

SPECIFICATION

Improvements in or relating to a display device

5 The present invention relates to a display device and more particularly the present invention relates to coin or credit actuated display device adapted to display information stored within a computer.

At the present time, in this country, the Post Office are proposing to operate a computer in which persons or Companies may store information. It is proposed that persons or companies interested in receiving the stored information may obtain computer terminals and when they wish to extract information from the computer they may use a conventional telephone dial to dial the number of the computer to establish contact between the computer and the terminal and may then have access to various "pages" of information stored within the computer. It is envisaged that the computer terminal will be connected to the computer through the normal Post Office telephone lines.

A charge will, of course, be rendered for this service, a portion of the charge comprising the normal telephone charges for the establishment of communication between the computer output terminal and computer, this charge being dependent upon the distance between the terminal and the computer, and the time of day and the duration of the connection. However, a further charge will be rendered for each page of information displayed on the terminal. This charge will vary from page to page, some pages of information have a very low charge and other pages of information having a relatively high charge.

Persons or Companies storing information within the computer will, of course, be reimbursed by the Post Office with regard to the number of times pages of information that they have stored within the computer are transmitted for display to the various terminals, the reimbursement depending upon the price charged by the Post Office to the users of the terminal.

Since the Post Office will be utilising a computer, it is relatively straightforward for the Post Office to assess the charge to be rendered to each terminal user at, for example, the end of each month or at the end of each quarter, since the computer will be programmed to store information concerning the number of pages displayed on each output terminal and the price or cost of each of those pages.

It has now been proposed to provide a coin operated computer terminal for use with this system and is proposed that when a customer wishes to view pages of information stored within the computer the customer will initially insert a coin into an appropriate slot. The insertion of the coin into the slot will initiate an automatic dialling process to place the computer terminal in communication with the computer, and, if the telephone lines are not engaged the terminal is placed in communication with the computer the coin will be accepted, an appropriate credit will be stored on a memory or credit meter, and the customer will be able to call various pages of information from the computer by utilising the press buttons provided on the terminal.

Whilst it would be possible for such a device to operate on the basis that a customer has a predetermined time of access to the computer for his payment, this may well not prove to be satisfactory since some pages of information within the computer may be very expensive. Thus it is desired to regulate the number of pages of information viewed by a customer with regard to the price of each of those pages and with regard to the overall duration of operation of the machine.

The invention seeks to reduce or obviate the above described disadvantages.

According to this invention there is provided a device for displaying information contained in a computer, the device comprising means for controlling the computer to display selectable pages of information, means for isolating information concerning the price charge for the computer to supply the requested pages, and means for accumulating corresponding information concerning the price of the pages in an appropriate register.

In one embodiment of the invention the register may be a credit register, a credit being entered on the register by inserting a coin into the apparatus, or by inserting an appropriate credit card or the like. In such a case, when each page of information is displayed a debit derived from the price of the page is subtracted from the credit register. In a simple embodiment of the invention the price of each page is entered into a temporary register and this price is subtracted from the credit register as the page is displayed. In an alternative embodiment of the invention the information related to the price of each page is recorded in a debit register and, when the customer has finished viewing, the accumulated debit in the debit register is transferred to a memory maintained by the computer so that the debit can also be debited against the account of the customer. In such an embodiment the customer would, of course, have to provide sufficient identity for the computer to be able to "identify" the customer to ensure that such debits are only debited against the correct account.

Preferably the apparatus is adapted to assess whether one predetermined character in the page of information to be displayed is a digit or a blank, and if the character is a digit, to enter the digit in a first register and to enter the next-but-one character in a second register, and if the said predetermined character is a space, to enter the next character, in a further register and the subsequent character in the first register. Preferably the apparatus is adapted to only operate if a predetermined character is detected in a predetermined position in the page to be displayed.

Whilst the invention has been defined above with reference to an embodiment in which the price of each page is calculated in pence it is to be appreciated that the invention is equally applicable to corresponding

systems in which the price of each page is calculated in another currency.

In order that the invention may be more readily understood and so that further features thereof may be appreciated, the invention will now be described by way of example with reference to the accompanying drawings in which is a block diagram of part of an apparatus in accordance with the invention.

5 In the Post Office "View Data" system it is proposed that the price of each page will be shown in the top line of the page, and it is proposed, at the present time that the price will be shown as forty-fourth, forty-fifth, forty-sixth and forty-seventh characters, that is to say the closing characters of the line. In each case the forty-seventh character, in this country, will be the letter p to designate pence. If the cost of the page is less than ten pence, for example 9.9 pence, character forty-four will be "9", character forty-five will be "." or 10 decimal point and character forty-six will again be "9". On the other hand, if the price of page is more than ten pence, for example twenty three pence the character forty-four will be blank, the character forty-five will be a two and the character forty-six will be a three.

In a display device in accordance with the present invention input signals received from the Post Office computer are initially present on lead 1 which is connected to a micro processor 2. The micro processor is a 15 "6802" and this type of micro processor includes a portion of working memory. The micro processor 2 is connected by a data bus 3 and by an address bus 4 to a programmable store 5, the programmable store being a "2716". An extension of data bus 6 and an extension of the address bus 7 connect the micro processor 2 and the programmable memory 5 to a page store memory 8, the page store memory comprising two "2114" devices. An output 9 from the micro processor 2 leads to the visual display unit of the display device in accordance 20 with the present invention.

The programmable memory 216 contains a program which effectively controls the overall operation of the display device, including the steps of establishing communication with the Post Office computer when a coin is inserted into the apparatus and including the control of the display device so that the display device displays the various symbols represented by the signals provided to the device by the Post Office computer.

25 However, the program also includes portions which relate to the reading of the price of a page of information and subtracting this price from a credit register, the credit register storing information relating to the total credit of any customer utilising the display device at any particular instant in time.

The appropriate portion of the program that is blown into the programmable memory 5 is set out in table 1.

When a person using the display device calls for a page of information to be displayed signals 30 representative of the page of information are supplied to the micro processor 2 through the input lead 1. The signals are stored in the page store memory 8. Whilst the initial signals are being stored the screen of the display device is blanked. The opening portion of the program set out in table 1 relates to the checking of the page number of a page that is to be displayed against page numbers stored in a memory. If the page number of the page that has been called for by the person operating the device corresponds with the page 35 number of a dis-allowed page as stored in the memory, then the page is not displayed. However, if the page called for is not a page whose number is stored in the memory and also is not a page that is provided with a "cursor on" signal, that is to say a response frame, then the frame is to be displayed and so it is necessary to ascertain the price of the page to enable that price to be subtracted from the price stored in the credit register.

40 The first step in this process is to check for the presence of a small p after the price. This is program step zero 234. If no small p is detected in the correct position it is assumed that there is noise on the line, and thus the entire process is terminated. However, if a small p is detected initially a check is made to see if the cost of this particular page of information has also already just been subtracted from the credit register and also a check is made to see if the "re-do" key has been pressed since if this is the case no charge is appropriate.

45 Assuming that it is permissible to charge for the page of information initially the first character of the price field is considered. This is program zero 241. The price field is, the forty-fourth, forty-fifth, forty-sixth and forty-seventh characters of the first line of the page of information. Thus, the forty-fourth character is analysed to see if the character is a digit or a space. If it is a space then the charge will not involve decimal fractions of a penny and so the program branches to a XXp routine. This is the routine that is followed if 50 the charge is, for example, 15p. This routine is set out as program steps 0250 to 0255 and it can be seen that as these procedure steps are followed the character 45 is analysed and is stored in a tens of pence temporary register and the next character, character 46 is stored in a temporary pence register. The temporary tens of pence register and the temporary pence register both form part of the memory present in the micro processor 2. This micro processor also includes a temporary tenths of pence register, and as can 55 be seen programme step zero 255 relates to clearing of this particular register.

Alternatively, if the character 44 is a digit then a different routine is followed, the routine being appropriate for situations where the charge is a number of pence plus a decimal fraction of a pence. Thus the routine for X.X.p set out in program steps zero 245 to zero 249 is followed. It is to be noted that in following this routine initially the character 44 is considered and this is stored in a temporary pence register as mentioned 60 above, and subsequently character 46 is considered and is stored in a temporary tenths of a pence register. Subsequently the tens of pence register mentioned above is cleared. Regardless of which of the two sub routines described above is adopted, subsequently the numbers stored in the tens of pence register the pence register and tenths of pence register is subtracted from a credit register which credit register stores the total credit remaining to the person utilising the display device.

65 The credit register is adapted to start with a predetermined credit and, when a coin is inserted into the

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machine and a communication established with the computer so that the coin is accepted by the machine, appropriate credits are added to the credit contained within the credit register.

Credits will be subtracted from the credit register firstly with regard to the duration of the connection between the terminal and the central computer, and secondly in accordance with the prices of pages called 5 for by the customer. If, at any particular time, when the price of an incoming page is subtracted from the credit register the credit falls below a predetermined level, the screen is automatically blanked so that page is not displayed to the customer, and a predetermined brief period of time will elapse during which a message is displayed on the screen inviting the customer to insert further coins into the apparatus to prolong the time of communication with the computer. If no further coins are introduced, the communication with the 10 computer is broken and the apparatus returns to its quiescent state. If, however, a fresh coin is inserted, the communication with the computer is maintained, further credit is added to the credit register and a "re-do" signal is transmitted to the computer to cause the page initially summoned to be displayed. A page re-displayed in response to a "re-dp" signal does not incur a specific page charge from the Post Office computer, and thus when the "re-do" signal has been sent the charge shown on the displayed page is 15 ignored, since the charge has already been accounted for in connection with the page that was blanked out.

When a coin is inserted into the apparatus after the apparatus has been in its quiescent state the credit register initially has the predetermined number stored therein and then a number representative of the credit resulting from the coin insertion is added to that number. Any number of coins may be inserted at one time, and the device may be adapted to accept coins of two different denominations.

20 Whilst the invention has been described with reference to an embodiment in which coins are inserted into the apparatus, it will be appreciated that the apparatus may be adapted to operate in response to a magnetically coded card to the like sufficient to identify a customer or indeed the customer may be able to activate the device by tapping a predetermined code on the key board. In such a case the device may have a memory adapted to act as a debit register, the total debit in the debit register being transferred to a master 25 memory within the computer for eventual debiting to the customer's monthly account, for example.

The last line of each frame or page of information stored within the Post Office "View Date" computer is at the present time, always blank. Thus it is envisaged that it will be possible to monitor the data arriving at the coin at the coin operated "View Data" terminal and when there is a predetermined delay from the reception of the last item of data it will be possible to presume that the last item of data on the page has been received 30 and then the remaining credit in the credit meter, less than the predetermined credit that was in the credit meter initially, can be displayed upon the screen so that the customer can be aware of his remaining credit at all times.

It is to be appreciated that whilst the invention has been described with reference to an embodiment in which the price of each page is subtracted directly from the credit register, to enable the coin operated 35 terminal to be operated at a profit it may be desirable to subtract, from the credit register, for each page viewed, a price which is slightly greater than the price charged by the Post Office, namely a price greater than that displayed in the forty-fourth to forty-seventh digits of the first line of the page. This may be achieved by causing a fixed sum to be added to the pence register whenever a "p" has been detected in the forty-seventh digit and before the sums in the above described temporary registers are subtracted from the credit register, 40 or, alternatively, the sums within the pence registers may be multiplied by a predetermined figure, for example 1.5, the product being placed in a debit register and then subtracted from the credit register.

Many alternatives will suggest themselves to persons skilled in the art.

It is envisaged that a printing device may be associated with the terminal so that predetermined pages of information may be printed for subsequent retention by the customer. The printer will be actuated by an 45 appropriate key, and on actuation of the printer a predetermined sum will be subtracted from the credit register, the printer and the operating if the predetermined minimum credit remains within the credit register after actuation of the print.

TABLE I

SUBROUTINE TO OUTPUT CHAR TO SCREEN					
0187					
0188	F920 81 20	VDU1	CMP A	#\$20	IS IT A CONTROL CHAR?
0189	F922 24 11		BHS	PRCHAR	
0190	F924 CE FC 09		LDX	#TABLE	START OF CONTROL CHAR TABLE
0191	F927 A1 00	MATCH1	CMP A	O,X	
0192	F929 27 22		BEQ	FOUND	CHAR FOUND
0193	F92B 08		INX		
0194	F92C 08		INX		
0195	F92D 08		INX		TRY NEXT CHAR
0196	F92E 8C FC 2D		CPX	#TABEND+3	END OF TABLE?
0197	FF931 26 F4		BNE	MATCH1	
0198	F933 86 3F		LDA A	#?	
0199	F935 DE 06	PRCHAR	LDX	DISPT	NOT CONTROL CHAR

TABLE I (continued)

0200	F935 6D 00		TST	O,X	
0201	F939 9A 04		DRA A	FORFLG	SET BIT 7 IF IN FOREIGN CHAR
0202	F93B 94 05		AND A	ESCFLG	SUPPRESS BIT 6 IF CONTROL CODE AND STORE IT
0203	F93D A7 00		STA A	O,X	
0204	F93F 86 FF		LDA A	#\$FF	
0205	F941 97 05		STA A	ESCFLG	RESET ESC FLAG
0206	F943 7F 00 04		CLR	FORFLG	
0207	F946 96 07		LDA A	DISPT+1	
0208	F948 BD FA B6		JSR	INCD1S	INC DISPLAY POINTER
0209	F94B 20 06		BRA	VDU2	
0210	F94D EE 06	FOUND	LDX	1,X	GET ADDR OF SUBROUTINE
0211	F94F 96 07		LDA A	DISP+1	
0212	F951 AD 00		JSR	O,X	GO THERE
0213	F953 DE 06	VDU2	LDX	DISPT	GET CURSOR ADDRESS
0214	F955 8C DO 40		CPX	#SCNST+\$40	HAVE WE FINISHED TOP LINE?
0215	F958 27 OE		BEQ	CHKNO	IF SO, GO TO ROUTINE FOR CHECKING PAGE
AGE NO AND SUBTRACTING FRAME COST FROM CREDIT					
0216	F95A 8C DO 67		CPX	#\$D067	
0217	F95D 26 03		BNE	NXSC	
0218	F95F 7E F9 E8		JMP	SYNC	
0219	F962 8C D5 D4	NXSC	CPX	#POSCN-1	
0220	F965 27 7D			BEQCLTFLG	
0221	F967 39		RTS		
0222		*ROUTINE TO CHECK PAGE NO AND DEBIT CREDIT*			
0223	F968 CE DO 19	CHKNO	LDX	#PAGEND	GET ADDRESS OF PAGE NO. ON SCREEN
0224	F96B DF 13		STX	XTEMP1	PUT IT IN TEMPORARY STORE
0225	F96D CE FX 88		LDX	#PGLIST	GET ADDRESS OF LIST OF DISALLOWED
PAGE NOs					
0226	F978 DF 17		STX	XTENP3	STORE IT
0227	F972 OE		CL1		ENABLE INTERRUPTS
0228	F973 BD FD 4A		JSR	SEARCH	JUMP TO SUBROUTINE WHICH CHECKS PAGE
NO. AGAINST THOSE IN LIST					
0229	F976 OF		SE1	DISABLE INTERRUPTS	
0230	F977 24 03		BCC	ABNDT	ON RETURN FROM SUBROUTINE, CARRY FL
AG SE1 MEANS PAGE NO. MRS FOUND IN LIST					
0231	F979 7E FA 15		JMP	ABORTPAGE NOT ALLOWED	
0232		*PAGE WAS NOT FOUND IN LIST, SO GET PRICE INFORMATION			
0233	F97C B6 DO 27	ABNDT	LDA A	\$D027	
0234	F97F 81 70		CMP A	#\$70	CHECK FOR SMALL P
0275	F981 26 53		BNE	VDU4	IF NOT SMALL P, FORGET IT
0236	F983 7D 00 20		TST	DEBFLG	CHECK IF WE HAVE ALREADY DEDUCTED
THIS FRAME COST					
0237	F986 26 4E		BNE	VDU4	IF SO, RETURN
0238	F988 7D 00 22		TST	REDFLG	CHECK IF REDO KEY HAS BEEN PRESSED
0239	F98B 26 45		BNE	VDU42	IF SO, RETURN
0240		*IF WE GET TO HERE IT IS O.K. TO CHARGE FOR THIS FRAME*			
0241	F98D B6 DO 24		LDA A	PRICE	GET FIRST CHARACTER OF PRICE FIELD
0242	F990 81 20		CMP A	#\$20	IS IT A SPACE?

TABLE I (continued)

0243	F992 27 OC	BEQ	NODP	IF SO, BRANCH TO XXP ROUTINE	
5 0244		*ROUTINE FOR X Xp FORMAT*			5
0245	F994 97 1E	STA A	UNIT1	IF NOT, STORE IN TEMP STORE FOR PENCE THEN GET CHARACTER FROM TENTHS OF	
0246	F996 B6 DO 26	LDA A	PRICE+2		
10	PENCE POSITION				10
0247	F999 97 1D	STA A	TENTH	AND STORE IT	
0248	F99B 7F 00 1F	CLR	TEN1	AND CLEAR TEMP STORE FOR TENS OF PENCE	
0249	F99E 20 00	BRA	VDU41		
15 0250		*ROUTINE FOR XXp FORMAT*			15
0251	F9AO B6 DO 25	NODP	LDA A	PRICE+1	GET TENS OF PENCE CHARACTER STORE IT
0252	F9A3 97 1F	STA A	TEN1		GET CHARACTER FROM PENCE FIELD
0253	F9A5 B6 DO 26	LDA A	PRICE+2		AND STORE IT
20					CLEAR TEMP STORE FOR TENTHS OF PENCE
0254	F9A8 97 1E	STA A	UNIT1		
0255	F9AA 7F 00 1D	CLR	TENTH		
0256	F9AD OC	VDU41	CLC		
25 0257		*THIS NEXT SECTION SUBTRACTS THE AMOUNTS IN TEMPORARY STORE			25
	AGE FROM THE CREDIT REMAINING*				
0258	F9AE 96 19	LDA A	TENTH	GET TENTHS FROM ACTUAL CREDIT STORE	
30 E					30
0259	F9BO D6 1D	LDA B	TENTH	GET TENTHS FROM TEMP STORE	
0260	F9B2 FD 7B	JSR	DECUSB	JUMP TO ROUTINE FOR DECIMAL SUBTRACTION	
35 0261	F9B5 97 19	STA A	TENTH	STORE RESULT IN ACTUAL CREDIT REGISTER	35
0262	F9B7 96 1A	LDA A	UNIT		
0263	F9B9 D6 1E	LDA B	UNIT1	DITTO FOR UNITS	
0264	F9BB C9 00	ADO B	#0	TAKING ACCOUNT OF BORROW	40
40					
0265	F9BD BD FD 78	JSR	DECSUB		
0266	F9CO 97 1A	STA A	UNIT		
0267	F9C2 96 1B	LDA A	TEN		
0268	F9C4 D6 1F	LDA B	TEN1	DITTO FOR TENS	
45 0269	F9C6 C9 00	ADC B	#0		45
0270	F9C8 BD FD 7B	JSR	DECSUB		
0271	F9CB 97 1B	STA A	TEN		
0272	F9CD 24 03	BCC	VDU42		
0273	F9CF 7A 00 1C	DEC	POUND	DECREMENT POUNDS REGISTER IF BORRO	50
50					
	GENERATED FROM TENS SUBTRACTION				
0274	F902 86 01	VDU42	LDA A	#1	
0275	F9D4 97 20	STA A	DEBFLG	SET FLAG TO SHOW WE HAVE DONE THIS	
55	FRAME				55
0276	F906 7F C4 01	VDU4	CLR	TEXT	
0277	F909 7F 00 22	CLR	REDFLG	REMOVE SCREEN BLANKING CLEAR FLAG WHICH IS SET WHEN REDO KEY IS PRESSED	
0278	F9DC DE 06	LDX	DISPT		

CLAIMS

1. A device for displaying information contained in a computer, the device comprising means for controlling the computer to display selectable pages of information, means for isolating information



TABLE I (continued)

0243	F992 27 OC	BEQ	NODP	IF SO, BRANCH TO XXP ROUTINE	
5 0244		*ROUTINE FOR X Xp FORMAT*			5
0245	F994 97 1E	STA A	UNIT1	IF NOT, STORE IN TEMP STORE FOR PENCE THEN GET CHARACTER FROM TENTHS OF	
0246	F996 B6 DO 26	LDA A	PRICE+2		
10	PENCE POSITION				10
0247	F999 97 1D	STA A	TENTH	AND STORE IT	
0248	F99B 7F 00 1F	CLR	TEN1	AND CLEAR TEMP STORE FOR TENS OF PENCE	
0249	F99E 20 00	BRA	VDU41		
15 0250		*ROUTINE FOR XXp FORMAT*			15
0251	F9AO B6 DO 25	NODP	LDA A	PRICE+1	
0252	F9A3 97 1F	STA A	TEN1	GET TENS OF PENCE CHARACTER STORE IT	
0253	F9A5 B6 DO 26	LDA A	PRICE+2	GET CHARACTER FROM PENCE FIELD	20
20 0254	F9A8 97 1E	STA A	UNIT1	AND STORE IT	
0255	F9AA 7F 00 1D	CLR	TENTH	CLEAR TEMP STORE FOR TENTHS OF PENCE	
0256	F9AD OC	VDU41	CLC		
25 0257		*THIS NEXT SECTION SUBTRACTS THE AMOUNTS IN TEMPORARY STORE			25
	AGE FROM THE CREDIT REMAINING*				
0258	F9AE 96 19	LDA A	TENTH	GET TENTHS FROM ACTUAL CREDIT STORE	
30 E					30
0259	F9BO D6 1D	LDA B	TENTH	GET TENTHS FROM TEMP STORE	
0260	F9B2 FD 78	JSR	DECUSB	JUMP TO ROUTINE FOR DECIMAL SUBTRACTION	
35 0261	F9B5 97 19	STA A	TENTH	STORE RESULT IN ACTUAL CREDIT REGISTER	35
0262	F9B7 96 1A	LDA A	UNIT		
0263	F9B9 D6 1E	LDA B	UNIT1	DITTO FOR UNITS	
0264	F9BB C9 00	ADO B	#0	TAKING ACCOUNT OF BORROW	40
40 0265	F9BD BD FD 78	JSR	DECSUB		
0266	F9CO 97 1A	STA A	UNIT		
0267	F9C2 96 1B	LDA A	TEN		
0268	F9C4 D6 1F	LDA B	TEN1	DITTO FOR TENS	
45 0269	F9C6 C9 00	ADC B	#0		45
0270	F9C8 BD FD 7B	JSR	DECSUB		
0271	F9CB 97 1B	STA A	TEN		
0272	F9CD 24 03	BCC	VDU42		
0273	F9CF 7A 00 1C	DEC	POUND	DECREMENT POUNDS REGISTER IF BORRO	50
50	GENERATED FROM TENS SUBTRACTION				
0274	F902 86 01	VDU42	LDA A	#1	
0275	F9D4 97 20	STA A	DEBFLG	SET FLAG TO SHOW WE HAVE DONE THIS	
55	FRAME				55
0276	F906 7F C4 01	VDU4	CLR	TEXT	
0277	F909 7F 00 22	CLR	REDFLG	REMOVE SCREEN BLANKING CLEAR FLAG WHICH IS SET WHEN REDO KEY IS PRESSED	
0278	F9DC DE 06	LDX	DISPT		60

CLAIMS

1. A device for displaying information contained in a computer, the device comprising means for controlling the computer to display selectable pages of information, means for isolating information



concerning the price charge for the computer to supply the requested pages, and means for accumulating corresponding information concerning the price of the pages in an appropriate register.

2. A device according to claim 1 wherein the register is a credit register, a credit being entered on the register by inserting a coin into the apparatus, or by inserting an appropriate credit card or the like, the debit 5 derived from the price of each page, when each page of information is displayed, being subtracted from the credit register.

3. A device according to claim 2 wherein the price of each page is entered into a temporary register, and this price is subtracted from the credit register as the page is displayed.

4. A device according to claim 1 wherein the information related to the price of each page is recorded in a 10 debit register and, when the viewing of information is terminated, the accumulated debit in the debit register is transferred to a memory maintained by the computer.

5. A device according to any one of the preceding claims wherein the apparatus is adapted to assess whether one predetermined character in the page of information to be displayed is a digit or a blank, and if the character is a digit, to enter the digit in a first register and to enter the next but one character in a second 15 register, and if the said predetermined character is a space, to enter the next character in a further register and the subsequent character in the first register.

6. A device according to claim 5 wherein the apparatus is adapted to operate only if a predetermined character is detected in a predetermined position in a page to be displayed.

7. A device for displaying information contained in a computer substantially as herein described with 20 reference to the accompanying drawing.