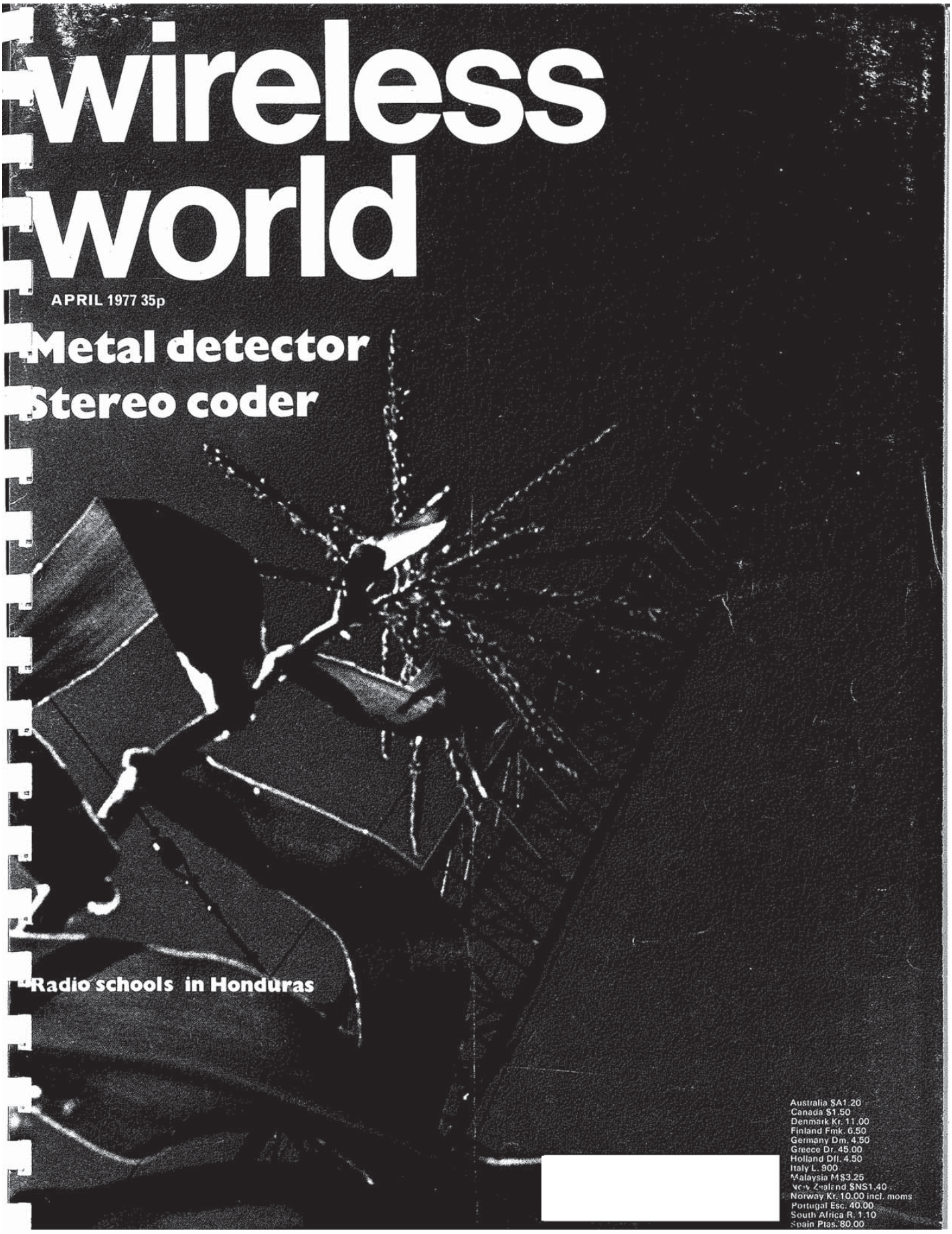
wireless world

APRIL 1977 35p

Metal detector
Stereo coder



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wireless world

Electronics, Television, Radio, Audio

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Contents

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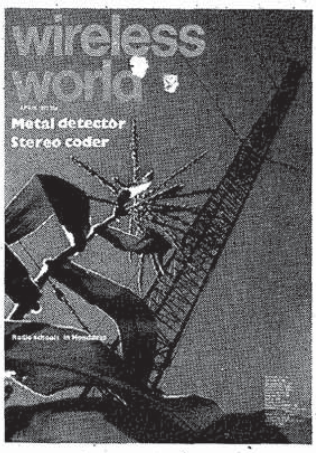


Front cover, showing the medium wave aerial at Radiolândia, Comayagua, Honduras, introduces the article on education by radio in that country (page 57).

Photographer Paul Brierley

IN OUR NEXT ISSUE

Electrolytic capacitor tester. Enables the value of an electrolytic capacitor to be measured automatically and the result displayed directly by meter. Leakage is also indicated.

Two-stage linear amplifier. A discussion of the design of solid-state 50W and 300W linear amplifiers for the h.f. band (1.6-30MHz).

Radio in the '80s, a look forward to sound receiver design and the ideal set of the future by the BBC's chief engineer of radio broadcasting.

ISSN 0043 6062

VIEWDATA

3 — Operation of the system: terminals and codes

by S. Fedida, B.Sc. (Eng), M.Sc., F.I.E.E., A.C.G.I. *Post Office Research Centre*

Part 1 of this series, in the February issue, gave an introduction to Viewdata, with mentions of earlier systems. Part 2, in the March issue, dealt mainly with applications. This article now describes the overall arrangement of the system, the codes used and the Viewdata terminal.

Fig. 1 gives an overall view of a Viewdata connection. The home terminal, shown at the bottom left hand side, comprises a domestic television set, a telephone instrument, a Viewdata adaptor and a keypad. The actual assembly is shown in Fig. 2. Two types of keypads proposed are shown in Figs. 3 and 4. The basic keypad is Fig. 3; this provides the ten numerals, * and # symbols and keys for automatic dialling, if installed. Fig. 4 is an alphanumeric keypad. This contains in addition to the above, the complete upper case alphabet, punctuation marks and symbols like £,%,/, arithmetic and algebraic symbols and cursor control characters. A typical Viewdata terminal for the office, the Viewdataphone, is shown schematically at the bottom right hand side of Fig. 1. This consists of a Viewdata terminal and a self-contained telephone instrument. A typical Viewdataphone was shown in the March issue. The Viewdata computer is shown at the top of Fig. 1, notionally connected to a variety of data banks, either direct or through the switched telephone network.

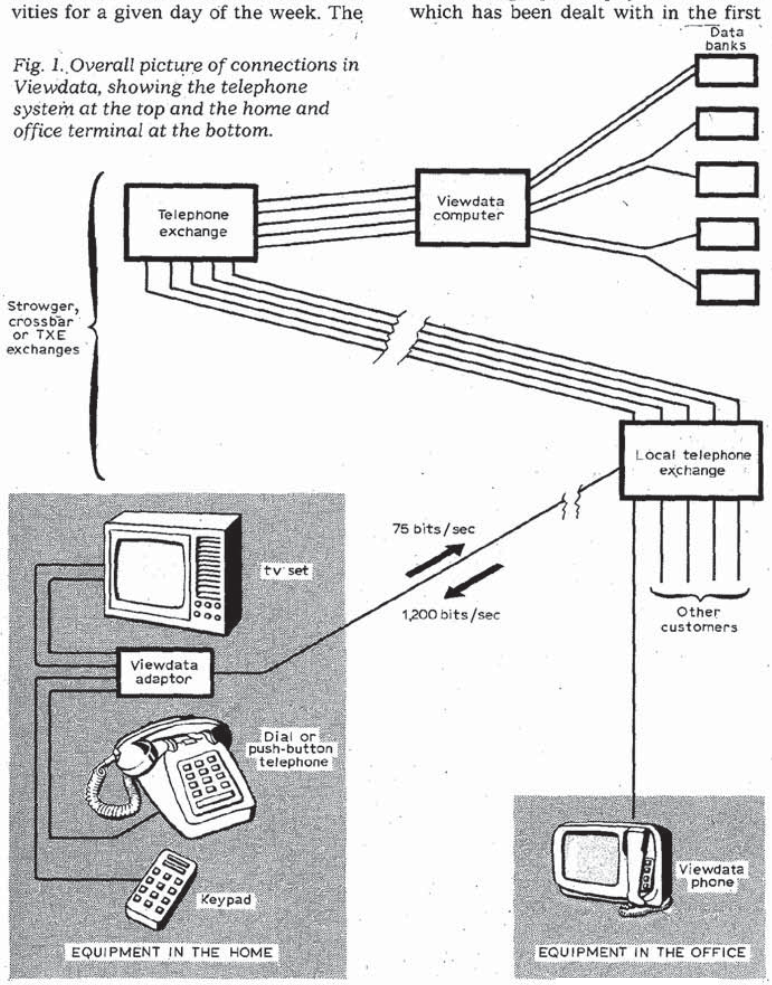
As mentioned in the February issue communication between the terminal and the Viewdata computer is at a rate of 1200 bits/s from computer to terminal and 75 bits/s in the opposite direction. More details of this arrangement will be given later.

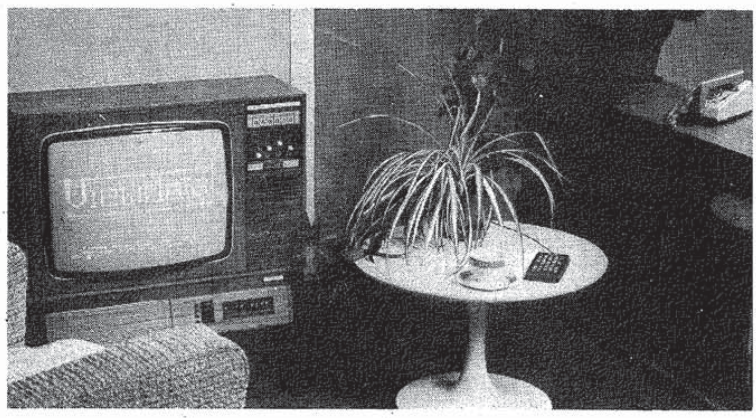
In order to establish a connection to the Viewdata computer the user dials the telephone number of the computer as for a normal telephone call. When the connection is established the computer generates a high pitched tone (frequency 1300Hz) which is heard in the telephone receiver. The user then presses a button marked "data" on the telephone set, which switches the telephone line from the telephone set to a modem (modulator-demodulator). The telephone receiver is then set by the side of the cradle. Once contact is established, the computer transmits a first frame, which requires the user to enter a user number. When this has been done Viewdata offers the first index (shown in the February issue, p. 32).

The action is now transferred to the keypad. On this the user keys-in his user number and any further responses. Suppose the user wishes to obtain information about entertainment activities for a given day of the week. The user may enter the entertainment page direct by keying *3230#. An example of one of the pages in the entertainment sequence was Fig. 6 in the February issue. In later models of the terminal, use is made of the calling key on the keypad. This calls the Viewdata computer automatically and switches over to the modem without the user's intervention. The keypad may then be used as previously.

The design philosophy of Viewdata which has been dealt with in the first

Fig. 1. Overall picture of connections in Viewdata, showing the telephone system at the top and the home and office terminal at the bottom.





▲ *Fig. 2. Home terminal for Viewdata, with television set, telephone (right) and keypad on the table.*

two parts of this article referred to the need to keep the cost of Viewdata down to very low levels, both on the terminal side and on the computer usage side. Indeed, unless the cost of using the computer facility is kept substantially below that of using current computer time-sharing systems, the whole project may not become viable. This therefore postulates the use of a distributed computer system, so arranged that the majority of users may have access to a nearby computer centre, at the cost of a local telephone call for the connection plus a correspondingly modest charge for the use of the computer and the information provided.

The resulting network is typically as shown in Fig. 5. Users are within a local call distance of their computer centres, shown as rectangles. A cluster of local computer centres is grouped under the control of a regional centre for the purpose of data gathering and distribution. A national data centre controls the operation of the whole system and distributes to each regional centre new information, news and data updates. Regional centres also accept information of regional or local interest and distribute this to the local centres.

The Viewdata terminal

Display format. The display format of Viewdata is identical with that of teletext, i.e. a page consists of 24 rows of 40 characters each, each character being generated by a 5 × 7 matrix with upper and lower case, character rounding, graphics symbols and colour. Thus a great deal of the electronics in a terminal may be common to Viewdata and teletext, the differences being primarily concerned with the additional functions needed in Viewdata, the different modes of transmission applicable to these two systems and the different contraints appertaining to the different communications media involved.

In the case of Viewdata the data enters the terminal via the telephone line at relatively low speed, and, as the probability of data corruption is quite low, little is needed for the purpose of error detection and correction. Indeed, extensive Viewdata tests have been

▲ *Fig. 3. Basic keypad used in a Viewdata terminal, providing ten numerals and a few other keys.*

carried out over the past two years from a large number of centres in the UK and on the Continent. In all these tests the public switched telephone network was used to connect up to the experimental Viewdata system based at Martlesham, near Ipswich, and transmission difficulties have been very rare.

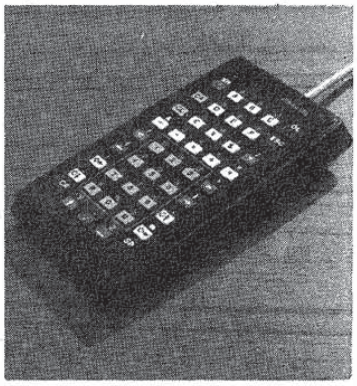
The character codes used for Viewdata and teletext are also identical, except for the actual codes transmitted over the line, where a slight change is made to comply with International Standards Organization recommendations.

The table of codes used for Viewdata is shown in Figs. 6, 7 and 8. Fig. 6 shows the joint Viewdata and teletext codes for alphanumeric characters only. This differs from earlier versions in the following characters:

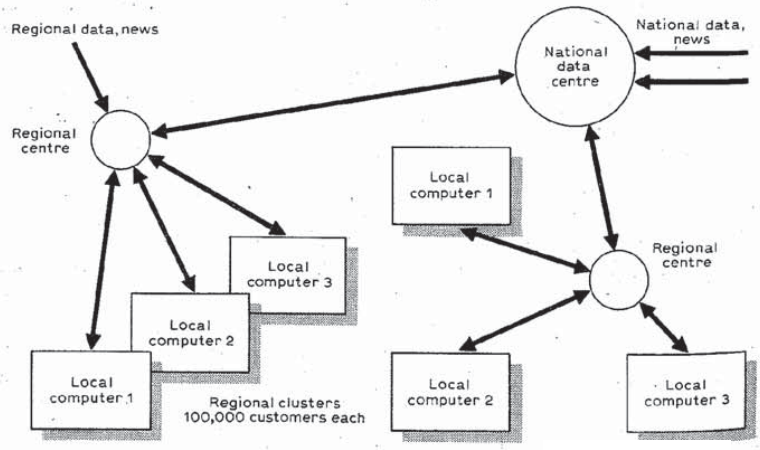
Column	Row	Was	Is now
5	11	[	←
5	12	\	½
5	13	]	→
5	15	←	≠
6	0		←
7	11	{	¼
7	12	|	‖
7	13	}	¾
7	14	→	÷

Note: The top, left-pointing, arrow is used as an assignment statement; the lower, right-pointing, arrow means "go to"; and the sign ≠ is used as a terminator and for special functions. Note also that the arithmetic operator × (multiply) used in Viewdata is shown as *x* (lower case *x*), while the minus sign (−) is code 2/13 and the exponentiation sign is code 5/14 shown as ↑.

▼ *Fig. 4. More elaborate, alphanumeric, keypad with a variety of other symbols.*



▼ *Fig. 5. A distributed Viewdata network, showing local computers, regional centres and national data centre.*



Bits $b_7b_6b_5b_4b_3b_2b_1$	Row \ Col	0	1	2	3	4	5	6	7
0 0 0 0	0			SP	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
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	10			*	:	J	Z	j	z
1 0 1 1	11			+	;	K	←	k	¼
1 1 0 0	12			,	<	L	½	l	//
1 1 0 1	13			–	=	M	→	m	¾
1 1 1 0	14			.	>	N	↑	n	÷
1 1 1 1	15	S1		/	?	O	#	o	■

▲ *Fig. 6. Codes for alphanumeric characters only, as used in both Viewdata and teletext.*

Bits $b_7b_6b_5b_4b_3b_2b_1$	Row \ Col	0a	1a	2a	3a	6a	7a
0 0 0 0	0	(NUL)	(DLE)				
0 0 0 1	1	alpha^n red	graphics red				
0 0 1 0	2	alpha^n green	graphics green				
0 0 1 1	3	alpha^n yellow	graphics yellow				
0 1 0 0	4	alpha^n blue	graphics blue				
0 1 0 1	5	alpha^n magenta	graphics magenta				
0 1 1 0	6	alpha^n cyan	graphics cyan				
0 1 1 1	7	alpha^n white	graphics white				
1 0 0 0	8	flash	conceal display				
1 0 0 1	9	steady	contiguous graphics				
1 0 1 0	10	end box	separated graphics				
1 0 1 1	11	start box	(ESC)				
1 1 0 0	12	normal height	black background				
1 1 0 1	13	double height	new background				
1 1 1 0	14	(SO)	hold graphics				
1 1 1 1	15	(S1)	release graphics				

Fig. 7. Codes for graphics used in teletext.

Fig. 7 shows the graphics and control characters use in teletext, as at September 1976*, the conventions being as before, that is:

1. All character rows start in the "steady", "alphanumeric white" and "unboxed" condition without control characters.
2. Control characters shown are displayed as spaces, but control whether alphanumeric or graphic characters are displayed and what colour is used.
3. Alphanumeric characters in columns 4 and 5, i.e. all of the upper case letters and a few others, may be displayed next to graphic symbols without an intervening space.

While the intervening space convention following a control character is essential in teletext, it has been accepted in Viewdata for the sake of uniformity, although it is not really essential and imposes undesirable constraints on the page format.

Additional control characters have recently been added to teletext to provide enhanced display facilities. The "intervening space" convention is somewhat modified and made less onerous, although not all its undesirable effects are eliminated.

The new control characters, which may be applied equally in Viewdata are in four groups:

Contiguous/separate graphics. Codes 1/9 and 1/10 in teletext, 5a/9 and 5a/10 in Viewdata. This provides the choice of graphics symbols filling the whole of a character rectangle, or only six discrete and separate dots.

Normal height/double height. Codes 0/12 and 0/13 in teletext, 4a/12 and 4a/13 in Viewdata. This provides for the optional display of alphanumeric characters in the standard size, i.e. within the normal char-

*Broadcast Teletext Specification. Published jointly by the Broadcasting Corporation, Independent Broadcasting Authority and British Radio Equipment Manufacturers Association.

Bits $b_7b_6b_5b_4b_3b_2b_1$	Row \ Col	0	1	2a	3a	4a	5a	6a	7a
0 0 0 0	0	NUL							
0 0 0 1	1		DC_1			alpha^n red	graphics red		
0 0 1 0	2		DC_2			alpha^n green	graphics green		
0 0 1 1	3		DC_3			alpha^n yellow	graphics yellow		
0 1 0 0	4		DC_4			alpha^n blue	graphics blue		
0 1 0 1	5	ENQ				alpha^n magenta	graphics magenta		
0 1 1 0	6					alpha^n cyan	graphics cyan		
0 1 1 1	7					alpha^n white	graphics white		
1 0 0 0	8	BS	CAN			flash	conceal display		
1 0 0 1	9	HT				steady	contiguous graphics		
1 0 1 0	10	LF				end box	separated graphics		
1 0 1 1	11	VT	ESC			start box			
1 1 0 0	12	FF				normal height	black background		
1 1 0 1	13	CR				double height	new background		
1 1 1 0	14		cursor home IS_2				hold graphics		
1 1 1 1	15						release graphics		

Fig. 8. Control and graphics codes used in Viewdata.

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