
(12) UK Patent Application (19) GB (11) 2 1 1 3 6 1 3 A

(21) Application No **8136325**

(22) Date of filing

2 Dec 1981

(43) Application published

10 Aug 1983

(51) INT CL³ **B41J 5/00**

(52) Domestic classification

B6F CB NB

(56) Documents cited

GB A 2071018

GB A 2057973

US 4187031

US 2950800

"Pattern Recognition"

Stallings Pergamon

Press Vol 8 pp 87-98

(1976)

(58) Field of search

B6F

(71) Applicant

British

Telecommunications

(Great Britain)

2-12 Gresham Street

London EC2V 7AG

(72) Inventors

Malcolm Edward Jones

Thomas Arthur O'Brien

(74) Agent and/or Address for

Service

F J Cleveland and

Company

40-43 Chancery Lane

London WC2A 1JQ

(54) **Improvements in or relating
to printers**

parts of the printing element or
elements.

(57) A printer for use in a text or data communication system has one or more printing elements such as a daisy wheel. The or each printing element has character forming parts which can be actuated to cause in a single strike of the character forming part the imprint of a character on a print receiving medium. The printer is arranged so that one or more of the character forming parts can be actuated to strike successively at the same position or substantially the same position on the print receiving medium to produce the final character. This arrangement allows complex characters of latin based alphabets to be produced by forming an image from a combination of characters provided on the character forming

GB 2 1 1 3 6 1 3 A

					b1/2	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
					b7	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
					b6	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
					b5	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b4	b3	b2	b1		∅	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	
0	0	0	0	∅				0	@	P	`	p	à				§				
0	0	0	1	1			!	1	A	Q	a	q									
0	0	1	0	2			"	2	B	R	b	r									
0	0	1	1	3			#	3	C	S	c	s			£						
0	1	0	0	4			\$	4	D	T	d	t									
0	1	0	1	5			%	5	E	U	e	u			μ						
0	1	1	0	6			&	6	F	V	f	v			°						
0	1	1	1	7			'	7	G	W	g	w			'						
1	0	0	0	8			(	8	H	X	h	x			†						
1	0	0	1	9			)	9	I	Y	i	y		‡	™						
1	0	1	0	A			*	:	J	Z	j	z			®						
1	0	1	1	B			+	;	K	[	k	{			©	é		Ä		ä	
1	1	0	0	C			,	<	L	\	l	|		¢	¼	ú	¥	Ö		ö	
1	1	0	1	D			-	=	M	]	m	}			¾	è		Ü		ü	
1	1	1	0	E			.	>	N	^	n	~			½	¨		€		β	
1	1	1	1	F			/	?	o	-	o				¶	f		=			

FIGURE 1

				b1/2	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
				b7	0	0	0	0	1	1	1	1	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1	0	1	0	1	0	1	0	1
b4	b3	b2	b1		∅	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0	0	0	0	∅				0	@	P	`	p	⌘				§			
0	0	0	1	1			!	1	A	Q	a	q								
0	0	1	0	2			"	2	B	R	b	r								
0	0	1	1	3			#	3	C	S	c	s			£					
0	1	0	0	4			\$	4	D	T	d	t								
0	1	0	1	5			%	5	E	U	e	u			μ					
0	1	1	0	6			&	6	F	V	f	v			°					
0	1	1	1	7			'	7	G	W	g	w			'					
1	0	0	0	8			(	8	H	X	h	x			ı					
1	0	0	1	9			)	9	I	Y	i	y			™					
1	0	1	0	A			*	:	J	Z	j	z			®					
1	0	1	1	B			+	;	K	[	k	²			©	ð		ı		κ
1	1	0	0	C			,	<	L	×	l	|		ı	¼	,	¥	Ɔ		ŋ
1	1	0	1	D			-	=	M	]	m	³			¾	˘		Ɔ		ŋ
1	1	1	0	E			.	>	N	^	n	˜			½	¨		¢		β
1	1	1	1	F			/	?	O	-	o				¶	,		Ω		

FIGURE 2

TELETEX CODE No	TELETEX CHARACTER	ACTION 1	ACTION 2	ACTION 3	ACTION 4	ACTION 5	ACTION 6	ACTION 7
10/11	≪	3/120"	<	3/C	<	3/120"		
11/00	°	4/48"	3/120"	A/6	3/120"	4/48"		
11/01	±	2/B	4/48"	5/E	4/48"			
11/08	÷	2/E	10/48"	5/E	•	2/E		
11/11	≫	3/120"	>	3/E	>	3/120"		
12/13	"	3/48"	4/120"	A/7	6/120"	A/7	2/120"	3/48"
12/15	∨	4/48"	1/120"	6/0	1/120"	A/7	4/48"	
14/01	Æ	2/120"	A	4/1	E	3/120"		
14/02	Ð	2/D	3/120"	D	3/120"			
14/03	ä	6/1	5/F					
14/04	Ë	4/8	12/48"	5/E	12/48"			
14/06	IJ	3/120"	I	4/9	J	3/120"		
14/07	Ĺ	4/C	4/48"	2/120"	•	2/E	2/120"	
14/08	Ł	4/C	4/48"	2/120"	'	A/7	4/48"	
14/09	Ø	4/F	1/120"	/	1/120"			
14/10	Œ	3/120"	O	4/F.	E	4/5	4/120"	
14/11	ō	6/F	5/E					

FIGURE 3a

TELETEX CODE No	TELETEX CHARACTER	ACTION 1	ACTION 2	ACTION 3	ACTION 4	ACTION 5	ACTION 6	ACTION 7
14/13	T	5/4	7/48" ↓	2/120" ←	'	2/120" →	7/48" ↑	
14/15	n	6/F	12/48" ↑	3/120" ←	,	3/120" →	12/48" ↓	
15/02	æ	3/120" →	a 6/1	6/120" →	e	3/120" →		
15/03	đ	6/4	4/48" ↑	3/120" →	-	3/120" →	4/48" ↓	
15/04	h	6/8	4/48" ↑	3/120" →	-	3/120" →	4/48" ↓	
15/06	ij	2/120" →	i 6/9	4/120" →	j	2/120" →		
15/07	l•	6/C	4/48" ↑	5/120" →	.	5/120" →	4/48" ↓	
15/08	ł	6/C	4/48" ↓	2/120" →	'	2/120" →	4/48" ↑	
15/09	ø	6/F	2/F /					
15/10	œ	3/120" →	6/F	7/120" →	e	4/120" →		
15/13	ł	7/11	6/48" ↓	3/120" →	'	3/120" →	6/48" ↑	

KEY		PRINT ACTION		MOVEMENT	
CHARACTER	REQUIRED RICOH DAISY WHEEL CODE COLUMN/ROW	ARROW DENOTES DIRECTION OF MOVEMENT	FRACTION DENOTES LENGTH IN INCHES		

FIGURE 3b

SPECIFICATION

Improvements in or relating to printers

5 This invention relates to printers. In particular the invention relates to printers which can be used in text or data communication systems or computer systems, the printer forming part of a terminal of the system and being used to print messages which have been transmitted to the terminal as digitally encoded signals and the printer being of the type in which a complete character normally is formed by the single actuation of a print element such as a petal on a daisy wheel printer.

10 Examples of communication systems are a Teletex service or a Videotex service such as Viewdata. The Viewdata system comprises a central computer in which is stored pages of information. Users of the system can access the information stored in the computer using terminal units which can be linked to the computer by way of telephone lines. When the user requires a hard copy version of the page or pages of information in which he is interested, this is provided by a printer. The printer has an associated control circuit which responds to the encoded signals and causes the print elements of the printer to print out the page or pages of information.

20 The use of Teletex and Videotex systems is becoming international and there is a requirement that a printer used in such a system should be capable of printing all the characters which constitute the latin based languages. The number of such characters is somewhat greater than the number of characters which are capable of being printed by the printing elements conventionally available on a printer such as a daisy wheel printer. One way of accommodating an increased number of characters would simply be to provide more individual character forming parts e.g. petals on a daisy wheel, but this is not a practical solution.

25 The present invention provides a technique which allows a greater number of characters to be printed by a printer without any significant increase in the number of character forming parts normally provided on a printer. By printing element is meant a member such as a spoke on a daisy wheel printer which is embossed at its tip with a character to define a character forming part, or a golf ball of a golf ball printer which is embossed with a plurality of characters to define a plurality of character forming parts, each member being actuable to cause in a single strike of a character forming part an imprint of a character to be formed on a print receiving medium.

30 According to the present invention there is provided a printer for use in a text or data communication system, the printer having one or more printing elements with character forming parts which can be actuated to cause

in a single strike of the character forming part the imprint of a character on a print receiving medium wherein the printer is so arranged that one or more character forming parts can be actuated to strike successively at the same position or substantially the same position on the print receiving medium to form the final character. Such a printer allows complex characters of latin based languages to be produced by forming an image from a combination of characters provided on the character forming parts of the printing element or elements. The character forming parts may be provided on the daisy wheel of a daisy wheel printer although the invention is equally applicable to other types of printer such as the golf ball type, cylinder type, basket type or belt type printers. Some modification of the conventional daisy wheel may be necessary in order to accommodate all the characters which are required to be printed. Some modification may also be necessary to the program which controls the operation of the printer.

35 Some complex characters may require small relative shifts of the print medium and the printing element between the successive actuations.

40 The invention will be described now by way of example only with particular reference to the accompanying drawings. In the drawings:

45 *Figure 1* is a chart showing the characters which are provided on a conventional print wheel of a daisy wheel printer together with the eight bit codes associated with each character;

50 *Figure 2* is a chart similar to that of Fig. 1 showing the characters provided on a daisy wheel used on a printer in accordance with the present invention, and

55 *Figures 3a and 3b* illustrate the operation of a printer constructed in accordance with the present invention.

60 The invention will be described in terms of a daisy wheel printer although its application is in no way limited to such a printer. Daisy wheel printers are well known devices and accordingly a full description of their construction and operation will not be given here. The character forming parts of such printers are carried on a daisy wheel which takes the form of a central hub from which project a plurality of radially extending spokes. The outer end of each spoke carries an embossed character, each constituting a character forming part. The wheel can be made of plastics material or metal. The hub is mounted so that it can be rotated to bring a desired character forming part into a predetermined position so that a print hammer located adjacent that position can be activated to press the end of that spoke against a print ribbon so that the ribbon is sandwiched between the embossed spoke end and a print receiving medium such as paper. The print wheel and the hammer are generally mounted upon a carriage which can

be moved laterally in steps of 1/120 inch. The mechanism for moving the paper upwardly relative to the print wheel is designed to allow movements of the paper in steps of 1/48 inch. In conventional daisy wheel printers the arrangement is such that the hammer is activated once at each character position, the carriage containing the hammer and print wheel moving to the next character position after the printing of the previous character in response to instructions from its controlling system. The characters which are provided by conventional daisy wheels are shown in Fig. 1. The numerals in the top four rows of the Table of Fig. 1 and the four left-hand side columns are representative of the eight bit codes which are associated with each of the characters on the Table. These are the codes which are transmitted to the printer to cause it to automatically print a required character.

In the present embodiment of the invention we propose to modify the characters provided on the print wheel in the manner illustrated in Fig. 2 of the drawings. This Figure is similar to that of Fig. 1 but it will be seen that characters provided on certain of the spokes of the daisy wheel are changed. This is to enable combinations of characters to be printed at the same character position to produce a complex character and thereby expand the range of characters which can be printed using the print wheel. Thus in broad terms the present modification is to arrange the printer so that certain characters are produced by actuating the character forming parts of one or more print elements at the same or substantially the same character positions so that the second actuation overwrites the first and thereby produces a combination of the two characters on the relevant character forming parts. The modification to the operation of the printer can be achieved relatively easily by a simple modification to the program which controls the printer operation. Such a modification will be within the capability of a person skilled in the art of printers. Because the carriage containing the print wheel can be moved in very small steps and the paper can be moved vertically in similar small steps the second character which is printed can be printed at a position which is shifted slightly from that of the first character.

Examples of characters which can be printed are shown in Figs. 3a and 3b. The second column of the Table shown in Figs. 3a and 3b represents the character which is to be printed. For example, taking the character shown in the first row of Fig. 3a, the first action is to produce the symbol shown in the third column which is produced by transmitting the code shown alongside that character. The next action shown in column 4 is to shift the print wheel carriage to the right by 6/120 inch. The next action shown in column 5 is to print the same character as on the first strike

and the final action shown in column 6 is to shift the carriage containing the print wheel to the left by 6/120 inch. A plurality of other characters can be produced in a similar manner by allowing a plurality of print elements to be actuated at the same or substantially the same character position. Examples of these are given in the Table of Figs. 3a and 3b and the manner in which they are produced is similar to that described above for the first character shown in the Figure.

The present print wheel with its modifications allows the required three hundred and six characters of Teletex to be produced but many more combinations are possible. This compares with the 125 characters which can be produced with a conventional print wheel.

CLAIMS

1. A printer for use in a text or data communication system, the printer having one or more printing elements with character forming parts which can be actuated to cause in a single strike of the character forming part the imprint of a character on a print receiving medium wherein the printer is so arranged that one or more character forming parts can be actuated to strike successively at the same position or substantially the same position on the print receiving medium to form the final character.

2. A printer as claimed in claim 1 wherein the character forming parts are provided on the daisy wheel of a daisy wheel printer.

3. A printer as claimed in claim 1 wherein the printer is one of a golf ball type, cylinder type, basket type or belt type printers.

4. A printer as claimed in any preceding claim wherein small relative shifts of the print medium and the printing element can occur between the successive actuations.

5. A printer substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

6. A method of operating a printer substantially as hereinbefore described with reference to Fig. 3 of the accompanying drawings.

CLAIMS (28 Mar 1983)

1. A printer of the type which operates automatically in response to receipt of coded signals, the printer having one or more printing elements with character forming parts which can be actuated to cause in a single strike of the character forming part the imprint of a character on a print receiving medium wherein the printer is so arranged that one or more character forming parts can be actuated to strike successively at the same position or substantially the same position on the print receiving medium to form the final character prior to the print element or elements being moved to the next character position.

Printed for Her Majesty's Stationery Office
by Burgess & Son (Abingdon) Ltd.—1983.
Published at The Patent Office, 25 Southampton Buildings,
London, WC2A 1AY, from which copies may be obtained.