XBOB Application Guide ~ Firmware V3.5 ~ April 23, 2007

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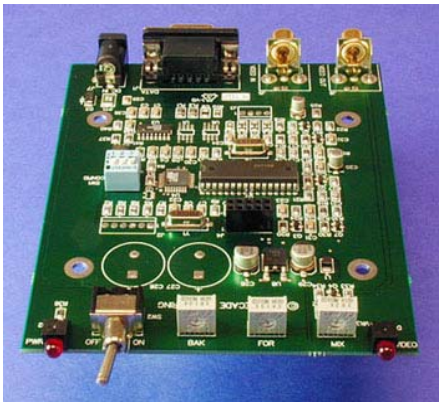


Introduction:

XBOB integrates Decade's third-generation video OSD (on-screen display) technology into a convenient plug & play format. The command set is nearly identical to that of our popular BOB-3 modules, and XBOB includes all of the optional circuitry described in the BOB-3 Application Guide. XBOB lets your PC display up to 680 characters on standard video monitors and TV sets. With 63 user-definable character patterns, XBOB supports pseudo-graphics and multiple languages. XBOB generates video on-board, or automatically genlocks to your video source and superimposes characters over the image. Printable characters and commands control XBOB through a fast RS-232 data link, much like a simple serial printer. NTSC or PAL video compatibility is available as an ordering option.

Cautions:

ESD (electro-static discharge) safety precautions must be followed at all times when handling XBOB boards. Use a grounded wrist strap and grounded work surface. XBOB boards must be stored and shipped in static-shield packaging (carbon-loaded or metallized, not pink poly).

Specifications:

Physical	PCB nominal length and width is 4.825 x 3.950 inches, exclusive of controls and connectors. Overall height is less than 0.75 inches for the standard version. Weight is about 2.6 ounces (73 grams). Ambient operating temperature range is 0~50 degrees C. For XBOB-C, the cabinet measures 5.25 (L) x 5.35 (W) x 2.00 (H) inches, exclusive of feet, controls and connectors. Total weight is about 10.2 ounces (290g).

Power Supply	8~15VDC at 100mA. Requires industry-standard coaxial DC power input plug with 2.1mm ID and 5.5mm OD. Center pin connection is positive. Higher current ratings are recommended if unregulated power supplies are used. The 15VDC upper limit must not be exceeded on a continuous basis.
Data I/O	The data path is RS-232 asynchronous serial with crystal-controlled rates of 1200, 2400, 4800, 9600, 19.2K, 38.4K, 76.8K, and 153.6K bits/S, using 8 data bits, no parity, and one stop bit (8N1). Bit rates are DIP switch selectable (preset to 9600). The I/O port is a 9-pin D-series female, allowing connection to a PC COM port with a straight-through (modem) male/female cable. Host hardware handshake signals are looped back. Software handshaking is provided, but use is not mandatory.
Print Speed	Printable characters are normally written to display RAM within a few uS after the stop bit is received, so total print delay time is essentially that of the serial interface (e.g. 521uS per character at 19,200 bits/S). Characters may not appear in the display until the next video scan cycle, depending on when they are written. If single-frame print timing accuracy is required, host write cycles should be triggered from vertical sync and print position should be near screen bottom.
Video I/O	XBOB's video environment is RS-170A (NTSC) composite baseband, 1Vpp 75 ohms unbalanced, connected via RCA jacks. BNC jacks may be available as an ordering option (please inquire). PAL-B video compatibility is available as an ordering option. The video input accommodates up to +2.5VDC bias mixed with incoming video. The video output contains a small DC bias (+1V), which is common to many video sources and is well tolerated at the inputs to most video equipment. An internal color video background signal is automatically generated if video input is not supplied, but application programs may enforce genlock or local video modes.
Character Format	Up to 680 characters may be displayed on screen, in 40 columns and 17 rows (16 when vertical scrolling is active). 320 character patterns are provided as 12x13 pixel bitmaps, including upper & lower case, italics, European language support, and a set of graphics characters useful for lines, bar graphs, etc. Non-ASCII characters are accessible through a simple command protocol. 63 of the standard character patterns are stored in font RAM and may be replaced by user-defined bitmaps, to support character-based graphics displays or alternate languages.
Display Features	Only monochrome text is available in genlock/overlay mode. Characters from ROM are displayed by default in white with a thin black outline. Halftone (reduced video intensity) and black character backgrounds are optional. Characters from font RAM have less display flexibility. This includes European language support, which is part of the default RAM character set. Color display features, including character background control, are supported in local video generation mode. In local mode, blue matte background is supplied by default. Other background colors are available by command. Blinking may be selected for any character or group in either video mode. Manual adjustment of transparency as well as character and background brightness (gray scale) is provided. Vertical scrolling may be configured for any contiguous group of display rows. A single crawl (horizontal scroll) line can display up to 256 characters sequentially. No other display is possible when crawl mode is invoked. The entire text display may be toggled on or off without affecting the contents of display RAM. Writing to display RAM is permitted with display on or off. A non-volatile boot script memory stores up to 512 characters that may be used to configure XBOB and/or automatically generate a display at power-up time.

Note: Product specifications, policies and prices are subject to change without notice. Contact Decade Engineering to confirm current status if any specified parameter is critical to your application.

Video Modes:

It's important to understand the video operating modes offered by XBOB. The basic modes are "Local" and "Genlock". Genlock mode may also be called *Overlay* mode, because video generator synchronization (genlock) must be achieved in order to superimpose characters on the image. A third video operating mode, "Automatic," derives from XBOB's ability to switch between the basic modes by detecting video input.

XBOB powers up in Automatic. If there's no video input, it selects local mode. In this case, XBOB generates the complete video signal, and characters appear on a blue (by default) matte background. If video input is present,

XBOB switches to genlock mode so that characters are superimposed on the externally generated video signal. XBOB continues to monitor incoming video and switch between the basic modes as required to maintain a video signal at the output.

Application programmers can force XBOB to stay in local or genlock modes if desired (see **{M** commands). Be aware, however, that video crosstalk artifacts can result from forcing local mode while video input is applied. Undesired mode switching (to local mode) due to incoming video signal dropouts or glitches can be avoided by forcing genlock mode. XBOB exhibits better behavior than BOB-II in this respect, so it's unlikely that you will be compelled to deal with video mode control directly.

System Hookup:

For the data connection to a PC COM port, XBOB requires a 9-pin D-subminiature male/female cable assembly with all pins wired straight through. This is often described as a DCE or modem style cable. Do not use a null-modem style hookup cable. Here's the RS-232 serial port connector pin assignment used in XBOB:

Pin	Function
1	Linked to 4 & 6
2	TX data out
3	RX data in
4	Linked to 1 & 6
5	Ground
6	Linked to 1 & 4
7	Linked to 8
8	Linked to 7
9	Not connected

The video output jack must be connected to the video input of a TV or video monitor, using 75-ohm coaxial cable with an RCA or BNC (if equipped) style plug at XBOB. TV inputs marked "Cable" or "Antenna" are not suitable. It's not necessary to connect XBOB's video input jack for a quick operating test, because XBOB will generate video. To overlay text on video, connect the composite video output of a camera, or equivalent video source, to XBOB's video input jack. This connection also requires 75-ohm coaxial cable terminated with an RCA or BNC plug.

Nominal power supply voltage range is 8~15VDC at 100mA. Decade Engineering recommends the use of power supplies with substantially higher current ratings, e.g. 500mA, for better voltage regulation. Use a standard coaxial DC power input plug with 2.1mm ID and 5.5mm OD, and wire the center pin positive. *RadioShack.com* part number 910-0902 is a suitable DC power input plug. Note that unregulated "9VDC" power supplies typically deliver about 12VDC with a light load, and "12VDC" supplies often exceed 15VDC output!

Front Panel Controls:

XBOB provides a power switch and power indicator LED, as well as an LED to indicate missing video at the video input connector.

Screwdriver adjustments are provided for character foreground (FOR) and background (BAK) brightness. They are factory-set near white and black, respectively, in the genlock/overlay mode. Brightness variation may occur when switching to local mode (blue screen), but the factory settings are best unless you use local mode exclusively. Wrong control settings can cause character overlay instability and video recording problems downstream. Use an oscilloscope or video waveform monitor to achieve accurate adjustment.

A third screwdriver adjustment is provided for setting overlay transparency (MIX). The factory setting is full clockwise, resulting in maximum overlay contrast. The full CCW setting makes characters almost disappear. This control may be freely adjusted for best results in each application. Mid-range settings allow background video to show through superimposed characters, and also reduce the crawling effect sometimes seen around character edges when they're placed over intensely colored regions of the image. In local video mode (blue screen), the MIX pot must be set full clockwise.

Baud Rate Configuration:

XBOB is shipped from the factory configured for 9600bps. All versions of XBOB with RS-232 communications capability use a three-position DIP switch to configure the communication bit rate. This switch is marked "CONFIG" (SW1) on the PCB. Set the three numbered switch levers to obtain communication rates as listed in the following table:

1	2	3	Baud Rate (bps)
On	On	On	1200
On	On	Off	2400
Off	On	Off	4800
Off	Off	Off	9600
On	Off	Off	19,200
Off	Off	On	38,400
On	Off	On	76,800
Off	On	On	153,600

Note: The RS-232 interface chip used in some production boards may not explicitly support XBOB's highest communication rate. Consult with Decade Engineering if you need to use this rate setting.

Using XBOB in a cable TV system:

It's not possible to insert a single XBOB in a cable TV system and display the same text on all channels at once. There are a number of reasons for this. In a cable system, video signals are modulated onto RF carriers at different frequencies (that's how the TV tuner is able to pick out just one). The signals often originate at widely separated locations with no regard for scan synchronization, and individual signal strengths may be poorly controlled.

XBOB's input and output are composite (baseband) video. This means that incoming TV channels must be demodulated from RF to baseband in order to place a text overlay on the image. To display the output from XBOB on a standard TV receiver, you must use an RF modulator to re-create a TV broadcast channel, which may then be fed into your cable system for distribution to as many TV sets as required. Each TV set must be tuned to the RF modulator's output channel in order to view the text.

Of course, you need a tuner/demodulator, an XBOB, and an RF modulator for each TV channel requiring a text overlay. A side-benefit of this arrangement is that you may freely restructure channel assignments in your local cable system. A potential problem is that low-cost modulators are sometimes poorly filtered and may generate interference on adjacent channels. Be sure to use modulators that are designed for adjacent channel operation, or else leave dead channels between the ones you place in service.

Control Protocol:

Serial communication parameters are: **8N1** (8 data bits, no parity, 1 stop bit). Bit rates are configured with a DIP switch in XBOB. See *Baud Rate Configuration* above.

Your application program must manage the software handshake correctly if you transmit data to XBOB continuously at a high rate. XBOB transmits the **<XOFF>** character (hex 13, ctrl-S) if the receive data buffer (512 bytes) reaches 75% full, and transmits **<XON>** (hex 11, ctrl-Q) when it drops below 25% full. This is an industry-standard flow control technique that is fully compatible with common PC terminal emulation programs such as HyperTerminal™.

After a brief start-up delay (about 500mS), XBOB transmits **{HR<CR>** (hardware reset) and **<XON>**, to inform the host controller that it's on-line. XBOB may send a garbage character or two during initialization. XBOB always monitors incoming video. If video status changes, and at power-up time, XBOB transmits **{VT<CR>** or **{VF<CR>** to indicate presence or absence of incoming video.

Any received character not preceded by the command prefix (**{**) is interpreted as ASCII text and written to the screen at the current 'cursor' (print position) location. The cursor automatically advances to the next available character cell and wraps to the next line, or back up to the first line as required. Display rows (lines) are numbered from the top down starting with zero. Display columns are numbered from left to right starting with zero. ROM characters are presented with white foreground and thin black outline by default.

Non-ASCII characters and unsupported ASCII characters are ignored in character translation modes other than 3 and 4. In those modes, transmit single-byte binary values (see character set illustrations) to specify each printable character. Do not send data containing the command prefix character (hex 7B) while in translation mode 3 or 4 unless you intend to send a command. The following ASCII codes are supported in mode 0, the default translation mode:

SP (space) **CR** (carriage return) **A~Z a~z 0~9 ~ ! # $ % & * ( ) + ' ` - = ; : " , . / ? < >**

ASCII **<CR>** (carriage return) normally moves the print position to the left end of the next available line. The **{Z** and **{2** commands change this behavior in ways that are useful for some applications.

Commands sent to XBOB must be prefixed by the left curly brace character: **{** All commands except **{N** and **{VW** employ a fixed-length format, and do not require a command suffix. Command salvos require a **{** prefix to each command in the string. Command letters are not case-sensitive.

Command	Description
{Ayy	Clears a single row of characters if "yy"=00~16. Clears the entire screen and sets the 'cursor' to top left home position if "yy"=17. Clears the scroll buffer if "yy"=18.
{BE & **{BD**	Display enable/disable. Enabled by default. Display RAM contents are not affected, and characters may be written to display RAM in either mode.
{Cxxyy	Moves print position (cursor). "xx" is the two-digit decimal ASCII column number (00~39) and "yy" is the row number (00~16). "yy" is ignored in scroll mode, but must be present.
{Dn	Character cell background color (local mode). "n" = 0~7. Defaults to blue.
{En	Character color for subsequent characters (local mode). "n" = 0~7. Defaults to white
{Fn	Screen color (local mode). "n" = 0~7. Defaults to blue.
{GE & **{GD**	Blink enable/disable. Subsequent characters flash or don't flash in the display. Does not affect characters from RAM font.
{GCn	Blink duty cycle. "n" = 0~3. 0: Off, 1: 25%, 2: 50%, 3: 75%. Defaults to 50%
{GMb	Blink mode. "b" = 0~1. 0: Default on/off flash, 1: Pixel data reversal
{GTb	Blink rate. "b" = 0~1. 0: Default slow (1S), 1: Fast (0.5S)
{HHphh	Horizontal display position offset with single-pixel resolution. "p" is a polarity sign (+ or -). "hh" is a two-digit hex value in the range of 00~FF. Numeric letters may be either case. Range is limited internally. For NTSC, the limits are –64 and +FF (–100 to +255 decimal). For PAL, the limits change to –67 and +FF (–103 to +255 decimal). Note: Sync distortion can occur if the overlay is shifted off screen.
{HVphh	Vertical display position offset with single-pixel resolution. "p" is a polarity sign (+ or -). "hh" is a two-digit hex value in the range of 00~FF. Numeric letters may be either case. Range is limited internally. For NTSC, the limits are –09 and +E2 (–9 to +226 decimal). For PAL, the limits are –23 and +C8 (-35 to +200 decimal).
{Iyyn	Character outline mode by row. "yy" = 00~16 (row number), "n" = 0~3. 0: no outline, 1: black outline, 2: cell color with char outline, 3: cell halftone (dark video) with char outline. Defaults to mode 1 in every row. RAM characters do not follow these rules, but mode 2 is useful.
{JE & **{JD**	Vertical scroll enable/disable. Defaults to disabled. When enabled, new characters appear immediately in the current scroll line. New line scrolls into display when **<CR>** is received or current line is filled. Only 16 lines may be displayed in vertical scroll mode. See notes below.
{JU & **{JO**	Scroll up/down. Defaults to scroll up.
{JSyy	Scroll block starting line. "yy"=00~14. Defaults to 14.
{JNyy	Scroll block ending line +1. "yy"=02~17. Minimum setting is starting line +2. Defaults to 16.
{JAn	Scroll buffer autoerase. "n"=0~1. 0: off, 1: on. Default = on.

{JT	Scroll status query. XBOB returns: **{SS <E/D> S=hh E=hh D=<U/D> L=hh<CR>** where E/D indicates scrolling enabled/disabled, S parameter is the starting row, E parameter is the ending row, U/D indicates up/down scroll direction, and L parameter is the buffer line number. Numeric parameters are in hex.
{JRn	Scroll rate. "n" = 0~1. 0: fast, 1: slow/smooth. Defaults to slow/smooth.
{K	Returns current print position as **{X-hh Y-hh<CR>**, where "hh" are 2-digit hex numbers indicating column and row where the next printable character will appear.
{Lyyhv	Sets character size by row. "yy" = 00~16 (row number), "h" = 0~1 (horizontal size), "v" = 0~1 (vertical size). Size value 1 doubles the character size in either or both directions. Defaults to minimum character size in every row.
{MF	Video mode locked to Local Generation.
{MI & **{MN**	Sets interlaced or non-interlaced video generation for local video mode. Defaults to non-interlace (progressive) scanning, which looks best on most video monitors.
{ML	Video mode locked to Genlock/Overlay.
{MM	Video automatic mode select (default). Allow time for lockup if external video is applied.
{N<data>|	Writes a boot script into non-volatile memory. Send **{N|** to erase it. When the termination character (vertical bar symbol) is received, XBOB sends **<XOFF>**, then sends **<XON>** and **{OK<CR>** upon completion (up to 6S later). All command and printable characters count toward the maximum script length of 512 characters. The **{P** and **{R** commands and data values FF and 7C (the bar symbol) are prohibited in a boot script, except that any data is allowed within a **{Y** command argument. The script is always executed at power-up time, without a host controller, but XBOB also operates normally if a host is connected. See troubleshooting section to clear a rogue boot script.
{ODh	Not useful in XBOB. Will not trigger an exception, but should not be used.
{OPh	Not useful in XBOB. Will not trigger an exception, but should not be used.
{P<data>	Writes user-definable character memory (font RAM). This command must be followed by exactly 1638 bytes of data, which loads all 63 user-definable characters. The data is structured as follows: Each character is 12 pixels wide by 13 tall. Data bits set to 1 (true) indicate active foreground pixels in the display. 2 data bytes represent each pixel row, starting with MSB at left end of each row. The last 4 bits of the second byte for each row of pixels are always zero. Pixel rows are sampled top-to-bottom within each character, and characters are sampled sequentially from character number 00 to 3E (3F is a 'transparent' space char). Notes: [1] This command could overflow the receive buffer if transmitted at high speed without pacing or flow control. [2] See default RAM character set illustration. [3] See **{Y** command to load a single RAM character instead of all 63. [4] A BOB-3/XBOB Font Editor utility program is available without charge from Decade Engineering; see www.decadenet.com. [5] Not allowed in a boot script!
{QT	If Q is true, **{U** controls RAM character background color (globally), and **{E** controls RAM character foreground color (globally) in local mode. In genlock mode, send **{U0** for black backgrounds. Other settings yield white backgrounds, so RAM characters can be made visible only be sending **{E0**.
{QF	If Q is false, RAM character background is defeated and the **{U** command controls character foreground color instead.
{QA	Engages automatic Q control mode (default). Sets Q false in genlock video mode, true in local video mode. To achieve the appearance of transparent character backgrounds in both video modes, RAM character backgrounds are set to the screen color in local mode.
{R	Forces XBOB system re-initialization. Restores all defaults and clears display RAM. Not allowed in a boot script!
{S	System status query. XBOB returns: **{ST Vv Mmmi Dd B35 s<CR>** where "v" is **T** or **F** (input video present or not), "mm" is 00~03 (video mode; 00: auto/local, 01: auto/genlock, 02: local, 03: genlock), "i" is **I** or **N** (local video is interlaced or non-interlaced), "d" is **E** or **D** (display enabled or disabled), **B35** denotes firmware version, and "s" is **N** or **P** (NTSC or PAL video compatibility).
{Tn	Character translation mode. "n" = 0~4. 0: standard ASCII (default), 1: italic ASCII, 2: spatially offset ASCII, 3: non-ASCII ROM characters, 4: user-definable RAM characters. See character set illustrations for ROM characters (modes 0~3) and default RAM characters. Note: Do not send data containing the command prefix character (hex 7B) while in translation mode 3 or 4 unless you intend to send a command.

{Un	Background color for RAM characters (local mode). “n” = 0~7. Defaults to 4 (blue). See **{Q** commands for important details!
{VE & **{VD**	Enable/Disable text crawl (horizontal scroll). When enabled, only a single line of text is displayed. Incompatible with vertical scrolling. Oversize characters are allowed. Color and blink controls are ‘global’ in crawl mode. Enable the crawl **after** sending other **{V** commands.
{VLnn	Sets crawl line number. “nn” = 00~16. Defaults to 16 (bottom of screen).
{VRn	Crawl rate control. “n” = 0~2. Defaults to 1.
{VW<data>}	Writes crawl buffer. Character string length may be up to 256. Do not embed any commands in the character string.
{Ynn<data>	Similar to **{P**, but loads a single RAM character bitmap. “nn” = 00~62. Must be followed by exactly 26 bytes of data.
{ZCn	**<CR>** clears to end of line if “n” = 1. “n” defaults to 0, for normal **<CR>** behavior.
{ZPnn	Sets new print position starting column (after **<CR>**). “nn” = 00~39. Default = 00.
{1D	Restores default display width value (9F).
{1Shh	Sets display width. “hh” is a 2-digit hex number in the range of 36~C6. Defaults to 9F. Note: [1] Characters can distort sync if they go off screen. [2] Use **{HH** command to fix horizontal position.
{2C & **{2L**	Sets **<CR>** or **<LF>** to trigger the normal carriage return and line feed response. **<CR>** is default.

Notes on Commands:

- In genlock/overlay mode, any color specification other than black causes a white display. The color controls operate normally only in local video generation mode. Command color parameters are as follows:

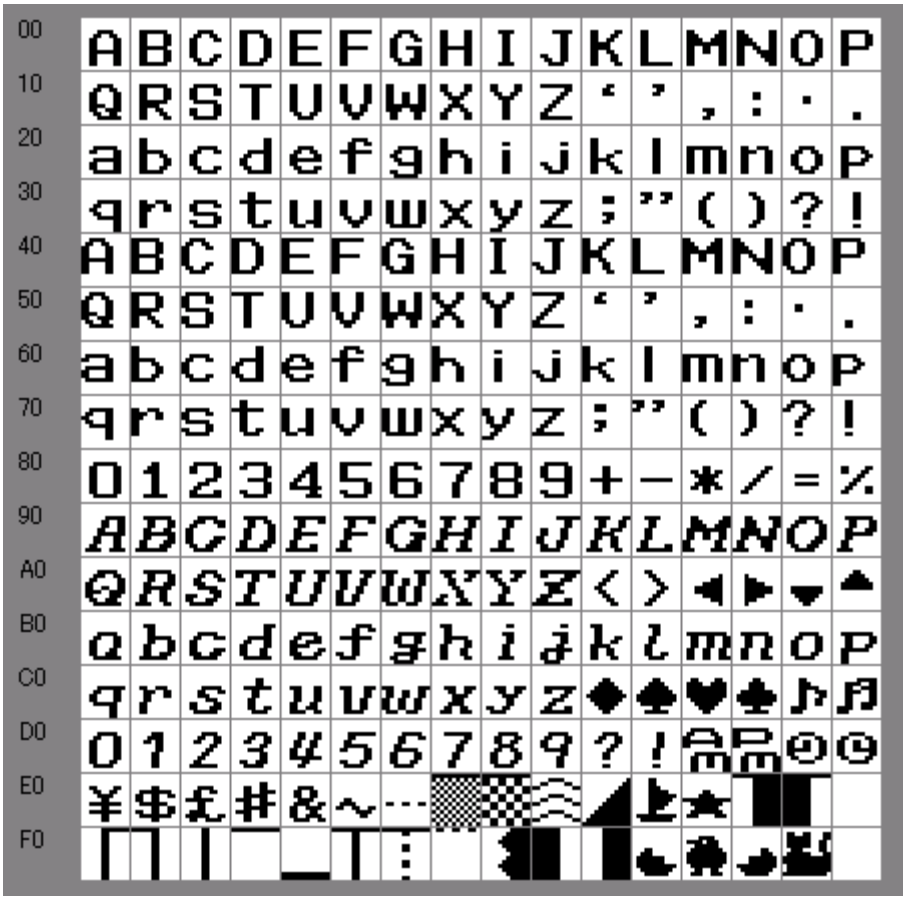
“n”	Color
0	Black
1	Red
2	Green
3	Yellow
4	Blue
5	Magenta
6	Cyan
7	White

- RAM characters are not treated the same as ROM characters in the display. Outlines and blinking are not available. See **{I**, **{Q** and **{U** commands for additional discussion. Include a space character in custom character sets, to avoid frequent **{T** mode switching. The space character at 3F in RAM behaves like the space character at FF in ROM. They both show screen color instead of character cell background color.

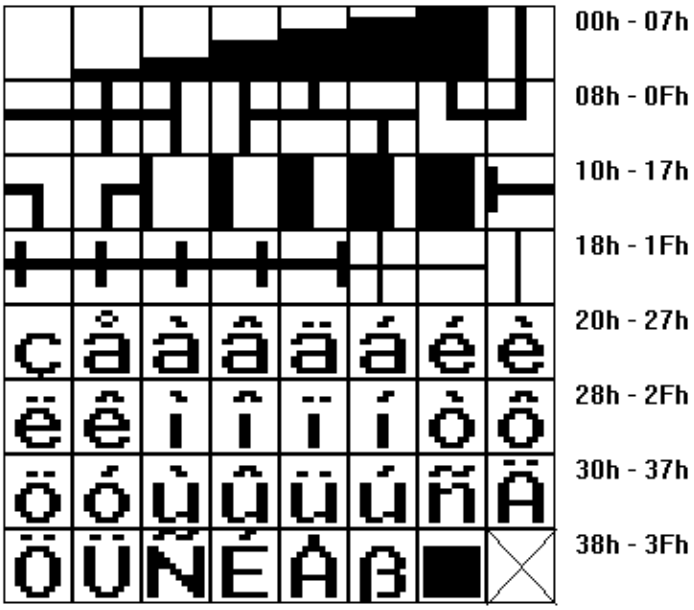
- Version 3.4 vertical scroll mode changes: If print position is set to a row outside the scroll block, the command is now accepted. To restore print position to the scroll line, issue the scroll enable command **{JE**, or set the print position within the scroll block using **{Cxxyy** (“yy” is ignored in favor of the active scroll line, but it must be present). If the current print position is within a scroll block, **<CR>** triggers a scroll and moves the print position to the beginning of the new line. A **<CR>** that moves the print position into the scroll block (from the last line of a non-scrolling area into the top line of a scroll block) also moves the print position to the active scroll line.

- Starting with firmware version 3.00, command exceptions cause the command processor to abort. XBOB emits **{?<CR>** as in previous firmware versions, but does nothing else in response to the faulty command.

ROM Character Set:



Default RAM Character Set:



Programming Examples:

Here's a simple QuickBASIC[tm] programming example:

```
' BOB-3 Test Program   ....Provides a very brief exercise....
OPEN "com1: 9600,n,8,1,cs0,ds0,cd0,op1000,rs" FOR OUTPUT AS #1
PRINT #1, "{A17"; 'Clear the screen, in case we've been playing
PRINT #1, "{C1101"; 'Print title in center of 2nd line...
PRINT #1, "BOB-3 Test Program"
PRINT #1,
PRINT #1, "Time: "; TIME$
PRINT #1, "Date: "; DATE$
PRINT #1, "{U0{D0" 'Set background attribute for RAM & ROM chars
PRINT #1, "RAM characters are next... ";
PRINT #1, "{T4"; 'Prepare to print a few RAM characters
PRINT #1, CHR$(0); CHR$(1); CHR$(2); CHR$(3); CHR$(4); CHR$(5); CHR$(6);
PRINT #1, CHR$(33); CHR$(34); CHR$(35); CHR$(36); CHR$(37); CHR$(38);
PRINT #1, "{T0"  'Return to normal ASCII translation mode
CLOSE #1
END
```

Note that RAM character codes were entered as decimal values in this example, but hex values are given as labels in the Default RAM Character Set illustration above. See www.decadenet.com BOB-3 and XBOB pages for additional programming examples.

If XBOB is confused or dysfunctional:

Observe the 500mS delay requirement after power-up or transmitting an **{R** command. Be sure to enter complete commands. It's easy to forget the termination characters required with **{N** and **{VW**, or to send insufficient data after a **{P** command, etc. Mistakes like this can be especially confusing if they occur in a boot script! Clear the boot script by transmitting "**{N|**". See **{N** command description for details, as well as the next paragraph…

For bizarre trouble symptoms, always suspect boot script corruption. This is especially likely if experimentation preceded (or might have prevented) operational status. Rogue boot scripts may be completely erased by holding pin 25 of U4 low as power is applied, even if XBOB is unable to communicate with the host computer. If you have XBOB-C, this operation requires cabinet top removal. It's better to return the unit to Decade Engineering for service if you're unsure about your technical skills, because the node in question is very small and a probe slip could cause permanent damage. The EE erase routine takes about five seconds to execute. A confirmation message is sent to the host upon completion.

If printable characters are sometimes dropped or corrupted, or if pacing delays must be inserted into the data stream to eliminate such data communication failures, then bit rate error must be suspected. This is especially likely if your host controller relies on a ceramic resonator instead of a quartz crystal for the master clock oscillator, or if the bit rate calculation doesn't yield a correct integer result. Note that commands are probably being corrupted as well, if you see missing or corrupted characters in the display.

Make sure your power supply is healthy. Substitute a known-good power supply unit, or check the DC output line of your power supply circuit with a scope. Ripple suppression capacitors can fail (especially with age), and power supply regulator ICs can oscillate vigorously. Low-dropout regulators often exhibit a profound intolerance for certain ranges of load capacitance and/or capacitor equivalent series resistance (ESR).

If there's no video output from an XBOB with RCA jacks, check the RCA jacks for center contact deformation (spreading) resulting from the use of plugs with oversize center pins. Deformed center contacts can easily be reshaped, from the inside, by careful prying with a tiny screwdriver or similar flat-tip probe.

Try another video monitor. In rare cases, monitors and other devices can react badly to DC bias in the video output from XBOB. If necessary, add a DC blocking capacitor of 470uF or 1000uF, rated at 6V or greater, in series with the video output cable center conductor. The "+" side of the capacitor should connect upstream (to XBOB video out).

If the overlay doesn't fit your monitor screen:

XBOB displays up to 17 lines of characters in both NTSC and PAL versions. The NTSC version, however, leaves little guard space at screen top and bottom, which could cause portions of these lines to be masked by video monitors that overscan excessively. If this happens to you, consider two possible solutions: [1] Don't write anything to line 0 or line 16. [2] Shift the overlay position downward with the **{HV** command and don't use line 16.

The PAL version could exhibit the opposite problem, in that excessive guard space appears above the top line and below the bottom line of displayed text. The best that can be done in this case is to move the overlay position up or down, allowing text to come closer to screen top or bottom but not both.

The new **{1S** command added in firmware version 3 may be used to adjust display width if necessary. Use **{HH** to correct horizontal centering if you alter display width.

If the text overlay is unstable:

Overlay jitters can be caused by weak and/or noisy input video. Typically, the video signal has been attenuated by passage through a long cable (or double termination). The best cure for long cable woes is a robust cable drive amplifier with pre-equalization for cable loss characteristics. Decade Engineering offers a Camera Adapter Board (CAB) with broad adjustment ranges and high drive capability for this purpose. A Cable Compensator or Video Processor at the receiving end may also be suitable. Bear in mind that long cables are subject to noise injection from a variety of sources, including ground loops, so the cable receiving circuit may have to deal with several kinds of signal defect simultaneously. Coaxial cable losses in the baseband video spectrum are notoriously nonlinear as a function of frequency, making long cable compensation a distinctly non-trivial exercise.

Maladjustment of the video foreground and background trimmers can also cause character overlay instability. These trimmers are located along the front edge of the PCB, and are accessible with a screwdriver through small holes in the front panel if your XBOB is in a cabinet. The most common problem is background level set too low, causing sync interference.

XBOB was not designed to work with tape playback signals from VCRs. It often performs as desired, but overlay stability can be unacceptable with some VCRs and some (usually worn) cassettes. Performance is generally worse in VCR special effects modes such as freeze-frame.

If yellow color looks poor (local mode):

Some XBOB boards were manufactured with an incorrect component value at R20, which is located adjacent to the 2x5 female header connector. If your board has a 2.2K resistor (marked '222') at this location, it should be changed to 470R or paralleled with 680R. Use 0805 size resistors. Return the board to Decade Engineering for service if it's in warranty, or if you're unsure about your technical skills.

Firmware Revision History:

[V3.50] Improved error checking for Q commands. Enabled watchdog timer. Revised status report string (S command) for equal length in PAL and NTSC versions.

[V3.40] Fixed bugs: BE command repetition eventually trashes display, video status ignored during vertical scroll. Allowed printing outside active vertical scroll block. Revised vertical scroll behavior to print incoming characters immediately instead of waiting for line buffer full or <CR>. Added 2C and 2L commands, to support <LF> code.

[V3.30] Fixed bugs: RAM characters sometimes invisible after video mode change, JN command fails if new value is less than current line number. Allowed arbitrary data with Y command in boot script. Disabled P command

execution in boot script. Added hardware method to clear boot script. Supported double-width characters in text crawl. Added work-around for minor artifact of JO command.

[V3.20] Fixed minor bugs in H command processors. Added PAL range limits for H commands and corrected the list of supported ASCII codes in this document.

[V3.10] The status report string was further extended in firmware version 3.10, to include video standards compatibility reporting (NTSC or PAL). See S command description.

[V3.00] Several commands were added or extended in version 3.00. The new commands are: JR, K, MI, MN, VL, Y, ZC, ZP, 1D and 1S. Receive buffer and boot script capacity (N command) was doubled, and three new communication bit rates were added. All changes are believed to be backward compatible with version 2 application programs except increased start-up delay time (to 500mS), the report string generated in response to the S command, and the (simplified) response to bad commands.

Decade Engineering contact information:

Please check our website for the most recent version of this document before concluding that a defect exists. Product warranty and service information is posted within the online ordering system.

Telephone	503-743-3194
Fax	503-743-2095
Post	5504 Val View Dr. SE, Turner, OR 97392 (USA)
Website	www.decadenet.com
Email	See website for current email contact information

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