 4K reader routine input area. The available area consists of 19 consecutive character locations starting at XAR +45.

Use of this area is not recommended because it complicates upward compatibility. 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 any attempt to get a card image. This is accomplished by performing a Jump Return (JR) to XIR with a 4K reader routine, or XINRD with an expanded system routine.

Initialization sets the channel interrupt entries to their appropriate values, the base address tetrad (tetrad 36), the standby base address tetrad (tetrad 37) if a row reader routine, and all indicators and counters to their initial conditions. In the case of the 4K routines without lockout (RD9, RDT, and RDU), a feed card order is also issued.

2.3.2. Execute

The execute section is entered when the worker program wants a new card image. This is accomplished by performing a Jump Return to XXR with a 4K reader routine or XINRD with an expanded system routine.

When the execute section is entered, a feed card instruction is issued if there is no card in the track. The present card area is assumed to be released by the worker program and the base address of the next reserve area available to the worker program is given in index register 1 for a 4K reader routine, or in the programmer assigned index register for an expanded system routine.

2.3.3. Close

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

2.4. COMPATIBILITY

2.4.1. Upward Compatibility

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

To convert a program from the use of a 4K card reader routine to the use of an expanded system routine,

(1) remove the 4K card reader routine source cards from the source deck.

(2) define the input area to be used by the expanded system reader routine.

(3) if the tape assembler is to be used, insert the appropriate call to the PAL library specifying index register 1.

if the card assembler is to be used, insert the appropriate specializing EQU cards, specifying the same index register, 1, followed by the expanded system card reader routine source deck.

(4) insert at the front of the worker program the following EQU cards, equating the entrance labels of the 4K routine to the corresponding labels of the replacement routine.

E INS 6	LABEL 7 11	OPERATION 13 18	OPERANDS 19 30
	XIR	EQU	XINRD
	XXR	EQU	XCTRD
	XCR	EQU	XCLRD

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

2.4.2. Downward Compatibility

There are limits to the downward compatibility of the card reader routines. Programs using the expanded system row reader routines can be converted to use only the 80 column row reader routines with lockout, RDTL and RDUL. These two routines may be used with the row reader if the programmer places the input area address in the reader standby base address tetrad (37) before initializing.

E INS 6	LABEL 7 11	OPERATION 13 18	OPERANDS 19 30
		FT	XAR,37

None of the other 4K read routines may be used with the row reader.

A program using an expanded system card reader routine can be converted to use a 4K card reader routine if the expanded system routine uses index register 1, and conforms to the limitations described above. To convert, proceed as follows:

(1) remove the expanded system card reader routine source deck and specializing EQU cards, or, if a tape system reader routine is used, the PAL library reader routine call.
(2) insert the following set of EQU cards followed by the required 4K card reader routine:

E INS 6	LABEL 7 11	OPERATION 13 18	OPERANDS 19 30
	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 Assembler manual UP 3915-1.01.

3. ERROR STOP AND PROCEDURES

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

30 11000x 60

where x equals 1 or 2, indicating the number of cards to be reloaded. Control is returned to the worker program when a card image becomes available.

REASON FOR STOP	RESULTING CONDITION	RECOVERY PROCEDURE
Stacker full Hopper empty Registration Marginal check	Recoverable	Clear problem at reader, reload number of cards as indicated by stop display, even if this does not agree with the number in the error stacker. Reload hopper, depress the READY and PROGRAM START buttons.
All others	Nonrecoverable	Any error that causes the reader drive motor to be stopped is nonrecoverable.

Table 2. Error Conditions and Recovery Procedures

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