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RC 4000 PERIPHERAL DEVICES

RC 315 TYPEWRITER
REFERENCE MANUAL

ABSTRACT

This report describes the logical structure of the RC 315 typewriter when used in connection with the RC 4000 computer.

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MAIN CHARACTERISTICS

The typewriter is connected to the low-speed data channel by means of a buffer register of 24 bits.

The typewriter has a maximum speed of 14 characters per second. The line width is 154 characters.

The character set is a subset of the ISO 7 bit character set consisting of 88 graphics and 4 control characters.

The typewriter is supplied with a local/remote switch which can be set manually. In the remote state the device is program controlled. In the local state the operator may insert or adjust printing sheets or use the typewriter as a device not controlled by the computer.

CHARACTER SET

In the internal representation of a character the seven bits are identified by the bit identifiers b1 through b7 each having the weigth as shown:

bit identifier	b7	b6	b5	b4	b3	b2	b1
weigth	64	32	16	8	4	2	1

In the following code table the columns and rows are identified by the decimal equivalent of the following binary numbers:

column: b7 b6 b5 0 0 0 0

row: 0 0 0 b4 b3 b2 b1

Accordingly, the decimal value of a character is the sum of the column and row number. For instance, the character H has the numerical representation 64 + 8 = 72.

Empty positions in the code table specify characters that are not available on the typewriter.

Graphic characters are printed in black during output, and in red during input.

	0	16	32	48	64	80	96	112
0			SP	0		P		p
1			!	1	A	Q	a	q
2			"	2	B	R	b	r
3				3	C	S	c	s
4				4	D	T	d	t
5			%	5	E	U	e	u
6			&	6	F	V	f	v
7			'	7	G	W	g	w
8	BS		(	8	H	X	h	x
9	HT		)	9	I	Y	i	y
10	NL		*	:	J	Z	j	z
11			+	;	K	Æ	k	æ
12			,	<	L	Ø	l	ø
13			-	=	M	Å	m	å
14			.	>	N		n	
15			/	?	O	_	o	

Control characters:

BS = BACKSPACE

HT = HORIZONTAL TABULATION

NL = NEW LINE

SP = SPACE

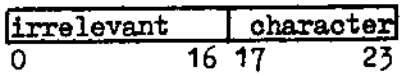
COMMANDS

The typewriter accepts read, write and sense commands. Only the basic command field i.e. bits 22 - 23 in the effective address of the input/output instruction is interpreted. Thus the value of the modifier field i.e. bits 18 - 21 in the effective address is irrelevant. Control commands will have no effect except causing an interrupt.

READ AND WRITE COMMANDS

A read command initiates the input of one character to the buffer register.

A write command initiates the output of one character from a working register. The contents of the working register is interpreted as follows:



After the initiation of input/output the typewriter is busy until the operation is completed successfully or terminated by an error condition. The typewriter delivers an interrupt signal when it becomes available.

The output of an unavailable character is immediately terminated by an interrupt.

Right margin stop

If the typewriter reaches the right margin stop during input the keyboard is locked and further input is prevented with the exception of the control characters BS, HT, NL and SP which still will be accepted.

If the typewriter reaches the right margin stop during output further output characters with the exception of NL are treated as unavailable characters, i.e. the output is suppressed, but the operation is terminated by an interrupt.

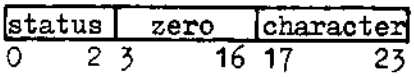
The typewriter can be set beyond the right margin stop during input or output by the control character HT; the situation will then be as if the margin stop was reached.

Input/output conflict

A conflict between input and output operations is prevented in the following way: A write operation starts by locking the keyboard to prevent the operator from typing during output; if the operator depresses a character key before and during a write operation, the typewriter will still be able to operate all keys including the depressed one; mechanically it is impossible for the operator to lock the typewriter in upper case; even if he depresses the upper case key before and during a write operation, the typewriter will merely delay the output until the key has been released. A read operation automatically unlocks the keyboard and switches on a green lamp on the left side of keyboard indicating that input is wanted.

SENSE COMMAND

When the typewriter is available a status word can be transferred from the buffer register to a working register by means of a sense command. The status word has the following format:



The leftmost 3 bits of the status word are status bits whereas the rightmost 7 bits contain the last character received in the buffer register.

In case of input the status character will be the character typed by the operator.

In case of output the status character will be the actually printed character generated by the feedback from the print selection contacts in the typewriter. This character is therefore normally equal to the character specified in the working register in the previous write operation. This will, however, not be true in the following cases:

1: Output of an unavailable character or setting of the timer status (see below) causes the status character to be equal to zero.

2: Output of characters different from NL beyond the right margin stop causes an undefined status character.

The status bits have the following meaning:

0 intervention
1 parity error
2 timer

Intervention: The intervention status indicates that the operator has interfered with the device by means of the local/remote switch.

Parity: The parity status indicates an attempt to input more than one character per read operation; it may also indicate an incorrect operation of the print selection contacts.

Timer: The timer status indicates the termination of a read or write operation that lasts longer than approximately 2 seconds. This can occur if the operator fails to respond to a read command or depresses the upper case key for more than approximately 2 seconds during a

write operation. It can also be due to mechanical faults in the typewriter. When the timer status is set the typewriter will generate a character equal to zero in the status word.

LOCAL/REMOTE SWITCH

If the operator switches to local during a read or write operation the transition to the local state is delayed until the operation has been completed.

If a read or write command is initiated in the local state the typewriter accepts the command and becomes busy. The actual operation, however, is delayed until the operator switches to remote control.

When the typewriter becomes local the intervention status bit is set. It can only be removed when a read or write operation is initiated in remote state (and not when initiated in the local state).

Two lamps on the right side of the keyboard indicate whether the typewriter is in remote or local state.

OPERATOR KEY

On the left side of the keyboard the typewriter is supplied with a button called OPR. KEY which sends an interrupt signal when depressed. This interrupt signal is completely independent of the interrupt signal delivered by the typewriter during input/output. It may be used by the monitor program to signal an operator request for input.