CITIFAX CF2000 TELETEXT DECODER COMMAND SET

1. Introduction

The Citifax CF2000 External Teletext decoder has been designed to interface to any host with a general RS232 port. Specifically, it has a 9-way `D' connector which connects directly to a PC COM port via. a straight 1:1 cable. The unit is capable of receiving Teletext conforming to the World Teletext system, as well as receiving and decoding data transmitted in the BBC 'Datacast' format. (Packet 31 VBI Data).
The decoder includes a VHF/UHF synthesized tuner.

Also available is the CF2000 PCI Card version; the command set is similar to the external unit, but note Baud Rate differences as below!

N.B. Throughout this document, the following convention is used for describing commands and responses:

i. STX, EOT etc. are ASCII control codes e.g. SOH is 01 hex. (Control A); EOT is 04 hex (Control D)

ii. Strings in quotes are literal e.g. 'AB' is equivalent to a two byte string containing 41 hex followed by 42 hex.

iii. Control codes in square brackets e.g. [ETX] are optional terminators which are ignored but should be sent for compatibility
with earlier decoders.

iv. Commas have been shown in this document for clarity, but are not present in commands or responses to and from the decoder.

2. Command interface.

The decoder provides a simple command interface to the host system via a full duplex RS232 port. You MUST set hardware handshaking ON with RTS/CTS flow control from the host.

Factory setting : 8 data bits, 1 stop bit, no parity.

Version 7.xx Firmware has a FIXED baud rate of 115,200 Baud.
Version 5.xx Firmware factory default is 9600 Baud

The commands supported by the decoder are described below:

2.1 'Reset Unit'.
This command forces the unit to reset. The format for this command is:

SOH,'Z',[EOT]

The response to the above command takes the following format:

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2.2 'Enable Headers'.

Following a reset command, the reception of headers is disabled. The following command enables the reception of headers:

SOH,'H+',[EOT]

A received header is transmitted to the host in the following format:

SOH,'H',n,STX,<40 characters>,ETX

Where n = Magazine number (page hundreds) of Header.
          Note: n is an ASCII digit, e.g. 31 hex.

2.3 'Disable Headers'

The command:

SOH,'H ',[EOT]

disables the reception of headers. There is no response to this command.

2.4 'Select page to be received'

Page requests may contain 3 or 7 digits. In the latter case the 4 least significant digits correspond to the required sub-page. A page request is of the following format:

SOH,'P',pppssss,EOT

where ppp is the displayed page number, and ssss is an optional subcode field.

The response to this command is:

SOH,ACK,'P',EOT

Any subsequently received pages are sent to the host in the following format:

SOH,'P',pppssss,STX,' ',<40 characters>

for Row 0, and for every other row a string of the following format is sent:

r,<40 characters>

where r is an ASCII character representing the number of the row which follows which has been calculated simply by adding 20hex to the actual row number e.g. '$' signifies row 4. The complete response is terminated by 7f hex, EOT (for compatibility with earlier products).

Note: The response always contains a seven digit page number irrespective of whether initiated by a three or seven digit page request.

2.5 'Send Test Page'
There is a test page stored in the decoder ROM to facilitate host software development in the absence of off air data. The command to request the test page is a special case of the 'Select Page' command as follows:

SOH,'P','FFFFFFF',EOT

The response is as previously described.

2.6 'Tune into TV channel number'

To tune to a TV channel, the following command needs to be sent to the receiver:

SOH,'T', n1, n2

where n1, n2 are ASCII digits in the range 21 to 69. These correspond to European TV channels E21 - E69.
The receiver will respond with:

SOH,ACK,'T',EOT

Note: The TV channel number is stored in non-volatile memory, and is recalled after a power on reset.

2.61 `Tune into Specified Frequency'

To tune into a specific frequency, the following command needs t o be sent to the receiver.

SOH,'F',n1,n2,n3,.,n4,n5,n6,n7

where n1 is 100's of Megahertz

n2 is 10's of Megahertz

n3 is units of Megahertz

n4 is 100's of Kilohertz

n5 is 10's of Kilohertz

n6 is units of Kilohertz

n7 is 100's of Hertz

Note the decimal point between MHz and Hz. All 8 ASCII characters must be entered for the command to take effect. The tuner will tune into the nearest lowest multiple of 62.5kHz, i.e. rounded down, because this corresponds the finest resolution of the tuner.

The receiver will respond with :

SOH,ACK,'F',EOT

Note: The frequency is stored in non-volatile memory, and is recalled after a power-on reset.

2.7 'Tune into TV channel'

The following command will tune into the optimum TV channel (UK Only)

SOH,'O', n

where:

n = '1' for BBC1 n = '2' for BBC2 n = '3' for ITV n = '4' for CH4

The unit will respond within 30 seconds with:

SOH,ACK,'O',EOT

if the TV channel has been found, otherwise the response will be:

SOH,NACK,'O',EOT

If lower case 'o' is substituted for the capital 'O' within the command, the response will include a set of two byte decimal digits corresponding to the channels being scanned e.g.:

21 22 23 24 25 26 27 28 29 30 SOH,ACK,'O',EOT.

This is useful in determining the actual channel number of say BBC1.

Note: The next time the 'O' or 'o' command is executed the direction of scan will be reversed producing the output (for the 'o' command):

69 68 67 ... 32 31 30 SOH,ACK,'O',EOT

Note: The TV channel number is stored in non-volatile memory, and is recalled after a power on reset.

2.8 'Select Datacast address'

The unit will enter Datacast mode when the following command is received from the host:

SOH,'D',n1,n2,n3,n4,n5,n6,EOT

where n1 to n6 are hexadecimal ASCII (n1 most significant) corresponding to the 24 bit Datacast address.

e.g. SOH,'D02343A'

will enable the receiver to receive Datacast frames with address field 2343A Hex.

Note: The command: SOH,'DXXXXXX' will enable reception of all Datacast frames in the given Datacast data channel.

A frame which is received with no CRC or Hamming errors, and contains the correct address field will have its data field passed to the host without modification i.e. up to 36 bytes of user data.

Note: If in the above command, the 'D' is replaced by 'X', a debug version of the complete packet will be sent e.g.:

Packet CRC: Good Format Type = 06 Data channel = 08

Packet address length = 2 Packet address = 000001

```
D0 EA 38 49 02 15 00 C2 2A 2A 2A 20 58 33 31 20 Pj8I...B*** X31
54 53 54 20 50 41 43 4B 45 54 20 5B 31 31 34 34 TST PACKET [1144
38 39 5D 20 2A 2A 2A 0D EF 49 89] 20         89] ***.oI
```

Note: The 'Datacast address' in stored in non-volatile memory, and is recalled after a power on reset.

2.9 'Select Datacast data channel'

There are four Datacast data channels 0, 1, 2, 3 as defined by the BBC, though these are also known as data channels 8,9,10 and
11 respectively.

To receive packets from a specific data channel the following command needs to be sent to the decoder:

SOH,'C',n

where:

n = '0' or '8' for data channel 0 (EBU channel designation 8),

'1' or '9' for data channel 1 (EBU channel designation 9),

'2' or 'A' for data channel 2 (EBU channel designation 10),

'3' or 'B' for data channel 3 (EBU channel designation 11).

Note: In addition to the 'Datacast address', the 'data channel' is also stored in non-volatile memory, and is recalled after a power on reset.

2.10 'Return Datacast status'

While in 'Datacast mode' status is returned after receipt of the following command (in Datacast mode):

SOH,'Q'

The response to this command is:

SOH,'Q',':',aa,':',bbbbbb,':',ccccc,':',ddddd,':',eeeee,':',fffff,':',ggggg,CR,LF

if Channel Tuning obtains (See 2.6), otherwise

SOH,'Q',':',ttt.tttt,':',bbbbbb,':',ccccc,':',ddddd,':',eeeee,':',fffff,':',ggggg,CR,LF

if Frequency Tuning obtains (See 2.61) where:

aa = tuner channel (decimal)

bbbbbb = Datacast address (hexadecimal)

ccccc = number of packets received (decimal)

ddddd = number of packets received with bad CRC (decimal)

eeeee = RI (Repeat Indicator) i.e. number of repeated packets (decimal)

fffff = (Bad) continuity counter (decimal)

ggggg = (Off air) Overrun counter (decimal)

ttt.tttt = Frequency in MHz (decimal)

2.11 'Set new host port baud rate'
NOT APPLICABLE TO PCI CARD VERSION Which is FIXED at 115,200 Baud

External Decoder Versions 5.XX will normally be factory set to 9600 bits per second. However, the following command may be issued to change the port speed:

SOH,'B',n

where:

n = '1' for 1200 baud

n= '2' for 2400 baud

n= '3' for 4800 baud

n= '4' for 9600 baud

n= '5' for 19200 baud

n= `6' for 38400 baud

Note: After the new speed is saved in non-volatile memory, the unit will automatically reset, and will reconfigure its serial port with the new speed.

If this command is issued to Version 7 or higher decoders, the baud rate will remain at 115,200 Baud.

2.12 'Enable Datacast error monitoring'. Version 5.XX Only

Normally the Signal LED simply flashes at 1:1 mark space ratio, to indicate the presence of off air video signal. Alternatively the LED may be used to indicate data quality (Datacast mode only). This is intended as an engineering diagnostic facility to gauge data quality.

The format of the command to enable error monitoring is:

SOH 'E' ssssssuuuuullllll EOT where:

sssss is a five digit ASCII number (number of packets to be analysed)

uuuuu is the upper threshold

lllll is the lower threshold

Note:

65536 > sssss > uuuuu > lllll.

Data quality may be described as:

A. Excellent. (The number of good packets received falls between upper and number of packets to be analysed).

B. Acceptable. (The number of good packets received falls between lower and upper thresholds).

C. Unacceptable. (The number of good packets received is below lower threshold).

Once the error monitoring command has been invoked, visual indication on the data quality will commence.

The Signal LED will emit the following patterns (1 = LED on, 0 = LED off):

Excellent data quality.

1010100000000000000000000000000000000000

<----------------- 2 Second cycle >

Acceptable.

1010000000000000000000000000000000000000

< 2 Second cycle >

Unacceptable.

1000000000000000000000000000000000000000

< 2 Second cycle >

This may be viewed as three, two or one 'blips' of the Signal LED every two seconds.

The error command may be cancelled by re issuing the command with an illegal non-numeric parameter e.g. SOH,'E','X'.

Note: Immediately after the command has been invoked, the Signal LED will indicate acceptable data quality, until sssss packets have been received, after which it will indicate the current received data quality.

3.1 Physical Connections (External unit)

a. The RS232 port (9 way female 'D') has the following pin assignments:

Pin number	Function	Direction
3	CF2000 data	input
2	CF2000 data	output
7	CF2000 RTS (busy)	input
8	CF2000 CTS (busy)	output
6	CF2000 DSR	output
7	Ground	-
5	CF2000 DCD	output

<u>Notes</u>

a. Use a standard 1:1 cable to connect the decoder to a PC.

b. The power input is 12v AC from the adaptor supplied with the decoder. If a power supply is sourced locally make sure it is fully isolated and rated at 400mA or more AC output at 12 volts. This may be 50Hz or 60Hz it does not matter, but it MUST be AC, not DC! Ensure it meets all safety approvals.

c. The UHF/VHF input is a standard IEC type connector or a PHONO type for certain overseas models.

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