U s e r ' s   G u i d e

GREETS for Bunnie and Andy and the guys like elephants who share what they've digested.

Index

Clever Mod is online at
www.clevermod.com

Introduction

Clever Mod is a combination of someone else's chips and then another guy's idea. The chip is basicly a SST with mod switch set up so you can set all available functions right from the power on and the eject buttons. The idea came from a post on isonews.com about a German site selling this mod switch chip that let's you disable the chip via the power on and eject buttons. My design takes it the next logical step and allows not only disabling the chip but also allows the end user to disable the write protection we've buildt into the design and easily upgrade to any 256k bios that's available, and there are plenty available.

CleverMod is about features. It's design replaces 2 external switches leaving the case looking like a factory Xbox. It has a mod on indicator LED. They are prewired on a professional PCB and it has a small footprint (1.01″ x 1.24″). All the chips are socketed and the PCB's can take 1/4 watt or smd parts. The hex code and assembly code for the small chip is a free download. The PCB has provisions for future upgrades.

 It's best features though are it's ease of use and intuitive design that encompasses what gamers need in a chip. The ability to disable and enable the chip & flash it's bios without opening the case or installing switches makes it a major contender feature wise against any other chip.

⚒ How It Works....

It's simple to enable, disable, or flash this mod chip!
Power ON Normally by tapping the power on button in for 1/2 a second or so, the mod chip takes over the xbox bios.
Power ON by pressing the eject button to load the factory bios that's unmodified and perfect for Xbox Live.
Power ON by pressing and holding the small power on button 5 seconds to update the bios image on the mod chip.

Voiding the Warranty

⚠️ *Note*   Before you start taking apart your Xbox keep a few things in mind. There is always the possibility of damage any time you take stuff apart and when you take the xbox apart you void your warranty. It is important to follow this guide carefully and understand the proceedure before you attempt any steps. Equally important is to have fun.

Step 1: Safety First

Be sure to unplug the xbox, leaving the xbox plugged in will expose you to possibly lethal voltage.

Step 2: Open the case

Flip the Xbox upside-down and examine the bottom. There are 6 screws that hold the top and bottom of the xbox together. All the screws are hidden by rubber feet or by stickers. The rubber feet are held on with adhesive and the best thing to do is pry them up on their outside edge as the screw lays on the outter half of the rubbet foot. Do not peel the feet back further than needed to remover the screws. The 2 screws located under stickers are best located by rubbing the sticker and feeling for it's indentation. Figure 1.1 illustrates the position of all the screw locations. Use a T20 size Torx bit to remove the screws.

Figure 1.1

Shows the location of all six case screws holding the Xbox together. This view is of the bottom of the Xbox.

👍 *Tip* Place your screws in a small bag or pput the in an ashtray or plastic container so that you don't lose them. The screws that hold the Xbox together are unique and you'll have a hard time finding them at a local store.

Step 3: Remove the top

You should have the screws out and turn the Xbox right side up. Grasping the Xbox side gently with the palms of your hands try the shake the top free from the bottom . You may have to use use your fingers and pry the back of the case and start the halfs to get the apart. Never force the case apart it's possible screws were added since the making of this guide so double check for any added screws and just work on it gently. It should pull straight up and off .

Step 4: Moving the disk drives

Now that you are inside you should notice 2 disk drives mounted on black plastic trays.At this point you can either move or remove the drives. For the prewire install simple moving the drives is required, for the pin header install the whole motherboard is removed and the drives are totally doisconnected. To remove or move the trays you need to locate the 3 screws that are holding the trays in place. You will need a Torx bit size T10 to remove the screws illustrated in figure 1.2
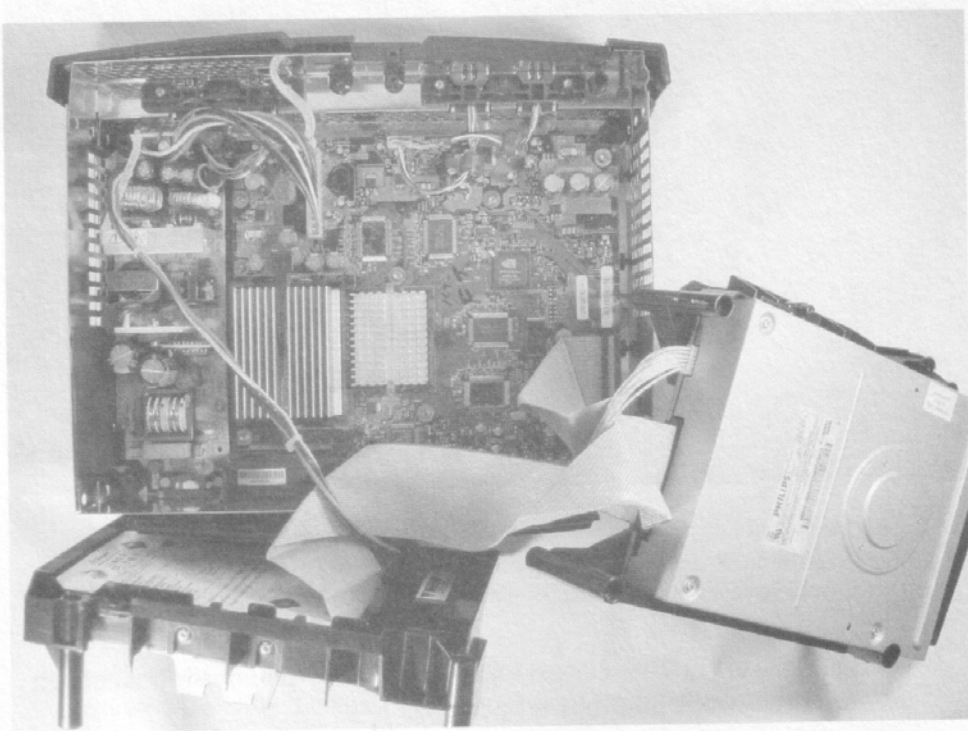

Figure 1.2
Shows the location of the 3 Torx T10 screws holding the drive trays in. Note the gray IDE ribbon is being held back to expose the location of the screw holding the hard drive tray in.

One of the screws is located under the ide gray ribbon cable and the other two are recessed an inch blow the top surface at the front corners of the DVD rom drive. A flashlight or good overhead lighting is needed to see the screws. Once thje screws are removed you will need to remove the Molex IDE power cord that is a bundle of red, yellow and black wire to move the trays. This is accomplished by using a small flat head screw drivers and gently prying the clear/white molex connect from the rear of the hard drive. Undo the threading hold downs and remove the power cord from the notch on the side of the tray. You can now pick the hard drive tray straight up and fold it over the DVD drive as soon in figure 1.3. Pull the DVD tray up and out of the way but be mindfull of both the gray IDE ribbon and the yellow cord that is attached to the DVD rom drive it can easily become unplugged. If you are doing the prewire chip insstall you are ready to proceed. For the pin header install the complete mother board must be removed and will be covered in an update later.

Figure 1.3

The DVD and hard drive can be temporarily set aside wile working or unplugged. I prefer to keep the DVD upright and the recessed screws right where they were taken out and plugging in the gray ribbon and yellow cord are on what's called 'protected' headers so that you have to line up notches on the plug to actually get it inserted.

Understanding a bit about circuit boards

A typical circuit board is made up of a couple layers of patterned copper sandwhiched between layers of fiberglass and epoxy. Circuit boards are covered with a soldermask which is the green material we recognize when we see a circuit board. Solder will not stick to the solder mask and it has openings for components to be soldered to the tinned pads. On top of the green soldermask layer there is the silkscreen layer in white. Every component on the mother board has a white silkscreen designator. The designator is used to quickly find a component on the board from a schematic. You can use the designator to guess the function of the component by looking it up by it's naming scheme. Figure 1.4 illustrates the Xbox disignator naming scheme.

Designator	Component Type
C	Capacitor
R	Resistor
U	Integrated Circuit or Transistor
L	Inductor
RP	Resistor Pack
Q	Transistor
CR	Diode
J	Connector or Jumper
RT	Resettable Fuse
Y	Crystal

Figure 1.4
The Xbox component naming scheme.

👍 *Tip*

The Xbox comes with a very handy coordinate system silkscreened on the outside edges of the motherboards. On the component side of the motherboard the coordinates goes from A-G on the sides and 1-8 along the top and bootom. On the reverse side of the board it has the coordinates M-V along the sides and you should note that I, O, Q and S are not viable designators as they could be confused with 1, 0, or 5. Xbox components on the mother board are encoded using this coordinate system. Thus J7D1, the LPC debug port the mod chip is attached to can be found on the top side of the board at coordinates 7D
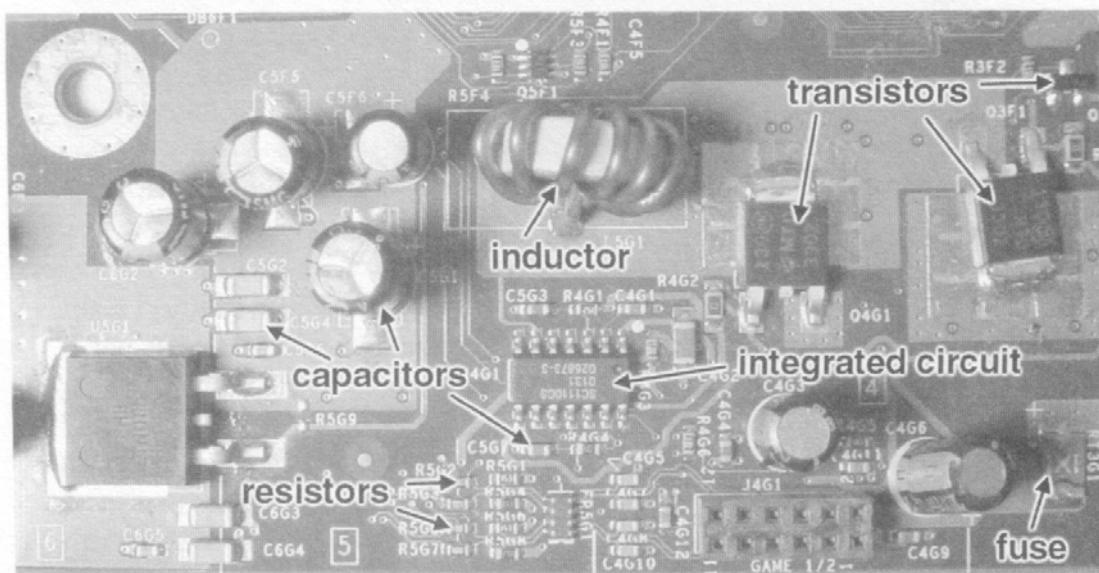
Figure 1.5
Photo illustrates the typical components found on the Xbox circuit board.

Installing CleverMod

⚠ *Note*

Great care has been taken to insure CleverMod arrives in good shape to it's end users. The installer has the reponsibilty for several very important things. First off t's important to fully insulate the CleverMod from any possible short outs. This can be done with hot glue or electrical tape but it must be done. Failure to obey this might mean a dead box. The chip must be wired fully and properly to work reliably. Each chip should be tested after the install to insure the chip is functioning properly. The installer must understand it's his responsiblity to check that any wires on the chip's end remain connected and the installer should inspect for and re-solder any bad connections.

Step 1: Examine and plan

Take a good look at the chip and make sure the pre-wired connections survived shipping and locate the mod inside sticker and there may also be a mylar type insulating sheet suitable for insulating the chip. Read ahead and understand all the steps and proceed with caution. Figure 2.1 illustrate the bag CleverMod may be shipped in. Before Shipping your CleverMod is tested and functions fully before we add the prewire's connections. I use a dedicated machine for this and it insures NO BAD FLASH or NO BAD PCB BOARDS as shown during testing in figure 2.2.

Figure 2.1

Shipped in a box and a bag, you will have the mod chip, a sticker, an insullating sheet and the other stuff is common peanut packing material.
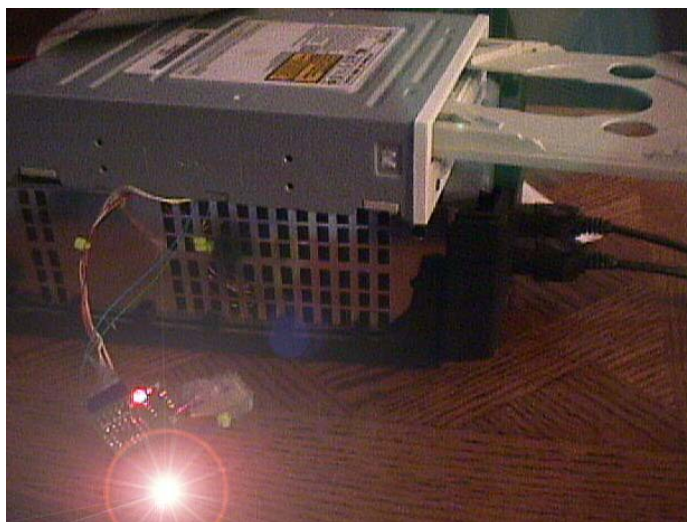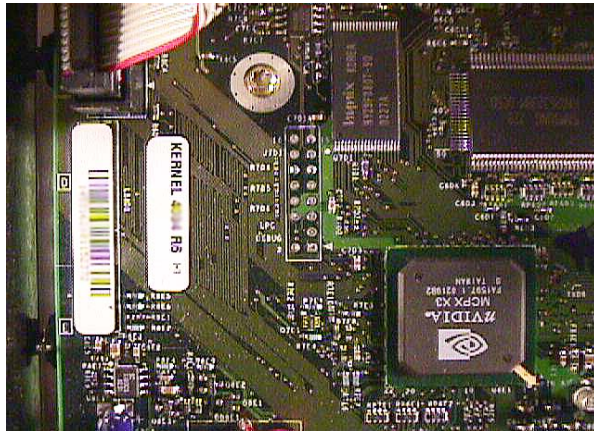
Figure 2.2

CleverMod going through testing via the special harness I set up just for this. Also being tested is a Samung 616T PC DVD drive that's converted to work exactly like the original xbox Samsung DVD drive.

Planning ahead requires you to determine what you have and assess the best proceedure for attaining the desired result. The 'before' picture in figure 2.3 and the 'after' picture illustrated in figure 2.4 are good reference to use as far as wire routing and how much area the chip takes up. One problem the installer always faces is how permanant and diligent should you hot glue wires and the chip to the plasatic sheet and the motherboard. Basiclcy you can mount the chip with the chip still service able then button it up nearly permananly after you test if briefly. The main reason to have the chip back out of their sockets is in the case of catostrophic bios flashing failure or perhaps updates to the small pic chip 12c508. Now is a good time to press the chips into their socket once in case they've loosened during shipping. The component side is mounted down in the xbox and you want them in there tight.

Figure 2.3

The area below the IDE port shows a nice spot for the chip to be mounted. Also visible is the LPC header port, the TSOP chips is Hynix brand and the D0 spot.
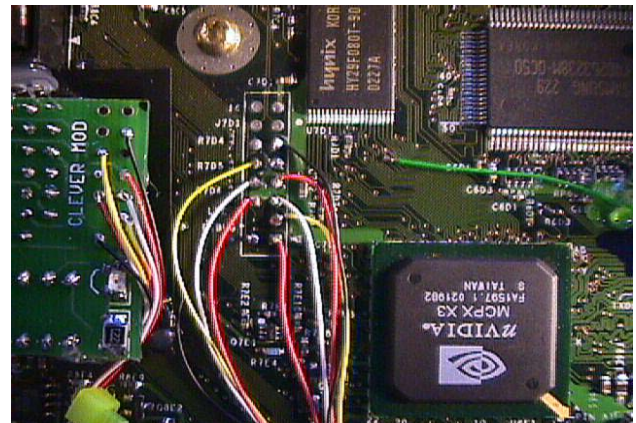
Figure 2.4

The installed CleverMod is glued to it's plastic sheet a which is also glued right to the stickers on the motherboard.. Note clevermod's orientation to the LPC port and the room allowed for routing of wires.
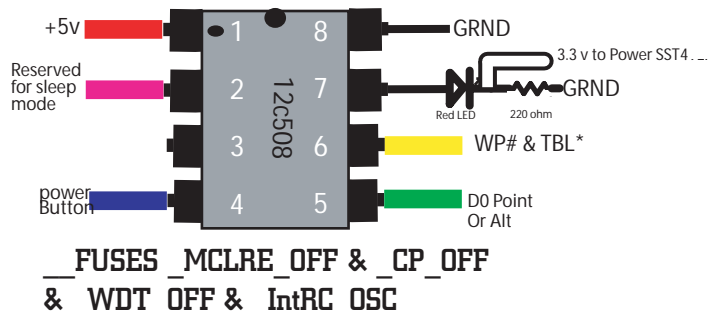
Keep in mind the airflow that is designed to allow air to flow around the top surface of the motherboard and exit out of the machine. Blocking the airflow of the xbox will cause the xbox to overheat. The plastic trays that hold the drives are designed to facilitate air flow and the Xbox can overheat simply from running without those installed over a period of time. Because of this plan to route wire wires as low as posibble. The wires we use are the same for every CleverMod and the color corresponds to a location on the Mod and LPC port but only for trouble-shooting purposes we make all mods the same. Notice that the LPC port is made up of 2 rows of pins and that on one sode of the pins there is a pin missing. This area is called the key and is useful for pin orientation when you begin soldering this mod in.

👍 *Tip*   **The next page is going to be used as a quick start guide, one page an experienced mod installer can print out and have the connections and diagrams he needs. Perhaps that's all the support an experienced guy needs but a newbie first time installer needs to look closely and try to follow along until we resume with a more detailed explanation in the following pages. Everyone isntalling should print at least the next page out.**

pic 12c508 circuit schematics

+5v — 1 ... 8 — GRND

Reserved for sleep mode — 2 ... 7 — 3.3 v to Power SST4

12c508

Red LED   220 ohm   GRND

power Button — 4 ... 5

3 ... 6 — WP# & TBL*

D0 Point Or Alt

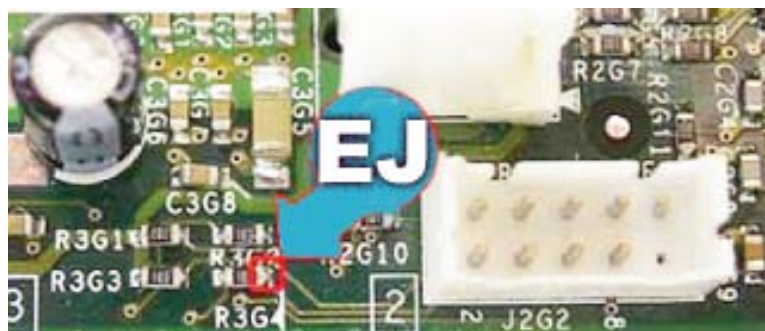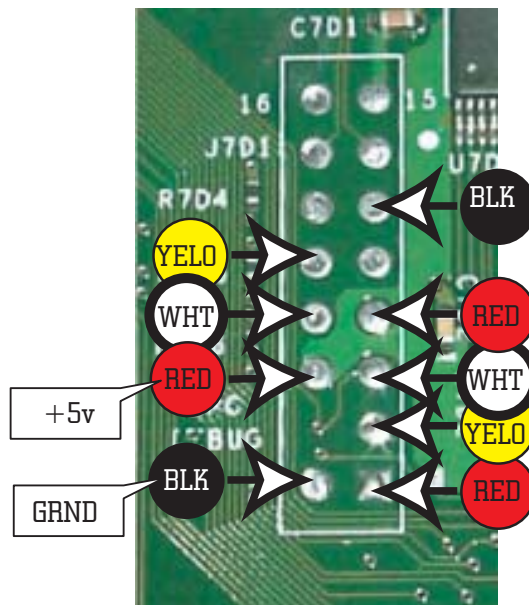__FUSES _MCLRE_OFF & _CP_OFF
& _WDT_OFF & _IntRC_OSC

How It Works....

CleverMod's bios: pin 7 hi, pin 6 low, Pin 5 low
Ms Bios Pin 7 input, pin 6 low, pin 5 input
Flash bios Pin 7 Hi, pin 6 hi, pin 5 low
Power button goes low when pushed and is read by pin 4. Pin 7 outputs 5v 25ma red LED (forward voltage 1.7) leaving 3.3v to power sst @15ma with 220 ohm resistor..
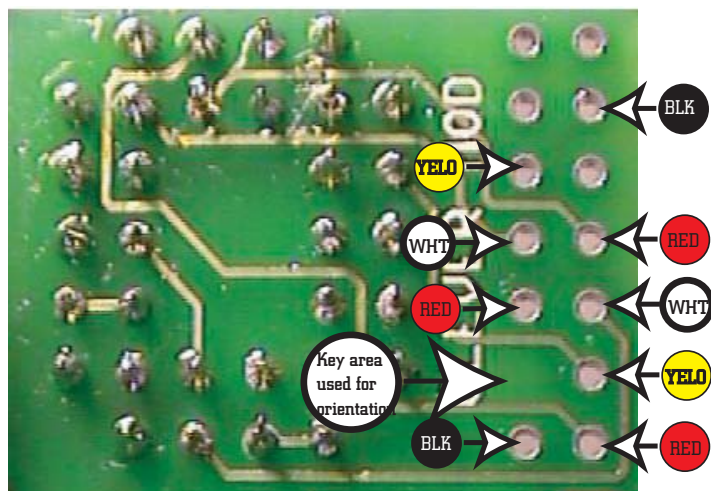
Wire colors on the clevermod PCB, note the `key' pin is missing on the left side pins. Use this for orientation.

Photo illustrates the wire colors used for CleverMod on the Xbox's LPC port. Note the key area exists on the port next to the silkscreened debug text partitaly covered by the black marker.

EJ spot of the Clevermod connects to this 10k resistor that on v 1.0 xboxes is nearly hidden under the USB daughterboard but is positioned as illustrated on all versions of xbox at R3G4. See detailed section for alternate spots.

Photo illustrates close up view of the xbox v 1.0-1.1 xbox versions `DO' spot. The Clevermod pad silkscreened DO links to this spot. Alternate spot for this signal exists on the bottom of xbox main board.

New version 1.2 Xboxes have a slightly different orientation on the xbox mainboard for the `DO' spot as illustrated in the photo above.

Soldering the chip

Soldering in a bios replacement is never going to be easy but the LPC port has relativly large pads to work with and can take quit a bit of heat in the through holes that are filled with solder. Even so this installation isn't for newbs or kiddies and if done improperly can ruin your xbox. Use a 15 watt iron like you find at Radio Shack or use real low heat like 525 F and only add more heat if needed. Experienced solderers know their equipment and can use alot more heat than a newb because they know how to work quickly in terms of how much heat is applied after the point the solder goes molten.

Step 2: Mount the CleverMod

CleverMod has a small footprint and is easily hot glued or taped to the mylar sheet provided. Some illustrations may show black mylar this was used because the clear mylar like the included mylar didn't show up in photographs. Hot glue and tape each has it's own advantages, both are affected by heat and humidity which can cause it to lose adhesion. The brand of the hot glue stick affects how well it sticks to a PCB and to wire considerably, and Radio Shack sold good glue sticks but seems to be dicontinuing them and the same story at Jameco. The adhesion of electrical tape when it's flat and not wrapped isn't that great and I prefer good quality hot glue.
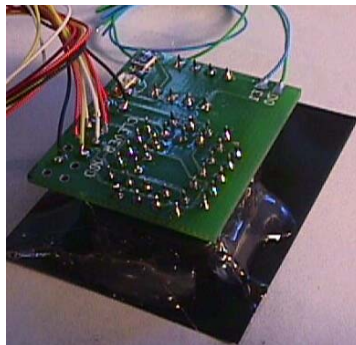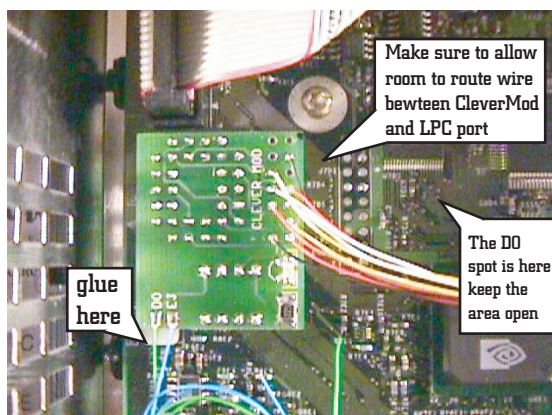

Figure 2.3
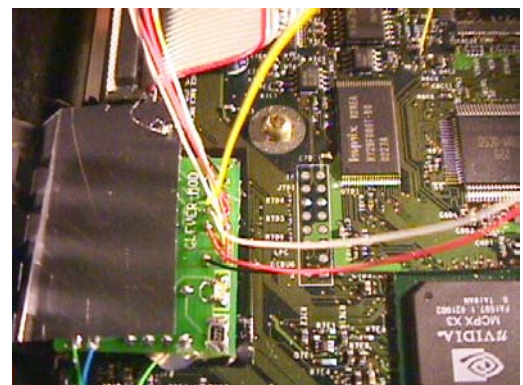Photo illustrates how the chip is hot glued to it's mylar sheet top view.

Figure 2.4
Photo illustrates how roughing up the edges to be hot flued increases adhesion.
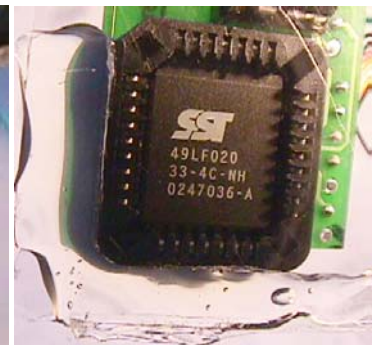
Figure 2.5
Photo illustrates how even with plenty of glue contacts are untouched. Photo is bottom view.

Make sure to allow room to route wire bewteen CleverMod and LPC port

The DO spot is here keep the area open

glue here

Figure 2.6
Illustration points out the main considerations for glueing the chip into the xbox.

Figure 2.7
Illustration of how you can also fold the mylar over for the top, like a taco.

Step 2: Solder the LPC

It's important to have the chip glued down pretty securely at this point because a main concern with modding is not to rip up or disturb any connections you just soldered. Catching a ring or a watch or the soldering iron on a wire or a component on the CleverMod or the Xbox is easier than you may think. I begin by 'tinning' each connection on the xbox motherboard as depicted in figure 2.8. Tinning is simply the process of applying a fresh dab of molten solder to each point and is optional EXCEPT in the case of our first wire we are going to attach, and for the spot depicted in figure 2.9 you must fill it with solder. It is the 'bottom' pin on the left hand side right below the key where the one of the 2 black wires connects. In most cases all the pins on the LPC port are filled with solder except this pin in figure 2.9. If you have flux I strongly suggest you use it on this point and this point is difficult for the low heat of the 15 RadioShack iron, it really needs a bit more heat than I like.

Tip

I can't teach you how to solder but if you're an average adult and have some patience you'll find that this silver plated wire sticks to solder like super glue that dries in 5 seconds. Here's the key strategy for doing the LPC pins. 1) Identify the wire from the CleverMod that goes to the spot on the xbox you are soldering. Use the illustrations on page 8 regarding the key and wire color orientation. 2) Make sure the kynar insulation is stripped and 1/16th to 1/8th of an inch of the wire is exposed. 3) Hold the wire near the LPC pin you intend to solder, heat the center of the pin until the instant you see the solder go molten. 4) At that instant you can insert the wire into the molten solder and remove heat from the connection. 5) Hold the wire steady for 5 to 10 seconds or more to prevent a disturbed connection. The connection should appear slightly shiny and it's important to check the connection under magnification.
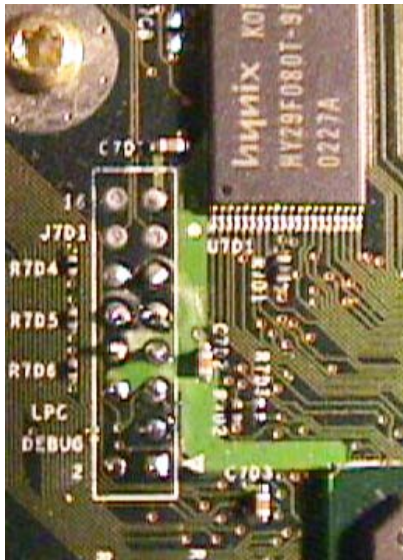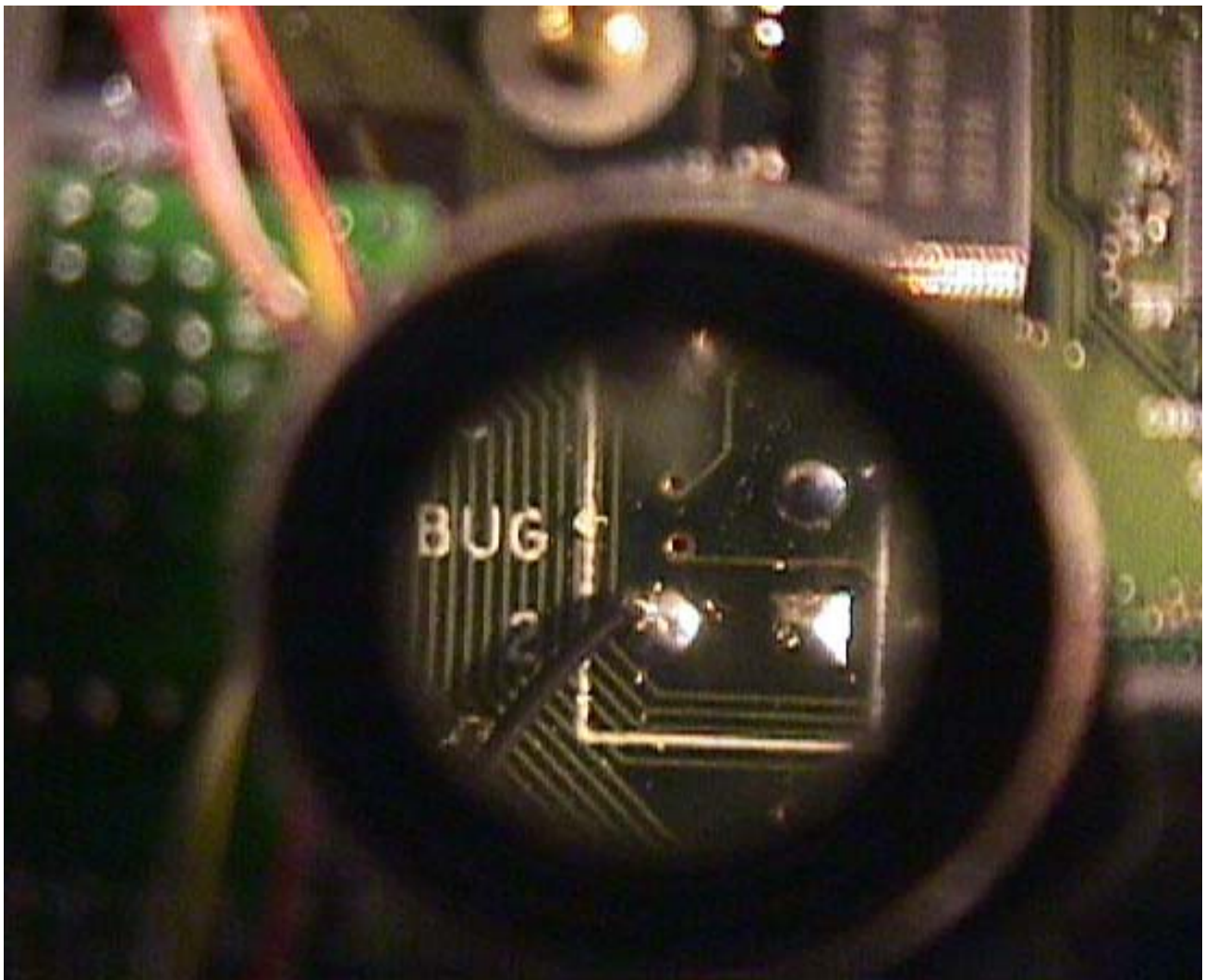
Figure 2.8

Illustration shows how the lower pins of the LPC port are tinned and ready. The upper pins are untouched since they are not used by CleverMod.
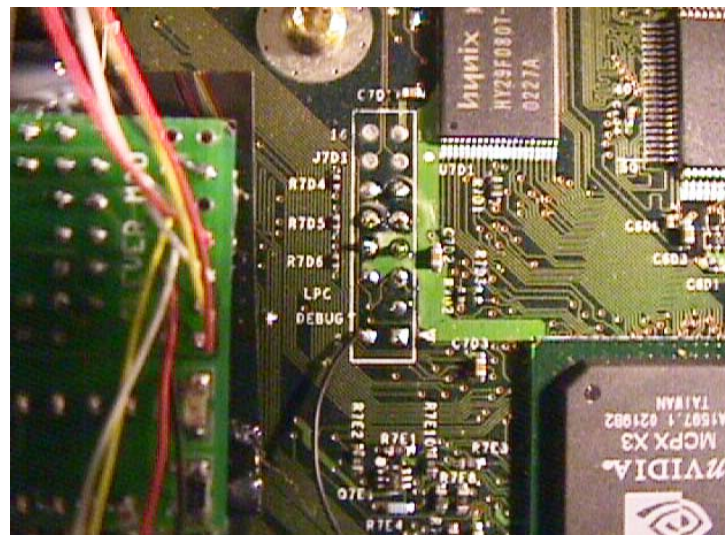
Figure 2.9

Illustration shows the first wire that's connected to the Xbox motherboard. Everything looks okay and you can make it easier by seperating the left and right hand side pin wires and tucking the right hand side wires behind the gray IDE ribbon cable to free up access to the wires you'll be attaching soon.

Figure 2.10

Illustration shows a top down view of the first connection magnified at 8x. the view is with the froont of the xbox at the bottom . This looks fine, some of those reflecting dots could be solder balls or shavings of some type but in this case is just some flux. Most types of Kester solders have non conductive flux that probably wont hurt in small amounts. Some flux is removable with water and some requires solvent, which can soften soldermask and must be used in moderation if at all. Checking the work under 8x magnification reveals many possible problems and it always amazes me what I find upon close inspection.

Once you have the first wire in it's you should route the wire down and loop it round so it passes near the wound coil inductor located below the actual CleverMod install. With the first wire done we are going to concentrate on the three connections on the left hand side of the LPC porrt and right abover the key area. Start right above the key area is one of 3 red wires. The sequence should go red, yellow and white and it will mimick the wires already attached to clevermod.

Note

Shipping and handling during the installation and fabrication of CleverMod can cause the pre-soldered wires to come off. The installer can easily fix this at the time of the installation. Failure to do this results in a non working mod. Remeber, all mods are tested here at CleverMod HQ and the most likely cause for failure is a bad connection and it can happen at either end.

Connect the entire left hand side of the LPC port as shown in figures 2.11 and 2.12. Make sure each pin is isolated away from any other pin of course and that you are careful not to disturb any wire and or connections you have already made. A good technique involves holding the soldering iron a little more straight up and down than you may feel is natural, the benefit is that you keep the area above the tip of the iron away from any surface mounted components that are easily removed that may be near the work area if you're not diligently paying attention. Proceed with the 2nd of 3 red wires on the LPC port bottom right hand side pin as illustrated in figure 2.12 and when happy proceed up the right hand side with the with the yellow, red and white wires as shown in figure 2.13. You skip a pin and connect the last black wire to finish the LPC port wiring. Double check all LPC connections both on the xbox and again on the CleverMod and look ahead at the last two connections, DO and EJ as shown in figure 2.14
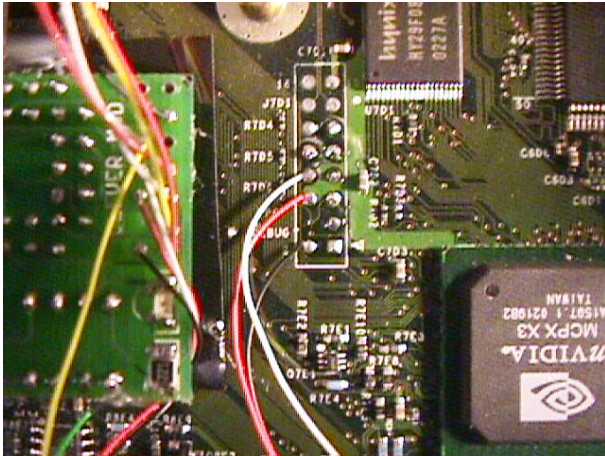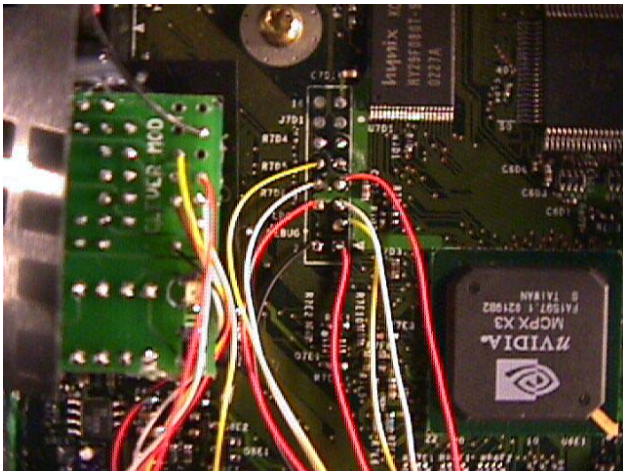

Figure 2.11

Showing the left side just about done, only the yellow on the left needs to be connected. On the LPC port CleverMod uses 3 red wires, 2 yerllow wires, 2 black wires and 2 white wires to help ease the install.
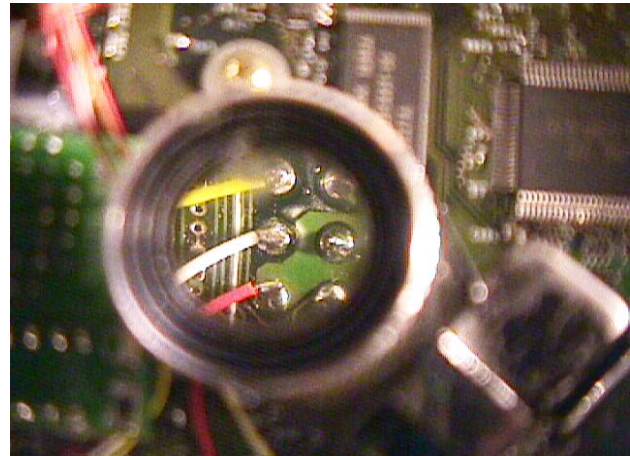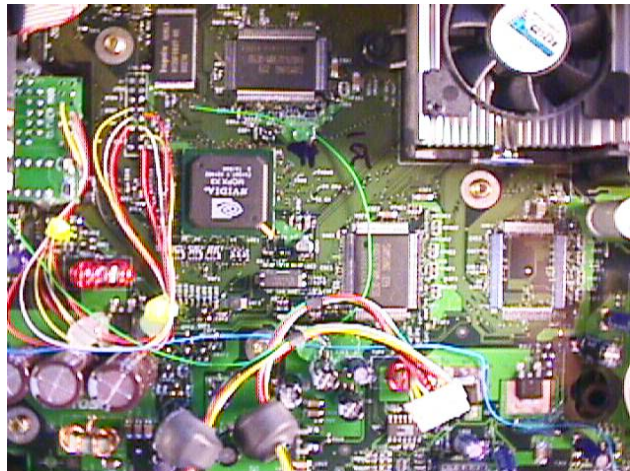

Figure 2.12

Showing the red wire is just sitting on top of the pin, not really inserted like I like. If you spot this or any small error don't leave it, fix it. It may work but that means it may fail and I redid this connection.

Figure 2.13

This photo shows the LPC port of the install all done except fpr the final black wire on the top right side. Note that no wires are routed over anothers connection and the wires bend gently with no sharp angles to the bend.



Figure 2.14

This photo shows the install all done eand gives the installer a rough idea what the install looks like. The connections are seperated a bit for the photos but this routing of the wires works well.

Step 3: Solder the Infamous DO Point

Oh boy! Hopefully you've made it this far without any fires starting up and everything is looking under control. So much has be written in tutorials and in forums and IRC about the DO spot I was a little reluctant to start this step on page 13 of the manual, so I didn't, welcome to page 12b :) The DO point on the top side of the board is located - depending on the version- as depicted in figures 3.1 and 3.2. Upon close examination of the DO spot on the top side of the board you see it is a via, and they are used to carry a signal from one layer of the PCB to another or possibly the other side of the PCB. It's actually like a hollow pipe, and it's to our benefit that the 30 awg kynar wire will fit snuggly into the via, so snuggley infact it barely needs soldering at all. The location of an alternative DO point is on the bottom side of the xbox main board near resistor R7R1 and is a ROM test point which although is bigger it will not take much heat before it lifts so use caution.
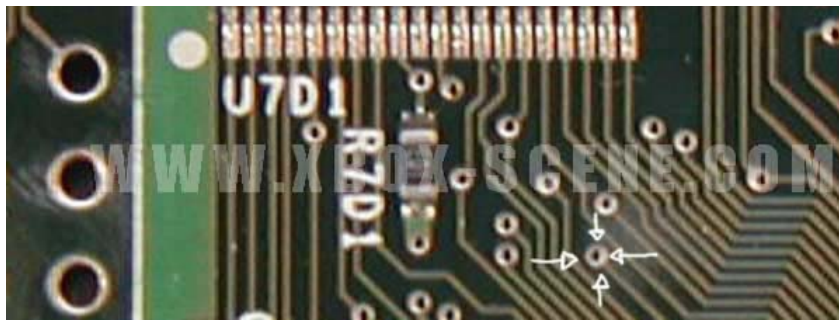
Figure 3.1
Shows DO point for top of board on V1.0 - 1.1 Xboxes.
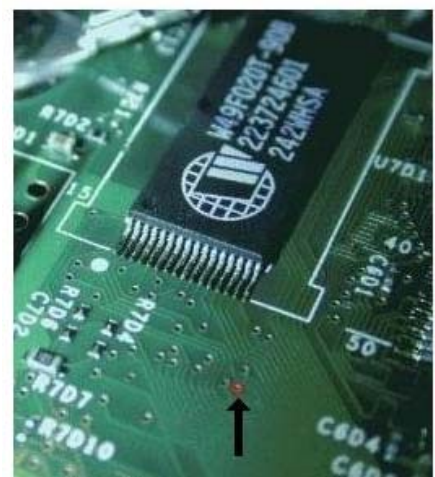
Figure 3.2
Shows DO point for top of board on V1.2 Xboxes.
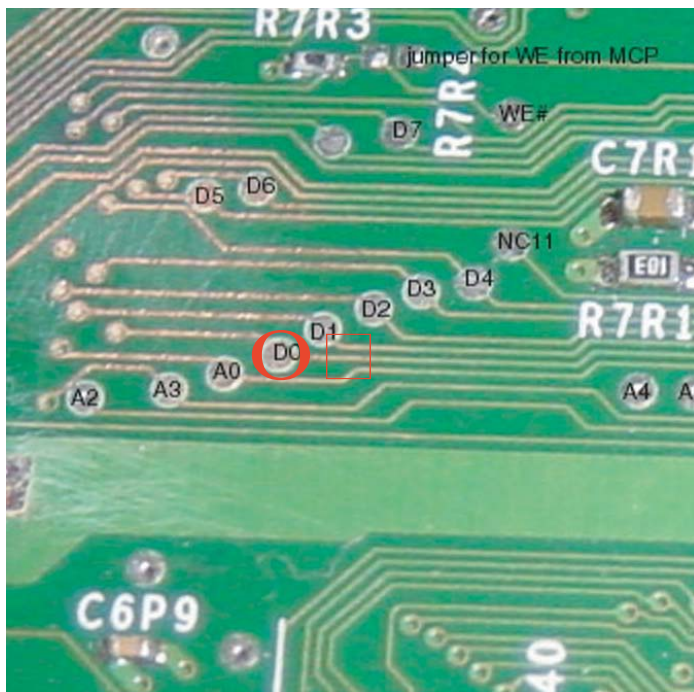
Figure 3.3
On the bottom of the Xbox Motherboard in an area I call the Christmas Tree and depicted here incircled by red is the alternate DO spot.
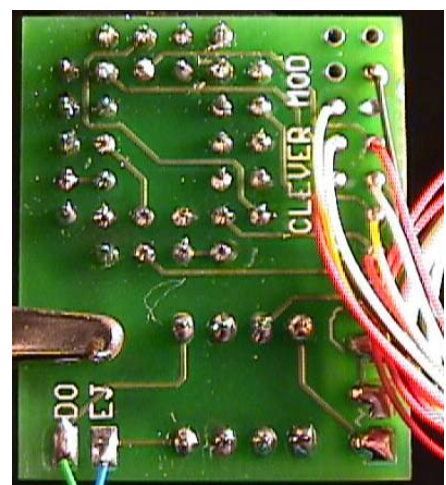
Figure 3.4
CleverMod PCB Solder Side showing the DO and EJ wires, note the DO wire is green. The EJ wire is blue. Located below the alligator clip holding the PCB up.

Strip the insulation of the green DO wire to expose more wire than normal, up to 1/4 of an inch exposed. Find and locate the proper DO point for your Xbox Version, 1.0, 1.1, and 1.2. Note as of this writting version 1.3 is not yet supported and we expect a change on this. The DO spot is confirmed the same as a 1.2 version machine.

Use a small 'pick' or needle to apply the smallest amount of flux as possible onto the top of the DO spot. Take the sharp end of the needle and stick it into the hole in the DO spot via and twist it to deburr the entrance of the DO hole. Take your green wire and stick it into the hole in a manner that is similar to figure 3.5. Stick about an 1/8th of an inch of the exposed wire in and then bend it gently in a direction opposite the direction of the LPC port so the wire runs toward a blank area of the xbox mainboard where hot glueing the wire won't be a problem. Some bad installers call this good and simply leave it and they probably have some success. I want it attached perfectly so we are going to solder it in. The vias in this area are covered with some laquer or soldermask type of material. You can easily see it under magnification and you need to scrap or pick as much as you can away with your needle even if you need to work under magnification as shown in figure 3.6. After the top of the point is clean you should have as small as a tip on your soldering iron as you can find for this, the Radio Shack 15 watter is good, any needle or fine point tip will do, but avoid big chisel tips or blunt tip from a Radio Shack 40 watter etc. Tin your tip well and load a small ball of solder onto the tip of yor iron, add the solder to the tip so it's not over the xbox motherboard and add only enough so that when you are moving the solder flooded tip over the mother board there is not so much solder that it will drop off. Take the solder flooded tip and hold it gently to the spot where the wire and the top of the via meet and hold it there until the area gets hot enough for the solder to flow, maybe like 5 seconds maximum and more like 4 depending on the tip and the temp of your iron etc. Take the needle and probe the wire while looking at the connection under magnification. By probing the wire in a manner which you try to wiggle the wire in the dDO spot and look for rotation at the connection, or simply confirm under manifcation the connection is good. Your wire should look something like figure 3.7 and you should confirm the connection again under magnification. Hot glue the wire down near the area.
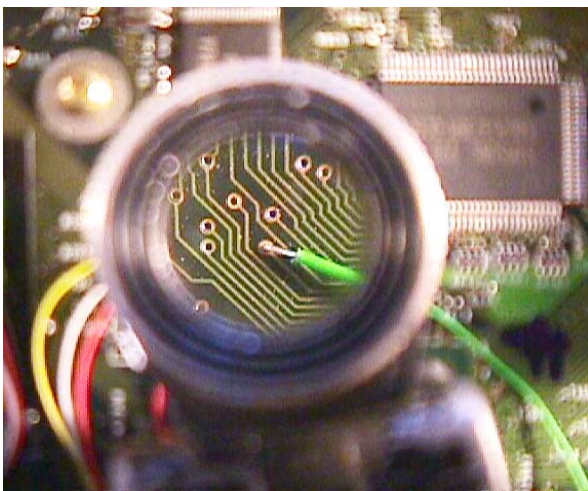
Figure 3.5

The green DO wire from the CleverMod PCB is inserted into the hole of the DO via. It's bent away from the LPC port and back in figure 2.14 you can see the area I like to hot glue it to the PCB so it can never wiggle free, not that the solder is going to let it.
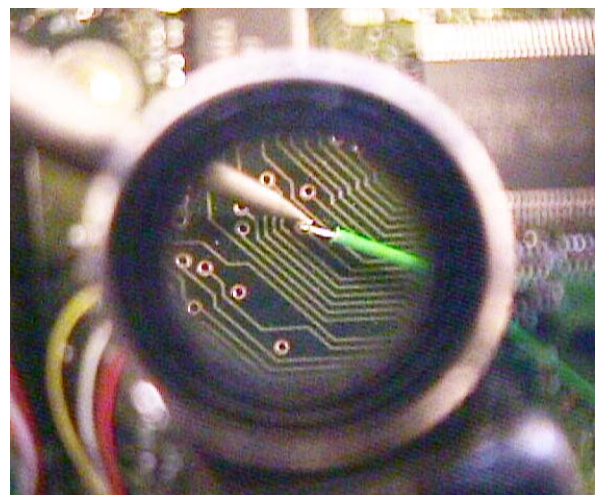
Figure 3.6

Using a pick or needle under 8x magnification takes a bit of orientation time. At first the tip of the needle looks as big as the end of a Lousieville Slugger baseball bat and you immediately feel very uncoordinated. After this passes you can scrape the area near the connection that may have soldermask or laquer overspray on it to insure a good solder connection.
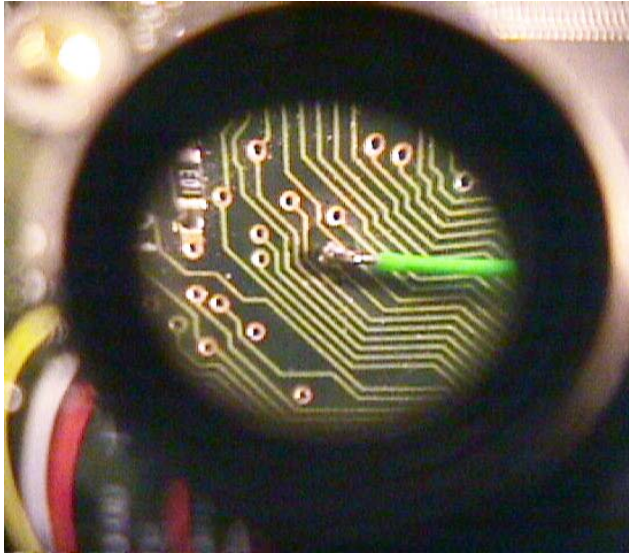
Figure 3.6
This soldered DO point will last a long time. There is solder near the top of the connection where I took the hot iron away but below that I can see a fine connection with solder flow across the top of the via. The uninsulated wire doesn't present a problem it is nearly 1/16th of an inch above the PCB surface.

👍 *Tip*

With the work on DO finished it's a good idea to hot glue it down as soon as possible to provide some strain relief, if needed, while performing the reassembly or perhaps if you ever need to remove the chips from the CleverMods sockets. I never glue the top of the connection but rather nearby so to allow the connection to remain servicable. Try to avoid hot gluing wires to small components or hot gluing over vias. You never where know what points the next hack you preform will be so find open parts of the board away from traces.

One last connection to do, I hope it's not too hard for you guys. I'm giving you 3 alternative locations so hopefully everyhting works out great.

Step 4: Hooking CleverMod up to the Outside World

🔧 *How It Works....*

The CleverMod needs a lint to the outside world so it can know if the power on button is pushed or the power on button was held in for 5 seconds. We do that with a dedicated input pin 4 of the 12c508 chip. It's possible to press and release the power on button so fast CleverMod never sees it, but if you press the button firmly it works as designerd each time.

CleverMod requires* a wire to read the power on button and the pad is labeled EJ on the CleverMod circuit board as shown ion figure 4.1. You should have already seen it next to DO and it's the blue wire. I prefer to connect it to a specific end of a 10k ohm resistor located at R3G4 on the Xbox motherboard. One problem is that on older 1.0 version xboxes this resistor is almost under the USB daughter board that has the controller ports wired to it via connectors you'll need to unplug. There are 2 white connectors on the USB daughterboard that disconnect sililar to the yellow cord of the dvd rom player. they pull off by pulling them towards the rear of the Xbox.
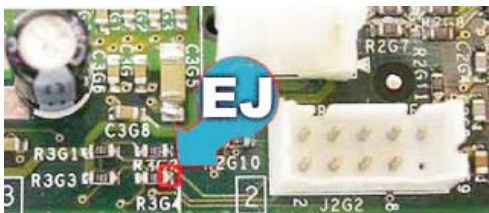

Figure 4.1 (LEFT)
The EJ connection UP CLOSE. Note the white connector that will have the 'Other' yellow cord that runs to the front switch board. It has that 2 on the left bottom corner and that pin 2 of the front switch connector is an alternate spot to connect to, but the original is easy with proper technique.

⚠ *Note*   Use caution unplugging the daughter board from the xbox main baord because the white connector for the yellow power switch cord lays in very close proximity to the USB daughterboard. I have seen many forum posts where fellows have scraped hard enough against that connector to knock small components off the USB daughter board.

Unplug the daughterbaord up and away from the white connector so it unplugs from it's 2 brown or black sockets on the Xbox main board. Place it safely aside and check the routing example in the connection illustrated in figure 4.2. The technique to solder this type of connections is easy for me I bet I've done 1000 just like this one. This connection is scarey for a newb so I'll try to let you in on all the secrets. The firsst secret is no secret, these damn SMD resistors are small, and a newb can't tell from looking if the connection is on top, on the side, near the base, or where? The tech drawings in figure 4.3 help explain this dilema.
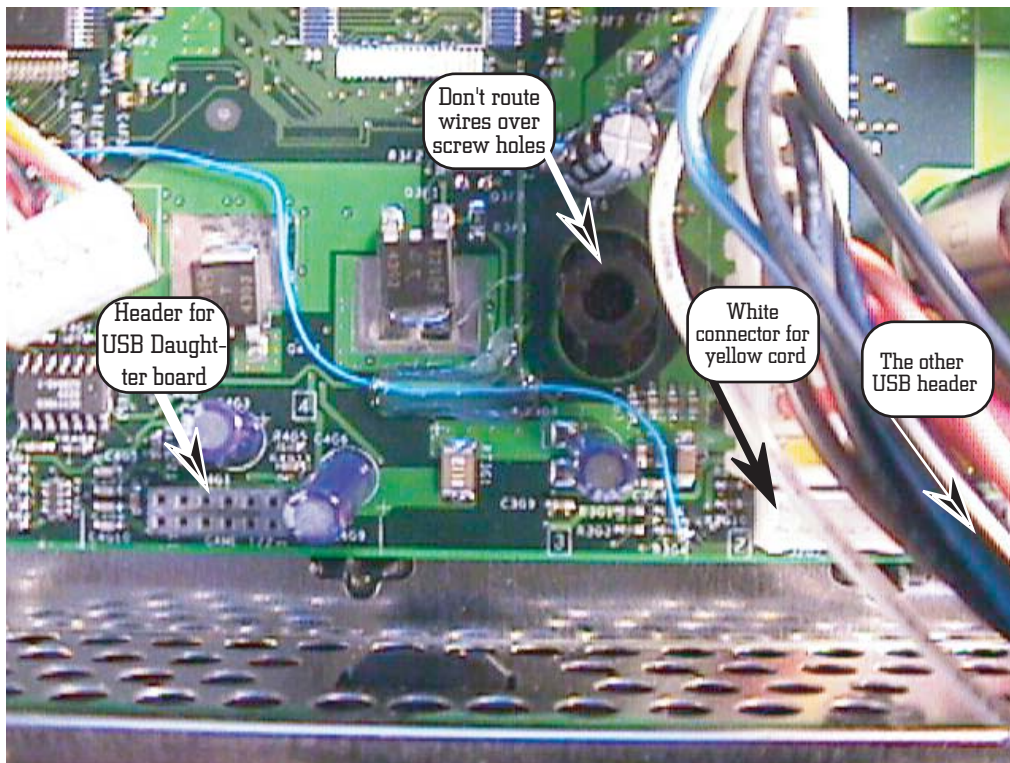
Figure 4.2
View of the wire routing and points for consideration when wireing up the EJ point.
Views is looking down with the front of the xbox at the bottom of the illsustration.
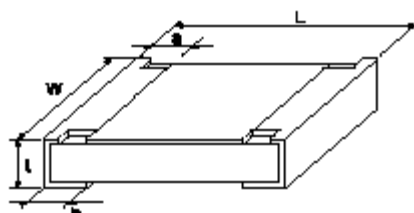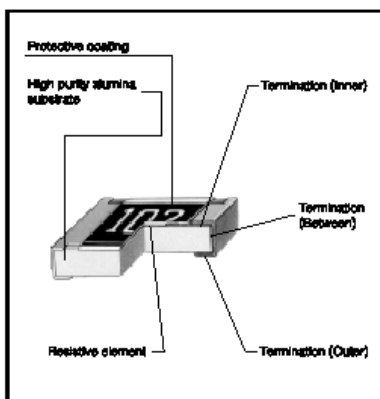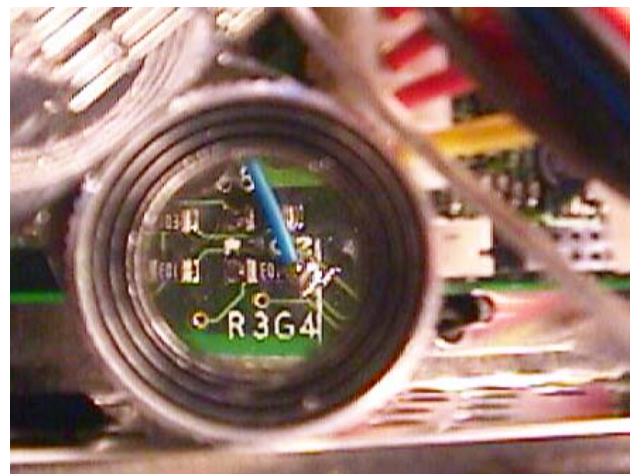

Figure 4.3
A typical cross section and tech drawing of a surface mounted resistor. Note the illustration depicts the ends of the resistor that are wrapped in metal much like a cover wraps a book. This is the area that is safe to solder to and it includes a bit on top and the entire sides.

Here is my technique for attaching a wire onto the end of the surface mount resistor. I tin my iron well and flood the tip with solder , again the flooding is done to prevent dripping any solder and you use 1/2 the amount that could possible cause drip off anyway. As the solder balls up on the tip of the iron note where the solder puddle lays and briskly smear the solder puddle on the irons tip up against the end of the resistor towards the middle to top and smear the solder in a way so that it foorms a spike as illustrated in figure 4.4. The technique discussed before about holding the iron straight up and down comes into play here as you are careful not to smear the solder onto another component nearby or heating a nearby component by mistake til it lifts off it's pads. When you've got the spike smeared (and the photo is a bit exagerated for clarity) you can easily solder a wire to the spike, waiting for it to go molten at the tip of the spike then pushing the exposed bit of wire in. Hold it vrey steady and after 20 seconds give it a slight tug to make sure it's firmly attached. Hot glue the wire as shown in figure 4.2 and inspect the entire motherboard for solder balls or splashes or any bits of wire that may have dropped off over the main board. BlowIing with compressed air or holding upside-down and blowing are always good ideas . If your EJ connection looks like figure 4.5 you're done, but remeber that the USB daughterboard sits directly above this connection and if your spike of solder is too high it could possibly short out against the USB board so just take care and realize it's a potential problem. Figure 4.6 illustrates yet another alternative for this proceedure if the above is just too scary for you.
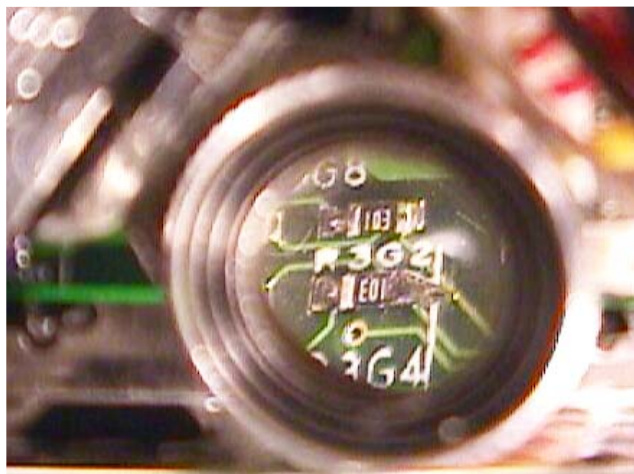
Figure 4.4

Under the magnifier you can see the spike of solder formed from smearing a bit of solder onto it. Never let the iron contact a surface mount component like this for over 1 or 2 seconds. This spike is a bit exagerated for photos sake and the photo has been rotated so the front of the machine appears down.

Figure 4.5

Figure 4.5

Under the magnifier you can see the wire attached and the spike has been melted down. Leave the wire as low as possible because the USB daughter board may be overhead.The small solder below was removed easily with a pick. You can make this connection reliably with less solder, the picture is the maximum you'll ever need. The photo has been rotated so the front of the machine appears down. The resistor directly above this connection is used if you are making CleverMod work via the remote addon (x ir remote) so keep the area clear if possible.

Figure 4.6 (left)
Alternate EJ spot is on pin 2 of the yellow power connector of the switch plate.

Step 5: What should happen and how to proceed

Here is what we've been working so hard for. Now is the time to test the install and note the results. For now you can set the drives aside and unplug the IDE ribbon cable entirely and with the drive un attached you need to power on and see if the chip is working before we begin the reassembly.

How It Works....

We are checking to see if the mod chip bios is present and that's about it. It's okay to power up the xbox without any drives so we can see the splash screen and from that we can tell if our mod chip is working. If the mod chip is working you'll get either a red X logo or the cromwell bios if it's a currently released chip. If you have a red x logo it's bios type is evox d.6 No Ani Red eject fix bios. The cromwell bios will have a version number on the screen.

So the proceedure for testing is secure the drives out of the way, plug in the power and the TV connector and turn the xbox on by pushing the power button in firmly. In a moment the splash screen should appear and you see a red x or cromwell screen and the RED LED will be shining brightly on CleverMod as an indication the mod chip is on. So far so good. Don't pay attention to the errors shown they are from testing without the drives attached. Power down the xbox and power on the xbox by tapping the large eject button firmly. The original MS bios 'flubber' animation should show and if it does you are ready to reassemble everything the mod chip is working in enabled mode and disabled mode. If you get no LED light or the xbox tries to boot once, resets, then boots the normal bios there is a problem with the install and you need to go to the troubleshooting section on the next page.

Step 6: Button it back up

As you can imagine the key here is to secure the modchip so that it's good 'forever' and install the drives back in a manner that is how they were from the factory. Hot glue or tape the chip so that it's secure and insulate it everyway possible. Make sure wires are routed in a manner so that when you re-install the screws that they don't sever any wires and make it clean so in case you need to do more mods on the box later. Keep in mind that there is a way to power the xbox on remotely and you can use clevermods's features easily from the remote and this is the first ever set up as easy to implement as this. Note the solution will work on all installs like an addon. But for now let's button it up and replace the dvd drive, install the yellow cord and ide ribbon. Look how the dvd drive sits it has to be level and flush with the case on all sides and front to back aswell. The legs of the plastic might need to fit in holes near the motherboard and the back right leg has a tab that tends to hook on to the fan plug in port so give it a little shake to free it. Once satisfied tighted the 2 hard to reach screws in the front and place the hard drive tray following the same rules as the dvd tray, flush and lever all the way around with the top of the case and position any legs in their mating holes if the drive isn't sitting level. Re-install the 6 screws that you put aside and retest the console to make sure nothing got pinched or severed during reassembly. It should boot to the mod chips bios when you press the small power on button and boot the MS bios when you power on with the large eject button. Good work, enjoy your modded xbox.

CleverMod Troubleshooting Guide for CleverMod chips *ONLY*

| PROBLEM	Probable Cause	Solution
The Led doesn't light on Clevermod & the Xbox loads MS bios	● No Power to 12c508 chip ● Bad EJ spot connection	✔ Redo connections LPC port pins 2 & 6 for power and ground & EJ - see EJ pin problems below
LED lights on CLeverMod but MS bios boots first try, never loads chip's bios	● DO Wire not connected or faulty ground condition then use of alternate if topside DO is botched. This is called fragging	✔Confirm DO connection is good at motherboard. Link 12c508 pin 5 and 8 to permanately ground DO (to test) If that helps replace link from 5 to 8 with 47 ohm resistor. *
Xbox attempts to power on, LED is on briefly, it resets once then loads MS bios. Frag Condition on clevermod and led is off and only on with the first attempt.	● Bad flash or bad wiring, most likely a bad connection. This is the most common error encountered.	✔Good news is: DO and EJ and LPC pins 2 and 6 are most likely good. This leaves any other connection as the suspect, see the pin numbers on the diagram below and check again.
EJ connection is suspect, mod chip fails to turn the LED on and the chip's bios never loads * *resistor rarely if ever needed for 12c508 pinouts see page 8*	● CleverMod is not reading that the power button is pushed. You can get erratic behavior if this connection isn't good but it's easy to test. Note that CleverMod Doesn't frag 3 times like other chips unless the power button is held in (if EJ connection is working) or the EJ wire is ran to ground (if EJ connection doesn't seem to be working)	✔ If xbox is fragging (rebboting once and loading ms bios) then press and hold power on button in and see if machine reboots 3 times then flashes red and green, if this happens EJ is good. ✔ Ground out EJ from CleverMod to ground, power on, LED should light and maybe load the chips bios but you know the connection wasn't working if grounding out helps.

KEEP IN MIND ALL CLEVERMODS ARE FLASHED AND TESTED BEFORE SHIPPING IN AN XBOX

Figure 4.7
LPC Pins by Functions   LPC pins by Number

Pin	Name	Comment	Pin	Name	Comment
1	LCLK	33 MHz clock	2	VSS	Current return
3	LFRAME#	Start, end of LPC transactions	4	KEYWAY	Blank for polarizing
5	LRST#	LPC Reset	6	VCC5	+5V power
7	LAD3#	Muxed Address/Data	8	LAD2#	Muxed Address/Data
9	VCC3	+3.3V power	10	LAD1#	Muxed Address/Data
11	LAD0#	Muxed Address/Data	12	VSS	Current return
13	SCL	I2C serial clock	14	SDA	I2C serial data
15	VCC3	+3.3V power (was SPDA1 in Intel spec.)	16	SPDA0	Address select for serial EEPROM device (?).
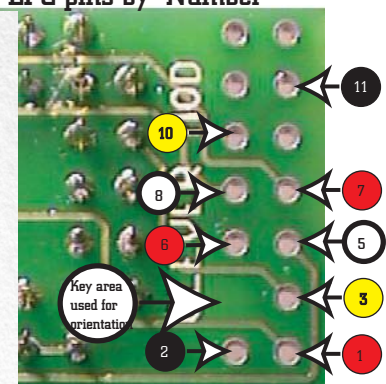
Dealing with 1.3 and Newer Machines

How It Works....

We are adding this update rather quickly but it's been possible to use any mod on any xbox since the discovery of the missing signal that was located on pin #3 of the LPC port. Since versions above 1.3 no longer supply the Lframe signal to the LPC you must wire these newer machines differently

Refering to figure 4.7 on page 19 you can easily locate pin #3 and where Lframe was for the older machines. Well Lframe still exists on an internal via on the Nvidia MCPX chip that is located ajacent to the LPC port with the silkscreen designation U6E1. The chip is easily recognizable because of the way it sits on a small board the has no pins and takes up nearly the entire coordinate 6E. Inspecting the MCPX chip closely you'll barely detect the vias that surround the chip on the small board the chip sits on. Using figures 4.8 and 4.9 below you can identify the the exact via that has the Lframe signal.
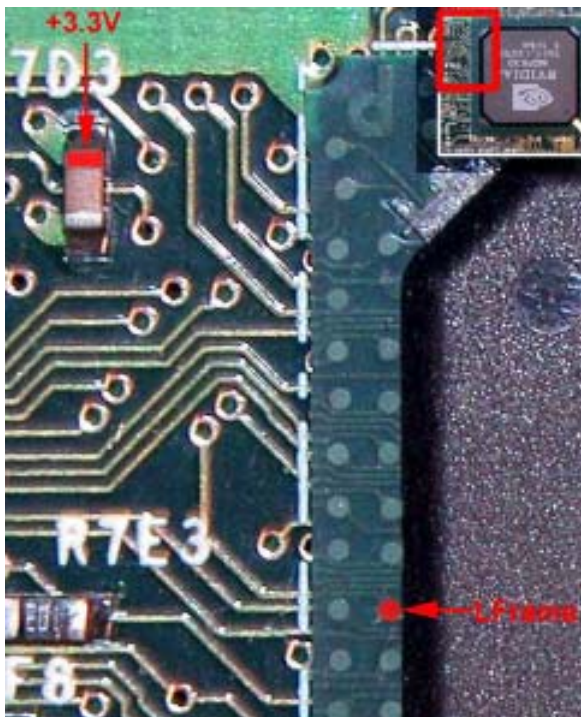

Figure 4.9
Replacing Lframe to version 1.3 and highewr machines is a matter of connecting the internal via on the MCPX chip to pin #3 of CleverMod (Yellow Wire on Pre-Wires) and this is reliable for all xboxes missing the signal on the LPC port.

Figure 4.8
This close up of the MCPX chip shows the exact via for Lframe very clearly. Ignore capacitor marked 3.3v, it's not used for CleverMod. The internal via sits very close to the chip and is covered with a green conformal solder mask. By carefully scraping the material off with a hard non metal (prefered) object like a fiberglass pen or toothpick you must expose the via and prep it for soldering with some flux or clean it up and use a conductive pen since the via is very small. I've had success with both methods but prefer the speed of the conductive pen for this one. On version 1.5 machines 5v and Ground is removed from the LPC port and you need to wire those seperate aswell. A clean source for 5v is the + side of capacitor C3G4. A good place for ground is the screw hole in coordinates 7C above the LPC port or the - side of capacitor C3G4. There is a myrid of alternatives here!
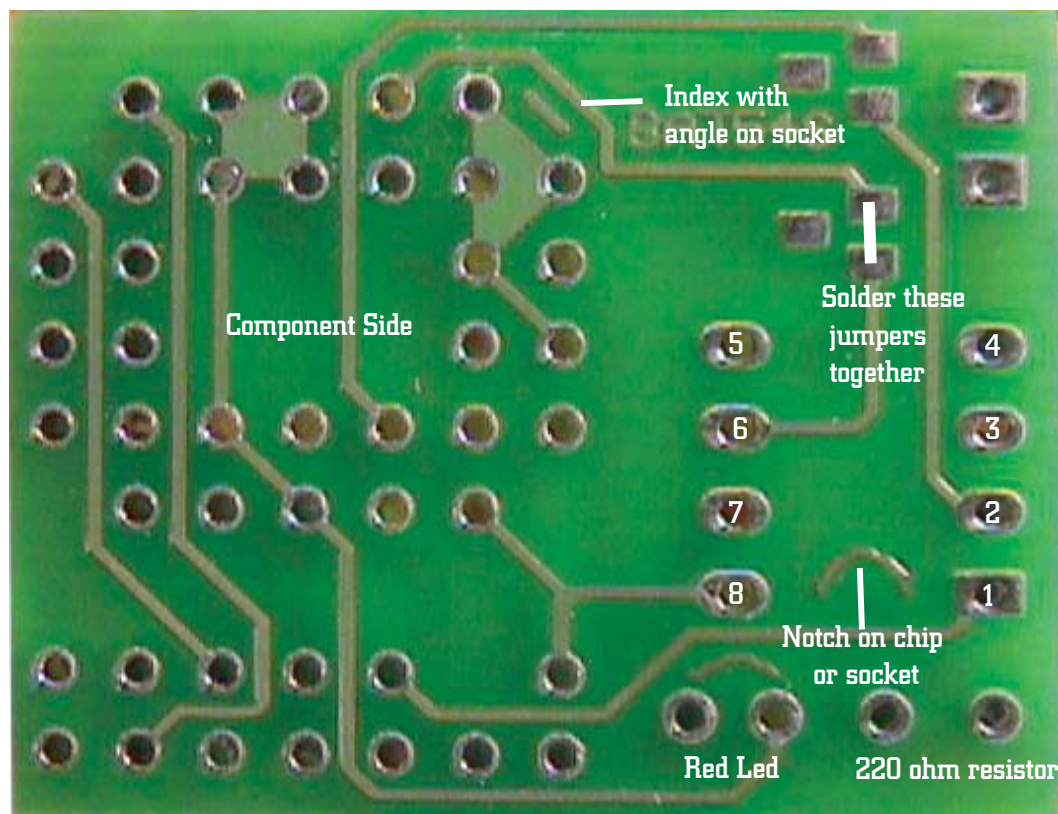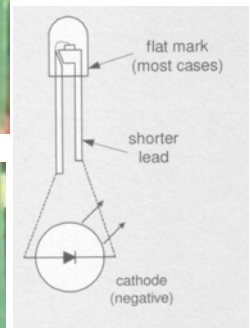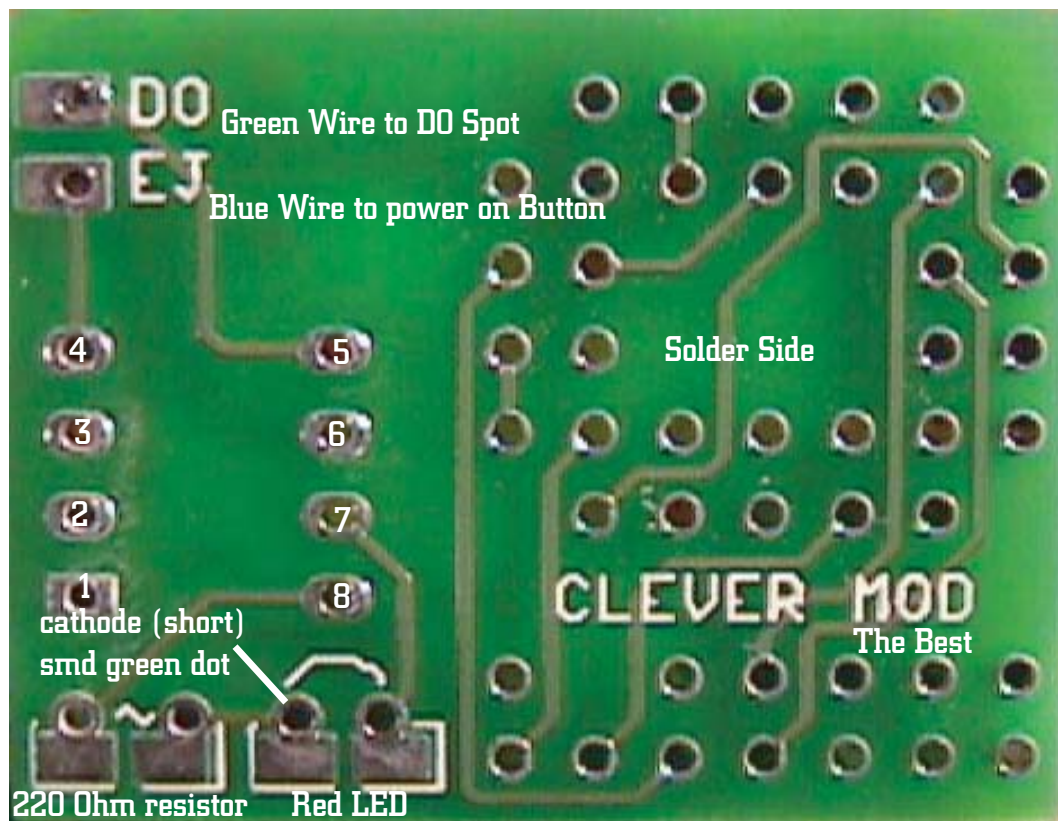
Figure 5.0
This large picture of the MCPX chip shows the vias and traces found nearby the correct Lframe via outlined in red. Note that this picture is for reference and it is not required or desirable to expose this much of the actual board.

DO Green Wire to DO Spot

EJ Blue Wire to power on Button

4　　5　　Solder Side

3　　6

2　　7

1　　8　　CLEVER MOD

cathode (short)　　　　The Best

smd green dot

220 Ohm resistor　Red LED

flat mark (most cases)

shorter lead

cathode (negative)

Index with angle on socket

Component Side

Solder these jumpers together

5　　4

6　　3

7　　2

8　　1

Notch on chip or socket

Red Led　220 ohm resistor

Figure 5.1

The bare boards are pictured here and the notes in white are helpful. The flash will operaste more reliably if you always solder wire between the jumper pads related to the flash protection circuit. In testing and in practice we've found this to really help. Otherwise it's self explanetory.