

RTE Line Printer Driver (DVA12)

Reference Manual

PRINTING HISTORY

The Printing History below identifies the Edition of this Manual and any Updates that are included. Periodically, Update packages are distributed which contain replacement pages to be merged into the manual, including an updated copy of this Printing History page. Also, the update may contain write-in instructions.

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RTE LINE PRINTER DRIVER

GENERAL DESCRIPTION.

This RTE line printer driver, referred to as DVA12, operates under control of Hewlett-Packard RTE II and RTE III operating systems and provides communications with the following line printers:

- HP 2607A (200 lpm)
- HP 2610A (200 lpm)
- HP 2613A (300 lpm)
- HP 2614A (600 lpm)
- HP 2617A (600 lpm)
- HP 2618A (1250 lpm)
- HP 2619A (1000 lpm)
- HP 2631A (180 CPS) - See Appendix A for specifics of 2631A operation

DVA12 is a non-privileged driver designed to operate in the interrupt mode without direct memory access (DMA) capability. This driver is capable of operating each of the listed line printers at its maximum rated speed under conditions specified for the line printer.

This driver allows the user to choose, via the I/O CONTROL EXEC call, whether or not to operate in the automatic page eject mode. Automatic page eject causes the line printer to skip the lines between the bottom of a form and the top of the following form (perforation step over). When not in automatic page eject, printing is continuous and page boundaries are ignored.

HARDWARE AND SOFTWARE REQUIREMENTS.

The minimum RTE II or RTE III operating system configuration is required plus the line printer and a 12845A (2607A, 2610A, or 2614A only) or a 12845B (all listed printers) interface. DVA12 must be incorporated into the RTE operating system using system generation procedures described in the RTE operating system reference manual. The timeout parameters must be adjusted to reflect the speed of the line printer being used (for example, 2607A = 500, 2617A = 100, 2619A = 100, this is the required time from top-of-form to next top-of-form).

CALLING PARAMETERS.

The primary source for information regarding I/O EXEC calling sequences and line printer formatting is the RTE operating system reference manual. The following information supports the operating system reference manual as it applies to DVA12.

WRITE REQUEST.

To request printing, the user codes an EXEC call for I/O WRITE as described in the operating system reference manual. When a print request is made, DVA12 assumes the data being printed is in ASCII format. Thus, the only significant fields of CONWD (other than the logical unit number and the W-field) are the V-field (bit 7) and the X-field (bit 10). Functions of the V- and X-fields are as follows:

CARRIAGE CONTROL (V-field). If bit 7 = "1" in CONWD, single spacing occurs and the entire buffer is output to the printer. If bit 7 = "0", the first character of the buffer is not printed; rather, it is interpreted as a carriage control character. Starting with the second character, the contents of the buffer are output to the printer. Control characters have the following meanings:

CHARACTER	MEANING
Ø	Double space
1	Eject page
*	Suppress space (overprint)
others	Single space

OVERPRINT (control character *). The overprint facility causes the driver to not advance the vertical line space after printing the buffer contents. The default is to advance to the next line. This means that the first buffer and succeeding buffers written on the same line must each use the asterisk as the control character.

The HP 2607A Line Printer does not have the suppress space feature. If the character "*" is used as a control character, a single space is performed.

HONESTY MODE (X-field). If bit 10 = "1" in CONWD, honesty mode is selected. When operating in the honesty mode, it is the user's responsibility to provide carriage-return, line-feed, and form-feed controls. A form-feed results in an automatic carriage-return; a line feed imbedded in data does not. The driver makes no effort to interpret bit 7 of CONWD. Data is only printed when one of the control characters is received. This allows the user to output from several buffers any of which may actually cause printing to occur.

PAPER COMMAND REQUEST.

Paper commands are issued by coding an EXEC call for I/O CONTROL. Procedures are described in the RTE operating system reference manual.

The RCODE = 3, bits 6 thru 12 of CONWD contain "011" octal, and PRAM1 must be specified. PRAM1 contains a decimal number indicating the paper command or other control function to be performed. Table 1 lists the valid PRAM1 values and the corresponding paper command or control function. Where applicable the parameters have been equated with the corresponding vertical format unit (VFU) channels. Paper command functions listed in the table reflect the standard VFU tapes supplied with the line printers.

Table 1. PRAM1 Values and Definitions

PARAMETER VALUE (decimal)	VFU CHANNEL	PAPER COMMAND/CONTROL FUNCTION
<0	1	Page eject (top-of-form).
0 *		Suppress space on the next operation only.
1 through 55		Space 1 to 55 lines, ignoring page boundaries.
56	3	Single space with automatic page eject.
57	4	Skip to next even line with automatic page eject.
58	5	Skip to next triple line with automatic page eject.
59	6	Skip to next 1/2 page boundary.
60	7	Skip to next 1/4 page boundary.
61	8	Skip to next 1/6 page boundary.
62	2	Skip to bottom of page.
63	1	Skip to top of next page.
64		Set automatic page eject mode.
65		Clear automatic page eject mode.
66 **	9	Skip to bottom-of-form. Status read is possible. (Refer to Table 2.)
67 **	10	User option.
68 **	11	User option.
69 **	12	User option. Status read is possible. (Refer to Table 2.)

*The 2607 line printer does not have a space suppress feature. If a 0 parameter value is specified, a single space is performed.

** VFU tapes on 2607 and 2610/2614 line printers do not include channels 9 thru 12; Parameters 66 thru 69 select VFU channels 1 thru 4 respectively. The 2631 which has an internal 8 channel VFU will disregard parameters 66 thru 69.

DEVICE CLEAR REQUEST

DVA12 can be used to issue a clear control to the interface. An I/O CONTROL calling sequence to clear a device should be coded where RCODE = 3 and bits 6 through 12 of CONWD (the function code) are set to octal 000.

PRINTER STATUS REQUESTS

REQUESTS FOR PREVIOUS STATUS. A user may need to know the number of words or characters transmitted during the last print operation or the status of the printer at the time of the last operation.

This information is contained in the I/O Status Word (word 5 of the Equipment Table) and is accessed by coding an I/O STATUS request (RCODE = 13). Execution of such a request causes the contents of the Status Word, EQT5, to be copied into the A-register and into the variable STATS (ISTAT in a FORTRAN program).

The RTE reference manual contains a description of an Equipment Table entry. Word 5 of that table entry appears as follows.

AV	equipment type code	status
bits	bits	bits
15, 14	13-8	7-0

Status Word bits 14 and 15 (AV) have the following meaning:

AV = 0 ₈	Unit not busy and available
AV = 1 ₈	Unit disabled (down)
AV = 2 ₈	Unit Busy

Status Word bit 8 through 13 will contain octal 12, indicating the output device is a printer.

Status Word bits 0 through 7 are maintained by DVA12 and their meanings can differ according to the printer model being driven. Table 2 lists the status of each device when the associated bit is set. For example: when bit 2 is set, a 2610/2614 Line Printer is out of paper. Status and Transmission Log are returned in the A & B registers respectively, after a Write request. If the unit is buffered, this data is meaningless.

REQUESTS FOR CURRENT STATUS. A user can request the dynamic (current) status of a line printer. When a call is made for I/O CONTROL, where RCODE = 3 and the function code field of CONWD contains octal 006, DVA12 updates bits 0 through 5 of EQT5 from printer status at the time of the last operation to printer status at the present time. (DVA12 always returns Status Word bit 6 = 1 when a top-of-form is executed).

The updated Status Word is returned in the A-register where it is available to the Assembly Language programmer.

When programming in a language other than Assembly, the programmer must go one step further to access the updated information: code an I/O STATUS request. This request causes the updated Status Word to be returned in the variable ISTAT.

Table 2. Line Printer Status Returns

(Bits 0 through 7 of EQT5)

BIT NUMBER	MODEL NUMBER			
	2607	2610/2614	2613/17/18/19	2631
0	not used		VFU chan. 12 Detected.	not used
1	not used		VFU chan. 9 Detected	not used
2	Power off	Paper out	Not ready	Paper out
3	PRINT switch enabled	START switch enabled	ONLINE switch enabled	
4	Printer idle			Buffer ready
5	not used			
6	Top-of-form was executed on last operation			
7	not used			

CONFIGURATION INFORMATION

This section provides configuration information for Driver DVA12 and is intended to augment the data provided in the Real-Time Executive Software System Programming and Operating Manual.

A-1 GENERATION PROCEDURE

Load the driver into the RTE System during system generation as described in the appropriate Real-Time Software Manual. During the system generation, take the following steps to configure the driver into the RTE system being generated.

A-2 PROGRAM INPUT PHASE

During the Program Input Phase, load Driver DVA12 along with other I/O drivers being loaded.

A-3 TABLE GENERATION PHASE

In the Table Generation Phase, make the following entries:

- a. An Equipment Table (EQT) entry for each printer.

EQUIPMENT TABLE ENTRY

EQTn?

sc, DVA12, B, T, = 1400

where "n" is the EQT entry number, "sc" is the select code of the I/O card, "B" specifies the buffering option, and "T" is the time out value for the device.

NOTE: The non buffering option must be used for the correct return of the transmission log.

- b. A Device Reference Table (DRT) entry relating the desired logic unit number (LU) for each printer to the EQT entry.

DEVICE REFERENCE TABLE

lu = EQT#?
n

where "lu" is the LU number to be assigned to the printer "n" is the EQT entry number of the 2631 printer. For example, if the EQT entry for the 2631 printer is the eighth entry in the EQT table and you select 11 as the LU number for the printer, then "8" is the correct response to:

11 = EQT #?

- c. An Interrupt Table entry for each terminal I/O card

INTERRUPT TABLE

sc, EQT, n

Where: "sc" is the select code of the I/O card, "EQT" specifies to interrupt to EQT entry "n" where "n" is defined above.

2631 OPERATION

Unlike the other printers supported by this driver, the 2631A has extended capability to react to escape sequences and certain control characters imbedded in the data. This capability need be of no concern to the traditional RTE line printer user unless either the user accidentally or intentionally imbeds the specific data sequences. The driver itself does not directly support any of the unique 2631A capabilities. It will never generate an escape sequence specific to the 2631A.

The user must be warned however, that since the driver will neither generate or screen out any of these sequences, it is the users responsibility to use the 2631A's special features with due caution. The system will never know the current state of the 2631A. Any data transfer to the 2631A may modify the characteristics (line spacing, print font, language selection, etc) of the machine. There is always the possibility for the Fortran listing to be printed in Cyrillic at 1 line per inch should an inconsiderate user leave the 2631A in such a state.

RELATED DOCUMENTS

1. HP 2631A OPERATORS MANUAL 02631-90901

The document will describe operator control and definitions of escape sequences and control characters

2. HP 2631A UTILITY SUBROUTINES

A utility subroutine available to aid in controlling the programmable features of the 2631A via generation for the user of the appropriate escape sequences and control characters.

SPECIAL CONSIDERATIONS

Following is a list of some of the possible events/considerations a user of the 2631 with DVA12 may want to consider. The list is not complete.

1. The 2631A will automatically wrap around on the 137th character. This probably is not a concern unless in expanded print font when the wrap around occurs at the 67th character.
2. Display function capability is enabled either remotely with escape sequence or locally on the front panel. When in display functions mode all data transferred to the 2631A is printed and not acted upon. Note that in this mode the VFU command being sent by the driver is displayed as the appropriate escape sequence.
3. The 2631A is heavily buffered. The machine will continue to print for an indeterminant time following completion of output from the system.
4. The 2631A will bi-directionally print all output unless the complete next line buffer has not been received or if the current buffer contains escape sequences or control characters which must be processed left to right.

5. The operator selects the default power up state of the 2631A via the 6/8 lpi slide switch on the front panel. The same is true of default print font (Expanded, Normal, or Compressed). The momentary 6/8 lpi switch is designed to allow the operator to immediately redefine the lpi setting independent of the power up default.
6. The 2631A does not have a paper tape VFU configurable by the user. The VFU is completely controlled by the processor within the 2631A. The standard definitions of 6 and 8 lpi as defined by HP are the only choices.
7. Beware of imbedding the "self test" escape sequence in the data. It will most certainly mess up your output.
8. If the 2631A is sent the "off line" escape sequence, the operator will have to manually restore the printer to "on line".
9. On a paper out condition, the operator must take care to follow exactly the paper restore sequence. There most likely will still be at least a single buffer of data within the 2631A. Care must be taken to NOT touch the reset switch. Insert the paper and align via the paper advance knob on the side of the machine. (The line feed and form feed switches are inoperative for paper out). When all is aligned, put the 2631A on line and then do normal "UP" operation on console/terminal.



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