



The TOTAL NOOB's Guide

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INTRODUCTION

This guide is intended to cover all the basics, from opening up the XBOX through installing a replacement dashboard, in modifying any version XBOX console with the Xenium ICE modchip. Some references may only apply to users from the USA, but most of this guide will apply to all Xenium users. While this guide has been designed to cover specifically the Xenium ICE modchip, there are portions that will equally apply to the regular Xenium (as well as other LPC bus modchips), and XBOX modding in general. Please feel free to email me with suggestions, comments, corrections, etc. in order to make this guide fully useful for its intended audience.

Experienced users will notice that this guide does not cover every single topic related to the Xenium ICE and the XBOX. It was not intended to be an exhaustive manual or to cover every aspect of using the Xenium ICE, or even modded XBOXes in general. The sole purpose of this guide is to provide enough information to a person new to the scene such that he or she can easily install and set up their new modchip on their XBOX.

WHAT COMES IN THE PACKAGE



All Xenium ICE modchips should come with a pinheader. If you specifically ordered the solderless version, you will also receive: a solderless adaptor, a packet of tiny rivets, and a screw. Most of the recent Xenium ICE modchips have also come with a small white connector with a blue and black wire attached. This is the Removable D0 wire loom. Additionally, in Summer 2004, OzXodus

released a bundle package that contained the Xenium ICE with the "Xternal LED" module and a USB controller port adaptor. Additionally, some resellers package some loose lengths of 30AWG wire, desoldering braid, and a short length of solder with their products. These items are added by the reseller, not OzXodus, so not all Xenium ICE modchips will come with them. If you did not receive all of the items that you think you should have based on the above information, please contact your reseller immediately for replacement.

WHAT YOU NEED TO KNOW BEFORE YOU START

The first thing you need to know is: opening your XBOX console will void your warranty. So, if you mess something up installing the Xenium ICE, Microsoft will not fix it and you will need to send it to a professional XBOX mod installer for repairs, or purchase a new XBOX. Also, there are exposed places inside the XBOX that could deliver a substantial electrical shock to you. Take all necessary precautions and disconnect the XBOX from electrical power before opening the cover. Never place your hands inside the XBOX, or connect or disconnect parts, while the XBOX is plugged in to electrical power, or operating. The XBOX contains sensitive digital circuits. Please also wear a grounding wrist strap or take other precautions to protect the XBOX against accidental ESD (electrostatic discharge). ESD can render your XBOX unstable, or even destroy it.

Next, please refer to Appendix A, Glossary of Terms, to familiarize yourself with some of the terminology you will encounter throughout the rest of this guide. Please read through the definitions. Even though there may be some terms that seem familiar to you, there is a likelihood that modern XBOX scene usage uses a term in a fashion you are not familiar with.

You should probably also have a basic understanding of networking. You should know how to set up a network connection on your PC, assign IP addresses, connect devices like hubs/routers/switches to your network, set up network shares (SMB), use FTP, use IRC, etc.

Installing the Xenium ICE is not a difficult undertaking as long as you completely understand the process and have all of the materials and tools you need at hand. Following the instructions and information in this guide, I hope your installation goes smoothly and successfully.

FINDING YOUR XBOX VERSION

Before proceeding, please take a few minutes to find out which XBOX version you have. You can do this without evening opening the XBOX up! Just turn on the XBOX and TV, and follow these instructions:

Have a piece of paper and pencil handy. On the dashboard menu, scroll down until you see Settings. Next, scroll down until you see System Info. Wait for a few seconds, and the text in the window on the right will begin scrolling. At the end of the text will be two numbers, a K and a D number. Write them down. They will look something like this:

K: 1.00.4034.01

D: 1.00.5659.03

The one you are interested in is the K number. Note, if you get no K number, it is a 3944.

If K = 3944, 4036, or 4627 then you have a v1.0 XBOX.

If K = 4034 then you have either a 1.0 or 1.1 XBOX. You will find out for sure if there are two fans inside after you open it up. A case fan and a GPU fan = v1.0 XBOX. Most 4034 XBOXes are v1.0.

If K = 4817, or 4972 then you have a v1.1 XBOX.

If K = 5101, 5530 or 5713 then you have a v1.2-1.5 XBOX. You can find out specifically which version you have after you open up the case. Most v1.5s are 5530. Most v1.4s are 5101 or 5713. The Halo LE 1.4 is 5713. Also, all v1.5 XBOXes have mfg dates in August 2003.

If K = 5838 or higher then you have a v1.6 XBOX. The Halo LE 1.6 is 5838.

After you open up the case, you can determine exactly which version you have by looking here: <http://www.xbox-scene.com/versions.php>

NOTE: There is only one way to tell v1.4 from v1.5 accurately. That is to run a continuity check on pin 2 of the LPC. If it has continuity to ground, it is a v1.4. If there is no continuity to ground, then it is a v1.5.

TOOLS AND MATERIALS REQUIRED

Any tools or materials followed by an RS#, indicates the Radio Shack part number (USA only) for that item. This is provided so you can easily obtain this item. If you do not have a Radio Shack store near you, any electronics parts house should carry an equivalent. Failing that, you can order most supplies and tools from www.digikey.com.

Solderless installation:

T10 torx driver

T15 torx driver (only needed if replacing the hard disk drive)

T20 torx driver

A cup to hold your screws

Small flat blade screwdriver

Small long-nose pliers

#1 Phillips screwdriver

Cotton Swabs

Denatured (or isopropyl) alcohol

Quicksolder and Pinheader installation:

The above materials plus...

15-30 watt fixed temperature grounded soldering iron (RS#64-2051)

½ ounce rosin-core 0.032" solder (RS#64-017)

De-soldering braid (RS#64-2090)

30AWG wrapping wire (RS#278-501, -502, or -503)

HOW TO OPEN UP YOUR XBOX

Take your XBOX to your clean, well-lit work area. Place a soft cloth or towel on the work surface where you will be working. Turn the XBOX upside-down and place it on the cloth. This is so the top of the XBOX won't get scratched up while you're working. Plug in your soldering iron so it can start heating up.



There are six T20 screws holding your XBOX case together. Turn your XBOX over so you can see the bottom. Four screws are under the rubber foot pads, and the last two are hiding under the stickers in the middle top and bottom of the case.



The first step is to lift off the rubber pad “feet” and peel back the stickers so that the case screws will be revealed. Using your small flathead screwdriver, carefully insert it under the edge of each rubber pad and either fold it back, or peel it all the way off. Keep in mind that if you peel it all the way off, it may not stick as strong as it did before. Some people peel them off and don't bother to put them back. New feet can be ordered online from various sources.

After you have dealt with the four rubber pads, we must tackle the stickers. If you don't care about preserving them, you can just feel around with your fingertip for the hole where the screw is and then just stick the screwdriver right through the sticker and unscrew the screw. If you want a cleaner look, back the screw out a little, then use an X-acto (or similar) knife (be careful, this is very sharp!) to cut around the screw head leaving a circle in the sticker for the screw to pass through. Watch out not to dig the knife blade into the plastic. Now, unscrew the six case screws (turn them counterclockwise!) and remove them from the case. Carefully turn the XBOX over (right side up). Firmly grasp the



case with one hand on each side of the case with your palms on top, give it a snap, and the top should come right off. You can now see inside your XBOX!

There is a metal shield inside on both halves of the case that interlocks. Some of these can be quite tight. If your lid doesn't come right off, and you have made sure that all six screws are out, try again. **DO NOT PRY THE CASE APART!!!** After a couple of tries, it should give in to your wishes and pop off.

That wide flat gray cable running across the inside of the box is the hard drive data cable. The hard drive is on the right (the silver box with the white sticker on it). You want to untuck the cable from the black clip at its center (just pull it toward you and out from under the clip) and reach in behind the hard drive and pull it straight out of the back of the drive. Use a firm hand, but don't use too much force, or you could damage the cable. When it's free from the hard drive, turn it away from you and let it hang off the back. Now you will see the power connection underneath where the gray cable was. It has a white plastic connector with a red wire, two black wires, and a yellow wire. Pull that connector straight out of the back of the hard drive as well. Some of these are in there very tight, so it may help to use your long nose pliers. Don't pull the connector by the wires themselves; you can accidentally pull them out of the connector. Instead, grasp the left and right sides of the plug with the pliers and wiggle it a little back and forth and it should eventually come right out.



Now, you will need to remove the screw retaining the hard drive and its plastic carrier. Use your Torx-10 screwdriver for this screw. Place it in your cup so it doesn't get lost. After removing the screw, just lift the hard drive (plastic carrier and all) straight up and out of the XBOX.

With the hard drive is removed, there are two Torx-10 screws holding the DVD drive carrier in place. Remove them and place them in your cup as well. Lift the DVD drive and its carrier straight up, but not out. It is still attached to the XBOX by the wide gray and yellow cables! Holding the DVD drive securely in one hand, use your other hand to unplug the two cables from the motherboard. You will need to use a firm hand, but don't use force, or you could damage the cables. Be careful not to drop the DVD drive! After the two cables are unplugged, you can remove the DVD drive, carrier and cables and all, from the XBOX. Set the DVD drive and the hard drive in a safe place where they will be free from harm (and being dropped!) until they are put back in the XBOX later.



Ok, so now you can see the XBOX motherboard. Nice, isn't it? You will notice quite a few screws holding it in place. There are eleven Torx-10 screws in all. Referring to the diagram, remove them and place them in your cup for safekeeping.

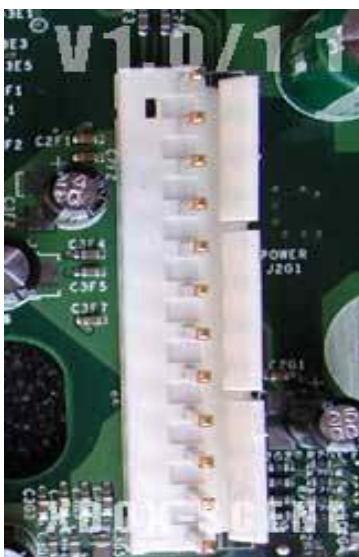


At this point, we should try to identify your specific motherboard version. There are currently seven known types numbered 1.0 through 1.6.

Version 1.0 is easy to identify by its fan on the GPU heatsink and USB daughterboard. If your XBOX has a fan like in the picture below-left, **you have a v1.0 XBOX** and can skip the rest of this.



Versions 1.1-1.5 do not have the fan, and the USB circuits are built into the main board.

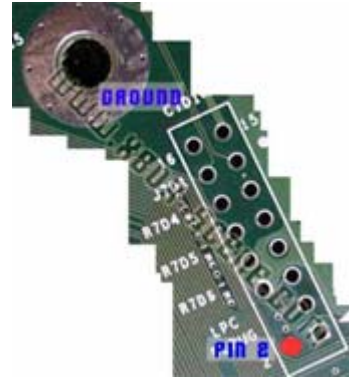


Now, look at the power supply connector. If it looks like the picture to the left, **you have a v1.1 XBOX** and can skip the rest of this. If it looks like the picture to the right, you have a v1.2 or later XBOX.



Near the back of the motherboard, at about the center, there is a small chip, about 1/2 inch (~1.5 cm) square. It will either have the word Conexant or the word Focus on it. If it reads Conexant, **you have a v1.2 or v1.3 XBOX** and can skip the rest of this. If your video chip reads Focus, you have either a v1.4 or v1.5 XBOX.

Unfortunately, there aren't any visible cues between v1.4 and v1.5 like with the others. However, using a continuity tester (or an ohmmeter or a multimeter set to ohms or continuity check) we can find out. Refer to the diagram to the right. If there is continuity between those two locations (the LPC hole marked with the red dot and the screw ring above the LPC area), **you have a v1.4 XBOX**. If there is NO continuity, then **you have a v1.5 XBOX**.



Version 1.6 motherboards look completely different altogether. The layout is similar, but they have two new chips on them, the Xcalibur and the Xyclops. If your motherboard has these two chips on it, then you definitely have a 1.6 motherboard.

If you have a v1.0 motherboard, you will now need to remove the USB daughterboard from the motherboard. Unplug the multicolored cables coming from each bank of controller ports (there are two, one on each side). Now pull straight up on the daughterboard and it should come right off. If you have a v1.1 or later motherboard, simply unplug the controller port cables. There is no daughterboard on the later boards. If you have a v1.0 or v1.1 motherboard, remove the power connector by just pulling straight up on it. If you have a v1.2 or later, squeeze the clip in the center of the connector while pulling straight up to remove the power connector.

Carefully lift up the front edge of the motherboard. While pulling it toward you (to dislodge the network and video connectors on the rear) lift the motherboard up and out of the case.

Now you can proceed with the installation of your Xenium. Make sure that you have adequately determined which version XBOX you have before proceeding so that you can refer to the correct sections of this guide as you continue. Go directly to the installation section addressing your XBOX motherboard version.

INSTALLING ON A v1.0-1.4 XBOX

On these versions, you can use any of the three main installations: solderless, quicksolder, or pinheader. At this point, you should: have familiarized yourself with the terms in the glossary, know your XBOX version, your XBOX should be open and disassembled, you have all tools and materials available, your Xenium ICE parts are all present and accounted for. Good!

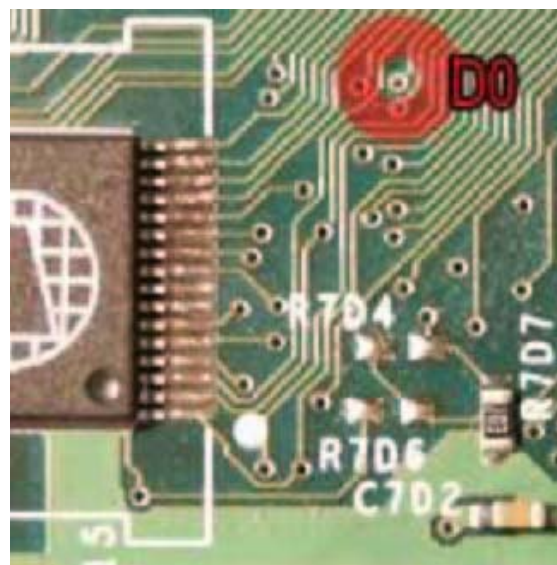
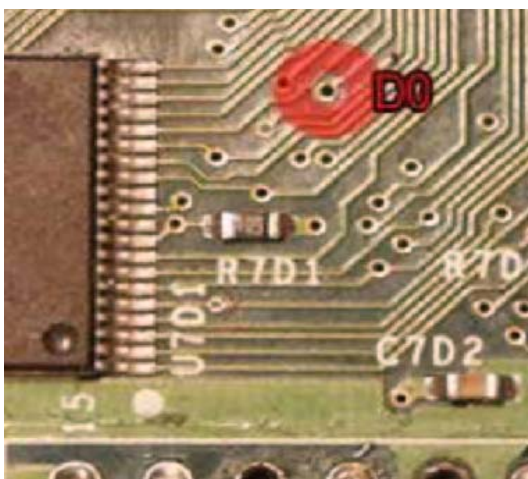
SOLDERLESS METHOD



Ok, so you want to install your Xenium chip using the solderless adapter. The good news is that you don't have to completely remove your motherboard for this. If you've already taken it out, you can put it back in now, and replace all the screws EXCEPT the one right above the LPC area.

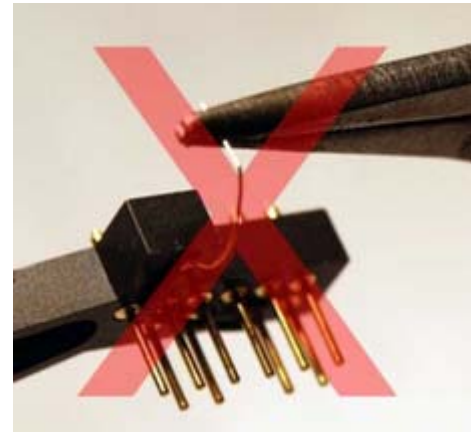
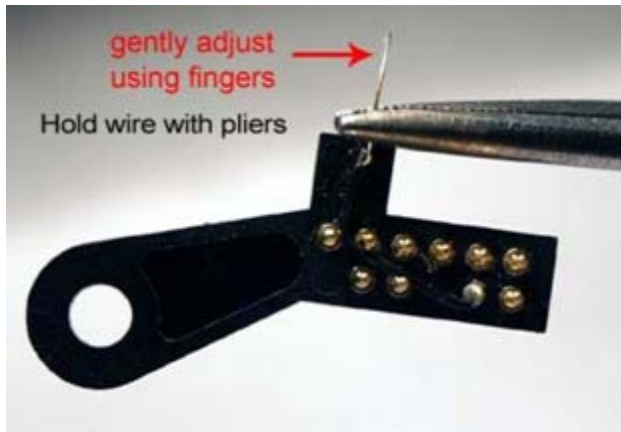
The first thing you want to do is to clean the LPC contacts. Do this by cleaning the area with alcohol. You may need to lightly scrape the surface with a sharp object as well. Be careful, though. You don't want to damage any traces.

Next, we must insert the rivets that came with your adapter into the LPC holes on the motherboard. If you have a v1.0 or v1.1 motherboard whose LPC holes are filled with solder, you can skip this step. Simply insert the rivets into the holes. Long nose pliers (or forceps, tweezers, etc) may be helpful for this task.



Next, you will need to locate the proper D0 point to use. There are two possible points, determined by which version motherboard you have.

Once you have found the proper D0 location, temporarily position the adapter on the LPC and rivets, and observe how the spring wire for the D0 needs to be bent, if at all, to fit into the D0 point. This wire must be bent carefully in order to still provide ample spring force when inserted to remain properly and firmly seated in the D0 hole. The wire can be quite delicate at the spot where it is attached to the adapter. Hold the wire near the adapter end with a pair of pliers if you need to bend the D0 spring wire to prevent breaking its solder connection to the adapter.



Insert the spring wire into the D0 hole on the motherboard, and make sure that the points of the pins on the adapter are properly locked into the rivets (or solder) of the LPC bus holes. Press down firmly on the adapter and attach it to the motherboard with the supplied screw. Be careful not to over-tighten the screw or you can strip out the soft plastic of the Xbox case. There should be very little to zero play on the adapter when it is properly installed

Now, simply line up the Xenium to the pins on the adaptor and press it down. The "X" in the word Xenium should be toward the back of the case (as shown).

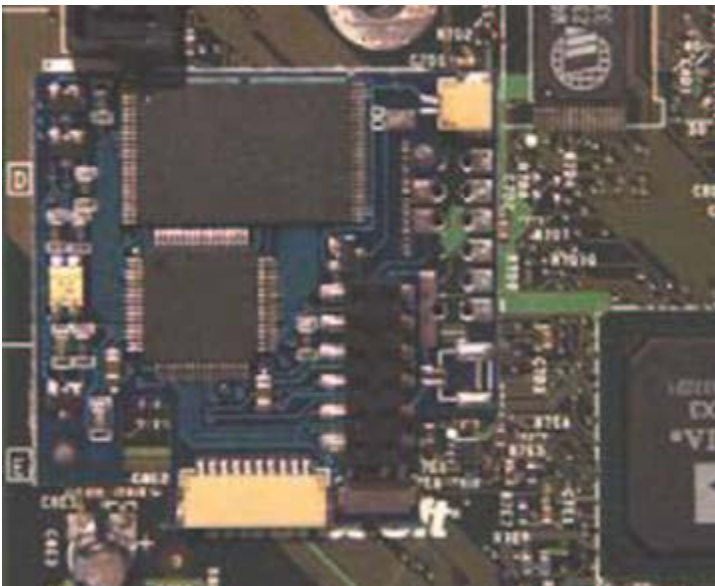


QUICKSOLDER METHOD

With the motherboard in front of you, orient it in the same direction as the picture shown and locate the LPC connection (circled in orange).

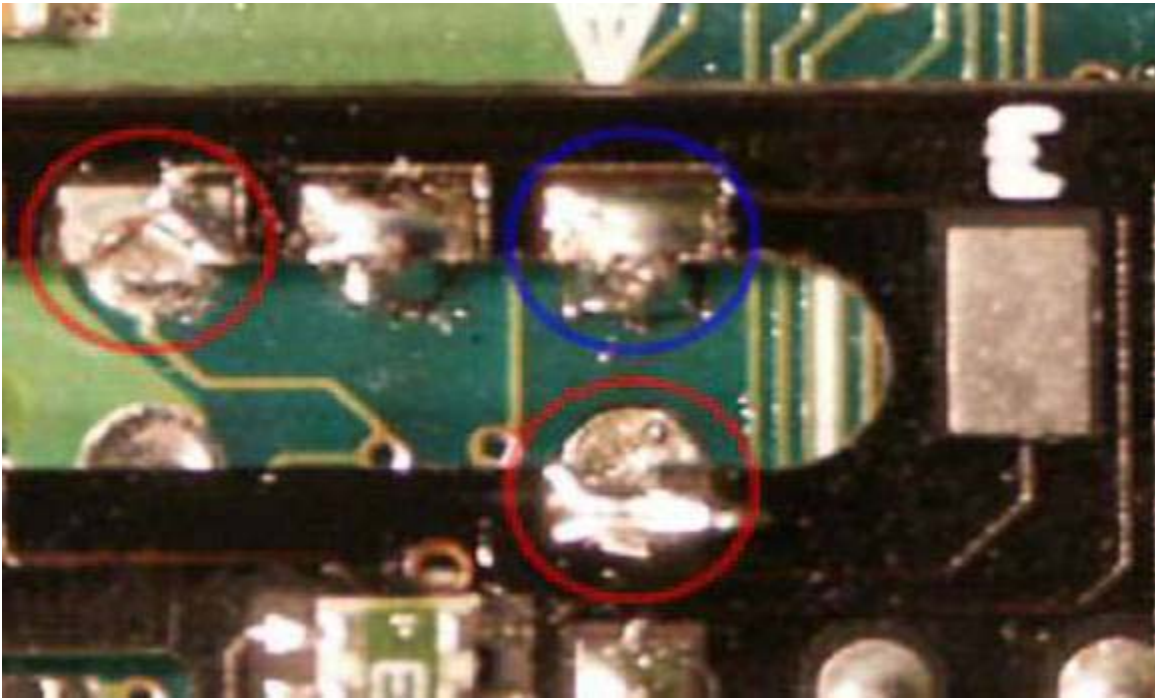


Place the Xenium over the LPC as shown in the picture below. Although the picture shows a blue Xenium being installed, the installation is the same for the Xenium ICE.



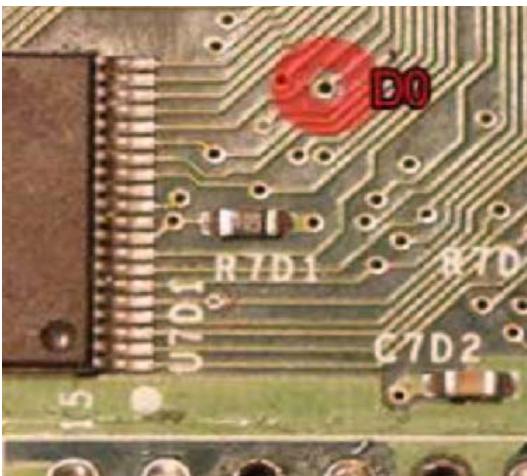
Using your soldering iron, heat both the Xenium pad and the pad on the motherboard at the same time, while applying some solder to the joint. It should not look like a glob, a ball, or have gaps in it. It should be shiny, not dull or grainy.

Also, do not apply too much solder, or it can puddle between the Xenium and the motherboard, causing a short circuit that you can't see to fix.

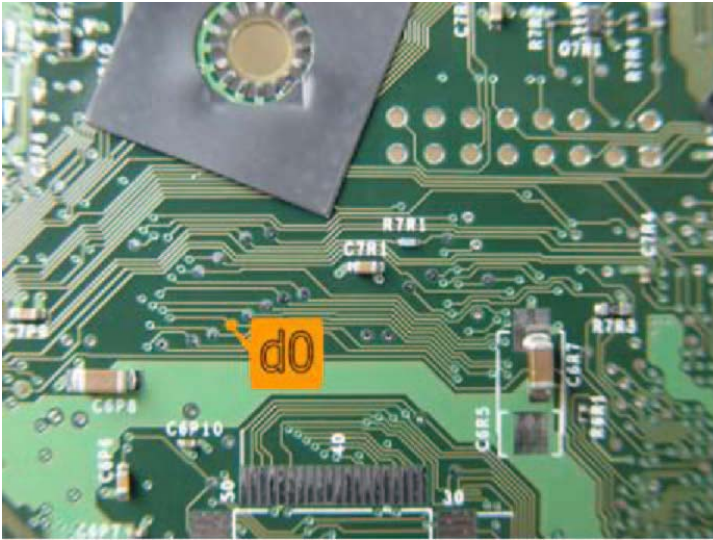


Refer to the picture shown above and compare to make sure your soldering job is done correctly. The photo shows a good solder joint (marked in blue) as compared to a bad joint (marked in red). If you have never soldered before, make sure you read the Appendix on soldering before attempting this step. A bad solder connection can cause your Xenium to fail to operate, or even damage your XBOX.

Now you'll need to determine which D0 point you are going to use. There are actually two D0 locations you can use, one on the top side of the motherboard, and one on the bottom side. Additionally, the upper D0 can be in one of two different places, depending on which version motherboard you have. While the



D0 on top is smaller than the one on the bottom, I prefer using the top point, because it results in a very short D0 wire (which is better) and makes for a cleaner looking installation. However, the bottom D0 (photo at left) is always in the same location on every motherboard, and the solder pad is a little larger, so some people choose this point for those reasons.



To connect the D0, you can either use the removable D0 wire loom, or your own piece of 30AWG wire to connect the D0. It is your choice. If you use the D0 wire loom,

the blue wire is for the D0 and the black wire is for ground. If you are using a wire, strip about 1/16" (1mm) insulation off of one end. You can use your fingernails to do this because it is so thin. Locate the D0 point that you have selected to use. Make sure you pinpoint the correct one! Use your magnifying glass if necessary.

Insert the stripped end of the wire into the D0 hole. Hold the soldering iron onto the wire and motherboard at the same time. Heat it up for a couple of seconds, and touch the solder to it, and that's it! Be extra careful not to use excess solder. Gently tug on the wire. If it comes out of the hole, it wasn't soldered correctly. Clean the hole and try again. Also be careful not to put too much heat on the D0 hole. It is very easily damaged (burned off)!

If the motherboard gets damaged, it can usually be repaired, but the repair can be quite difficult unless you have experience doing such things. In some cases you will need to replace the motherboard.

The photo at the right shows the Xenium connected to the top D0 point on a v1.2 XBOX.



PINHEADER INSTALLATION

While there are several ways to install the Xenium chip, it has been my experience, and that of other professional modchip installers, that the pinheader installation method is the preferred way to go. By using this method, the Xenium can easily be removed. This is a good idea if: your XBOX stops working and you get a new one; or, you decide to return it to stock condition; or, the Xenium breaks and you need to replace it; or, you buy a new XBOX and want to put your Xenium in the new one instead; or, well, you get the idea. With the motherboard in front of you, orient it in the same direction as the picture shown below, and locate the LPC connection (circled in orange).

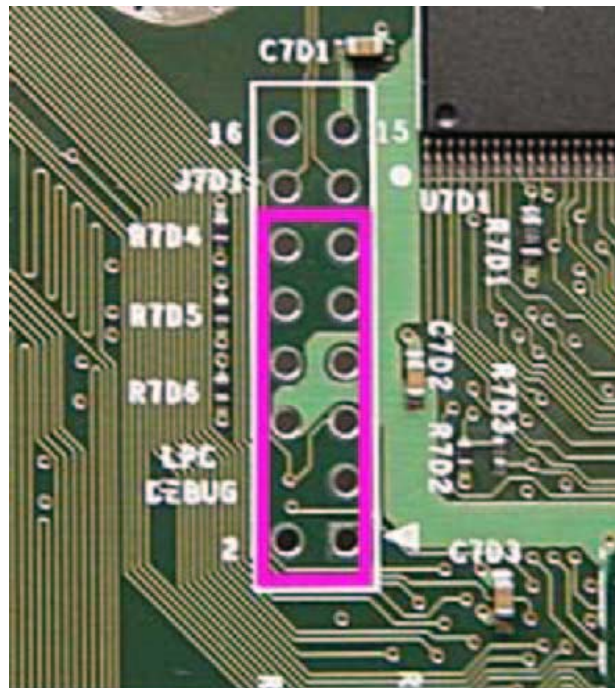


Ok. Look at the magenta rectangle shown in the picture below. This is the LPC area, and is where the pinheader will be placed. Take note, that the pinheader that came with your Xenium is 6 pins x 2 rows, while the LPC area is 8x2.

The magenta outline shows where the pinheader will be placed. YOU MUST make sure that the pinheader is oriented properly before any soldering is done! But before we get to that...

Some XBOX motherboards are shipped with the LPC holes filled with solder. On top of that, some boards have a “conformal coating” on top of the solder. This coating is like a plastic varnish. If your board has the filled holes and/or the conformal coating, you have to remove the solder first. If your board has empty LPC holes, then you can skip the next step.

With your prepared hot soldering iron, touch the tip to each filled hole. This will melt the conformal coating (if there) and soften the solder in the holes. Now, using the desoldering braid, lay the braid over the first hole. Touch the iron to the braid

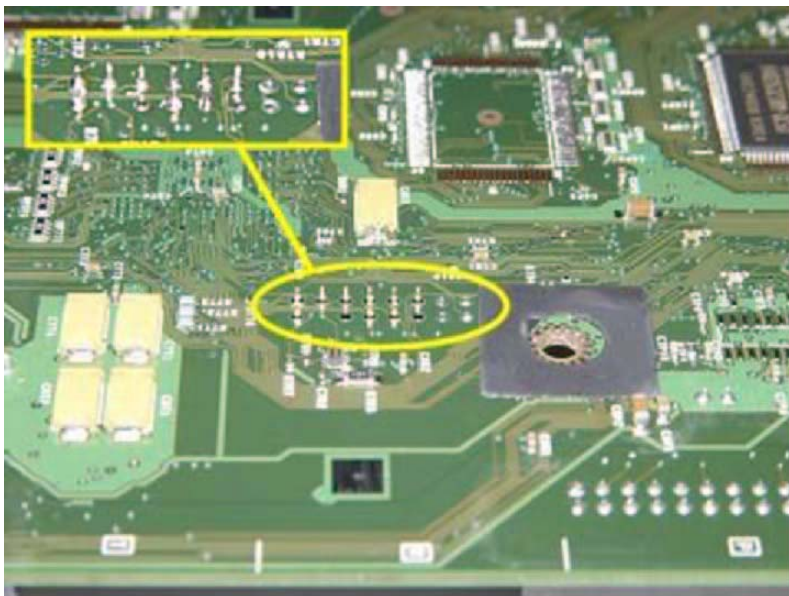
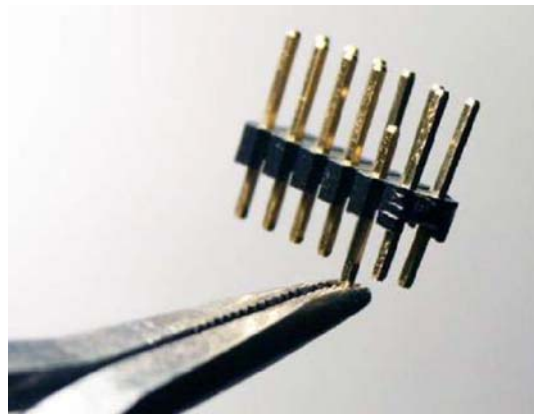


right over the hole. As the heat transfers through the braid to the hole, the solder will melt and get sucked up by the braid. Repeat this for each of the remaining holes the pin header will be using. Don't take the solder out of the four leftover holes, because having them filled will ensure that you get the header installed in the correct position later on.

Now get your pinheader. You may have noticed that one LPC hole position on the motherboard isn't actually there. The arrowhead to the right of the LPC box indicates Pin 1, and the hole opposite to it is labeled '2' for Pin 2. Therefore, the odd numbered pins are on the right and the even numbered pins are on the left. So, the non-hole position is Pin 4. We need to remove that pin from the pinheader so that we can install it in the holes on the motherboard in a little while. You will notice that on the pinheader, one side of the pins is taller than the other. The short side will be the side that is inserted in the motherboard. The tall side will be sticking up out of the motherboard, and will be what your Xenium mounts to.

With your longnose pliers, hold the pinheader firmly in your hand, and making sure you remove the correct pin, just grasp the pin with the pliers and pull it straight out of the header.

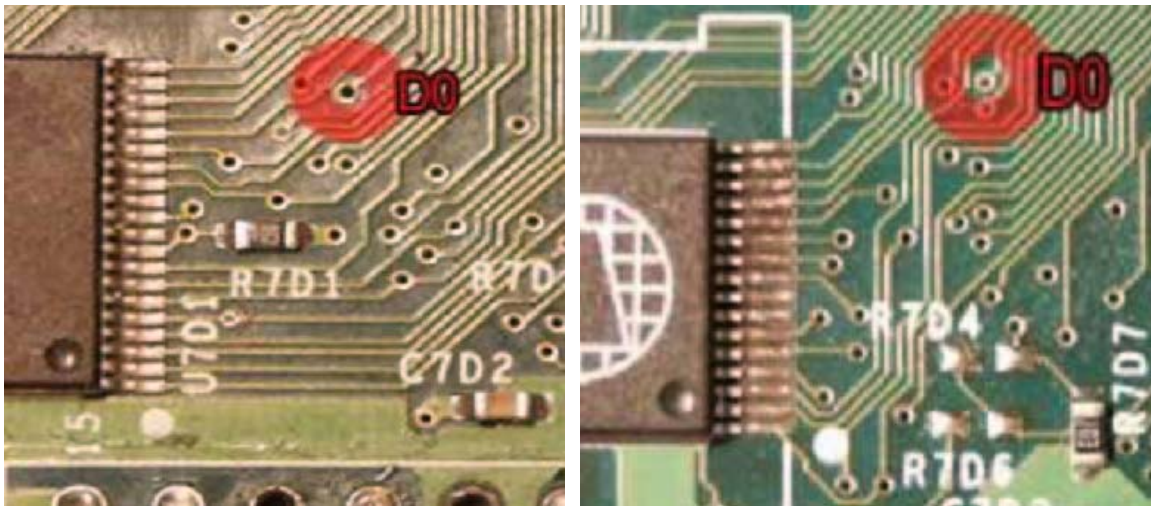
Good. Now, place the header into the holes, lining up the pin you removed with the non-hole position on the motherboard. Keeping the pinheader in place, turn the motherboard over, bottom side up, and make sure the pinheader is fully seated.



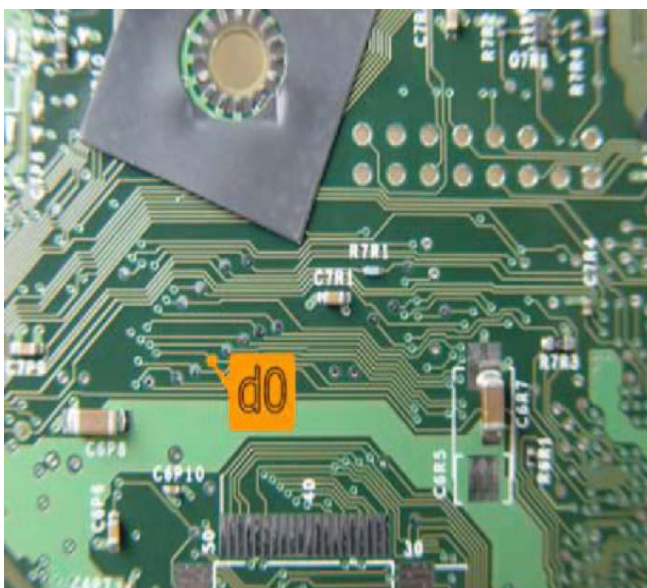
Let's solder the first pin point. Place the tip so that it makes contact with both the pin AND the circle on the motherboard. Let it heat up for a second or two. Now, touch the solder to the joint. The solder should now immediately melt and flow into the hole. Pull the iron straight off the pin. Be careful not to let too much solder flow! If you did it right,

your solder joint should look similar to a cone with the tip of the pin making the point. It should not look like a glob, a ball, or have gaps in it. If you have never soldered before, make sure you read the Appendix on soldering before attempting this step. A bad solder connection can cause your Xenium to fail to operate, or even destroy your XBOX.

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To connect the D0, you can either use the removable D0 wire loom, or your own piece of 30AWG wire. It is your choice. If you use the D0 wire loom, the blue wire is for the D0 and the black wire is for ground. If you are using a wire, strip about 1/16" (1mm) insulation off of one end. You can use your fingernails to do this because it is so thin. Locate the D0 point that you have selected to use. Make sure you pinpoint the correct one! Use your magnifying glass if necessary.

Insert the stripped end of the wire into the D0 hole. Hold the soldering iron onto the wire and motherboard at the same time. Heat them up for a couple of seconds, and touch the solder to it, and that's it! Be extra careful not to use excess solder. Gently tug on the wire. If it comes out of the hole, it wasn't soldered correctly. Clean the hole and try again. Also be careful not to put too much heat on the D0 hole. It is very easily damaged (burned off)! If the motherboard gets damaged, it can usually be repaired, but the repair can be quite difficult unless you have experience doing such things. In some cases you will need to replace the motherboard.

Now that you have one side of the D0 wire in place, it is time to take care of the other side. But first, let's mount the Xenium. Line up the chip with the pinheader as shown in the picture below and slide it fully onto the pinheader as far down as it will go. The "X" in the word Xenium on the chip should be toward the back of the case. Locate the pad on top of the Xenium marked D0. Route the wire you attached to the motherboard D0 as close as possible to the Xenium D0 pad. Trim and strip about 1/8" (2mm) from the end. Solder this end to the D0 pad on the Xenium. Observe the green wire in photo below connecting the top D0 on the motherboard to the Xenium. That's it! You're through.



INSTALLING ON A v1.5 XBOX

On this version, it is recommended that you use the pinheader. This is because there are two connections for power and ground that need to be made in order for the Xenium to work. At this point, you should: have familiarized yourself with the terms in the glossary, know your XBOX version, your XBOX should be open and disassembled, you have all tools and materials available, your Xenium ICE parts are all present and accounted for. Good!

PINHEADER INSTALLATION

This method is essentially the same as the pinheader installation on v1.0-v1.4 boards, except there are two additional steps.

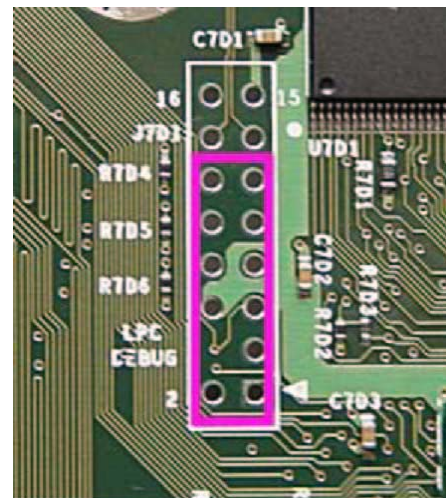


With the motherboard in front of you, orient it in the same direction as the picture shown below, and locate the LPC connection (circled in orange). Ok.

Look at the magenta rectangle shown in the picture below. This is the LPC area, and is where the pinheader will be placed. Take note, that the pinheader that came with your Xenium is 6 pins x 2 rows, while the LPC area is 8x2.

The magenta outline shows where the pinheader will be placed. YOU MUST make sure that the pinheader is oriented properly before any soldering is done!

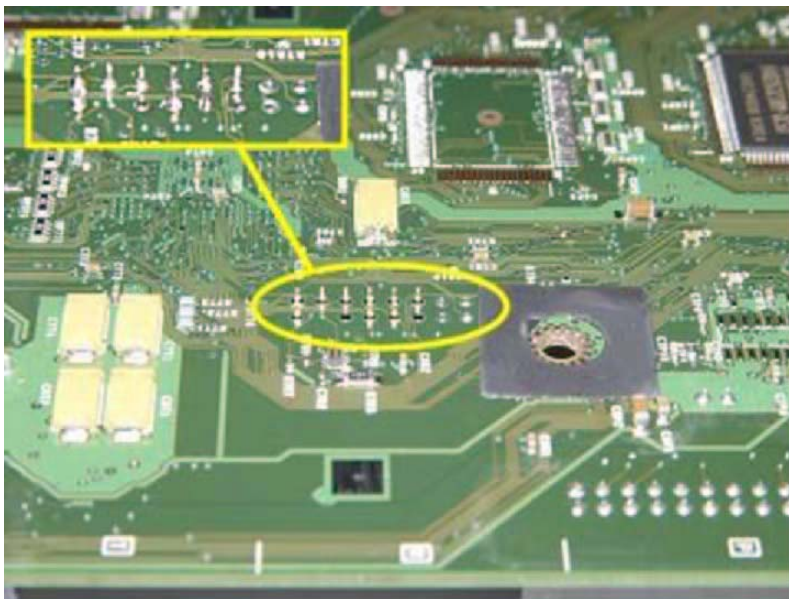
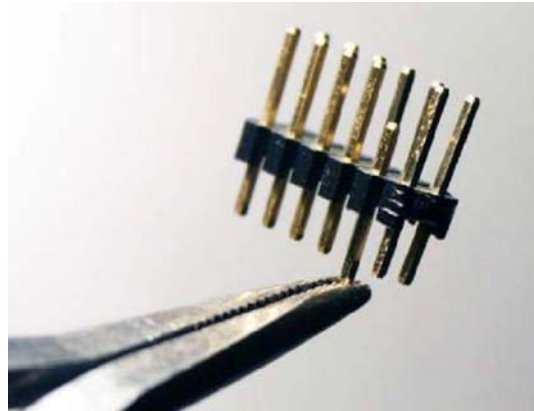
Now get your pinheader. You may have noticed that one LPC hole position on the motherboard isn't actually there. The arrowhead to the right of the LPC box indicates Pin 1, and the hole opposite to it is labeled '2' for Pin 2. Therefore, the odd numbered pins are on the right and the even numbered pins are on the left. So, the non-hole position is Pin 4. We need to remove that pin from the pinheader so that we can install it in the holes on the motherboard in a little while.



You will notice that on the pinheader, one side of the pins is taller than the other. The short side will be the side that is inserted in the motherboard. The tall side will be sticking up out of the motherboard, and will be what your Xenium mounts to.

With your longnose pliers, hold the pinheader firmly in your hand, and making sure you remove the correct pin, just grasp the pin with the pliers and pull it straight out of the header.

Good. Now, place the header into the holes, lining up the pin you removed with the non-hole position on the motherboard. Keeping the pinheader in place, turn the motherboard over, bottom side up, and make sure the pinheader is fully seated.

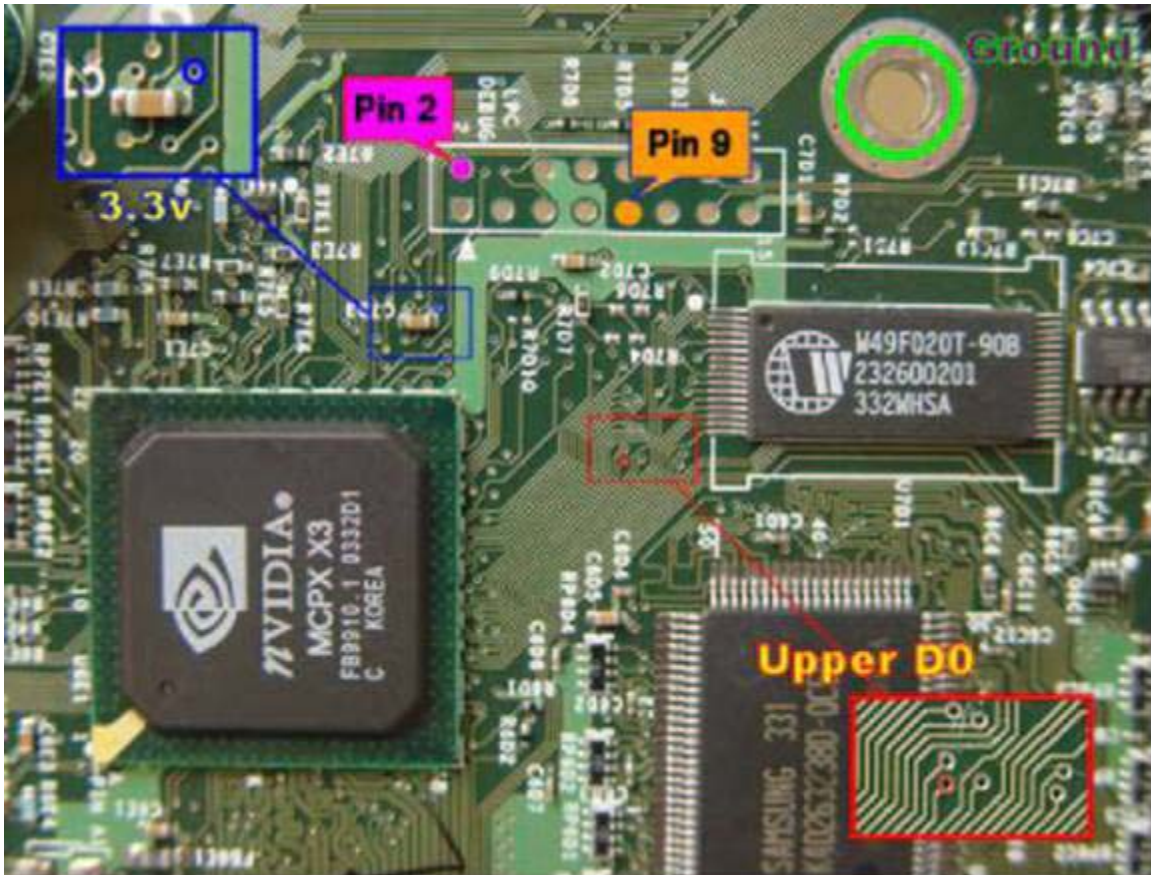


Let's solder the first pin point. Place the tip so that it makes contact with both the pin AND the circle on the motherboard. Let it heat up for a second or two. Now, touch the solder to the joint. The solder should now immediately melt and flow into the hole. Pull the iron straight off the pin. Be careful not to let too much solder flow! If you did it right, your solder joint should

look similar to a cone with the tip of the pin making the point. It should not look like a glob, a ball, or have gaps in it. If you have never soldered before, make sure you read the Appendix on soldering before attempting this step. A bad solder connection can cause your Xenium to fail to operate, or even destroy your XBOX.

Now we have those additional connections to make. The v1.5 board was not in production very long. All of the XBOXes reported having 1.5 boards were manufactured in August 2003. After that date, until the 1.6 emerged, XBOXes were made with 1.4 boards. That includes some of the HALO Special Edition consoles.

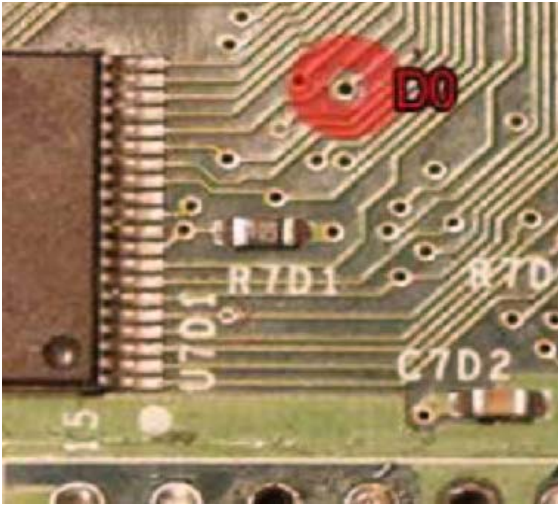
Two pins on the LPC were removed from v1.5 motherboards. The 3.3v supply on Pin 9 and the ground on Pin 2. We can rebuild them from other points on the motherboard. Refer to the photos below to locate these points. Solder a piece of wire to pin 2 and to the silver ring around the screw hole (marked by the green circle). Next, solder a wire to pin 9 and to the small hole (marked in blue) above the right end of component C7D3 (the end closest to the LPC area).



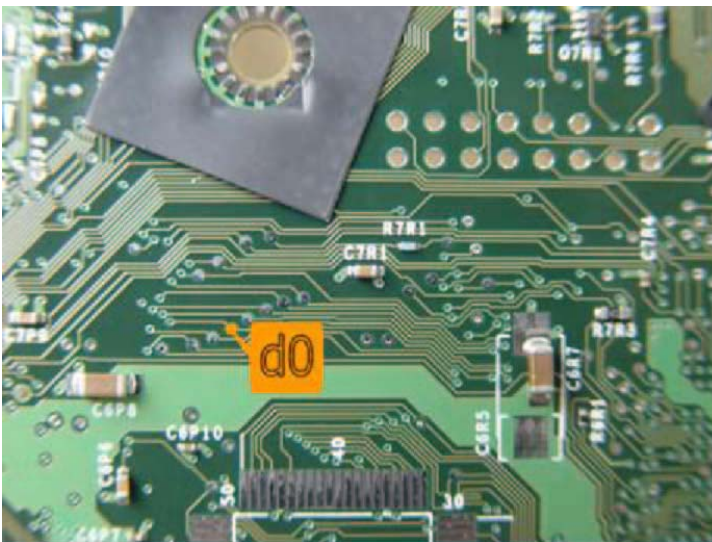
When you're done, you should have something like this:



Next, we'll be connecting the D0 point. There are actually two D0 locations you can use, one on the top side of the motherboard, and one on the bottom side. Additionally, the upper D0 can be in one of two different places, depending on which version motherboard you have.



While the D0 on top is a little smaller than the one on the bottom, I prefer using it, because it results in a very short D0 wire (which is better) and makes for a cleaner looking installation.



However, the bottom D0 is always in the same location on every motherboard, and the solder pad is a little larger, so some people choose this point for those reasons.

To connect the D0, you can either use the removable D0 wire loom, or your own piece of 30AWG wire. It is your choice. If you use the D0 wire loom, the blue wire is for the D0 and the black wire

is for ground. If you are using a wire, strip about 1/16" (1mm) insulation off of one end. You can use your fingernails to do this because it is so thin. Locate the D0 point that you have selected to use. Make sure you pinpoint the correct one! Use your magnifying glass if necessary.

Insert the stripped end of the wire into the D0 hole. Hold the soldering iron onto the wire and motherboard at the same time.

Heat it up for a couple of seconds, and touch the solder to it, and that's it! Be extra careful not to use excess solder. Gently tug on the wire. If it comes out of the hole, it wasn't soldered correctly. Clean the hole and try again. Also be careful not to put too much heat on the D0 hole. It is very easily damaged (burned off)! If the motherboard gets damaged, it can usually be repaired, but the

repair can be quite difficult unless you have experience doing such things. In some cases you will need to replace the motherboard.

Now that you have one side of the D0 wire in place, it is time to take care of the other side. But first, let's mount the Xenium. Line up the chip with the pinheader as shown in the picture below and slide it fully onto the pinheader as far down as it will go. The "X" in the word Xenium on the chip should be toward the back of the case. Locate the pad on top of the Xenium marked D0. Route the wire you attached to the motherboard D0 as close as possible to the Xenium D0 pad. Trim and strip about 1/8" (2mm) from the end. Solder this end to the D0 pad on the Xenium. Observe the green wire in photo below connecting the top D0 on the motherboard to the Xenium. That's it! You're through.



INSTALLING ON A v1.6 XBOX

On this version, it is highly recommended that you use the pinheader. This is because the motherboard has been completely redesigned for this XBOX version. The D0 points have been eliminated, the chipsets are different, there is no TSOP, and the LPC needs to be rebuilt. The solderless adaptor will not work at all because of the physical changes. Also, while it would be technically possible to do a quicksolder installation, this is not recommended due to the number of additional jumper wires that are needed to rebuild the LPC port.

The wires used to rebuild the LPC port must be kept as short as possible for system stability. Wires of excessive length can allow noise into the digital circuitry of the XBOX causing freeze-ups and other aggravating behaviors. It is recommended that Kynar insulated 30AWG "wire wrapping" wire be used for the LPC rebuild.

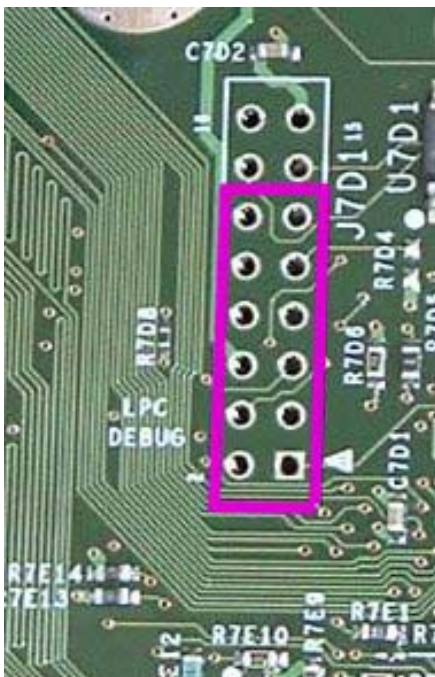
At this point, you should: have familiarized yourself with the terms in the glossary, know your XBOX version, your XBOX should be open and disassembled, you have all tools and materials available, your Xenium ICE parts are all present and accounted for. Let's begin!

1.6 PINHEADER INSTALLATION

With the motherboard in front of you, orient it in the same direction as the picture shown below, and locate the LPC connection (circled in orange).

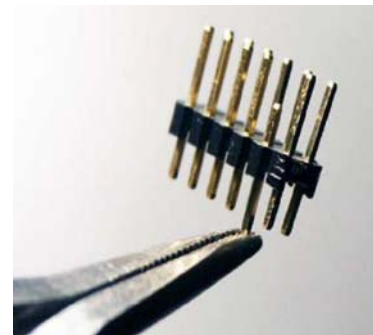


Ok. Look at the magenta rectangle shown in the picture below. This is the LPC area, and is where the pinheader will be placed. Take note, that the pinheader that came with your Xenium is 6 pins x 2 rows, while the LPC area is 8x2. The magenta outline shows where the pinheader will be placed. **YOU MUST** make sure that the pinheader is oriented properly before any soldering is done! But before we get to that...

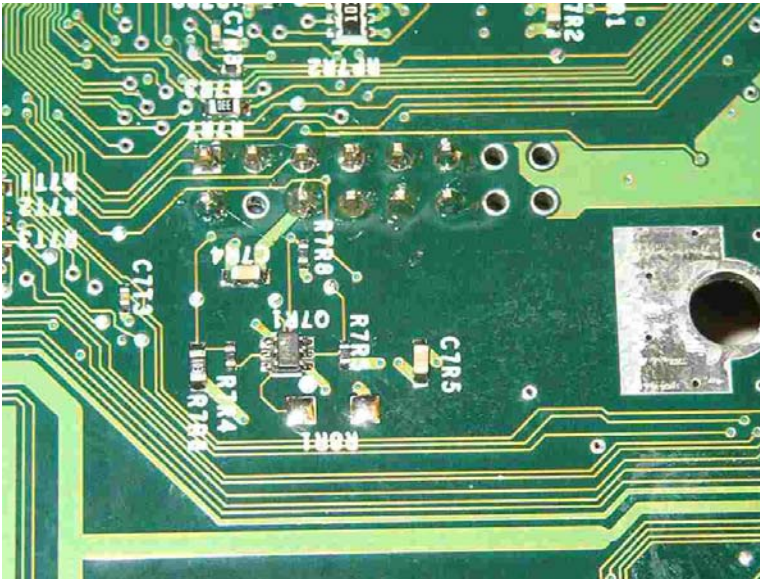


Now get your pinheader. Normally, on v1.0-1.5 boards, we have to remove pin 4 from the pinheader. This is because there is no hole in the motherboard at this location. However, although v1.6 motherboards do have a hole there, we must still remove that pin, since the Xenium uses that pin location for other purposes. You will also notice that on the pinheader, one side of the pins is taller than the other. The short side will be the side that is inserted in the motherboard. The tall side will be sticking up out from the motherboard, and will be what your Xenium mounts to.

With your longnose pliers, hold the pinheader firmly in your hand, and making sure you remove the correct pin, just grasp the pin with the pliers and pull it straight out of the header. (Pin 4 is the second row from the bottom on the left side). Good. Now, place the header into the holes, lining up the pin you removed with the non-hole position on the



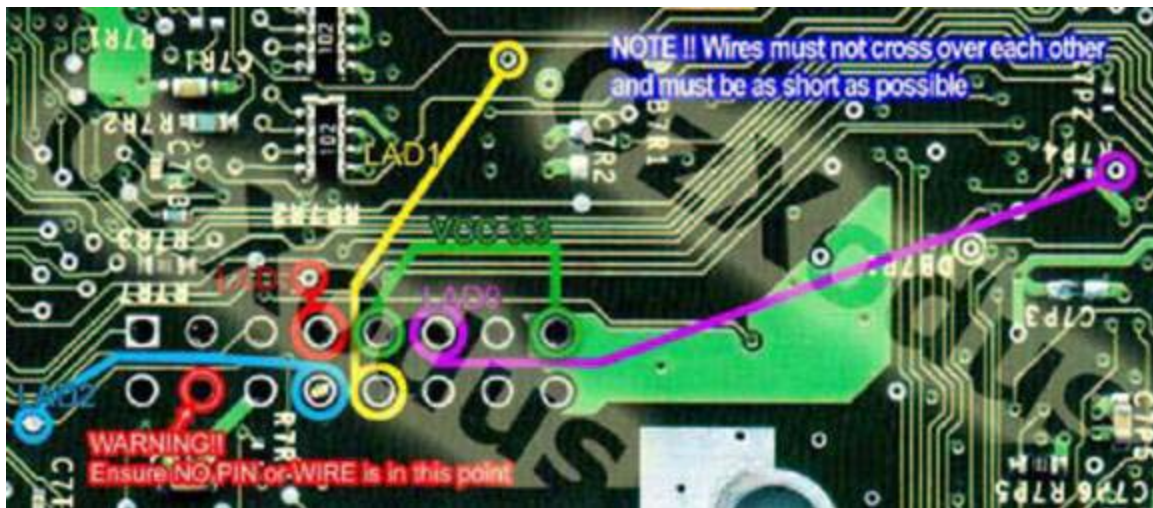
motherboard. Keeping the pinheader in place, turn the motherboard over, bottom side up, and make sure the pinheader is fully seated.



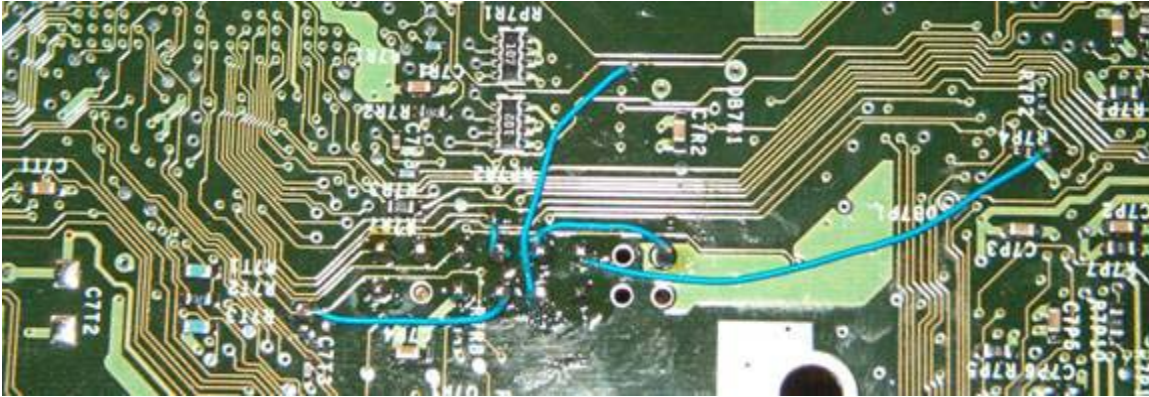
Let's solder the first pin point. Place the tip so that it makes contact with both the pin AND the circle on the motherboard. Let it heat up for a second or two. Now, touch the solder to the joint. The solder should now immediately melt and flow into the hole. Pull the iron straight off the pin. Be careful not to let too much solder flow! If you did it right, your solder joint should look similar to a cone with the

tip of the pin making the point. It should not look like a glob, a ball, or have gaps in it. If you have never soldered before, make sure you read the Appendix on soldering before attempting this step. A bad solder connection can cause your Xenium to fail to operate, or even destroy your XBOX.

LPC REBUILDING



These connections are going to be made on the underside of the motherboard. For each of the five wires, locate both endpoints. Measure and cut a piece of 30AWG wire to fit. Strip 1/16" (1 mm) from both ends of the wire. Solder the wire, first to the motherboard point, then to the end of the part of the pinheader sticking through the LPC hole. Route the wires as close and as short as possible.



When you are through making the five connections, it should look something like the picture above. Now, it's time to make the LFRAME connection. On the 1.6, the LFRAME point replaces the point we call D0 on other motherboard versions. This connection is made on the top side of the motherboard.

There are two LFRAME connection points. One on the top and one on the bottom. The top connection point has two holes that can be used. Look at the following picture: At the location U7C1, there are two vias. One above the letter U and one below it. Either point can be used as they are tied together with a trace between them.

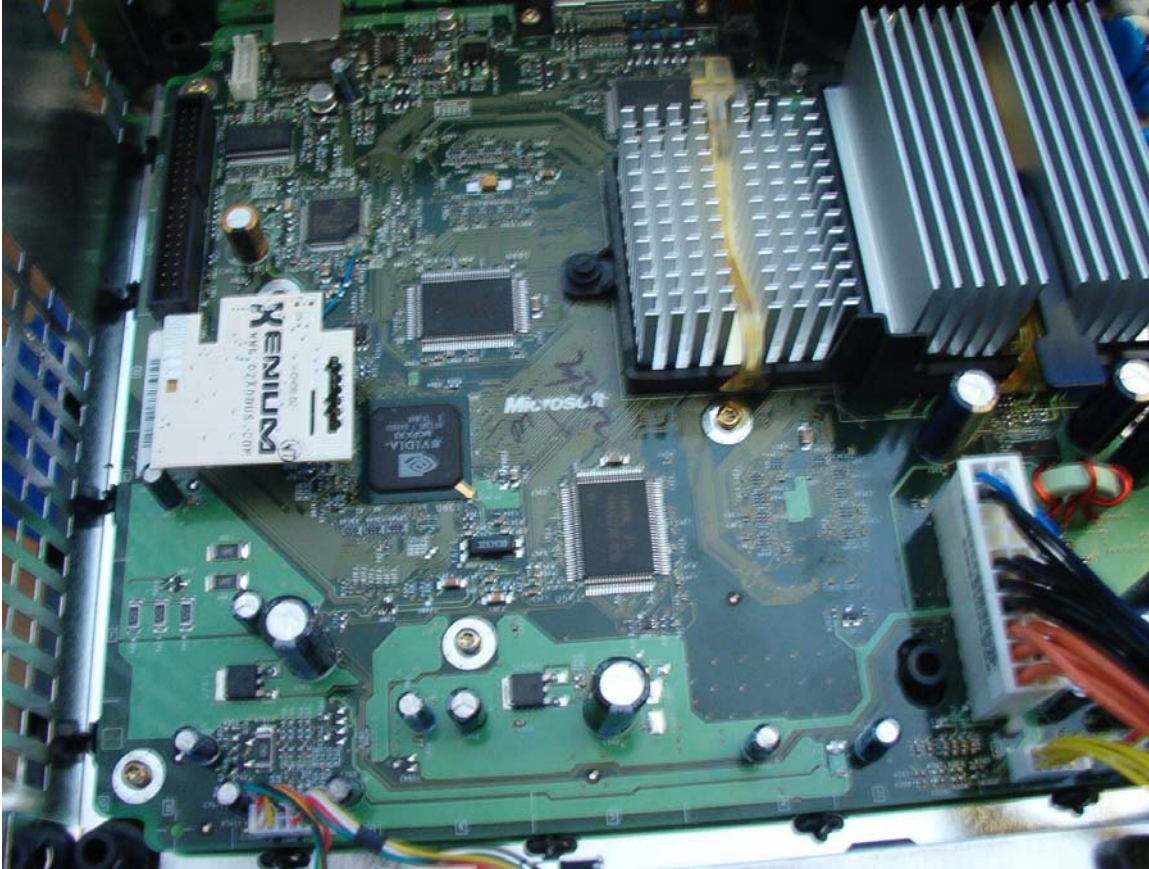


To connect to the top LFRAME, you can either use the removable D0 wire loom, or your own piece of 30AWG wire. It is your choice. If you use the D0 wire loom, the blue wire is for the D0 and the black wire is for ground. If you are using a wire, strip about 1/16" (1mm) insulation off of one end. You can use your fingernails to do this because it is so thin. Locate the D0 point that you have selected to use. Make sure you pinpoint the correct one! Use your magnifying glass if necessary.

With a length of 30AWG wire, strip about 1/16 (1mm) off the end and insert it into the hole. Solder it in place. Route the other end of the wire over to the pinheader area for attaching to the Xenium.

Mount the Xenium on the pinheader. With the "X" in the word Xenium (silkscreened on the chip) toward the back of the case, align the pins with the connector on the Xenium, and slide the Xenium down as far as it will go. Now you can trim, strip, and solder the free end of the LFRAME wire to the pad marked D0 on the Xenium.

NOTE: This only currently works for the Xenium ICE. If you are not mounting an ICE chip, you will need to instead solder the free end of the LFRAME wire to a nearby ground, such as the silver screw ring just barely visible at the bottom left of the above picture.



REASSEMBLING YOUR XBOX

Congratulations! You have just finished the installation of the chip. Now you can reassemble your XBOX. It is pretty much the reverse of disassembly.

Insert the motherboard by tilting the back edge into the case, routing the network and video connectors into their appropriate openings in the back of the case. Once they are in, slide the motherboard back and down. There are dowel pins molded into the case that help align the motherboard. Make sure these are engaged properly. The motherboard should be sitting flat and even. If it is pushing up anywhere, check for interference and re-align. Put the T10 motherboard screws back in their places. Remember, there are eleven screws for v1.0-1.5, and ten screws for v1.6.

Next, place the DVD drive back into the system. Line up and install the yellow cable connector (there is a raised tab on each end of the cable connector that fits into a corresponding slot on the motherboard. The connector on one end is larger than the connector on the other end.

Fit the gray IDE cable next. There is a raised tab in the center of one side of this connector that fits into a corresponding slot on the motherboard. Place the drive back in position in the case. Make sure the posts on the DVD drive carrier are securely placed over the pegs molded onto the bottom of the case. Take two of the Torx-10 screws from your cup and screw them into their holes on each side of the front of the drive.

Next, reinstall the hard drive. Position the drive carrier into its relative position. Make sure the posts on the right hand side of the carrier are fully seated on the case pegs on the bottom. There is an alignment pin on the DVD carrier that protrudes through the hard drive carrier near the front of the center rail. Make sure the hard drive carrier is fully seated here. Use one T10 screw to secure the hard drive in the center rail near the IDE cable clip. Reconnect the power cable first, be sure to route it along the channel in the right side of the hard drive carrier. Next, reconnect the wide gray data cable. The red stripe on the data cable should be on the side nearest the power cable. Tuck the top edge of the data cable back into the clip in the center of the carrier.

You are now ready to connect your XBOX up to your TV. Move your XBOX to its regular place (or near your PC if you will be hooking it up to the PC for file transference) and reconnect the power, video, and LAN cable (if you use one), and one controller. If you are connecting the XBOX directly to a PC, you will need a "crossover" cable instead of a regular LAN patch cord. (By the way, a "System Link" cable *is* a crossover cable).



Turn on the TV, then turn on the XBOX. You should now see the Xenium splash screen on the TV, and in a few moments, the OS 2.0 menu (pictured at left).

Congratulations! Your Xenium ICE is now ready to setup and use!

If you did not see the Xenium splash screen, then refer to the troubleshooting sections and repair your installation before proceeding.

If you will be replacing the hard drive, or installing any other accessories inside the XBOX case, you will not want to proceed reinstalling the cover. Otherwise, carefully slide the top of the case over the side supports and press firmly until the top locks in place over the sides. Turn over the XBOX bottom side up, and place the six long case screws back into their holes. Tighten them up with a Torx-20 driver, being very careful to not over-tighten. The plastic is quite soft, and the screw holes can strip out very easily.

If the sticky layer came off of the rubber foot pads when you removed them, you can apply a light coat of household contact cement to BOTH the XBOX case (inside the oval where the pad goes), and to the pad where the sticky stuff used to be. Let both sides dry for about 5 minutes, then stick them on. The contact cement will make an instant bond.

SETTING UP THE ORIGINAL BIOS

Before you can do anything with your newly modded XBOX, you must set up the BIOS. The Xenium allows a variety of BIOS programs to be installed at the same time. The first one that should be set up is the original MS BIOS that came built-in to your XBOX. On version 1.0-1.5 XBOXes, we call that the "TSOP BIOS" because of the way the motherboard was built. The onboard BIOS chip was encased in a package called a TSOP (thin small outline package). On the 1.6 motherboards, the chips are all different and there is no longer a TSOP. However, there is still an onboard BIOS. Regardless of whether the BIOS is in a TSOP or not, we will continue to refer to the onboard BIOS as TSOP, even if it is on a 1.6 motherboard and not actually in a TSOP.

On the Xenium OS 2.0 menu, the first item is called the Launch Menu. This is the menu that allows you select which BIOS program to launch. In the beginning, when the chip is freshly installed, there are no program items in the menu. All that is there is the command item, Add a New Item. So, that is what we are going to do. Press A to select it.



Next, we are presented with a dialog box asking us for the storage location of this new item. The options are: TSOP, Flash, and Hard Disk. Since we are setting up the original BIOS, we should select TSOP, since the original BIOS is stored on the motherboard and not the modchip. Use the D-pad to highlight **TSOP** and press A. Now another dialog box will appear. This is the Bank Name dialog. Already filled in for you is Retail Kernel. You may leave this name, or you can use the D-pad and the onscreen keyboard to type a new name (such as Original BIOS, TSOP, etc.) Once you are satisfied with the name, use the D-pad to highlight Done and press A.



The next thing that happens, is you get the LED dialog. This lets you select what color the Xenium LED will be when this bank is selected. Green is automatically highlighted. You can press A to select this option, OR, most people prefer to select Off for the original BIOS, that way when the LED is dark, they know they have booted the TSOP and the modchip is disabled. If you would like this to happen, use the D-pad to highlight Off, and press A.

You will now get a message saying "Adding Launch Item." This message will disappear in a few moments, and you will be returned to the Launch Menu. This time, it will be different looking! There will be an item called Retail Kernel (or whatever you named it), a separator line, and then some command items. Retail Kernel should be highlighted. Press A. You should now get a confirmation dialog that this is what you intended to do. Press A again.

If all went well, your XBOX should now boot the TSOP and the standard Microsoft XBOX dashboard should appear on the screen. If you look in the left side vents of the XBOX, the Xenium LED should be off (or whatever color you set it to). Before doing anything else, take a moment and set the system clock and date. Failing to do so at this point may cause you to encounter system errors later during other activities. Remember that your XBOX only holds its clock settings for about 3 hours when disconnected from AC power. Please remember to always reset the clock and date whenever your XBOX has been disconnected from power for longer than 3 hours. In some cases you can set up your replacement dashboard to automatically synchronize the time with an internet time server each time you power on. This is a handy thing to do, and will prevent you from having to manually set the clock and date after power interruptions. This does require that the XBOX have a permanent internet connection, however.

At this point, your XBOX is fully operational. It can do everything it could do when you took it out of the box originally. Except, it now has the capability to do much, much more! Throughout the rest of this guide, we will go through setting up an additional BIOS, a replacement dashboard, and some other activities relating to using your newly modded XBOX.

If you are not planning to install any additional BIOSes or replacement dashboards, then it is recommended that you proceed to the Backing up the EEPROM section. This is a safety precaution to help prevent your accidentally making a change to system settings that could cause you to lose video or the ability to operate the XBOX. With the EEPROM backed up to the Xenium, if such an event were to happen, the Xenium would be able to restore EEPROM settings back to the way they were when they were backed up. If you make changes to EEPROM settings that you wish to remain permanent, remember to re-backup the EEPROM after making such changes to write them into the backup. It is recommended that you operate the XBOX with your changes for a few hours to make sure they are what you want prior to overwriting your EEPROM backup. Once overwritten, the changes can not be undone.

SETTING UP AN ADDITIONAL BIOS

At this point, you should already have a working modified XBOX console, that can present the Xenium OS 2.0 menus, load the original (TSOP) BIOS, and boot to the standard Microsoft XBOX dashboard.

Now you want to install an additional BIOS. What is an additional BIOS? Well, simply put, it is a piece of system software that the XBOX can load in order to permit it to run different software than the original BIOS runs. The original BIOS is coded to only run Microsoft signed code. This basically means original game disks. In order to run additional applications, homebrew software and games, Linux, etc., you will need to install an additional BIOS that will permit non-signed code to run. This is generally referred to as a “hacked” BIOS.

There are many “hacked” BIOSes available for the XBOX, but be careful, some are motherboard version specific and can only be run on XBOXes containing that specific version. Please check the BIOS requirement prior to flashing it to your Xenium to make sure it is compatible with your system. Otherwise you could encounter system errors, accidental EEPROM changes, hard drive data loss, etc.

NOTE: At the time of this writing, there is only ONE hacked BIOS available for the version 1.6 XBOX. That is the Evolution-X M8 BIOS. If you have an XBOX 1.6, please DO NOT try to install any BIOS files other than Evolution-X M8 and the original MS BIOS (5838 or higher) at this time.

The actual process of setting up additional BIOSes is similar to the process of setting up the original BIOS, except for a few more options.

Let's say we were going to install the Cromwell 2.31 BIOS. If you are wanting to set up Evolution-X M8 or Xecuter 2 4983, you would do it in similar fashion. The first thing we would do is access the Xenium OS 2.0 menus. If your XBOX doesn't automatically go into Xenium OS upon boot up, then power on your XBOX with the Eject button. This causes the XBOX to run the Xenium OS 2.0 menu system before launching a BIOS.

Now that Xenium OS 2.0 is on screen, select Launch Menu. It should already be highlighted, so just press A. Next, go to Add a New Item, just like before, and press A. Next, we are presented with a dialog box asking us for the storage location of this new item. The options are: TSOP, Flash, and Hard Disk. Since we have already set up the original BIOS, we should NOT select TSOP. Instead, we want to flash this new BIOS to the modchip's memory, so use the D-pad to highlight **Flash** and press A.



Here is where it gets a little different than before. We have to choose the source location of the new launch item.



We are presented with the “Choose a file” dialog. You will see a list of drive letters, and \\server\ at the bottom of the list. If your BIOS file is on a CD-RW, and it is already inserted in the drive, and the XBOX can read it, then D:\ will appear on the list. If there is no disk in the drive, or the disk is unreadable, D:\ will NOT appear on the list.

Let us suppose that the Cromwell BIOS we are installing is in a file located on C drive. Since it is already highlighted, press A. At this point, we simply continue navigating “Windows Explorer style” with the D-pad, A button to proceed, B button to go back, until we find the file we want to flash. Highlight the file name, and press A to select it.

Once selected, we will then get the “Pick a bank name” dialog. If the Xenium OS can auto-detect the name of the BIOS (based on its calculated hash code) then the name will be filled in for you. If it can not detect the name, then you will have to manually name it using the D-pad, A button, and onscreen keyboard. Once you are satisfied with the name, Use the D-pad to select Done, and press A.



Once again we’ll be presented with the LED color picker dialog. Use the D-pad to highlight the color you wish the LED to display when this bank is launched, and press A. Finally, we get the “Adding Launch Item” message box again. A few moments later, we are returned to the Launch Menu, and our new item is now displayed on the menu, available for launching.

A couple of words about BIOS files. First of all, BIOS images will be a file with a .BIN extension. 256k BIOS files are 262,144 bytes in size. 512k BIOS files are 524,288 bytes in size, and 1MB BIOS files are 1,048,576 bytes in size. If your file is not one of these sizes, exactly, something is wrong with it. Next, you should NEVER CHANGE THE EXTENSION of a file from something to .BIN. That doesn’t make it work. Nor should you change the .BIN to something else. Doing so could really mess up something. You can NOT change an .XBE file to a .BIN file, nor can you change a .BIN to a .XBE. That won’t work.

BIOS files can be downloaded from the usual places. Do not ask for them.

BACKING UP THE EEPROM

The EEPROM contains system settings, video mode selection, the hard disk unlocking key, and some other information. Without this information, all of it, your XBOX will not function. Therefore, it is imperative that you utilize the Xenium's ability to backup the EEPROM to its own flash memory. That way, if your EEPROM gets accidentally changed (or erased!) you can easily restore it from Xenium's flash memory.



Simply navigate from Xenium OS main menu to EEPROM tools, and select Backup EEprom. **DO NOT MAKE ANY OTHER CHANGES UNTIL YOUR EEPROM HAS BEEN BACKED UP!!!** You have been warned!

Once the EEprom has been backed up, a new menu item will appear: "Restore EEprom." Press B to return to the Main Menu.

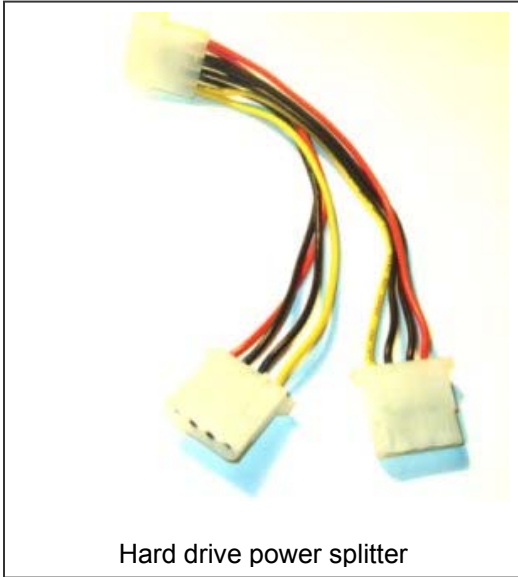
UNLOCKING THE HARD DISK

There may be an occasion where you would want to do this. However, you can not load the original BIOS (TSOP), the MS dashboard, or play XBOX Live with an unlocked hard disk. So, you should keep it locked at all times and only unlock it when necessary, then lock it back again. The hard disk lock and unlock tools can be found on Xenium OS 2.0's Disk Tools menu. The tool is a toggle, meaning if the drive is locked, you'll only have the option to Unlock the drive; and if the drive is unlocked, you'll only have the option to Lock the drive.



REPLACING / UPGRADING THE HARD DISK DRIVE

As you begin to realize what all your newly modded XBOX can do, it will become increasingly, painfully, aware to you that the stock hard disk drive is simply too small to be of much use. You can only store one or two movies, a handful of apps, and a game or two before it is full. So, you'll be needing an upgrade at some time. Fortunately, it is really simple to do that! Ahead of time, you will need to get a hard drive power splitter from your local computer store, if you don't already have one. And, of course, you'll need the replacement hard disk drive. It



Hard drive power splitter

must be EIDE (Ultra-ATA), NOT the newer type Serial-ATA. It is also VERY IMPORTANT that the replacement drive you select supports ATA disk locking! If it does not, you will not be able to load the TSOP and/or play on XBOX Live, since they both require a locked drive. Once you find a drive candidate, you can look up its model number at <http://xboxdrives.x-pec.com> to see if that particular drive model supports disk locking. If so, then terrific! Let's get it and put it in...

With the XBOX cover removed, and the XBOX switched off, detach the gray IDE cable from the DVD drive and the hard disk drive. Leave it attached to the motherboard. Remove the power cable from the hard disk drive and de-route it from the hard disk drive carrier. Remove the screw in the center rail holding the hard disk drive carrier in place. Lift the hard disk drive carrier out of the XBOX. Using a Torx-15 driver, remove the four screws holding the hard disk drive in the carrier. Remove the hard disk drive from the carrier. Set the carrier (and its four screws) aside for now. On the back of the drive, between the power connector and IDE connector, is a little jumper setting. This jumper is usually set for Cable Select. Remove this jumper, and set it to Master.

Remove the new hard disk drive from its packaging. On its rear, find the jumper and set it to Slave. Attach it to the IDE cable where the DVD drive was attached. Reconnect the original hard disk back to the end of the IDE cable it was attached to. Using the power Y splitter, connect it so that both drives can receive power.



USING THE DRIVE UPGRADE WIZARD

Press the eject button to turn on the XBOX and launch the Xenium OS menu. Press the D-pad down once to Disk Tools and press A. Press D-pad down once to highlight Drive Upgrade Wizard and press A.



You will now be shown a dialog box, informing you that this wizard will walk you through the steps. Press A.

Next, you will be asked to ensure that the drives are properly connected (as explained above). Press A.

Now you will get a message stating that the upgrade process will format the new hard disk drive to only work in an XBOX, that all data on the drive will be erased. Press A.

Finally, you are at the "last chance" screen. Pressing A now will begin the upgrade process. If you have changed your mind, this is your last chance to cancel.

The upgrade wizard will now unlock the old drive, format the new drive, and copy all data from the old drive to the new drive. NOTE: the wizard will NOT lock the old drive, nor lock the new drive. You will have to lock your drives manually, should you wish to.

When the upgrade wizard process has completed, shut down the XBOX. You can now remove the hard disk drives. Set the jumpers back to Cable Select on both HDD units. Reattach the IDE cable to the DVD drive. Mount the new hard drive in the hard disk drive carrier, using the four screws you removed from the old drive. Reinstall the hard disk drive carrier and secure it with the screw in the center rail. Remove the power Y splitter, and re-route and attach the hard disk drive power cable. Finally, reconnect the IDE cable to the hard disk drive. Tuck the IDE cable back into its retaining clip on the center rail. If you have no other accessories to install, you may now replace the XBOX cover.

You have successfully upgraded your hard disk drive unit. Reminder: Once you turn the XBOX back on, don't forget to go into Disk Tools and lock the hard disk drive.

NETWORKING THE XBOX TO YOUR PC

When you network your XBOX to your PC, not only do you have the advantage of being able to share an internet connection for playing online games, but you also unlock a whole new world of functionality with the XBOX. You can FTP data files to/from the PC and XBOX, you can access network drives to share data, stream media files, and so much more. Combine that with the built-in FTP server and SMB support of Xenium OS 2.0, you won't have to worry about burning a CD to install software and BIOS files ever again! Think of all the possibilities!

So, how is this done? There are several ways to do it. The easiest way is to connect the XBOX directly to the PC with a system link (crossover) cable. However, you can also connect the XBOX to a hub, router, or switch using a standard Ethernet cable and have it join your PC network.

Once you have your physical connection made, you need to set up the addressing. There are so many variables in "how to" set up an IP address on your PC that I can't begin to cover each one. So, I'll just gloss over some basic settings and you'll have to figure out how to get them into your PC.

NETWORKING DEFINITIONS

DHCP – Dynamic Host Configuration Protocol - DHCP allows a computer to join an IP-based network without the need for it to have a pre-configured IP address. In order for this to work, one (and only one) device on the network, usually a router, must be running the DHCP service. This protocol is tasked to assign unique IP addresses to each device joining the network, based on MAC address, and release these IP addresses as devices disconnect from the network.

DNS – Domain Name System - The DNS translates an internet domain and host name (i.e. www.ozxodus.com) to an IP address (i.e. 66.111.59.177). DNS implements a distributed database to store name and address information for all public hosts on the internet. You must have your network set up to contact a DNS server in order to access websites.

LAN – Local Area Network - A computer network that spans a relatively small area. Most LANs are confined to a home, or a single building, or small group of nearby buildings. However, one LAN can be connected to other LANs over any distance via broadband cable services, telephone lines and radio waves. A system of LANs connected in this way is called a wide-area network (WAN).

NIC - Network Interface Card (network adapter) - An expansion board you insert into a computer so that it can be connected to a LAN.

Hub - A common connection point for devices in a network. Hubs are commonly used to connect computers to a LAN. A hub contains multiple ports and all users share the same bandwidth. When a packet arrives at one port, it is copied to all of the other ports, so that all devices can see all packets. Hubs are inexpensive to buy and use, but inefficient compared to a switch.

Switch - A common connection point for devices on a network. A switch gives full bandwidth to each user. The switch reads the destination address of each packet and then forwards the packet to the proper device. This is a much more intelligent and efficient device than a hub, and is preferred to a hub, but is a little more expensive.

Router - A device that connects LANs to WANs. Very little filtering of data is done through routers. Routers do not care about the type of data they handle. A router is needed to connect a LAN to the Internet, for example.

Gateway - In networking, a combination of hardware and software that links two different types of networks. An internet gateway typically consists of a router, a switch, and a firewall.

Bridge - A device that connects two local-area networks (LANs), or two segments of the same LAN. Bridges can be hardware or software based. Unlike routers, bridges simply forward packets received without analyzing and re-routing them.

TCP/IP – Transmission Control Protocol / Internet Protocol

IP is responsible for moving a packet of data from one network node to another. IP forwards each packet based on a four byte destination address (the IP address).

TCP is responsible for verifying the correct delivery of data from client to server. Data can be lost in the intermediate network. TCP adds support to detect errors or lost data and to trigger re-transmission until the data is correctly and completely received.

Dynamic IP – You do not manually configure TCP/IP settings and instead let a DHCP server on the network assign them.

Static IP – You do not use a DHCP server and instead assign the TCP/IP settings manually.

Netmask - A netmask is part of the process of IP subnetting. It helps to simplify the routing of IP networks. Your netmask should always be 255.255.255.0, unless you know exactly what you are doing and why you need to change it.

NETWORK CONFIGURATION

There are 3 ways to connect your XBOX to your PC/network.

- 1) Connect XBOX directly to a PC with one NIC:
This method employs a System Link cable (also known as an Ethernet crossover cable) connecting the network port of the XBOX to the NIC on the PC. The PC and XBOX then form a LAN with each other.

- 2) Connect XBOX directly to a PC with two NICs:
This method employs a System Link cable (also known as an Ethernet crossover cable) connecting the network port of the XBOX to a NIC on the PC which is already connected to a LAN with another NIC. The XBOX becomes a private LAN with the PC while the PC can still access its other LAN. A software bridge could also be installed so that the XBOX can join the PC LAN. Useful if you want to share your PC's internet connection with your XBOX.

- 3) Connect XBOX and PC to a hub, switch, or router:
This method employs a standard network Ethernet cable connecting the network port of the XBOX to a port on a hub, switch, or router to which the PC is also connected. The XBOX then becomes part of the LAN the PC is already connected to.

CONFIGURATION METHOD #1

STEP 1: Connect the crossover cable between the PC and XBOX.

STEP 2: On the PC, enter the following settings in the appropriate places:

IP: 192.168.0.2
Netmask: 255.255.255.0
Gateway: <leave blank>
DNS: <leave blank>

You may have to restart your computer for the new settings to take effect.

STEP 3: On the XBOX, Go to your Xenium OS menu. Go to Settings, then Network Settings, and change the settings as follows:

Using Static IP
IP: 192.168.0.3
Netmask: 255.255.255.0
Gateway: 0.0.0.0
DNS: 0.0.0.0

After the settings are changed, highlight Restart Network and press A.

CONFIGURATION METHOD #2

STEP 1: Connect the crossover cable between the PC and XBOX.

STEP 2: Enter the following settings in the appropriate places for the NIC that the XBOX is connected to:

IP: 172.16.0.1
Netmask: 255.255.255.0
Gateway: <leave blank>
DNS: <leave blank>

You may have to restart your computer for the new settings to take effect.

STEP 3: On the XBOX, Go to your Xenium OS menu. Go to Settings, then Network Settings, and change the settings as follows:

Using Static IP
IP: 172.16.0.2
Netmask: 255.255.255.0
Gateway: 0.0.0.0
DNS: 0.0.0.0

After the settings are changed, highlight Restart Network and press A.

NOTE: If you are using Windows XP, your operating system may have automatically installed a software bridge connecting the two PC NICs to the same LAN. If this is the case, right-click on the icon for the NIC the XBOX is connected to and select Remove from Bridge. If you would rather leave the bridge connected so you can share an Internet connection with the XBOX, then you will need to follow the instructions later in this guide, "Sharing an internet connection with your XBOX."

CONFIGURATION METHOD #3A – HUB or SWITCH

STEP 1: Connect a standard network cable between the XBOX and the (hub or switch).

STEP 2: Connect a standard network cable between the PC and the (hub or switch).

STEP 3: Enter the following settings in the appropriate places for the PC NIC:

IP: 172.16.0.1
Netmask: 255.255.255.0
Gateway: <leave blank>
DNS: <leave blank>

You may have to restart your computer for the new settings to take effect.

STEP 4: On the XBOX, Go to your Xenium OS menu. Go to Settings, then Network Settings, and change the settings as follows:

Using Static IP
IP: 172.16.0.2
Netmask: 255.255.255.0
Gateway: 0.0.0.0
DNS: 0.0.0.0

After the settings are changed, highlight Restart Network and press A.

CONFIGURATION METHOD #3B – ROUTER or RESIDENTIAL GATEWAY

STEP 1: Connect a standard network cable between the XBOX and the router.

STEP 2: Connect a standard network cable between the PC and the router.

STEP 3: The router is factory set to enable DHCP. On the PC in the settings for the NIC, set the TCP/IP client to automatically obtain IP information from DHCP.

You may have to restart your computer for the new settings to take effect.

STEP 4: On the XBOX, Go to your Xenium OS menu. Go to Settings, then Network Settings, and change the setting as follows:

Using Dynamic IP

After the setting is changed, highlight Restart Network and press A. The IP address should automatically be obtained from the router.

SETTING UP XENIUM'S FTP SERVER

Now that your network is set up, we need to enable the Xenium OS 2.0 FTP server so you can use it to transfer files to and from your XBOX hard disk drive.

Go to the Xenium OS menu, and select Settings. Then, select FTP Settings. Make sure the first line says: FTP Server – On. If it doesn't, highlight it and press A to change it. By default, the FTP username = **xbox** and the password = **xbox**. There is no need to change these at the moment, but you can if you wish.

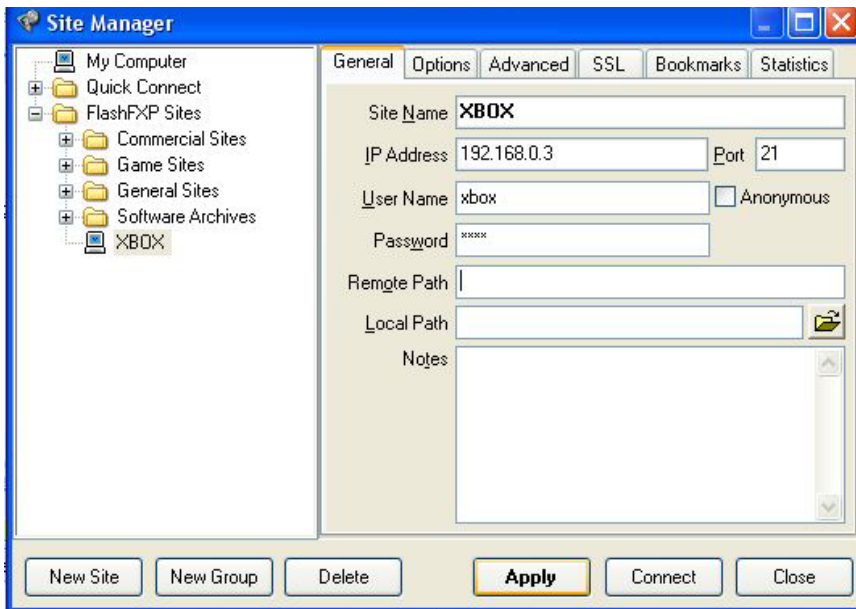
Restart the XBOX by turning it off and pressing the Eject button to turn it on. At this point, you should be able to access your XBOX via FTP from your PC. You can test the connection with an internet browser on your PC by typing the following in the address bar: ftp://<user>:<pass>@<XBOX IP address> replacing the fields in <> with the correct values. If it worked, you will see folder icons for your XBOX hard drive's partitions fill in the window after it logs on.

USING FTP TO TRANSFER FILES TO/FROM YOUR XBOX

Now that your FTP server is running, and your network is set up, and you have tested your FTP access, you can begin using that connection to transfer files to and from your XBOX hard drive. This means you will not have to burn a disk to install additional BIOSes, Xenium OS updates, XBOX applications, homebrew software, game backups, etc!

It is recommended that you use a good quality FTP client on your PC instead of the internet browser built-in FTP. There are more options and you will get better speed and data throughput using a standalone FTP client. Most people in the scene use and recommend FlashFXP software. This software is available from <http://www.flashfxp.com>. Take a few minutes right now to download and install this software to your PC, if you don't already have it. The next few paragraphs will help you set up your XBOX connection in FlashFXP. If you have already done this, or are using different FTP software, just skip ahead.

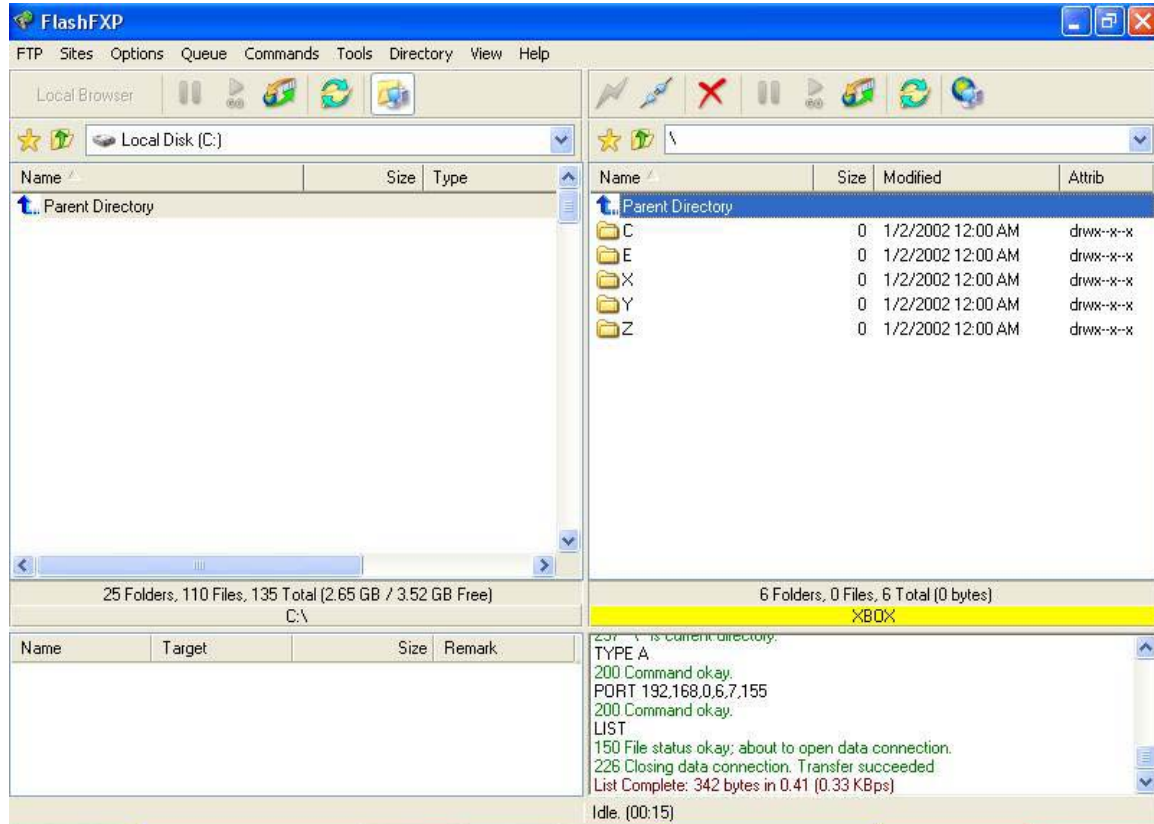
1. Start up FlashFXP
2. Click Sites, then Site Manager.
3. Click New Site at the bottom left of the window that pops up.
4. Enter your XBOX connection information. Replace the info in this example with the correct values for your setup.



5. Click Apply.

6. Click Connect.

If everything has gone well, you should now see a screen similar to this:



You can now navigate your PC folders in the left pane, and the XBOX folders in the right pane. You can drag and drop files from one to the other.

Familiarize yourself with the interface and practice using FlashFXP by backing up your XBOX hard drive to your PC. (Note: the C and E folders on the XBOX are the only ones that need to be backed up. The X, Y and Z folders are nothing but game cache space. All the important stuff is on C and E.

You can place files on the XBOX just as easily. Simply navigate in the right pane to the folder on the XBOX where you want to store the file, navigate in the left pane to the folder on the PC of the file you want to copy, and then drag it across. You can also drag entire folders, or you can make a multiple selection and click the Transfer button to send the selection across.

INSTALLING EVOLUTION-X DASHBOARD

Alright. By now, you should have: a modified XBOX with a working Xenium ICE modchip, set up the Xenium FTP server, set up the XBOX/PC network connection, installed FlashFXP (or some other FTP client) on your PC, connected to your XBOX, and backed up your EEprom and hard drive. Next we are going to install a replacement dashboard. Why? Because the stock MS dashboard does not allow us to do everything we are capable of doing with our newly-modified console. We are going to install the Evolution-X dashboard. It is the simplest dashboard to install, and still lets you do a host of things. If you have not already set up an additional ("hacked") BIOS, you must do this first. You can use the FTP connection to place the bios binary (.BIN file) on the XBOX hard drive to make it easier to install.

Right now, you need to get a copy of Evolution-X Dashboard-Build 3935, if you don't already have it. Do not confuse this with Evolution-X BIOS. Team Evolution-X makes both software products, but they are different from each other. You want the dashboard files. Download the dashboard archive and extract it to a folder on your PC. We have to do a couple of things before we can send it over to the XBOX.

Ok. In the folder where you extracted the archive, locate the file evox.ini. On some operating systems you will only see "evox" by the notepad-with-gear icon and "Configuration settings" written below it. The file has a file size of about 4KB.

Open this file in a text editor. On Windows systems, just double-click the icon and the file will be opened in Notepad.

Move down through the file until you come to the line [Network]. Below this line are the network settings Evolution-X will use with its built-in network services. You should have the following lines:

[Network]

SetupNetwork	= Yes
StaticIP	= Yes
Ip	= <your XBOX IP address>
Subnetmask	= 255.255.255.0
Defaultgateway	= <your PC IP address>
DNS1	= 0.0.0.0
DNS2	= 0.0.0.0
SetupDelay	= 0
SkiplfNoLink	= No

If you are using DHCP to configure the XBOX networking, then set StaticIP = No. Once set to No, you do not have to fill in any values for IP, Subnetmask, Defaultgateway, or DNS1 and 2.

Save the changes you have made and exit the text editor.

Now we can transfer the dashboard to the XBOX. Make sure the XBOX is turned on and at the Xenium OS menu. It doesn't matter which screen the Xenium OS is displaying, just as long as it is on an XOS screen.

Start FlashFXP on your PC. Click the lightning bolt icon over the right pane, select XBOX from the list. This will automatically connect with the XBOX. If you can not connect, and you are using DHCP, then you may have to change the IP address in Site Manager since the DHCP server may have assigned a new one to the XBOX.

Once FlashFXP has connected to the XBOX and you see the XBOX folders in the right pane, double-click the XBOX's C folder to open it. This is where we will be putting the Evolution-X dashboard files.

Now, in the left pane, navigate to the folder on the PC containing the Evolution-X files. You want to transfer two files to the XBOX. Evox.ini and evoxdash.xbe. Once these files have transferred (it goes pretty quickly) that's all there is to it! If you also have the Skins folder on your PC, you can drag that over as well, but it is not necessary for dashboard operation.

At this point, you can go over to the Xenium OS, go to the Launch Menu, and select any BIOS other than the original (retail kernel). Confirm that you want to launch it, and if everything went right, you should see the Evolution-X dashboard appear on your TV screen.

USING THE OZXODUS “XTERNAL” LED MODULE

This is one of the latest accessories to the Xenium product line. As you may already know, the Xenium ICE (and regular Xenium) has an RGB programmable multicolor LED on board. The Xternal LED module is an expansion module that has two SPI expansion ports with another RGB LED on it. This means you can place the LED module outside your case, or really, anywhere you would like. It makes a really neat dress-up item for your case, especially translucent cases, or you can use it as a secondary indicator if you can't see the LED on the Xenium itself.

It is simple to use. One end of the wire loom plugs onto the Xenium's expansion port and the other end plugs into the Xternal LED module. Use some double-sided foam tape to mount the module wherever you want it to be positioned. You may want to route the cable through slots or other passages before you connect both ends.



Here is the LED module mounted below the front panel under the #1 controller port.

USING THE OZXODUS USB CONTROLLER PORT ADAPTOR

If you want to connect a USB keyboard, mouse, or pen drive to your XBOX, then this is for you! Another new accessory to the Xenium product line, the USB controller port adaptor simply plugs into any empty controller port and then you plug the USB device into it. You can connect a hub to the adaptor, or you can use up to four adaptors (one in each controller port), to attach multiple USB devices.

Keep in mind, the XBOX uses a USB 1.1 root hub, not USB 2.0. What that means is, since USB 2.0 is a high speed USB interface, you can still connect a USB 2.0 device to the XBOX, it will just operate at the slower USB 1.1 speed.

FINAL WORDS AND CREDITS

As a fellow Xenium user, I hope you enjoy all the benefits that Xenium has to offer. I also hope this guide has helped you to install and begin using your new Xenium products without difficulty.

RECOMMENDED WEBSITES AND LINKS:

OzXodus <http://www.ozxodus.com>

Xbox-Scene.com <http://www.xbox-scene.com>

X-B-O-X.net <http://www.x-b-o-x.net>

HELPFUL IRC RESOURCES:

#ozxodus @ efnet

CREDITS

Team OzXodus for a fine product line, and the use of some of their photos
Xbox-Scene for the use of some of their photos
airedale for use of the photo: Xternal LED module on front panel
superfr0 for the detailed descriptions of XBOX Service Error codes

APPENDIX A: GLOSSARY OF TERMS

Certainly, these aren't all the jargon and terms you'll encounter during your adventures in modding, but, listed below are some of the basic terms that you should be familiar with from the beginning.

ATA - Advanced Technology Attachment. This is the most common disk drive interface standard, based on the IBM PC ISA 16-bit bus, but also used on other personal computers. The ATA "bus" only supports two devices - master and slave. NOTE: You can NOT use the new type Serial ATA drives on an XBOX.

BIOS - Pronounced either "BY-aws" or "BY-ohs." BIOS is an acronym for **B**asic **I**nput/**O**utput **S**ystem. Its function is to instruct the hardware devices how to work with each other. In the XBOX world, the BIOS also launches the *Dashboard* (see definition below). A "hacked" BIOS is designed to circumvent Microsoft's built-in securities to allow unsigned code (backups and homebrew software) to run, as well as various other applications and features. Not to be confused with OS (*Operating System*)

CD-R – Compact Disc Recordable – Ordinary blank CDs. You can NOT usually use these with your XBOX.

CD-RW – Compact Disc Re-Writable – Blank CDs that can be written to more than once. These have a more highly reflective surface and work better with installing XBOX software. Imation and TDK seem to be the most reliable brands.

Cromwell - A legal BIOS replacement, devoid of Microsoft code, designed specifically to run Linux and other alternative *Operating Systems* (see definition below), It currently does not run games or XBEs (XBOX Executables).

Crossover - a System Link cable - the kind of cable you need to connect an XBOX to another computer (or another XBOX). If you are using a router, hub, or switch, you must NOT use a crossover cable. It will not work. Instead, use a regular CAT5 ethernet patch cable for that.

D0 - an install point to the right of the LPC holes. This is the data signal line that controls whether the original BIOS will load, or if the modchip will take over. If the D0 point is not connected (or connected properly), the XBOX will boot to the original bios as if there were no modchip installed at all.

Dashboard - A GUI (graphical user interface) for the XBOX. This is usually the first program run when you start up your XBOX without a disk in the drive. The "original MS dash" is the menu with which you are already familiar for dealing with game saves, setting the clock, playing audio CDs, etc.

Dongle -

- 1) The piece of the controller breakaway cable that plugs directly into the front panel of the XBOX.
- 2) The receiver from the DVD controller that plugs into one of the ports on the front of the console.

DVD – **D**igital **V**ideo **D**isc – The type of compact disc drive in your XBOX.

EEPROM - **E**lectrically **E**rasable/**P**rogrammable **R**ead-**O**nly **M**emory - a very small chip that is on the XBOX motherboard, located near the TSOP. This chip contains information about your XBOX such as the hard drive lock key, region code, video mode etc. It can be backed up and restored by the Xenium.

Eject Fix – A BIOS hack that causes the opening of the DVD drive to not reset the XBOX. This lets you load CDs with a media player without resetting the Xbox between each disk.

EvolutionX –

- 1) EvolutionX Dashboard - the most popular custom dash, has a boot menu for homebrew software, ftp server, custom skins, etc.
- 2) EvolutionX BIOS - this is a bios made by the EvolutionX team. Currently, the latest version is M8.

EvoX - see EvolutionX - If you have heard "EvoX is the bios, EvolutionX is the dashboard" thing, it is false; not sure where this got started, but its not true.

Flash (or Flashing) – the process of installing a BIOS onto a chip (modchip or TSOP)

FRAG - when the light around the eject button **Flashes Red And Green**. This means that the XBOX cannot boot a BIOS or some other major system error. This could be caused by a variety of problems, such as: problem with installation of your chip, bad bios, solder splash, lifted traces, broken component, etc.

FTP - **F**ile **T**ransfer **P**rotocol - lets you access your xbox hard drive from the pc (or from another xbox) when it's running evox or another ftp server. you can do anything you could with a drive attached right to your pc

HDD - Abbreviation for **H**ard **D**isk **D**rive.

IDE - **I**ntegrated **D**rive **E**lectronics, the original name for ATA by Compaq. EIDE – Enhanced IDE (also called Ultra-ATA). You can only use EIDE/Ultra-ATA drives with the Xbox. You can NOT use the new type Serial-ATA drives.

IRC – Internet Relay Chat – Internet Relay Chat is one of the most popular and most interactive services on the Internet. IRC is the net's equivalent of CB radio. You will need to download and install an IRC client to your PC in order to use IRC services. A good one is available at <http://www.mirc.com>.

LCD - Liquid Crystal Display (not to be confused with TFT LCD) a simple display screen like a calculator or digital clock face, typically greenish grey with black characters, and sometimes backlit with LEDs.

LED - Light Emitting Diode – a small device that emits colored light when energized.

Locking - Xbox hard drives, like some laptop hard drives, are locked. You must unlock them to use in another XBOX or PC, and the drive **MUST** be locked to be used with the Original BIOS. You can only unlock an XBOX hard drive on a motherboard containing the EEPROM that locked it.

LPC - Low Pin Count - refers to an Intel standard for an Input/Output bus. The LPC port is used to connect an external BIOS (such as a modchip) to the XBOX.

Modchip - holds a BIOS (or several BIOSes), causes the XBOX boot to an auxiliary BIOS instead of its own onboard BIOS (thereby circumventing built-in security measures).

Motherboard – The main circuit board in the XBOX. It is the large, square, green board located inside the XBOX that everything plugs into. There are seven known versions, numbered 1.0 – 1.6. It is very important that you know which version you have before you begin modding.

Molex - the standardized 4 pin connector attached to the hard drive. The Red wire is +5VDC, the Yellow wire is +12VDC and the Black Wires are grounded.

NTSC - National Television System Committee - refers to both the global region the XBOX comes from, as well as the video signal standard that is produced by the video encoder. NTSC-NA refers to North America and NTSC-J refers to Japan. The video signal output by an NTSC XBOX is 60Hz.

OS (Operating System) –The XBOX Operating System consists of two parts. The Kernel, located in the BIOS, and the GUI, located in the Dashboard. The Kernel provides a hardware level interface for XBOX software, while the GUI (Graphical User Interface) provides a method of interacting with the human user. Do not confuse this with Xenium-OS. The Xenium-OS does not contain an XBOX Kernel, but it does contain a graphical user interface by which the human user configures and operates the features of the Xenium modchip. The user will still need to flash a BIOS containing an XBOX Kernel to the Xenium after installation is complete.

PAL - **Phase Alternation by Line**, refers to both the global region the Xbox comes from as well as the video signal standard that is produced, PAL XBOXes come from Europe. The video signal output by a PAL XBOX is 50Hz

PSU - **Power Supply Unit** – the smaller circuit board installed to the right of the XBOX motherboard.

SPI - **Serial Peripheral Interface**. A serial interface in which a master device supplies clock pulses to exchanges data serially with a slave over two data wires (Master-Slave and Slave-Master). This term probably originated with Motorola in about 1979 with their first all-in-one microcontroller. The Xenium interfaces with devices clocking data on the rising edge.

"The Usual Places" - Places for obtaining XBOX downloads. Often newsgroups, peer-to-peer filesharing systems, etc.

Torx - A star-shaped screwdriver tip/receptacle in the head of screws. The XBOX uses three sizes of Torx screws. T-10 for motherboard and internal parts attachment, T-15 for the hard drive carrier, and T-20 for the exterior case screws.

Trace - A path of conductive material such as copper, silver, or gold, on the surface of, or sandwiched inside, a PCB (printed circuit board). Traces carry electrical signals from one electronic component to another, with minimal use of space. In other words, traces are all the small lines you see running all over a PCB.

TSOP - **Thin Small Outline Package** - the XBOX's onboard BIOS chip. It can be flashed with a hacked bios as a cheap alternative to a modchip, but it's dangerous though, as you might permanently ruin your XBOX. Although TSOP actually refers to the chip packaging of the microchip holding the onboard BIOS, the word TSOP has become synonymous with "original BIOS" through XBOX mod scene usage.

Via – what those teeny tiny holes running all the way through the motherboard traces are called. The D0 hole is an example of a via.

XBE – **XBox Executable**. The main entry point of an Xbox program or game.

Xecuter 2 (X2) – While Team Xecuter made a modchip called the Xecuter 2.3, it is more commonly used to refer to a bios series made by Team Xecuter. Currently, the latest BIOS version is 4983.

Xenium – The world's first "4th generation" modchip, made by Team OzXodus.

APPENDIX B: SERVICE ERROR CODES

<i>Code</i>	<i>Meaning</i>
5	Kernel; HDD not locked
6	Kernel; Cannot unlock HDD
7	Kernel; HDD timeout
8	Kernel; No HDD present or can't detect HDD parameters
9	Kernel; HDD parameters (DMA/PIO/size < min required)
10	Kernel; DVD timeout
11	Kernel; No DVD found
12	Kernel; DVD parameters (PIO/DMA)
13	Kernel; Dashboard launch failed
14	Dashboard; general failure
15	Unknown or undefined
16	Dashboard; cannot find file
17	Unknown or undefined
18	Unknown or undefined
19	Unknown or undefined
20	Kernel; Dash attempted to load on cold boot, unknown failure, but DVD ok
21	Hard drive general failure; Hard drive not formatted; Hard drive full

APPENDIX C: XBOX LED ERROR CODES

<i>Behavior</i>	<i>Meaning</i>
Green and orange flashing	No A/V pack installed Solder splash or damaged circuit trace on motherboard. Check motherboard and clean if necessary.
Red and green flashing (FRAG)	LAD lines not communicating. Recheck solder connections on LPC bus. Check Xenium LED. If lit, chip is probably ok. If not lit, chip may be defective. You may have a v1.5 console and didn't install the additional two wires required for v1.5 consoles.
Solid green, but no eject or A/V	Try using a standard A/V pack instead of a HD pack.
Orange flashing	Damaged motherboard circuit trace or a solder splash. Check motherboard and clean up if necessary.
Solid red	System has overheated. Major system component failure - motherboard replacement may be necessary.

APPENDIX D: SOLDERING 101

First, let me say that soldering is more of an art than a science. Like any art, it requires practice, practice, and more practice. If you have never soldered anything before, find a circuit board from something broken (or break something ☺) so you can practice some of the techniques presented here before you attack your XBOX.

Second, many of today's electronic devices are sensitive to static electricity. While a lot of people "get away" without one, it is a good preventative measure to use a grounding wrist strap available from most electronics supply houses and computer supply houses. You just might be the unlucky one misfortune finds if you don't have one.

Third, did I mention practice? The XBOX motherboards are factory assembled by machine. Precise amounts of solder and heat are applied during assembly, and the circuit boards were engineered for those conditions. When you manually touch a soldering iron to these boards, you may/will be subjecting the board to greater amounts of heat for longer periods of time. This means, without taking care, the motherboard is vulnerable to potential damage at your hand. You can literally destroy the board with your soldering iron by applying too much heat, too much solder, desoldering, and leaving the iron in one place for too long a time.

Now that you are sufficiently scared to death, the good news is, if it is done properly, and with the proper equipment, soldering is not only easy, it can be fun too. The purpose of this tutorial is to expose you to the method of basic soldering, and then specific soldering techniques to employ while installing your modchip.

Some DOs and DON'Ts

- DO have a properly prepared and maintained iron and tip.
- DO have a comfortable, safe, clean, and well-lit workspace.
- DO have a first aid kit with skin burn gel available.
- DO have (and wear) safety glasses or other eye protection.
- DO use the right tools for the job at hand.
- DO practice the techniques and use the correct ones for each task.
- DO clean off the tip after each and every joint.

- DON'T take shortcuts. Do it right or don't do it at all.
- DON'T unnecessarily risk injury to yourself, others, or your equipment.
- DON'T use your soldering iron as a wire stripper or hole-boring tool.
- DON'T drop your soldering iron. Most contain fragile ceramic heaters.
- DON'T dip your iron in water to cool the tip. Let it cool naturally.
- DON'T use any type of cleaner chemical, steel wool, etc. on the tip.

OK, now that's out of the way... Soldering can be a difficult skill to master, but with the right knowledge, you will find it an easy one to understand. There are a number of rules to follow when soldering, many of which are often broken by the unskilled. Here is a list of just a few of those rules.

- ✓ Too much solder is NOT a good thing.
- ✓ Never apply the solder directly to the iron and attempt to 'paint' it onto the workpiece (wire, component, or board).
- ✓ Yes, you CAN apply too much heat.
- ✓ Soldering takes patience. (This is the most important part of learning to solder. You must wait if you want to have a good solder joint. So you need to understand that this isn't a speedy process.)

Now I'd like to go over properly preparing and caring for your soldering iron.

1. You need to take care of your tips. If you get a coating of melted plastic on your tip, it needs to be replaced. The plastic draws heat from the tip, and you can end up with cold solder joints.
2. You also need to be careful about cleaning your tip. If you scratch it up, it will again lose heat too quickly. Buy a simple soldering stand, with a holder for the iron and a small sponge on the base. These are usually less than \$10 at most electronics supply houses. The sponge is used to clean the tip while soldering. You need to soak it with cold water, and should use it to clean the tip between each joint that you solder. This helps to keep the tip working at peak efficiency.
3. If you are using your soldering iron for the first time you need to "tin" the tip. (This is also true if you are using a new tip for the first time.) Tinning is the process of heating up the iron and applying a thin coat of solder to the tip. This helps to achieve maximum heat transfer to the item you are trying to solder.
4. When you are done soldering, always re-tin (put a bit of solder onto the tip) as it cools. This keeps the tip sealed nicely, preventing oxidation.

Now that you have a well maintained and prepared tip, it's time to do some soldering!

Equipment

Soldering requires two main things: a soldering iron and solder. Soldering irons are the heat source used to melt solder. Make sure the iron you use has a grounded tip. Irons around 15 watts are good for most electronics/printed circuit board work. Anything higher in wattage and you risk damaging either the component or the board. Note: Never use soldering "guns." These are very high

wattage (100+ watts) and generate most of their heat by passing an electrical current through a wire. Because of this, the wire carries a stray voltage that could damage circuits and components.

The choice of solder is also important. One of the things to remember is to never use acid core solder. Acid core solder will corrode component leads, board traces and form conductive paths between components. The best solder for electronics work is a thin rosin core solder. I prefer a thickness of 0.032" but other thicknesses will also work. Just remember not to get anything too thick or it will be difficult to control the amount of solder applied to very small joints. There is usually sufficient rosin in the core of the solder so that you will not need to use flux paste. If your solder has no flux core, then you must use flux paste. Make sure the paste you use is designated for using with electronic applications. Dab a little on both parts to be soldered prior to completing the joint.

Remember also that when soldering, the rosin in the solder releases fumes. These fumes are harmful to your eyes and lungs. Therefore, always work in a well ventilated area. Hot solder is also dangerous. Be sure not to let it splash around because it will burn your skin almost instantly. Eye protection is also advised. A solder splash to the eye not only hurts, but can cause permanent blindness.

Surface Preparation

A clean surface is very important if you want a strong, low resistance joint. All surfaces to be soldered should be cleaned with denatured or rubbing alcohol. Don't neglect to clean wires and component leads, as they may have a built up of glue or chemical from packaging, or rust from improper storage.

Component Placement

After the component (or wire) and board have been cleaned, you are ready to place the component on the board. Insert the component or wire through the proper hole(s) on the board. Once you are sure that the component is properly placed, you can proceed to the next step. As noted above, if your solder does not contain a rosin flux core, then this is the point at which you should dab some flux paste onto all parts to be soldered together. Be sparing; only a tiny amount is required.

Apply Heat

Apply a very small amount of solder to the tip of the iron. This is called re-tinning. This helps conduct the heat to the component and board, **but this is not the solder that will make up the joint**. Now you are ready to actually heat the component and board. Lay the iron tip so that it rests against both the component lead and the board. Normally, it takes one or two seconds to heat the component up enough to solder, but larger components and larger soldering pads on the board can increase the time by a little bit. Be careful not to overheat. Use your

practice experience and your nose. If you smell something that smells “hot” ... it probably IS TOO HOT. Remove the iron and let it cool down.

Apply Solder

Once the component lead and solder pad has heated up, you are ready to apply solder. Touch the tip of the strand of solder to the component lead and solder pad, but **not** the tip of the iron. If everything is hot enough, the solder should flow freely around the lead and pad. Once the surface of the pad is completely coated, you can stop adding solder and remove the soldering iron (in that order). Don't move the joint for a few seconds to allow the solder to cool. If you do move the joint, you will get what's called a "cold joint". (This will be discussed shortly.)

A good joint will be shiny and smooth, with a **slight** bubble shape to it. It will not completely cover the pin, but encase it, leaving the tip to stick out of the top of the “bubble.” It will not have **any dents, gaps or open spaces**.

A bad solder joint will look dull; more grey than silver. It will not be shiny. It might even look a little grainy. (See the paragraph on cold joints below) If you need to redo a solder joint, always start from scratch, removing the solder you just put on, and cleaning the surface with alcohol. This will be frustrating at first, but as your skill grows, you will need to do this less and less often.

Cleanup

Flux is an important part of the heat transfer, but can leave an ugly residue. Flux residue can also hide a bad solder joint. Clean the solder joints with alcohol when you are through soldering.

Cold Solder Joints

A cold joint is a joint in which the solder does not make good contact with the component lead or printed circuit board pad. Cold joints occur when the component lead or solder pad moves before the solder is completely cooled, or insufficient heat or solder was applied to make a secure joint. Cold joints make a really bad electrical connection and usually prevent your circuit from working properly, if at all.

Cold joints can be recognized by a characteristic grainy, dull gray color, but they can be easily fixed. This is done by first removing the bad solder with a desoldering braid. Once the bad solder is off, you can re-solder the joint, making sure this time to keep it still as it cools.

Desoldering

Before desoldering, there isn't too much preparation involved. Just remember to tin the tip of your soldering iron like usual, by applying a small amount of solder to the tip, then wiping it off on a damp sponge just like if you were soldering.

Desoldering With Desoldering Braid (AKA “Soder-Wick”)

Desoldering braid is a copper braid that has a rosin flux coating that "sucks up" the solder, somewhat like a sponge. To use desoldering braid, pull a little off the spool, and place it directly over the joint to be desoldered. Then place the iron over the braid. After the solder starts to melt, it should get sucked up by the braid. Once the braid sucks it up, that portion of the braid is used up, and can be cut off. Be VERY careful holding the braid over the joint and after use, because the braid gets very hot! Desoldering braid is NOT reusable. Always discard the parts of the braid that have already sucked up solder.

Tips and Tricks

Soldering is something that needs to be practiced. Have I mentioned that? ☺ These tips should help you become successful so you can stop practicing and get down to some serious soldering.

Always use only just enough solder in whatever you are doing. There IS such a thing as too much. Too much solder lends itself to a cold joint, or cracking later on.

Remember to take care of your iron (and tip), and it will take care of you.

Keep the iron tip **clean**. A clean iron tip means better heat conduction and a better joint. Use a tip cleaner (or a wet sponge) to clean the tip between each and every joint soldered.

Double check all joints. It is a good idea to check all solder joints with an ohmmeter **and magnifying glass** after they are cooled. If the joint measures any more than a half of an ohm, then it may be a good idea to re-solder it. (Note, sometimes in-circuit resistance can make a joint appear faulty. Always judge appearance and mechanical connection first, and continuity as a secondary test.)

Don't heat up the joint for too long a time. You can permanently damage your circuit board and/or components.

Be patient!

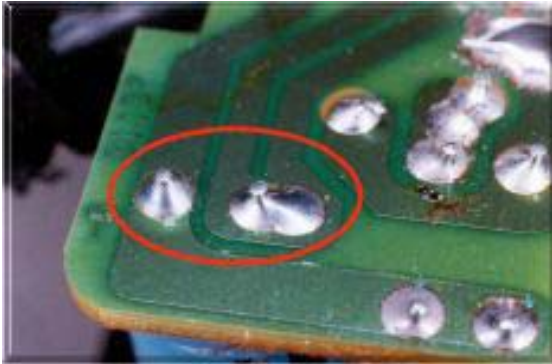
Practice! (Did I mention that already?)

Now, let's put this knowledge to work. Get out your tools, heat up your iron, get some practice boards (broken stuff makes good practice material!) and practice soldering and desoldering things.

Look at your work under a magnifying glass and see how good of a job you did. Re-do joints that look bad, consider redoing joints that look "iffy" -- after a while you'll get the hang of it.

Compare your work to these pictures...

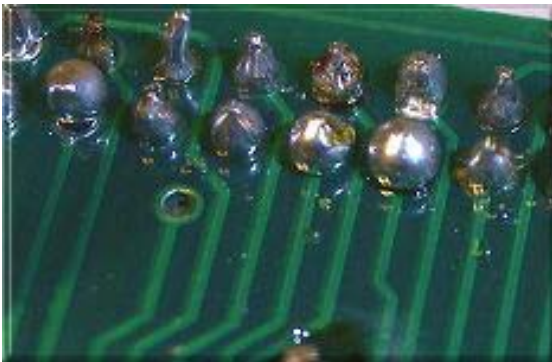
GOOD JOINTS



Notice how the joints “peak” ... no globs or balls of solder, the tip of the wire is still visible.

Finished joint is shiny, not gray, dull, or grainy. Board around joint does not have flux residue or look burned.

BAD JOINTS



Some of these joints have WAY too much solder on them. They show poor peaking, and some have too little solder, which can lead to fracturing and separated connections. Notice how some of them look grainy or dull compared to the others. Those are probably cold joints. All of these joints should be redone.

APPENDIX E: WHAT TO DO IF SOMETHING GOES WRONG

Symptom	Possible Remedies
Nothing happens when power or eject button is pressed.	Power cord not plugged in (at both ends) Power supply connector was not reconnected to motherboard Power supply fuse has blown Internal short circuit, check wiring
Power comes on, no audio or video on the TV, but the disk drive will still eject its tray.	Make sure TV is powered on Make sure both ends of the video cable are connected (to XBOX and to TV) Check XBOX LED Error Code chart if it is not solid green.
Power comes on, no video but audio works Power comes on, no audio but video works	Check A/V connections Wrong video or audio mode may be selected in XBOX EEPROM settings A/V pack may be defective
Power comes on, no audio or video on the TV, and the disk drive will not eject its tray.	Bad solder connection(s) Console is overheated (CPU has shutdown)

If these did not help you solve your problem, please post a help message at the forums at <http://www.ozxodus.com>