Xblast Lite Install Manual

XBlast Lite is a fourth generation modchip for the Original Xbox video game console. It comes pre-installed with the fully legal XBlast OS.
For more info on how to operate XBlast OS, please read the XBlast OS manual.

XBlast Lite features are:
- Compatibility across all retail revisions of Xbox
- 2 BIOS banks. 1*512KB and 1*256KB.
- Intelligent LFRAME signal blocker, for 1.6/1.6b consoles
- Hardware-assisted TSOP recovery feature, like on the Chameleon Modchip
- Full software control for splitting your on board TSOP in 2 banks (1.0/1.1 Xbox only)
- User programmable input and output ports for customisation and modding
- Character LCD support with full software control over backlight and contrast
- Basic Sega Chihiro MediaBoard spoof(for developers only)
- Fully legal, Open source and well featured embedded "OS".
    -Check the status and "health" of your Xbox
    -Change your Xbox system properties
    -Modify EEPROM content
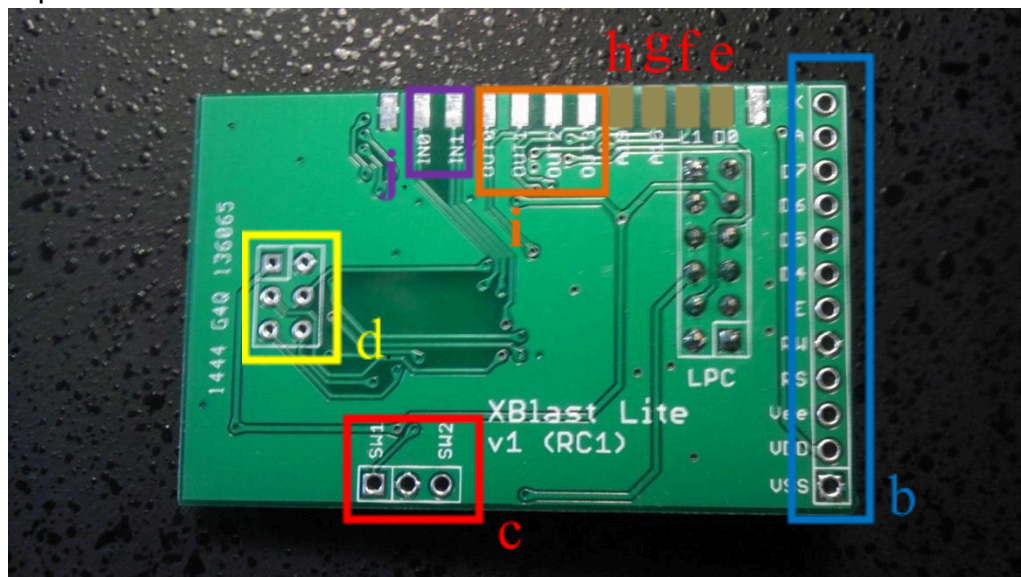   -Flash new BIOSes
    -Manage your hard drive

1. Hardware description

Bottom side:
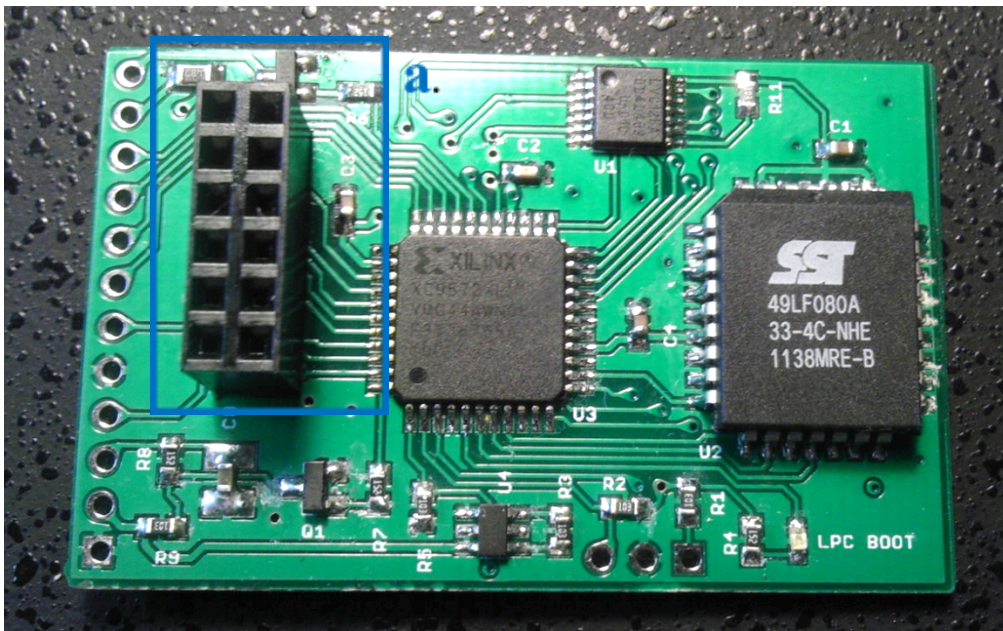
a) LPC port: This port is used to connect the XBlast Lite modchip to the Xbox motherboard.

Top side

b) LCD port: 12 pins port to connect a HD44780 or KS0073 compatible character LCD. All the pins are labeled on modchip.

c) Rescue switch port: This port is to be left untouched during normal operation. For more information, please see the Rescue XBlast section of this manual.

d) Modchip programming port: This port is for production use. Leave it untouched.

e) D0 pad: This pad is for use with 1.0 - 1.5 consoles only. It connects to D0 signal on Xbox motherboard. Please check the appropriate installation section depending on your motherboard revision.

f) L1 pad: This pad is for exclusive use with 1.6/1.6b consoles only. It connects to LFRAME signal on Xbox motherboard. Please check the 1.6/1.6b installation procedure of this manual.

g) A15 pad: This pad is for use with 1.0 - 1.5 consoles only. It enables the optional TSOP recovery feature. Please check the appropriate installation section depending on your motherboard revision.

h) A19 pad: This pad is for use with 1.0/1.1 consoles only. It enables software control for 1MB TSOP split. Please check the 1.0/1.1 installation procedure of this manual.

i) GPO0-3 pads: These are General Purpose Output signals. They can be controlled via software running on the Xbox or custom scripts in XBlast OS.

j) GPI0-1 pads: These are General Purpose Input signals. They can be probed via software running on the Xbox or custom scripts in XBlast OS.

2. Installation

XBlast Lite is compatible with all retail Xbox revisions. However, the installation procedure varies slightly depending on which revision it will be installed.

2.1 Tools and equipment required

- Torx 20 screwdriver(for Xbox disassembly)
- Torx 10 screwdriver(for Xbox disassembly)
- Long nose pliers
- 15W soldering iron
- small gauge electrical wire (preferably 30AWG)
- XBlast Lite modchip and supplied male pin header.

[pic of required stuff]

If you need explanation on how to properly solder please visit the following site :
http://electronicsclub.info/soldering.htm

2.2 Common procedure

2.2.1 Disassemble the Xbox

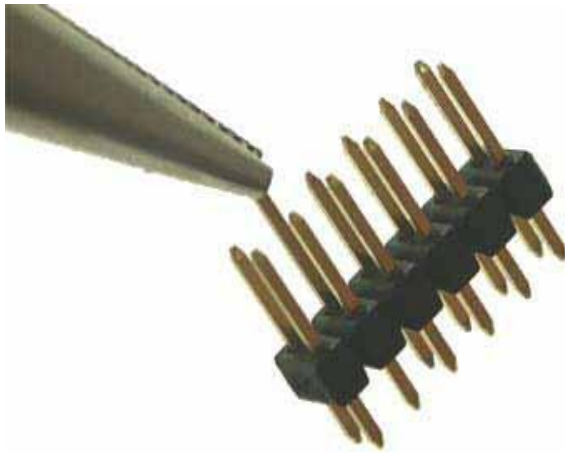The first step is to extract the motherboard from the Xbox console.
Opening the Xbox console and removing the motherboard is not explained in this manual. There are numerous tutorials available on the Internet that explains how to do this. You can follow the one on ifixit.com up to the point the motherboard is removed from the case:
https://www.ifixit.com/Teardown/Xbox+Teardown/1308

2.2.2 Preparing the male pinheader.

The supplied 2x6 male pin header comes with an extra metal pin. You need to remove the extra pin with your long nose pliers to make the male pin header fit in the LPC port on the Xbox motherboard. Please take note of the orientation of the pin header as the length of the metal pins are not equal on both sides of the plastic seating of the pin header.

2.2.3 Soldering the male pin header to the motherboard.

(Note that most 1.0/1.1 motherboards have the LPC port holes already filled with solder. You should remove the solder using a solder pump before any of the following instructions)

Place the male pin header into the LPC port on the Xbox motherboard from the top side so that the plastic seating is on the top side too. The longest part of the pin header's pin should be on the topside too. The 4 holes closer to the rear of the motherboard should not be covered by the pin header. Use any form of temporary adhesive (electrical tape, etc.) to secure it in place as you will need to flip the motherboard to the bottom side to solder the pin header. Once you have flipped over the motherboard, make sure the pin header is still properly seated in place(all pins perfectly perpendicular to the motherboard); you should also make sure that all the pins of the header are equally sticking out from the LPC port holes on the bottom of the motherboard.

[Pic of seated pin header]
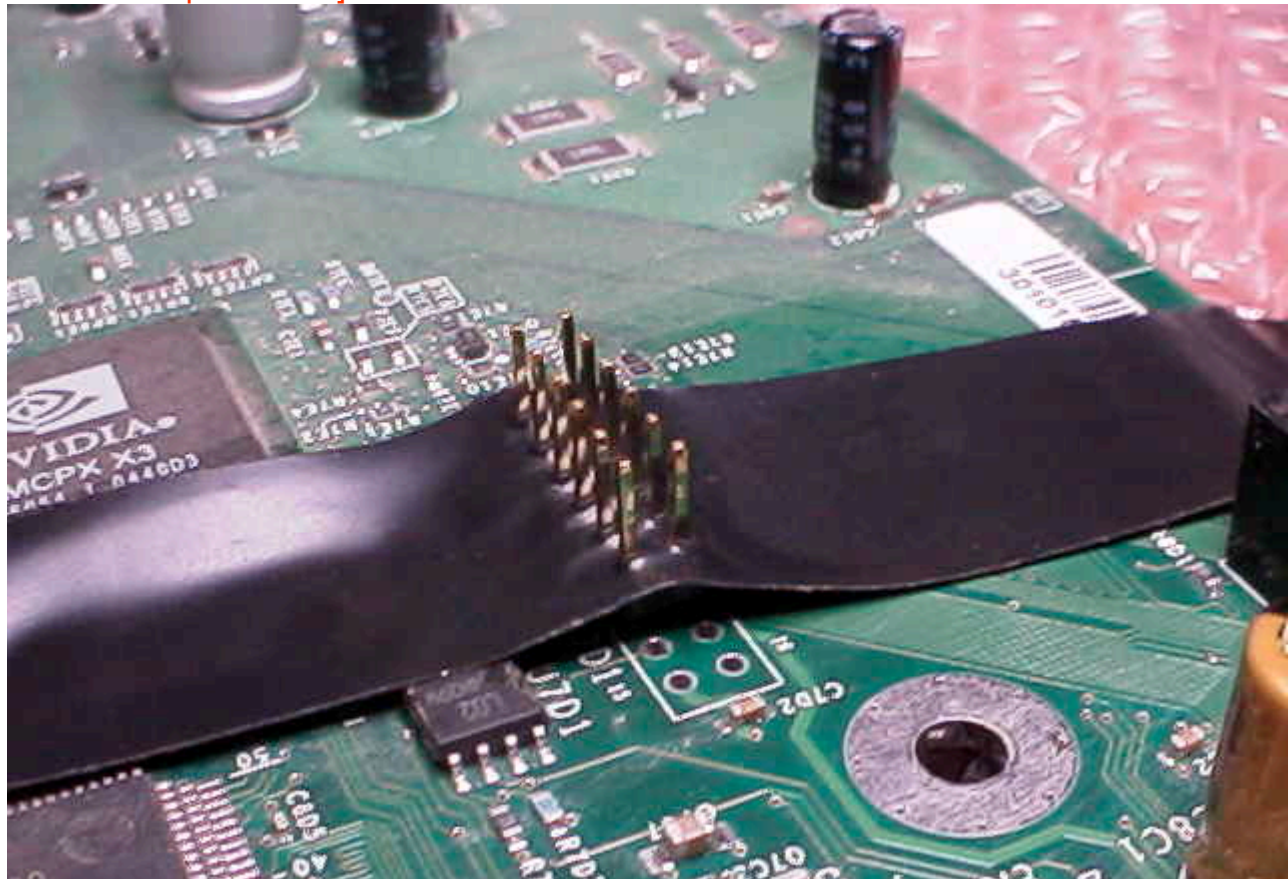
Solder the pin header with your soldering iron. You should put just enough solder onto each pin so that it forms a concave cone around each pin of the LPC port.
[pic of soldered pin header]

For the rest of the installation please refer to the appropriate installation section depending on your Xbox motherboard revision. If you do not know your Xbox revision, there are numerous tutorials on the Internet that will guide you through the process of identification. One of them is located here: http://www.xbox-scene.com/versions_0.php

For 1.0/1.1 installation, please see section 2.3.
For 1.2 to 1.4 installation, please see section 2.4
For 1.5 installation, please see section 2.5
For 1.6/1.6b installation, please see section 2.6

2.3 1.0/1.1 installation

The rest of the installation procedure requires soldering wires to solder points on the bottom side of the motherboard. There are up to 3 points to solder to; only 1 is mandatory: D0 point. Here are the locations of the 3 points you can solder on the bottom side of the motherboard. They are located near the LPC port, toward the center of the motherboard.
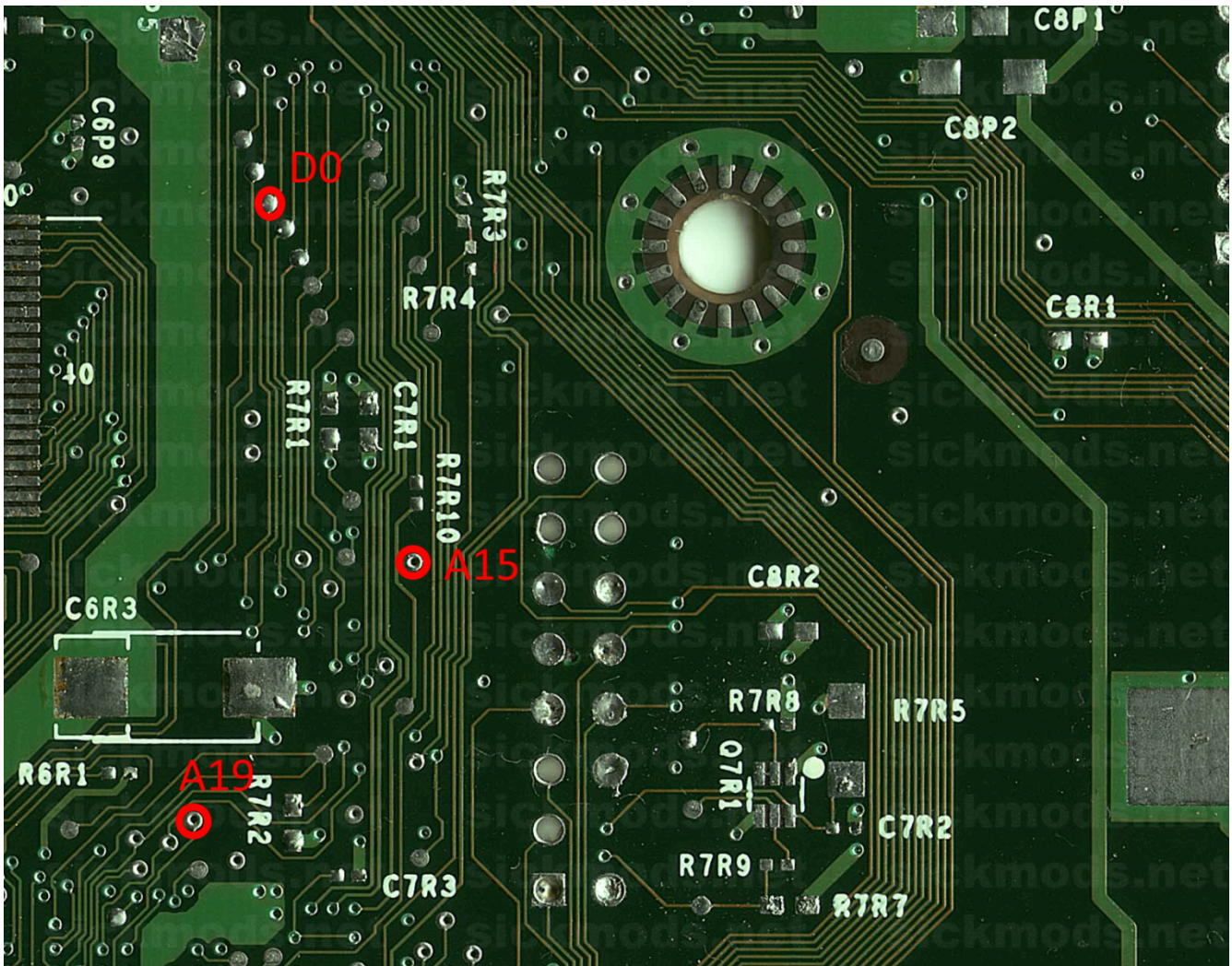
The D0 point is mandatory and must be soldered and connected to the XBlast Lite's D0 labeled solder pad in order to enable it.

The A15 point is optional and should be soldered and connected to the XBlast Lite's A15 labeled solder pad. Its purpose is to enable TSOP recovery feature of the XBlast Lite. The TSOP recovery is explained in detail in the Extra features section of this manual.

The A19 point is optional and should be soldered and connected to the XBlast Lite's A19 labeled solder pad. Its purpose is to enable splitting of the 1.0/1.1 1MB TSOP in half and control it via software. The TSOP splitting feature is explained in detail in the Extra features section of this manual.

To ease soldering wires to these points, you should pre tin the via(s) on the motherboards as well as the stripped end of the wire(s) with just a little bit of solder. Take care in removing just enough insulation of your wire, 1mm should be enough. Once done, just solder the wire onto the via by placing the wire's end on top of the via and heating the tinned via and wire at the same time.

TIP: If you plan on flashing your on board TSOP, you should solder the write-enable points of the TSOP. More info in the Extra features section of this manual.

2.4 1.2-1.4 installation

The rest of the installation procedure requires to solder wires to solder points on the bottom side of the motherboard. There are up to 2 points to solder to; only 1 is mandatory: D0 point. Here are the locations of the 2 points you can solder on the bottom side of the motherboard. They are located near the LPC port, toward the center of the motherboard.

D0 point is mandatory and must be soldered and connected to the XBlast Lite's D0 labeled solder pad in order to enable it.
A15 point is optional and should be soldered and connected to the XBlast Lite's A15 labeled solder pad. Its purpose is to enable TSOP recovery feature of the XBlast Lite. TSOP recovery is explained in detail in the Extra features section of this manual.
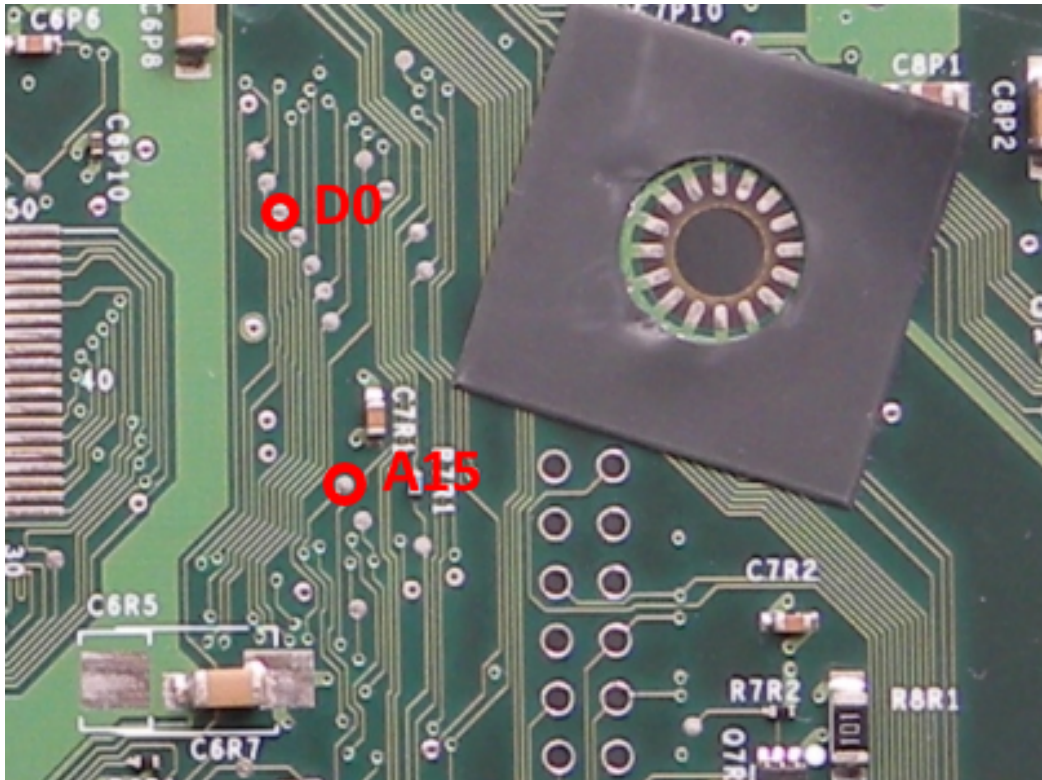
To ease soldering wires to these points, you should pre tin the via(s) on the motherboards as well as the stripped end of the wire(s) with just a little bit of solder. Take care in removing just enough insulation of your wire, 1mm should be enough. Once done, just solder the wire onto the via by placing the wire's end on top of the via and heating the tinned via and wire at the same time.

TIP: If you plan on flashing your on board TSOP, you should solder the write-enable points of the TSOP. More info in the Extra features section of this manual.

2.6 1.5 installation

1.5 Xbox motherboards requires you to "fix" the LPC port. In fact, the LPC port of 1.5 motherboards lack the necessary ground and +3.3V signals applied to the appropriate pin. In order to restore these 2 points on the LPC port, please check the picture below.
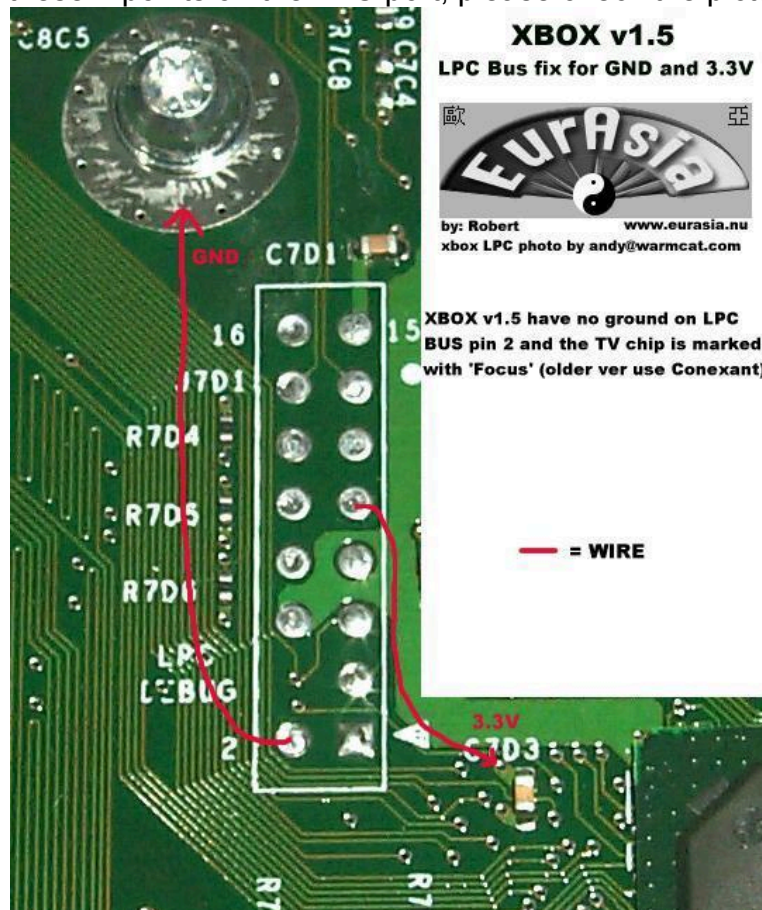
The rest of the installation procedure is the same as 1.2-1.4 installation procedure.
Please go to section 2.4 of this manual and continue reading the instructions from there.

2.6 1.6/1.6b installation

1.6/1.6b Xbox have a severely crippled LPC port. There are numerous signals missing. In order to properly install the XBlast Lite modchip, you must "rebuild" your LPC port. Please check the diagram below to identify the connections between the solder points on the motherboard and LPC port holes.
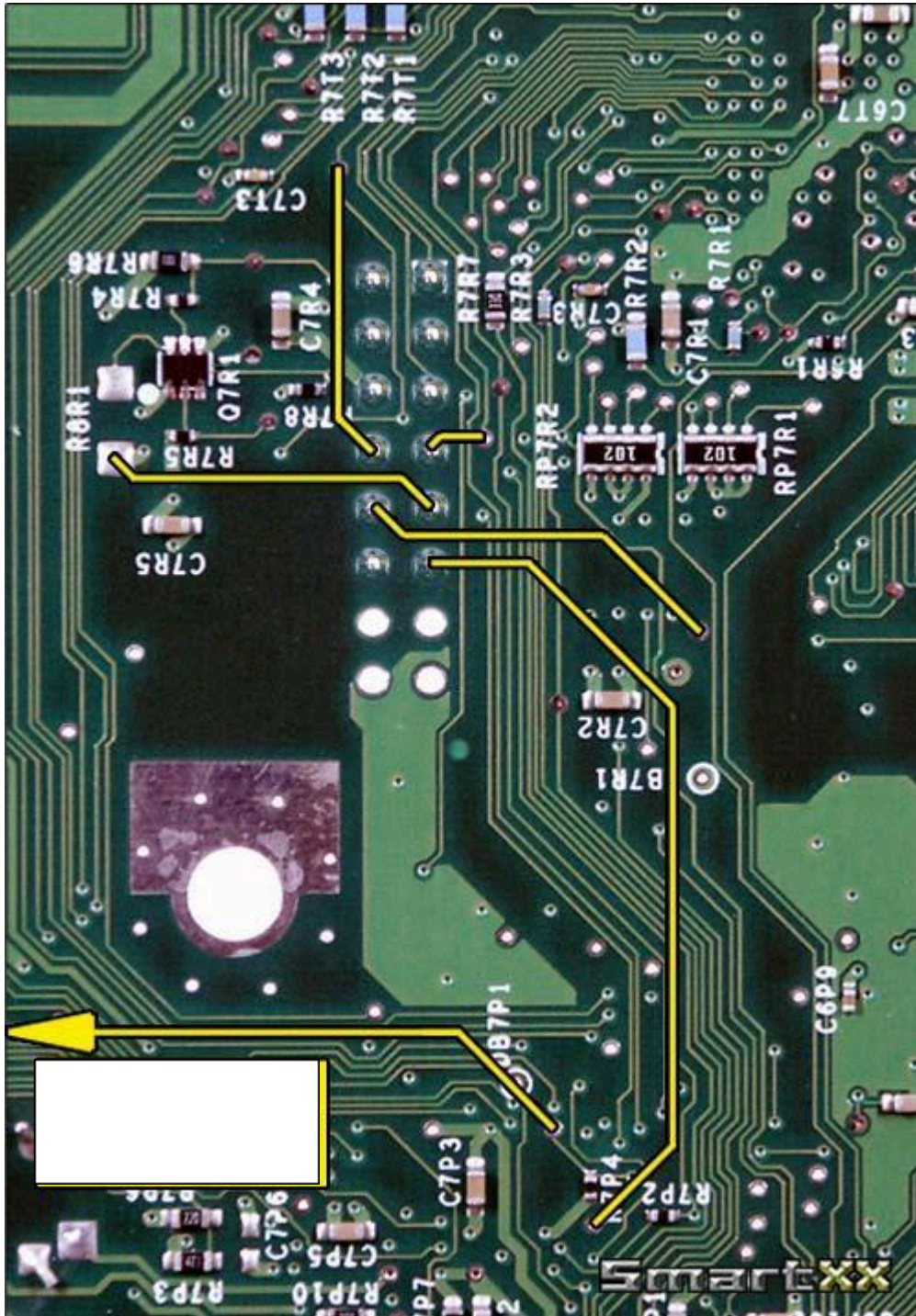
Tip: Rebuild the LPC port after installing the pin header. Also pre-tin the solder points for ease of   soldering.

The rest of the installation procedure requires soldering a wire to a solder point on the bottom side of the motherboard. There is only 1 point to solder on 1.6/1.6b: LFRAME. The location of LFRAME signal on the motherboard is identified in the picture above.
LFRAME point is mandatory and must be soldered and connected to the XBlast Lite's L1 labeled solder pad in order to enable it.

For ease of soldering wires to these points, you should pre tin the via(s) on the motherboards as well as the stripped end of the wire(s) with just a little bit of solder. Take care in removing just enough insulation of your wire, 1mm should be enough. Once done, just solder the wire onto the via by placing the wire's end on top of the via and heating the tinned via and wire at the same time.

For the rest of the installation. Please go to section 2.7 Installation finalization.

2.7 Installation finalization

Once all the wires are firmly soldered to the vias, pass them through the unused LPC port holes, (if the wires aren't too big), or bring them to the top side by running them to the motherboard's side edge. Make sure all the wires are long enough to reach their designated solder pad on the XBlast Lite. Also make sure no wire runs across a screw hole. For optimal performance, adjust length of the wires so it will reach the XBlast solder pads with little slack. Too long a wires could produce unexpected behavior and/or boot failure!

[pic of area to avoid][pic of wires through LPC port][pic of wires from board edge]

Insert the modchip onto the male pin header on the LPC port. When inserting the XBlast Lite, make sure the larger part of the XBlast Lite is toward the Xbox motherboard side edge(using the LPC port as a reference point). Check that the modchip is properly aligned with the male pin header on the LPC port. Solder all the wires to the appropriate solder pads on the XBlast lite.
[Pic of modchip installed]

Put the motherboard back into the Xbox case and connect all the necessary cables.

Tip: Before completely reassembling the console, you should do a power ON test to see if the xbox boots with XBlast installed .

Reassemble your Xbox.

See the XBlast OS manual for more information on usage.

3. Extra features

3.1 TSOP write-enable points

For 1.0 to 1.5 Xbox consoles, it is possible to rewrite the on board TSOP flash chip and replace the stock BIOS initially programmed with a hacked BIOS that will enable homebrew and backup support.

In order to enable erasing the old (stock) BIOS and programming a new (hacked) one, you need to enable the write support to the TSOP chip as it was disabled from the factory. To enable write-support, you will need to bridge the solder points together. The Location of these points varies depending on your Xbox revision.

The TSOP chip is the large, but thin black chip near the LPC port with narrow pitched legs. Possible TSOP brands are Atmel, Hyundai/Hynix, ST, Winbond and Sharp(Special procedure for Sharp TSOP, see picture below).
1.6/1.6b do **NOT** have a TSOP.

3.1.1 1.0/1.1 Xbox consoles

1.0/1.1 have 1 set of points to bridge on each side of the motherboard. They are both located near the TSOP chip.
Top side of the motherboard:

Bottom side of the motherboard:

The Red Points are the location of jumper wire for a Sharp TSOP
---WARNING---
only solder a wire to these points if you have a Sharp TSOP on a Ver 1.0/1.1 Board

Solder this Point

Same area as top photo but flipped over to Backside of board.

Bottom of Board Ver 1.0/1.1
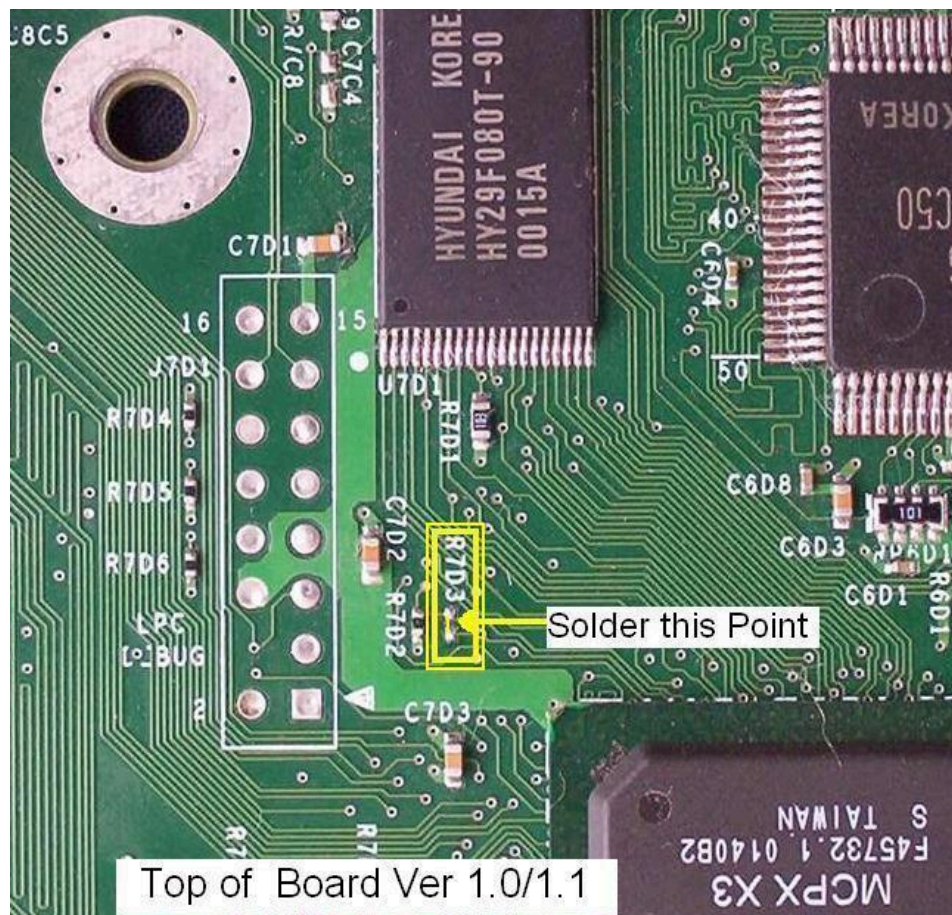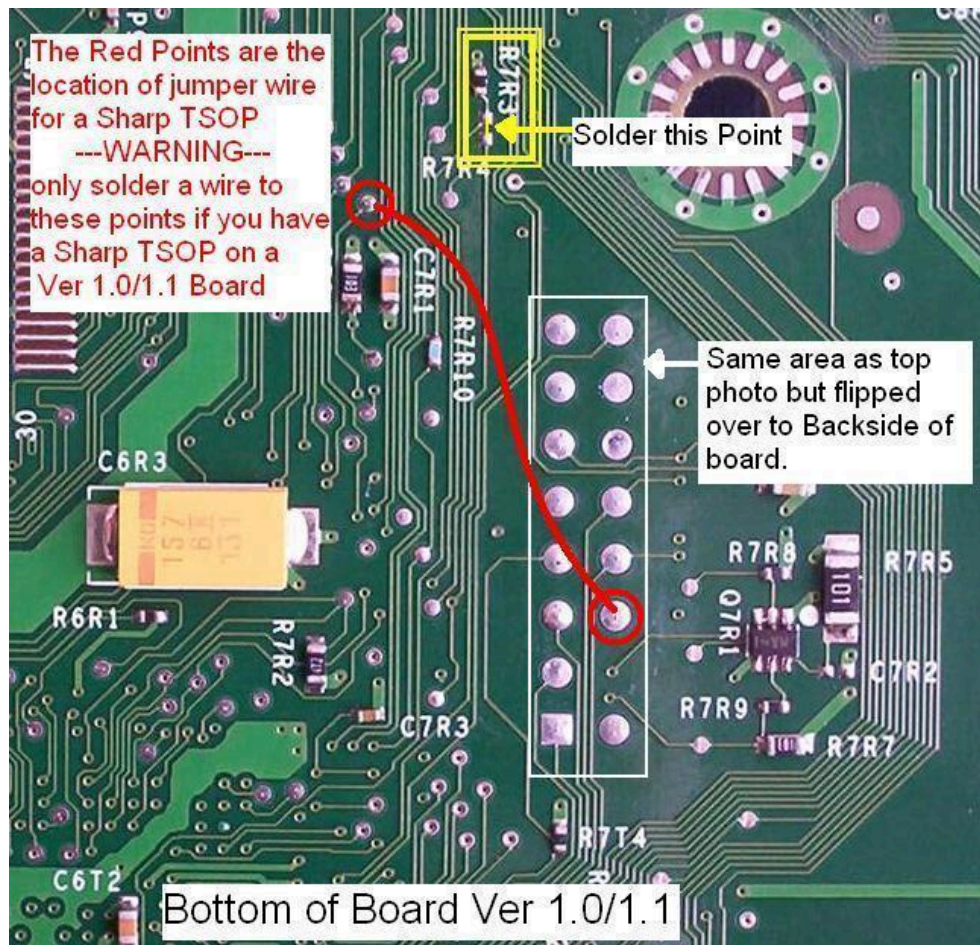
3.1.2 1.2-1.5 Xbox consoles

1.2-1.5 have their 2 sets of points on the top side of the motherboard. They are both located near the TSOP chip.
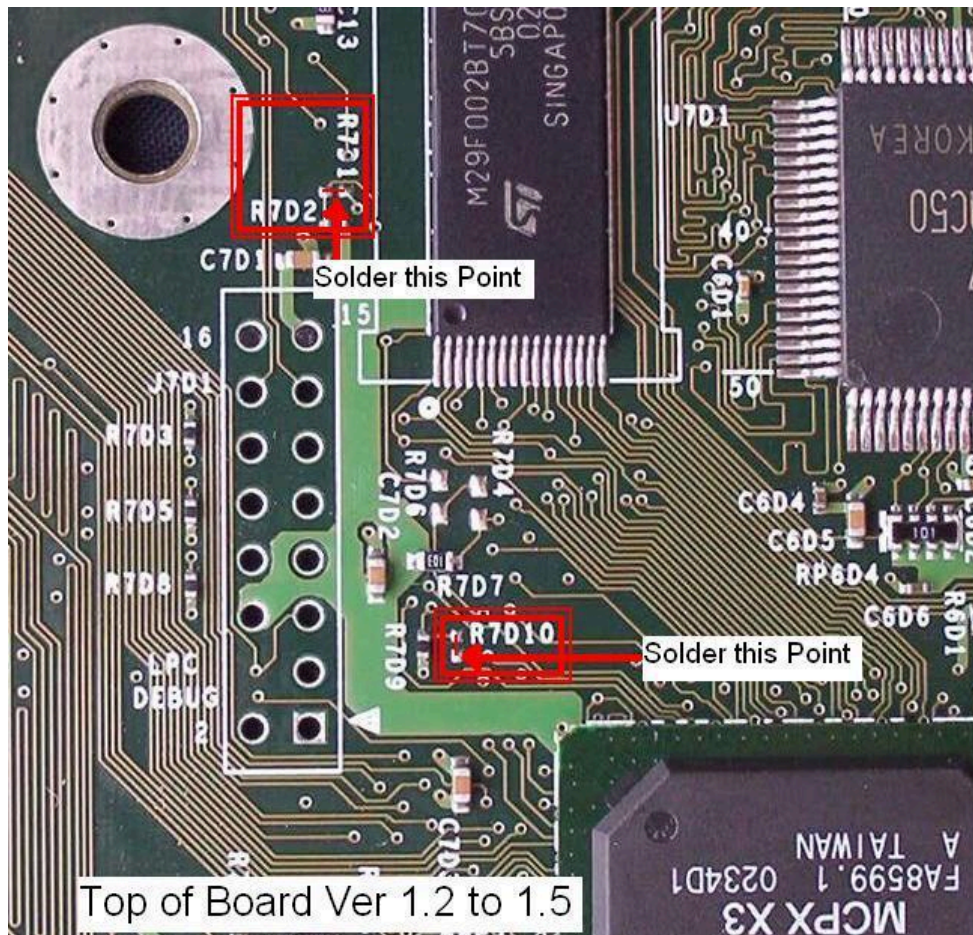
Tip: You need to have the write-enable points soldered to fully take advantage of the TSOP recovery feature.

3.2 TSOP recovery

TSOP recovery feature is available for 1.0-1.5 Xbox consoles. It allows you to flash the TSOP of your Xbox when booting from a modchip. TSOP recovery requires to have a working DVD drive and a DVD-R to boot from, like "heimdall's HeXEn xbox engineering disc" or "Auto-Installer Deluxe Disc".

For information, the Xbox console has 2 way of booting a BIOS: from onboard TSOP and from LPC port (where the XBlast Lite is). Depending from which one your console boots, the other one will not be accessible by conventional means. So if you boot from your TSOP, you cannot flash your modchip and if you boot from your modchip, you cannot flash your TSOP.

TSOP recovery also requires that you flash one of the BIOS bank of your XBlast Lite with a special hacked BIOS called "tsop_m7.bin" and boot from it. This BIOS will enable booting

from LPC port while giving access to flash the on board TSOP.

To summarize the mechanism, the special BIOS, coupled with a XBlast Lite, will start booting the console from the LPC port, then reset and restart booting from on board TSOP and finally switch back to LPC, mid-boot, to load the kernel of the hacked BIOS. So the feature rely on the fact that the TSOP to recover contains partially valid data to work. If you TSOP is blank or too corrupted, the TSOP recovery feature will not work. Also, if your TSOP is already flashed with a "modern" hacked BIOS (like Evox M8+, X2 5035 or others), there is a strong possibility that this feature will not work, at least with the special BIOS tsop_m7.bin. As of writing this manual, no special BIOS can recover a TSOP flashed with Evox M8+ or X2 5035 due to their different boot process compared to stock or more "traditional hacked" BIOSes. Technically, it is possible to create a special BIOS that would enable TSOP recovery for M8+ and others but such BIOS has not been created yet. TSOP recover feature will work all the time when a stock BIOS is already programmed on the TSOP.

For users who use the TSOP splitting feature of the XBlast Lite, please refer to the XBlast OS manual for more information on the "TSOP recover force bank" feature prior to attempting to do a TSOP recover.

The procedure to do a TSOP recover on XBlast Lite is as follow:
0- Ensure TSOP write-enable flash points as well as A15 signal are all soldered before attempting this procedure.
1- Flash a user flash bank with the special BIOS tsop_m7.bin
(optional for TSOP split feature users)Configure the "TSOP recover force bank" feature in the "Tools" section.
2- Insert a burned DVD-R to boot from in your DVD drive
3- From XBlast OS main (icon) menu, boot the bank on which you flashed "tsop_m7.bin"
4- If the operation is successful, you should see the following boot screen(there is no flubber animation before the big "X" screen shows up)
[pic of tsop_m7.bin boot screen]
5- The DVD-R should boot like normal. (Note that both Auto-Installer and HeXen discs take a really long time to boot on some consoles, seeing the top_m7.bin boot screen for some minutes is possible and expected).
6- Use your favorite Xbox program to flash your TSOP with a new BIOS.

Tip: XBlast OS.xbe, Evolution-X dashboard, raincoat all support flashing the TSOP.
Tip: TSOP split feature users should use XBlast OS to flash their TSOP as it will detect the TSOP split and give you the option to flash the bank you want.

3.3 TSOP split feature

1.0/1.1 differs from other revisions of motherboards as they have a 1MB TSOP. Normally, a Xbox BIOS fits in 256KB of flash space. It is a well-known fact on the scene that you can "split" this 1MB of flash space into either 2 or even 4 equal parts. This gives you the ability to have 2 * 512KB or 4 * 256KB BIOS banks on your Xbox TSOP. This is called TSOP splitting. Normally, to control from which TSOP "bank" you wish to boot from, you'd need physical switch(es) to toggle the desired bank. This normally requires mounting the switch(es) somewhere outside the case.

The XBlast Lite modchip can help you take advantage of this "feature" by enabling you to split your TSOP in half (thus getting 2 * 512KB BIOS banks) and replacing the need for physical switch with additional boot options in XBlast OS main (icon) menu.
Here's the main menu without TSOP splitting activated:
[pic of XBlast OS iconMenu, no TSOP split]

Here's the main menu with TSOP splitting activated:
[pic of XBlast OS iconMenu, with TSOP split]

To take advantage of the XBlast Lite TSOP split feature you must solder a wire from your Xbox motherboard's A19 solder point to XBlast Lite's A19 solder pad, if you haven't done it during the initial installation of the XBlast Lite. You must then activate the TSOP split feature in XBlast OS. To enable this feature in XBlast OS, please refer to the XBlast OS manual.

Tip: If you don't ever plan on "unsplitting" your TSOP, you really should disconnect the MCPX chip from the A19 signal of your TSOP. Leaving the MCPX connected to A19 while controlling it with the XBlast Lite can cause excess heat in MCPX chip and could eventually burn the signal driver for the pin controlling the A19 signal inside the MCPX chip. It does not matter too much as it will not break your Xbox; it will just make it impossible to boot a full 1MB TSOP after a few years of usage in the event you'd remove the XBlast Lite from that Xbox. For the very experienced modders, if you wish to disconnect the MCPX from A19, please cut a trace on the Xbox motherboard located under the MCPX chip, on the bottom side of the motherboard.

Here are 2 suggestions of location for cutting the trace.
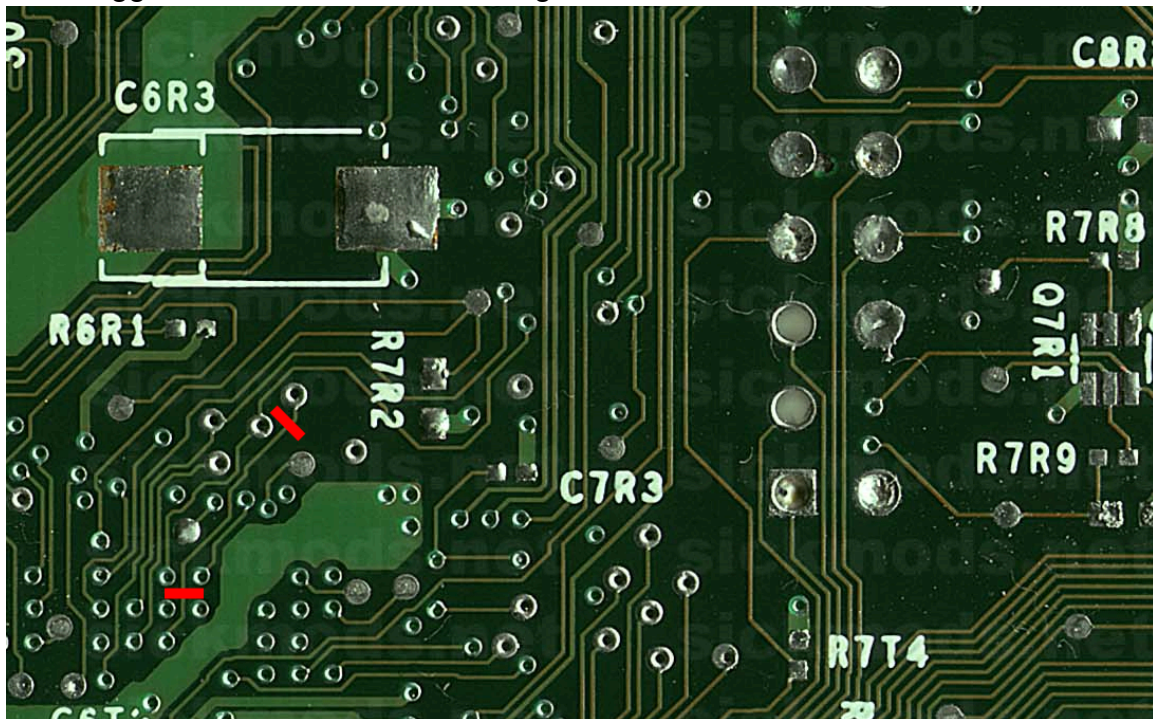
Using a really small drill bit and turning it by hand on top of the trace works well. A very sharp X-acto knife to do a straight cut works too. Whatever method suits you, be very careful and be patient as accidentally cutting surrounding traces would be very hard to repair!

3.4 Character LCD support

XBlast Lite supports connecting a small Character LCD via the LCD port. It also controls backlight intensity as well as contrast setting from software; no need to adjust external potentiometer.
[Pic of XBlast Lite LCD port]

Supported LCD models have to be compatible with either HD44780 or KS0073 protocols. The LCD requires a total of 12 connections with the XBlast Lite to properly interface it. If your LCD doesn't support backlight, only 10 connections are necessary; leave A and K signals unconnected.
Please refer to the schematic representation below for proper pin mapping
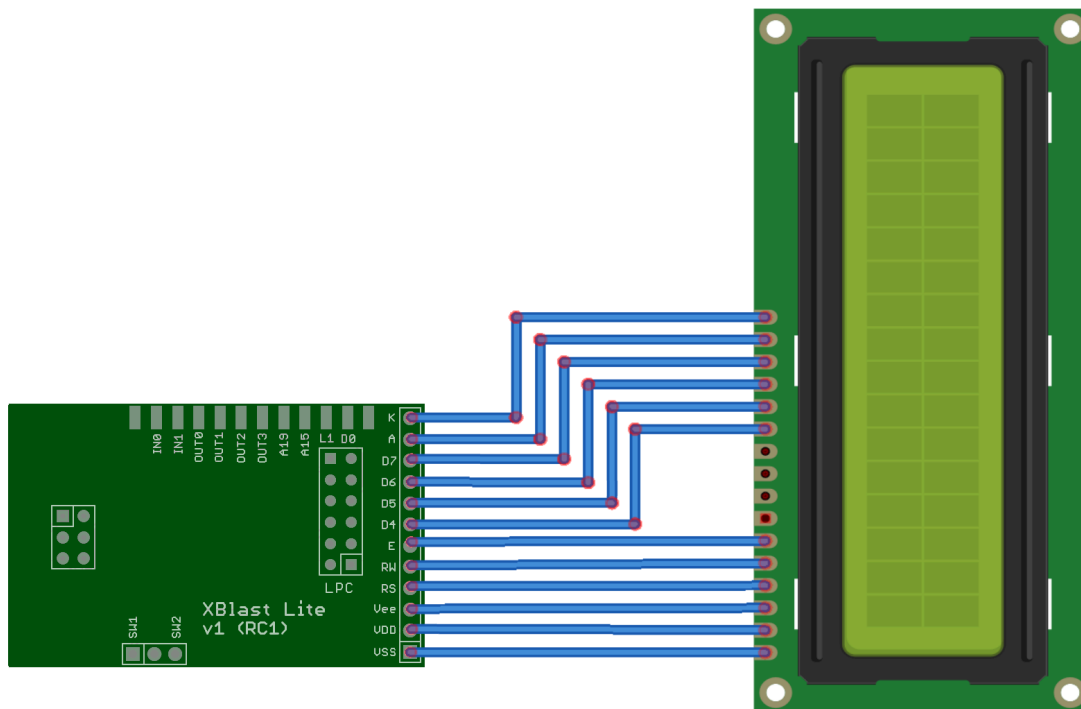
It is normal and desired to leave pins labeled D0 to D3 on the LCD unconnected. Although the graphical representation above is made with a 2 lines by 16 characters wide LCD, a 4 lines by 20 characters wide LCD is recommended.

Tip: Remember to enable the LCD in the XBlast OS for it to function.t
XBlast Lite uses the same communication protocol between your Xbox and the LCD as SmartXX modchips to display information. This means that every homebrew software that supports the SmartXX LCD will support XBlast Lite LCD.

Tip: On 1.0-1.5 Xbox consoles, LCD as well as GPIO ports of the XBlast Lite are accessible even if you booted your Xbox from the TSOP. For 1.6/1.6b consoles, XBlast Lite is totally unresponsive if you boot from the on board, stock BIOS.

3.5 Evolution-X dashboard Xblast control

It is possible to partially control your XBlast Lite via the Evolution-X dashboard. With it, you can reboot your Xbox to the desired bank (Xblast Lite bank or TSOP) and flash a new BIOS to a selected bank (also support TSOP bank selection when TSOP is split).

You need to add a menu section with specific commands to your "evox.ini" file. The valid commands are regrouped into 3 categories. A single category of command can be shown in Evolution-X dashboard depending on the state of your XBlast Lite modchip. There are 3 known states: "Xbox booted from XBlast Lite flash bank", "Xbox booted from split TSOP bank" and "Xbox booted from full TSOP". For 1.6/1.6b Xbox, only the first state is possible as XBlast Lite will be completely unresponsive if your Xbox booted from the on board BIOS. [Evox command list]

You can rename the menu entries, remove unwanted lines ,modifying the existing command lines may produce Unexpected behaviour

Here's an example of integration into a sample evox.ini file.

```
 Section "XBlast TSOP split mode",ID_Chameleon_Mode_1
{
        Line "XBlast TSOP split mode"
        Item "Switch To TSOP (Disable Chameleon)",ID_Chameleon_Release_D0,ID_Full_Reboot
        Item "Switch To XBlast 512KB Bank",ID_Chameleon_Bank_0,ID_Full_Reboot
        Item "Switch To XBlast 256KB Bank",ID_Chameleon_Bank_2,ID_Full_Reboot
        Item "Switch To TSOP Bank 0",ID_Chameleon_Bank_1,ID_Full_Reboot
        Item "Switch To TSOP Bank 1",ID_Chameleon_Bank_3,ID_Full_Reboot
        Line "-=*-*=-"
        Item "Flash TSOP Bank 0",ID_Chameleon_Bank_1,ID_Flash_Bios
        Item "Flash TSOP Bank 1",ID_Chameleon_Bank_3,ID_Flash_Bios
}
Section "XBlast TSOP mode",ID_Chameleon_Mode_2
{
        Line "XBlast TSOP mode"
        Item "Switch To TSOP (Disable Chameleon)",ID_Chameleon_Release_D0,ID_Full_Reboot
        Item "Switch To XBlast 512KB Bank",ID_Chameleon_Bank_0,ID_Full_Reboot
        Item "Switch To XBlast 256KB Bank",ID_Chameleon_Bank_2,ID_Full_Reboot
        Line "-=*-*=-"
        Item "Flash TSOP",ID_Flash_Bios
Section "XBlast Onboard Flash",ID_Chameleon_Mode_4
{
        Line "XBlast Onboard Flash"
        Item "Switch To XBlast 512KB Bank",ID_Chameleon_Bank_0,ID_Full_Reboot
        Item "Switch To XBlast 256KB Bank",ID_Chameleon_Bank_2,ID_Full_Reboot
         #Item "Switch To TSOP (Disable Chameleon)",ID_Chameleon_Release_D0,ID_Full_Reboot
        Item "Switch To TSOP Bank0",ID_Chameleon_Bank_1,ID_Full_Reboot
        Item "Switch To TSOP Bank1",ID_Chameleon_Bank_3,ID_Full_Reboot
        Line "-=*-*=-"
        Item "Flash XBlast 512KB Bank",ID_Chameleon_Bank_0,ID_Flash_Bios
        Item "Flash XBlast 256KB Bank",ID_Chameleon_Bank_2,ID_Flash_Bios
}
```

Tip: If you copy the example above, make sure you enable the proper line(s) depending on

your situation in the "XBlast Onboard Flash" section. If your TSOP is split, you might want to remove the line
"Item "Switch To TSOP (Disable Chameleon)",ID_Chameleon_Release_D0,ID_Full_Reboot". If your TSOP is **NOT** split, you should remove the lines "Item "Switch To TSOP
Bank0",ID_Chameleon_Bank_1,ID_Full_Reboot" and "Item "Switch To TSOP
Bank1",ID_Chameleon_Bank_3,ID_Full_Reboot".
Tip: Don't forget to add XBlast Lite's flash chip in the supported flash list of your Evox.ini to enable flashing BIOS to banks. Add the following line in the [BIOS] section of your evox.ini file:
Flash = 0xbf5b,"XBlast Lite",0x80000

4. Rescue XBlast

In the unlikely event that the XBlast Lite does not power ON due to an interrupted OS update or general flash corruption, there is a failsafe mechanism in place that will allow you to rescue your XBlast. On the XBlast Lite modchip, there is an unpopulated port with "SW1" and "SW2" labels next to it.
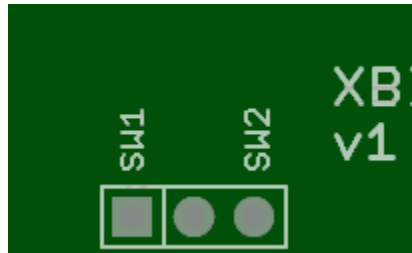
This port enables you to manually select a flash bank to boot from, bypassing XBlast OS initial boot up (Even if you enable Quick boot feature, XBlast OS still boots for a very short time, selects the appropriate user flash bank and boots it. You just don't see it).
So if you have a user flash bank containing a valid Xbox BIOS, you can boot from that BIOS and then launch the XBE version of XBlast OS to reflash your OS on the XBlast Lite.
Linking SW1 pin to ground (center pin of the port) will boots 512KB flash bank.
Linking SW2 pin to ground (center pin of the port) will boots 256KB flash bank.

Here is the procedure to rescue your XBlast Lite:
1- Partially disassemble your Xbox. Exposing the motherboard and the XBlast Lite modchip.
2- Remove XBlast Lite modchip. Don't forget to unsolder all the wires soldered to it (D0, L1, etc...)
3- Solder a piece of jumper wire between SW1 and center pin (ground) of the port to enable booting from 512KB flash bank or SW2 to center pin to enable booting from 256KB flash bank. Soldering both SW1 and SW2 will do the same thing as soldering only SW1.
4- Insert back the XBlast Lite on the LPC port of the Xbox motherboard. Solder back all the wires your previously unsoldered from it(D0, L1, etc...).
5- Partially reassemble your Xbox. At least your Hard Disk Drive must be connected to boot to your Dashboard.
6- Launch XBlast OS.xbe from your dashboard. It can be on your Hard Disk Drive or burned DVD-R/CD-RW.

7- Follow the procedure to update XBlast OS as described in the manual.
8- Once the update procedure is successful, unplug your Xbox.
9- Remove the jumper on the Rescue port. Remove the XBlast Lite from the LPC port if necessary. Neither SW1 or SW2 must be connected to ground (center pin of the port).
10- Reassemble your Xbox.
11- Boot your console and XBlast OS should load correctly.

If the above procedure is not working for you, please seek help on the Internet. You can try to contact "bennydiamond" and/or "pysko_chewbacca" on various Xbox-oriented forums or on https://xblastmod.wordpress.com/

5. Developers documentation

People who want to develop Xbox homebrew software that interface with the XBlast Lite are very welcome. XBlast Lite communicates exclusively on the LPC port of the Xbox. As the LPC port is mapped in memory, you can access it using CPU IO input/output functions(_inp/_outp in XDK) and supply the correct address that will trigger the XBlast Lite to listen and in the appropriate case, reply to a software command. XBlast Lite will only work with specific "register" addresses. Every 8 bits "register" supported by XBlast Lite as well as their usage and function are described in the table below:

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x00FE	Read	XODUS_ID	SW1	0	SW2	0	1	0	1	0
Chameleon ID (0xAA), only if external switches SW1 and SW2 are not grounded.										

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF701	Read	SYSCON_REG	0	0	0	1	0	1	0	1
SmartXX OPX spoof(low nibble) + Xblast mod variant(high nibble)										

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF701	Write	LCD_BL		LCD-BL5	LCD-BL4	LCD-BL3	LCD-BL2	LCD-BL1	LCD-BL0	
LCD backlight register. LSB is ignored.										

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF703	Write	LCD_CT		LCD-CT5	LCD-CT4	LCD-CT3	LCD-CT2	LCD-CT1	LCD-CT0	

LCD contrast register. LSB is ignored.

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF700	Write	LCD_DATA		LCD-D7	LCD-D6	LCD-D5	LCD-D4	LCD-E	LCD-RS	

LCD data register

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF70D	Write	XBLAST_IO	GPO-3	GPO-2	GPO-1	GPO-0				Enable 5V

GPO=General Purpose Output, GPO-2&3 only accessed when SW1-2 = "11" & D0_control = '1' &A19ctrl = '0'

Enable 5V = Set to '1' to enable 5V rail to LCD.

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF70D	Read	XBLAST_IO	GPO-3	GPO-2	GPO-1	GPO-0	GPI-1	GPI-0	A19_ctrl	Enable 5V

GPO = General Purpose Output, read state of GPOs.

GPI = General Purpose Input, read state of GPIs.

A19_ctrl = Read state of A19_ctrl. Is '1' when TSOP is split.

Enable 5V = Read state ofEnable 5V. Is '1' when enabled.

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x00FF	Write	XODUS_CONTROL		Latch_en	Kill mod		A15	D0_control	ltch_A19/ltch_iSW1	ltch A19_ctrl

Latch_en enables write for bit1-0.

Kill mod completely mutes modchip until a power cycle.

A15 and D0_control are put to ground when sending '1' to the corresponding bit.

ltch_A19/ltch_iSW1 controls user banks and TSOP split at the same time(if ltch A19_ctrl and/or A19_ctrl is set). iSW2 is automatically set to '0'.

ltch A19_ctrl enables TSOP split. Bank is selected by ltch_A19 and/or A19

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0x00FF	Read	XODUS_CONTROL		iSW2	A19_ctrl	iSW1	#A19_ctrl	D0_control/#A19_ctrl	A15	iSW1

iSW* = internal state of SW*. iSW* can be disconnected from SW* when OS seize control of it.

A19_ctrl = State of TSOP split feature. '1' when TSOP split is enabled.

#A19ctrl = inverted value of A19_ctrl(For Evolution-X support)

D0_control/#A19_ctrl = This bit is set to '1' whenever D0_control = '1' OR A19_ctrl = '0'(For Evolution-X support)

A15 = State of A15. '1' when is grounded.

Address	R/W	Name in OS	bit7	bit6	bit5	bit4	bit3	bit2	bit1	bit0
0xF70F	Write	XBLAST_CONTROL	OS Bank ctrl		Kill mod	A19_ctrl	A19	D0_control	iSW1	iSW2

OS Bank ctrl = Seize control of iSW1 and iSW2 when set to '1'. Needs a complete power cycle to return to '0'.

Kill mod completely mutes modchip until a power cycle.

A19_ctrl enables TSOP split. Bank is selected by ltch_A19 and/or A19

A19 = Control selected bank of split TSOP. A19_ctrl must be set for this to take effect.

D0_control = D0 signal is put to ground when set to '1'.

iSW* = Internal state of SW*. Is used by OS to select banks on Xblast.

Bank switches truth table		
iSW1	iSW2	Bank
0	0	BNK512
0	1	BNK512
1	0	BNK256
1	1	BNKOS

TSOP split control signals truth table		
A19_ctrl	A19	TSOP Bank
0	0	Full TSOP
0	1	Full TSOP
1	0	Split bank0
1	1	Split bank1

For more information and examples on how to interface the registers. Please check XBlast OS' source code.

6. Apendixces.

7. Disclaimer

Any instructions in this manual are given in good faith, the project and associated hardware are provided without any warranty. Any modifications done to your hardware are done so at your own risk