RTE Driver DVR11 For HP 2892A Card Reader

Programming and Operating Manual

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PUBLICATION NOTICE

Information in this manual describes the use of the RTE Driver DVR11 for the HP 2892A Card Reader. Changes in text to document software updates subsequent to the initial release are supplied in manual update notices and/or complete revisions to the manual. The history of any changes to this edition of the manual is given below under "Publication History." The last change itemized reflects the software currently documented in the manual.

Any changed pages supplied in an update package are identified by a change number adjacent to the page number. Changed information is specifically identified by a vertical line (revision bar) on the outer margin of the page.

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SECTION I
GENERAL INFORMATION

1-1. GENERAL DESCRIPTION

1-2. This manual contains information and procedures that allow the user to write application programs using FORTRAN or Assembly language and RTE Driver DVR11. Section III provides information required when configuring DVR11 into a Real-Time Executive (RTE) Operating System.

1-3. The driver is entered through a FORTRAN or Assembly language call to control an HP 2892A Card Reader (via a HP 12924A Card Reader Interface Kit) in a Real-Time Executive Operating System environment. The driver may be used for reading Hollerith data, packed binary data, or column binary image data into an area of memory (input buffer) designated by the user. The user initiates the reading of a card by executing a calling sequence. The driver can convert binary-coded-decimal (BCD) cards, standard HP EBCDIC (extended binary-coded-decimal interchange code) cards, and EBCDIC-RDTS (remote data transmission system) cards. If the card is read successfully, the driver returns control to the user's program. The user may request card reader status information and the most recent transmission count at any time by executing a special calling sequence.

1-4. OPERATING ENVIRONMENT

1-5. The operating environment for this software must be:

a. HP 1000 Series Computer
b. RTE Operating System
c. HP 12924A Interface Kit

Refer to the HP 12924A Operating and Service Manual (HP Part No. 12924-90001) for interface kit hardware details.

1-6. COMPONENTS

1-7. The following components are included with Driver DVR11:

a. This manual
b. Driver DVR11 binary tape, HP Part No. 29030-60001.

SECTION II
APPLICATION INFORMATION

2-1. GENERAL

2-2. This section details the calls to the driver and describes any results of the hardware/software marriage where the hardware may influence software techniques.

2-3. CALLING SEQUENCES

2-4. The HP 2892A Card Reader is operated in the Real-Time Executive Operating System through FORTRAN or Assembly language programs calling DVR11. These calls are listed in Tables 2-1 and 2-2 and described in Paragraphs 2-5 through 2-9.

2-5. READ CALL

2-6. This calling sequence (Table 2-1) reads one card through the specified card reader. If the read operation is performed satisfactorily, the driver returns control to the "return point". To read a deck of cards, it is necessary to execute the calling sequence repeatedly (once for each card).

2-7. The maximum possible transmission count after any read operation is as follows:

Hollerith: 80 characters of 40 words
Packed Binary: 60 words
Column Image Binary: 80 words

2-8. The number of words or characters transferred during any read operation is as follows:

Hollerith:	Buffer length (IBUFL) or the number of characters on the card (not including trailing blanks), whichever is smaller.
Packed Binary:	Buffer length (IBUFL) or the count in rows 12-5 of column 1 of the card, whichever is smaller.
Column Image Binary:	Buffer length (IBUFL) or the number of used columns on the card (not including trailing blanks), whichever is smaller.

2-9. STATUS REQUEST

2-10. This calling sequence (Table 2-2) causes two words in the Equipment Table (EQT) to be copied into the specified pair of memory locations (ISTA1 and (ISTA2). After the information has been copied, control returns to the "return point".

Table 2-1. HP 2892A Read Calls (DVR11)

Assembly Language	
EXT EXEC . . JSB EXEC DEF *+5 DEF ICODE DEF ICNWD DEF IBUFR DEF IBUFL <return point> . .	Where: ICODE = Function Code 1 = Read Request ICNWD = Control Word Bits 0 thru 5 = Logical Unit Number. The card reader may be assigned up to three logical unit numbers: LU #N = reader, subchannel Ø LU #M = reader, subchannel 1 LU #L = reader, subchannel 2. a. To convert EBCDIC punch set, address reader as subchannel Ø. b. To convert BCD punch set, address reader as subchannel 1. c. To convert EBCDIC-RDTS punch set, address reader as subchannel 2. Bits 6 and 7 = Type of data to be read 0 or 2 = Hollerith 3 = Packed Binary 1 = Column Binary Image Bits 8 thru 15 = Not used IBUFR = Address of data storage buffer's first word for Read call. IBUFL = Size of input buffer. Size may be expressed either as a number of words or as a number of characters. The sign of IBUFL tells the driver how to interpret length specification as follows: + = words - = characters a. If IBUFL is expressed as a number of words, transmission count placed in EQT by driver at end of Read operation is also expressed as number of words. Likewise, if IBUFL is expressed as a number of characters, transmission count is expressed as a number of characters. b. An IBUFL should be expressed as a number of characters only when reading in Hollerith code. c. An IBUFL of zero in Hollerith code causes an immediate return to user's program (return point) with a transmission count of 0 in EQT.
FORTRAN	CALL EXEC (ICODE,ICNWD,IBUFR,IBUFL)

Table 2-2. HP 2892A Status Call (DVR11)

Assembly Language	
EXT EXEC . . JSB EXEC DEF *+4 or [*+5] DEF ICODE DEF ICNWD [DEF STAT2] <return point> . .	Where: ICODE = Function Code 13 - Status Request ICNWD = Logical Unit Number ISTA1 = Card Reader status flags. See Table 2-3 for format. ISTA2 = Most recent transmission count. May be omitted from calling sequence.
FORTRAN	CALL EXEC [13,LU,ISTA1,ISTA2 (optional)]

2-11. After a Status request, ISTA1 contains the card reads status flags and ISTA2 contains the most recent transmission count. The format of ISTA1 is described in Table 2-3.

2-12. DATA FORMAT

2-13. The driver accepts Hollerith data, packed binary data, or column binary image area. These modes are described in Paragraphs 2-14 through 2-22.

2-14. HOLLERITH

2-15. In the Hollerith mode, card codes are converted to ASCII octal equivalents and stored in the input buffer. Each word in the buffer accommodates two codes. The octal equivalent of a code from an odd-numbered card column is always stored in bits 8 through 15 of a buffer word while the octal equivalent of the code from the next highest even-numbered card column is stored in bits 0 through 7 of the same word. Codes are stored in the input buffer consecutively starting with the first (lowest) buffer word. For example, the codes from card columns 1 and 2 are always stored in the first buffer word, the codes from card column 3 and 4 are always stored in the second buffer word, etc. Trailing blanks, though actually read into the buffer, are not included in the transmission count returned by the driver at the end of the read operation.

2-16. The driver accepts all 64 standard Hollerith card codes. Table 2-4 shows the octal equivalents for each code. Note that there are two octal equivalents for each code. The lesser value applies if the code is stored in bits 0-7 of a word while the greater value applies if the code is stored in bits 8-15.

2-17. All non-valid card codes enter the input buffer as the ASCII code for the question mark.

Table 2-3. Status Information (ISTAT)

Bits	Function
15-14	Card Reader availability code 0 = available 1 = disabled (down) 2 = currently busy 3 = waiting for an available DMA channel
13-8	Equipment code always = 11 (octal)
7-0	Status flags. Meaning when on (1 = on, 0 = off) Bit — Status 0 — Card-reader is on-line but not ready or card reader is off-line. 1 — An illegal card code is encountered during previous read operation or card reader has hardware trouble. 2 — Card reader is off-line. 3 — Timing error or pick failure was sensed during previous read operation. 4 — Pick failure or card motion error was sensed during previous read operation. 5 — If both bits 3 and 5 are on, no data was transmitted during previous read operation. If bit 3 is off and bit 5 is on, previous read request was rejected because hopper was empty or stacker was full. 6 — Stacker is full. 7 — Previous Read operation left input hopper empty and END OF FILE switch was on during Read operation.
	Codes 0, 2, 5, and 6 indicated that previous Read request was rejected for specified reason.

2-18. With the following six exceptions, every internal ASCII code relates directly to the corresponding key on an IBM 029 keyboard. Note that although the internal ASCII ! character corresponds with the IBM 029 key, the standard and RDTS ASCII octal equivalents are different.

Internal ASCII Character	029 Key	Hollerith Code	ASCII Octal Equivalents (Standard)	ASCII Octal Equivalents (for RDTS)
[	¢	12-8-2	133 or 554	Unassigned
/	0-8-2	0-8-2	134 or 560	134 or 560
]	-	11-8-7	135 or 564	136 or 570
↑	|	12-8-7	136 or 570	41 or 204
←	¬	0-8-5	137 or 574	137 or574
!	!	11-2-8	41 or 204	135 or 564

Table 2-4. EBCDIC Hollerith-to-ASCII Octal Equivalents

Character		ASCII Octal Equivalent	
EBCDIC HOLLERITH	ASCII	Bits 15-8 (offset)	Bits 7-0 (true)
A	A	404	101
B	B	410	102
C	C	414	103
D	D	420	104
E	E	424	105
F	F	430	106
G	G	434	107
H	H	440	110
I	I	444	111
J	J	450	112
K	K	454	113
L	L	460	114
M	M	464	115
N	N	470	116
O	O	474	117
P	P	500	120
Q	Q	504	121
R	R	510	122
S	S	514	123
T	T	520	124
U	U	524	125
V	V	530	126
W	W	534	127
X	X	540	130
Y	Y	544	131
Z	Z	550	132
0	0	300	060
1	1	304	061
2	2	310	062
3	3	314	063
4	4	320	064
5	5	324	065

Character		ASCII Octal Equivalent	
EBCDIC HOLLERITH	ASCII	Bits 15-8 (offset)	Bits 7-0 (true)
6	6	330	066
7	7	334	067
8	8	340	070
9	9	344	071
(space)		200	040
!	!	204	041
" *(quote)*	"	210	042
#	#	214	043
$	$	220	044
%	%	224	045
&	&	230	046
' *(apostrophe)*	'	234	047
(	(	240	050
)	)	244	051
*	*	250	052
+	+	254	053
, *(comma)*	,	260	054
- *(hyphen or minus)*	-	264	055
. *(period)*	.	270	056
/	/	274	057
:	:	350	072
;	;	354	073
<	<	360	074
=	=	364	075
>	>	370	076
?	?	374	077
@	@	400	100
¢ *(cent)*	[	554	133
¬ *(not mark)*	]	564	135
| *(vertical bar*)*	↑	570	136
_ *(underscore**)*	←	574	137
0-8-2	\	560	134

**NUMERIC Y*

***NUMERIC W*

2-19. PACKED BINARY

2-20. In the packed binary mode, every four card columns are read into ("packed into") three buffer words. See Figure 2-1. The relocatable decks produced by assemblers and compilers are in packed binary format. A full 80-column packed binary card fills a 60-word input buffer. In rows 12-5 of the first column of each card is a three-digit octal number (row 12, high order bit), specifying how many words of data are on the card. The count includes itself, since it is read into the input buffer along with the other data.

2-21. COLUMN BINARY IMAGE

2-22. In the column binary image mode, the information in each card column is read into bits 0-11 of a separate buffer word (bits 12-15 are set to zeroes). Refer to Figure 2-2. The columns are stored in the input buffer consecutively starting with the first (lowest) buffer word. For example, card colum 1 is always read into the first buffer word, card column 2 is always read into the second buffer word, etc.

2-23. REJECTION OF A READ REQUEST

2-24. Either of the following conditions causes a Read request to be rejected:

a. The request code of other parameter is illegal.
b. The specified card reader is not ready.

When a Read request is rejected, the status information in the Equipment Table (EQT) is updated and control passes to the operating system (not to the user's program).

2-25. ERRORS

2-26. If an error condition occurs during the reading of a card, the driver alters the appropriate entry in the equipment table (EQT) to signify that the card reader is "down" and then passes control to the operating system (not to the user's program). The EQT entry must be changed to specify that the device is "up" before the user's program can be re-executed.

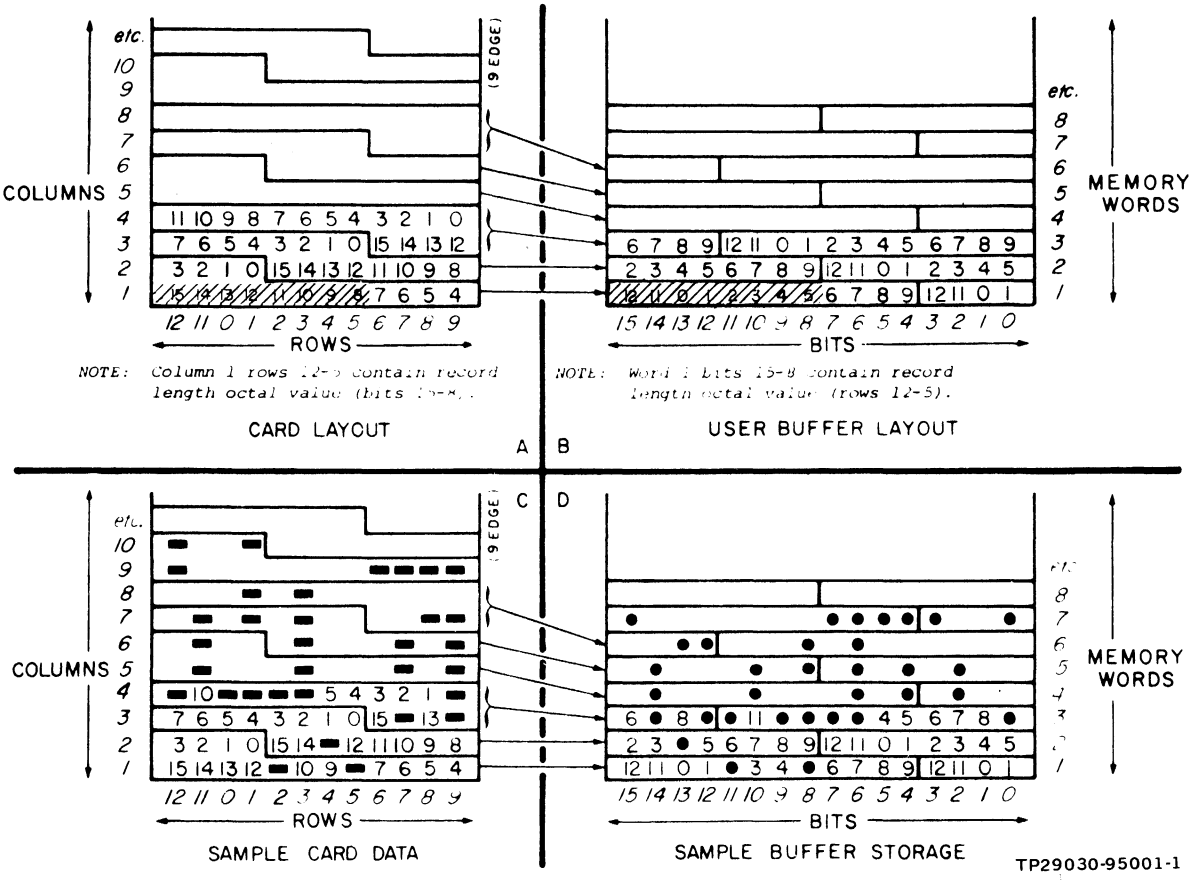
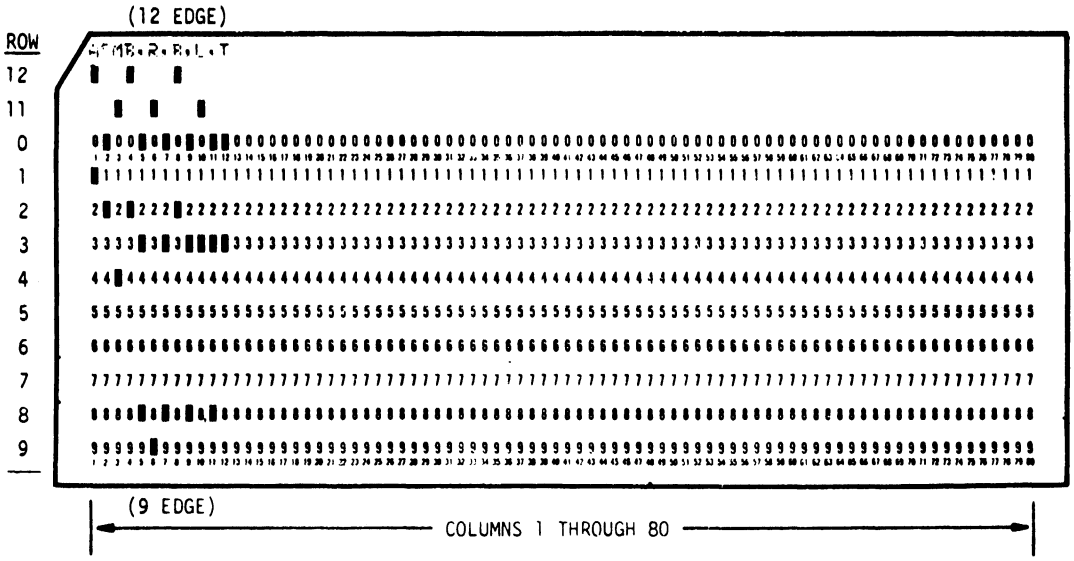
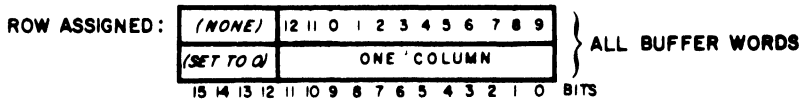


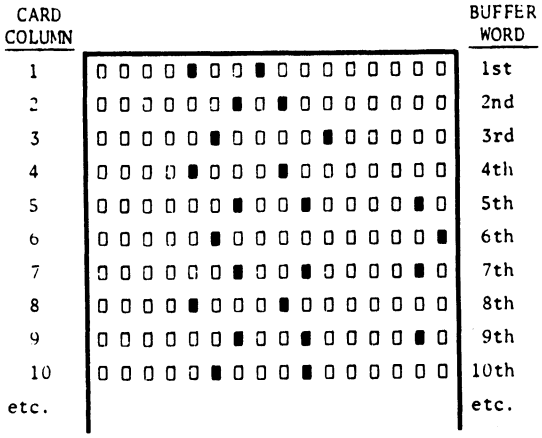
Figure 2-1. Reading Packed Binary



CARD DATA READ



BUFFER WORD ASSIGNMENTS



BUFFER WORDS AFTER DATA TRANSFER

TP29030-95001-2

Figure 2-2. Reading Column Binary Image

SECTION III
CONFIGURATION INFORMATION

3-1. GENERAL

3-2. This section provides configuration information for Driver DVR11 and is intended to augment the data provided in the Real-Time Executive Software System Programming and Operating Manual.

3-3. REAL-TIME GENERATION

3-4. The driver is loaded into the RTE System during system generation, as described in the appropriate RTE Software Manual. At this time, the following items must be supplied by the operator to configure the HP 2892A Card Reader into the system being generated.

3-5. PROGRAM INPUT PHASE

3-6. Driver DVR11 must be loaded during this phase.

3-7. TABLE GENERATION PHASE

3-8. In this phase, the following three entries must be made:

a. An Equipment Table entry for each HP 2892A Card Reader:

```
*EQUIPMENT TABLE ENTRY
      .
      .
nn,DVR11,D
      .
      .
```

where "nn" is the select code of the card reader interface card

b. A Device Reference Table entry for each HP 2892A Card Reader

```
*DEVICE REFERENCE TABLE
      .
      .
xx = QQT#?
m
      .
      .
```

where xx is a logical unit number. Response "m" is a number that corresponds to the "nn,DVR11" position in the Equipment Table

c. An Interrupt Table entry for each card reader interface card:

```
*INTERRUPT TABLE
        .
        .
nn
        .
        .
```

where "nn" is again the select code of the interface card.

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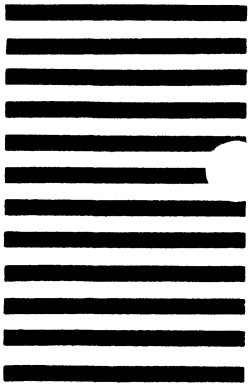

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