

00307eb0-0

COLLABORATORS

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WRITTEN BY		November 24, 2024	

REVISION HISTORY

NUMBER	DATE	DESCRIPTION	NAME

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Chapter 1

00307eb0-0

1.1 Main

More Amiga Projects

Issue #1 Apr95

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~ Atari TrackBall Hacks

~ Microsoft Ergo Keyboards

~ Extrenal A1200 Keyboards

~ A500 Fan Hack

~ Sega Joypad Hack

~ HardWare Copier

~ ParNet Adapter

~ External Floppy Interface

~ Credits

1.2 Atari-Intro

Atari Trackball to Amiga Conversion

By John H. Lee
(jhlee@hac2arpa.hc.com)

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This file documents how to convert Atari model CX22 and CX80 trackballs (originally manufactured for the Atari Video Computer System(TM) and Atari home computers) for use on Commodore Amiga computers.

I've encountered at least two different Atari trackballs: the model CX22 and model CX80. The model CX22 has a beige trackball and two round buttons. The model CX80 has a black trackball and two triangular buttons. The CX22 appears to be the original model while the CX80 is the newer cost-reduced model. They are functionally identical with somewhat similar circuit designs. Their construction differs considerably, but both can be converted into Amiga trackballs while preserving their switchable trackball and joystick modes.

1.3 CX22

Atari CX22 Trackball Conversion (Round Buttons & Beige Trackball)

Theory of Conversion:

The CX22 trackball generates quadrature signals from vertical and horizontal optical interrupters just like an Amiga mouse. A LM339C quad op-amp IC is used as a quad comparator to clean up the signals from the optical pickups. A 4538 (dual D-flip-flop) and a 4011 (quad 2-input NAND) IC take the quadrature signals and generate four direction signals: left, right, up, and down. The four direction signals, the vertical pulse signal, and horizontal pulse signals are fed into a 4019 (quad AND/OR selector) IC that selects between the joystick signals and the Atari mouse velocity & direction signals.

The conversion works by replacing the Atari mouse signals at the 4019 selector IC with the quadrature signals from the comparator.

The Atari joystick signals are the same as the Amiga's. If desired, the right trackball button is separated from the left button and turned into Mouse Button 3 (the right mouse button). Some games also recognize it as a second joystick button.

~ Parts

~ Tools

~ The Hack

1.4 CX80

Atari CX80 Trackball Conversion (Triangular Buttons & Black Trackball)

Theory of Conversion:

The CX80 trackball generates quadrature signals from vertical and horizontal optical interrupters just like the Amiga mouse. Two-thirds of 40106 (hex Schmitt-trigger inverter) IC is used as a quad comparator to clean up the signals from the optical sensors. A 4098 (dual precision retriggerable monostable multivibrator), 4013 (dual D-flip-flop), and remaining one-third of the 40106 IC take the quadrature signals and generate four direction signals, left, right, up, and down. The four direction signals, the vertical pulse, and horizontal pulse signals are fed into a 4019 (quad AND/OR selector) IC that selects between the joystick signals and the Atari mouse velocity & direction signals.

The conversion works by replacing the Atari mouse signals at the 4019 selector IC with the quadrature signals from the 40106 hex inverter. The Atari joystick signals are the same as the Amiga's. If desired, the right trackball button is separated from the left button and turned into Mouse Button 3 (the right mouse button). Some games also recognize it as a second joystick button.

~ Parts

~ Tools

~ The Hack

1.5 cx22Parts

Parts Needed:

9-pin cable with female DB9 onnector (if a right-mouse button is desired)
 Parts to connect the 9-pin cable (heatshrink tubing for insulating
 splices or 6 crimp terminals for a .100"-center Molex-type housing)
 Hookup wire

1.6 cx22tools

Tools Needed:

#2 Phillips screwdriver
 Anti-static wriststrap
 IC puller
 Needle nose pliers
 Ohmmeter
 Soldering iron
 Solder

1.7 cx22hack

1. Remove the four screws from the corners on the underside of the case..
 Carefully pry apart the two halves of the shell, which are held together
 by two pressure-fit posts. They might be tight, so be patient. You
 might want to try pushing on the post with a screwdriver through what
 look like two screw holes inthe bottom shell. Be careful not to drop
 the freed trackball on your foot.
3. Remove the two interrupter shafts and bearings.
4. Remove the two screws that hold down the printed circuit board and
 carefully disengage the plastic hook that hold down the corner.
5. Lift up the PCB and unplug the cable connector J1.
6. Remove the PCB from the shell.
7. Take anti-static precautions and locate the 16-pin IC marked "A5" on
 the PCB (a 4019) on the left side of the PCB. Carefully remove IC 5
 from its socket, noting the orientation of the IC (look for the dot
 at pin 1 or the notch at one end.)
8. Carefully straighten pins 1, 3, 5, and 7 so that they stick straight
 out to the side of the IC.

Dual In-Line Package IC Pin umbering
 (looking from COMPONENT side at a 16-pin IC):

```

-----
Dot---\  v-----Notch
      +-U-+
      1 |o  | 16
      2 |   | 15
  
```

```

      3|   | 14
      4 |   | 13
      5 |   | 12
      6 |   | 11
      7 |   | 10
      8 |   | 9
      +---+

```

9. Reinsert IC A5 into its socket, making sure it's oriented correctly.
- . Solder the following jumper wires directly to IC A5 from the test points marked "TPx" placed along the bottom of the PCB. Be careful to avoid overheating the IC.

IC A5 Pin	Test Point	Which Is Connected To (for reference)
1	TP3	IC A1 pin 13
3	TP2	IC A1 pin 1
5	TP4	IC A1 pin 14
7	TP1	IC A1 pin 2

11. Unfortunately, the original cable does not connect pin 9, so it cannot support a right mouse button. If you don't want the right mouse button, you can leave the original cable and skip to step 16.
12. Repace the original cable with the new 9-pin cable. Connect the following pins from the female DB9 cable to connector J1. I reused the J1 connector shell from the original cable and installed new crimp-on terminals purchased from an electronicsstore. You may find it easier to cut the wires, leaving about 2" to splice the connector onto the new cable (don't cut the black ground wire to the buttons!) I highly recommend heat-shrink tubing to seal the splices; electrical tape *will come apart, permitting shorts to occur.

DB9 Pin	J1 Pin	Used For
1	4	Mouse Vertical / Forward
2	3	Mouse Horizontal / Back
3	6	Vertical Quadrature / Left
4	5	Horiz. Quadrature / Right
5	(not connected)	Mouse Button 2 (Middle) / Horiz. Pot
6	(Left Button)	Mouse Button 1 (Left) / ire
7	2	+5
8	1	Ground
9	(Right Button)	Mouse Button 3 (Right) / Vertical Pot

DB9 Pin Numbering (looking at the end of the female DB9):

```

+-----+
| 5 4 3 2 1 |
 \         /
 \9 8 7 6/
+-----+

```

13. Cut the red wire that runs between the two buttons. Cut it as close as possible to the connector at the left button.

14. Splice the left button red wire to the DB9 pin 6.
15. Splice the right button red wire to the DB9 pin 9.
16. At this point, all wiring has been completed. Double check your work and make sure there are no shorts.
17. Plug connector J1 back onto the PB.
18. Snap the PCB back into the bottom shell, but do not install the screws yet. Replace the two interrupter shafts and bearings, and place the trackball on the shafts.
19. Test the trackball while it's still disassembled. Set the mode select switch on the trackball to "Trackball" and plug the trackball into the mouse port of your Amiga.
20. Turn your Amiga on and verify that the mouse cursor moves and the buttons work as expected.
21. Run your favorite joystick game, move the trackball to the second mouse port if needed, switch the trackball to joystick mode, and verify that the trackball now acts like a joystick.
22. Turn your Amiga off and unplug the trackball.
23. Install the two screws that hold down the PCB. Make sure that the interrupters spin without touching the optical sensors.
24. Reassemble the shell and install the four screws in the corners.
25. Enjoy your new trackball!

1.8 cx80parts

Parts Needed:

- 9-pin cable with female DB9 connector (if a right-mouse button is desired)
- Heatshrink tubing (for insulating splices)
- Hookup wire

1.9 cx80tools

Tools Needed:

- Anti-static wristtrap
 - #1 Phillips screwdriver
 - Needle-nose pliers
 - Soldering iron
 - Solder
 - X-acto knife
-

1.10 cx80hack

1. Peel off the four stick-on rubber feet on the underside of the case.
2. Remove the four screws hidden by the feet.
3. Open the shell. Be careful not to drop the loose trackball on your foot.
4. Take anti-static precautions. The main printed circuit board is attached to two small circuit boards by ribbon cable. These small PCBs hold the optical sensors for the vertical and horizontal interrupters. They are slid into place and held by friction. Carefully pry up and loosen them.
5. Carefully lift the PCB assembly from the bottom shell. Do not disconnect the cable yet.
6. There are four IC's on the PB. Looking at the component side of the PCB with the connectors to the cable at top, locate the 4019 (16 pin) and 4013 (14 pin) IC's on the right side of the PCB.
7. Turn the PCB over and on the solder side locate the solder pads for the 403 and 4019 IC's.
8. Using a sharp Xacto knife, cut the traces to the 4019 IC at pins 4, 6, and 15. Be sure to cut only the traces to those pins. Pin 1 is marked with a small "1". Remember that the left and right sides are reversed when you're looking at the solder side. My favorite technique is to make two cuts close to each other and then lift (or scrape) the copper sliver between the cuts away from the PCB.

Dual In-Line Package IC Pin Numbering
(looking from COMPONENT side at a 16-pin IC):

```

-----
Dot---\  v-----Notch
      +-U-+
      1 |o  | 16
      2 |   | 15
      3 |   | 14
      4 |   |13
      5 |   | 12
      6 |   | 11
      7 |   | 10
      8 |   |  9
      +---+

```

9. Verify with a ohmmeter that the traces have been cut.
10. Solder the following jumpers from the pads of the 4013 IC to the pads of the 4019 IC. Use short pieces of hookup wire; 30-gauge wire-wrap wire works pretty well. Be careful not to overheat the IC's.

4013 IC Pin	4019 IC Pin
-----	-----
3	6
9	15

11

4

11. Unfortunately, the original cable does not connect pin 9, so it cannot support a right mouse button. If you don't want the right mouse button, you can leave the original cable and skip to step 15.
12. Locate the contact area for the right button on the PCB. There is a trace that goes to the "BLUE" connector via a solder pad for a jumper to the left button. Cut this trace between the right button contact area and the first solder pad, near the solder pad. The wire to pin 9 of the DB9 cable will be soldered directly to the trace leading to the contact area.
13. Replace the original cable with the new 9-pin cable. Connect the following pins from the female DB9 cable to the connector pads along the top edge of the PCB. You'll probably want to solder the new cable directly to the pads. Optionally, you can cut off the spade connectors from the original cable and splice them to the new cable. (I couldn't find substitute spade connectors.) I highly recommend heat-shrink tubing to seal the splices; electrical tape *will* come apart, possibly permitting shorts to occur.

DB9 Pin	PCB Pad	Used For
1	Brown	Mouse Vertical/Forward
2	Red	Mouse Horizontal/Back
3	Orange	Vertical Quadrature/Left
4	Yellow	Horiz. Quadrature/Right
5	(not connected)	Mouse Button 2 (Middle)/Horiz. Pot
6	Blue	Mouse Button 1 (Left)/Fire
7	Purple	+5
8	Gray	Ground
9	(Right Button)	Mouse Button 3 (Right)/Vertical Pot

DB9 Pin Numbering (looking at the end the female DB9):

```

+-----+
| 5 4 3 2 1 |
 \         /
 \ 9 8 7 6 /
+-----+

```

14. Scrape the oxidation off the trace to the right button and solder the wire to the DB9 pin 9 directly to the PCB trace leading to the right button.
15. At this point, all wiring has been completed. Double check your work and make sure there are no shorts.
16. Reinsert the optical sensor PCB's back into their slots. Make sure they're fully inserted and that the interrupters spin without touching the optical sensors.
17. Position the PC back into the bottom shell and place the trackball on the interrupter shafts.

18. Fit the top shell back on and install only two screws, in diagonally opposite corners.
19. Test the trackball while it's still partially disassembled. Set the mode select switch on the trackball to "TB" and plug the trackball into the mouse port of your Amiga.
20. Turn your Amiga on and verify that the mouse cursor moves and the buttons work as expected.
21. Run your favorite joystick game, move the trackball to the second mouse port if needed, switch the trackball to "JS" mode, and verify that that trackball now acts like a joystick.
22. Turn your Amiga off and unplug the trackball.
23. Install the remaining two screws into the shell.
24. Stick the four rubber feet back over the screw holes.
25. Enjoy your new trackball!

1.11 MicrosoftKB

- Area: Amiga Tech

```
Attr: Read                      Date: 01 Apr 95
17:48:00
From: Dale Currie
To: Randolph Murdock Iii        Mark:
Subj: Re: Microsoft Ergo keyboard
```

-- In a message dated 30 Mar 95 15:52:53, Randolph Murdock Iii wrote:

```
RMI> Does anyone know whether you can hook up a Microsoft ergonomic
RMI> keyboard to an A3000?
```

You can purchase an IBM PC-AT keyboard adapter from Dana_Peters@Mitel.COM, which especially supports the Microsoft Natural keyboard. Contact him for more details. It allows screen-swapping via a single key, uses the "Windows" keys on the MS keyboard, allows the numeric keypad to become your mouse, etc. Works great for the Amiga and for NetBSD.

1.12 A1200KB

```
New KeyBoard Hack
-----
By: JON GUIDRY
```

Here's some info about putting an external keyboard on an A1200.. USE AT YOUR

OWN RISK!... I haven't tried it yet. :)

-Jon

I've noticed a number of people asking about putting an external keyboard on their 1200's. Unfortunately, the only replies they got said it couldn't be done, or that it would be very difficult. Neither of these is true. Electronically, the keyboard interface is pretty much the same as it always has been. The only real obstacles are physical; Thus I decided to make an attempt, and recently managed to pull it off. What follows is an account of what I did along with a few suggestions. Be sure to read it through all the way before breaking out the tools...

It's been working well so far (I'm typing this on my good old A1000 keyboard hooked up to my 1200 right now.) The result is that I can have both an internal and external keyboard hooked up simultaneously without interference. In fact, they complement one another. You can actually press shift on one keyboard and 's' on the other and get a capital 'S'! Those old 6570 keyboard controllers are quite robust, seemingly in contrast to the on board one in the 1200.

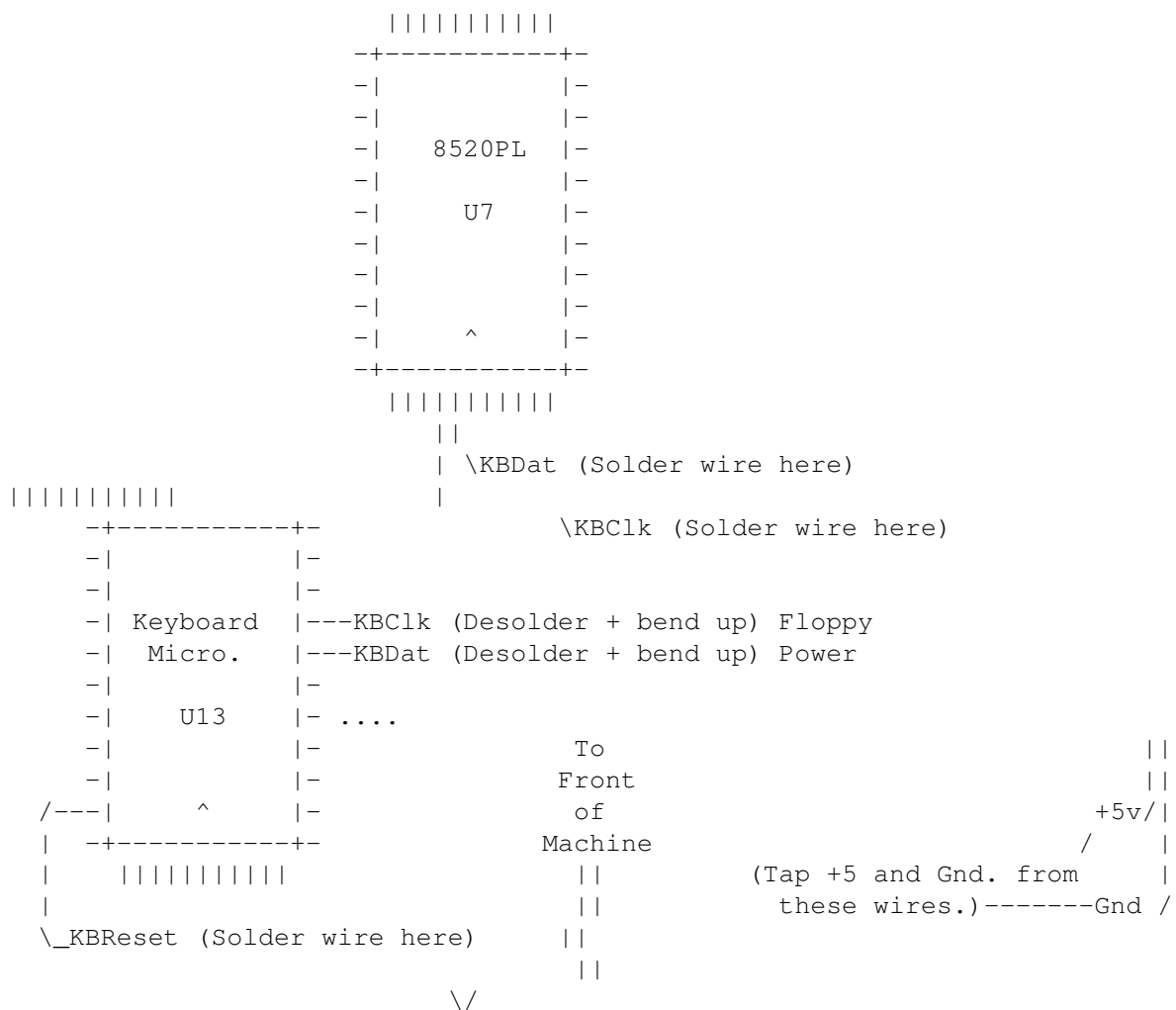
Needless to say, doing this modification required some very delicate work. The internal keyboard micro has to be physically taken off-line in order to connect an external keyboard or keyboards. This isn't like the 500 where all you had to do to hook up an external was to patch into the KCLK and KDAT lines, tap +5 and Ground from somewhere and you were done. The 6570's took care of all the handshaking automatically. Unfortunately, the 1200's keyboard micro doesn't work that way. Hooking up another keyboard in parallel with it's clock + data lines just hangs both of them. (My guess is that the output isn't open-collector like it is on the externals, (there's no reason for it to be) so when you have an external hooked up, the internal can't drive its 0's low enough.) Anyway, I just decided to do away with the internal controller altogether.

Um...let me just say this... I'm not really writing this post in the form of a full blown hardware hack. This is more of a "Here's what I did. If you'd like to give it a shot, here's what you need to know." sort of thing. I'm not going to go into disassembly instructions or anything like that. I will make the standard disclaimer, though: If you try this and you blow up your machine, don't come crying to me. There are some quite tiny spots that have to be soldered and/or desoldered, so patience, a steady hand, and a reasonably sharp soldering iron are a definite necessity. If there's enough support for turning this into a full article I'll throw something together. (My brother suggested submitting it to AC, but it may be a bit hardcore for them. Schematically, it's quite simple, but the tiny joints do make it a little more difficult. Maybe Aminet...

Okay, with that out of the way here are the gooey details. The two chips we'll be dealing with are U13 (The keyboard micro) and U7 (The keyboard/parallel 8520). Try to keep your soldering iron and any other potentially destructive tools away from the other chips. ;^) The KBClk and KBDat pins on the keyboard micro need to be heated and bent up away from the motherboard. I touched the top of the pin with the iron, let it heat for a second and then, with a razor-knife wedged behind the pin, twisted, lifting the pin away from the board. There's not much solder holding these down, so it shouldn't take too much force. Once the pin was free, I straight ened it up with a pair of needle-nose pliers and went on to the next one. Fortunately,

both pins are right next to each other and the keyboard micro (and the 8520) are surface-mounted PLCC's and not true SMD's. These are the only two pins that need to be desoldered. The rest of this hack just involves soldering wires in. ***NOTE: I've heard from at least two people that their internal micros did not need to be taken offline for the external to work. All I know is that on mine it had to be disconnected. Your Mileage May Vary, however, so you may want to try skipping this step, do the rest, and see if it works.***

Get your hands on the smallest insulated wire you can find (>24 awg), and solder wires to the KBClk, KBdat and _KBReset lines as shown in the diagram below. The number of pins on the chips should be accurate. they are 44 pin PLCC's, with 11 pins on each side. The ^ denotes the pin 1 dot on the chips.



As you can see, power is easily tapped from the floppy cable. You should use somewhat larger wires for this. Thus, when you're done you should have five wires coming out of your machine: KBClk, KBDat, _KBReset, +5, and Gnd. You will also have a non-functional internal key board. If you want, however, you can take these wires (except _KBReset) and hook them up to a 5 pin DIN and

attach a 2000/3000 keyboard, or a phone plug and connect a 1000 keyboard. There is a catch, however. You will not be able to reset from the external keyboard. 1000s, 2000s, 3000s, and 4000s have internal circuitry which interprets 500 milliseconds of KBClk low as a "reset" pulse, and pulls the _KBReset line internally (This is according to the Hardware Manual). So unless you fabricate a circuit that does this (see below), you'll need to reset from the native keyboard. (This function should still work. Actually, If you're going to do it this way, there's no need to solder the extra wire for _KBReset.)

Now, the A500 keyboard is slightly different. It has no case but it will generate a _KBReset signal. Remember how I said you could have two kbd's simultaneously? Well, all you have to do is hook up your external as described above, and string your wires along (Including _KBReset) to the 500 keyboard. What's more, the 500 keyboard is a near-exact fit replacement for the 1200 one (and with full sized Left-Shift and Return keys!). In order to do this I had to desolder the LEDs on the 500 kbd altogether and then remove the ones from the 1200's "LED board", hot glue them individually to their positions, bend the leads down flat, and wire them up again. Also, the support on the top part of the wedge-shaped floppy bracket has to be sawed off to make room for the encoder board. It works, though, and theoretically I should even be able to fit the RF shield back on.

Okay, so you may not like the beige-colored keys of the 500 keyboard sticking out of your shiny white 1200 case. The simple solution is to swap the 500 keyboard's beige keycaps for your defunct 1200 keyboard's white ones. They should be the same in every respect except color. There is, however, another alternative. Your original 1200 keyboard may be compatible with the 500

keyboard's encoder board. Encoder boards that are compatible have a slot for one large ribbon cable to fit in. Incompatible encoder boards have slots for two small ribbon cables. If compatible, all you have to do is unplug the ribbon from the 500 keyboard itself, unscrew the little circuit board in the upper-right corner (the encoder board) and remove it along with its plastic bottom-shield. You can then plug the ribbon from your 1200 kbd into the socket, and wire the encoder board up as you would with the true 500 keyboard. This is the setup I had originally. Now, since the ribbon comes out of the middle-back of the 1200 keyboard, you have to put the controller board in that same vicinity. It's up to you how to mount it, but what I did was to first off trash the RF shield. (REAL hackers don't need no steenkin' RF shield 8^) Then I hot-glued the plastic shield to the bottom of the encoder board, and hot-glued this by the lower left corner to the top of the hard drive. The other end rests on the floppy cable, and tension from the keyboard ribbon folded under the keyboard keeps the whole thing steady.

Here's a quick recap:

- Desolder the clock and data pins coming from the onboard A1200 keyboard microcontroller. (This is probably the hardest part of this whole thing.)

- Solder the KBClk, KBDat, _KBReset, +5, and Gnd. lines to the locations described in the diagram. (A magnifier lamp is useful for this.)

- Hook the KBDat, KBClk, +5, and Gnd. lines up to some sort of external keyboard connector, and use the dead internal to reset, OR

Hook the KBDat, KBCLK, +5, and Gnd. lines up to some sort of external keyboard connector and run the wires along to their corresponding locations on a 500 keyboard INCLUDING _KBReset, OR

Hook the KBDat, KBCLK, +5, and Gnd. lines up to some sort of external keyboard connector and run the wires along to their corresponding locations on a 500 keyboard's encoder board INCLUDING _KBReset and then plug your 1200 keyboard's ribbon cable into the encoder board.

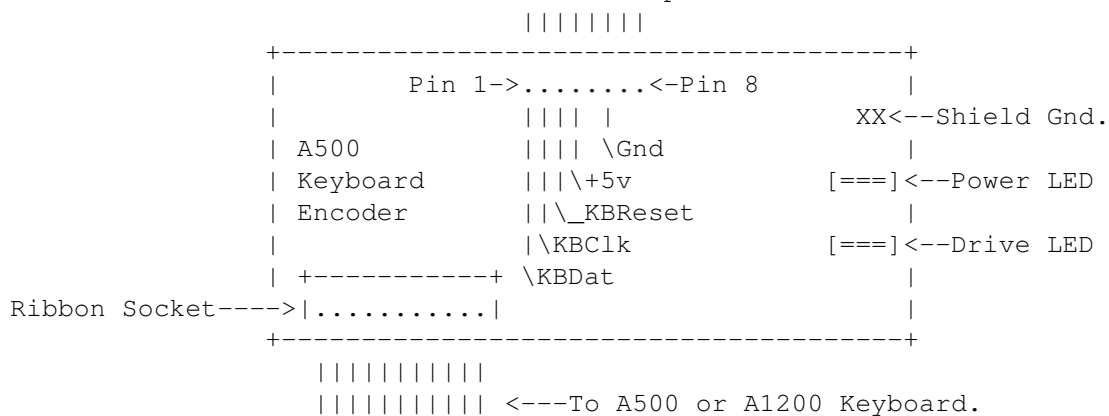
-Seal up, fasten down, make sure there are no solder bridges, shorts, etc.

-Power up and enjoy! -----

Below are the pinouts for various types of Amiga keyboards.

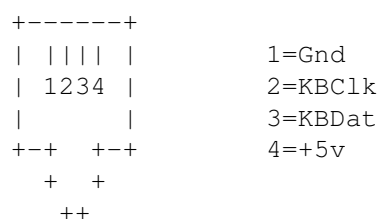
A500:

Ribbon out (usually rainbow)
Black=1...Purple=8



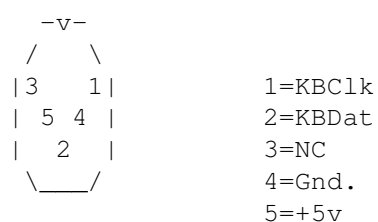
A1000: (Connector on back of keyboard itself)

(Female)



A2000/3000: (This is from the Hardware book. Not firsthand information.)

(Female)



That's pretty much it. As I said, this isn't a full tutorial, so I'm leaving the mechanical considerations up to the reader. If you have any other suggestions for improvement let me know, or feel free to add them in yourself. Start a credits list if you so desire.

Some final thoughts:

- I wouldn't worry too much about power supply overloading. I've got 2 floppys, 2 keyboards, a hard drive, a DataFlyer SCSI+ SCSI controller, and a MicroBotics 50Mhz 1230XA with '881 and 8 megs and my stock supply hasn't complained yet.
- You could also use a DPDT switch to switch between internal and external keyboards. One side goes to KBCLK and KBData on the internal micro, the other side goes to the same lines from the external, and the middle goes to the pins on the 8520. The keyboards should be able to deal with being switched in or out in midstream. (I have not actually tried this one, but don't see why it wouldn't work, as it's effectively the same thing as unplugging one keyboard and plugging in another one.) The Hardware Manual says the keyboards were designed to handle hot connects/disconnects.
- No, IBM keyboards are electrically totally different. You would need a microprocessor driven interface to make the translation. There is a (fairly involved) hack on Aminet in /hard/hack to do this.
- If you hook everything up and get a pulsing stream of ''', you've got the clock and data lines backwards. Switch them around.
- If you're installing your 1200 in a tower and your tower has a Reset button on it, you can hook the _KBReset line and Ground up to the button and reset that way.
- As a couple people have asked, I don't have A1200 schematics. The data herein is the result of some poking around with a logic probe, a little deductive reasoning, some extrapolation from the A500 schematics, and a lot of trial and error. However, if someone out there HAS A1200 schematics, I'll gladly reimburse you for your time at a photocopier! 8^)
Enjoy... ...Sean Curtin. (smc8516@ultb.isc.rit.edu)
^^New address!

The following is an optional modification to the above hack which allows the ability to reset the computer from the external keyboard, posted by Dana Peters. It looks good, although as of this time I have not yet tried it myself.

16152.3.26294.1 A1200 external keyboard reset hack 7/5/94 06:16 89/4737
ai745@FreeNet.Carleton.CA (Dana Peters) Lines 1 to 89 of 89 (100%) -----

Got an A1200? What do you think of the keyboard? If you're a touch typist you probably figured out pretty fast that the A1200 keyboard has a problem with rollover. Try rolling over between two keys on the same row, and you're just as likely to get them in the reverse order as the forward order. Commodore botched this one, IMHO.

Anyway, I decided to try to "fix" my machine, and found two different hacks to put another model Amiga keyboard on the A1200; one by Hans Luijten (j.a.w.m.luijten@kub.nl) and another by Sean Curtin (squirrel@cup.portal.com). Using the info from these plans I decided to add a connector to my A1200 for an A2000/3000 keyboard. Although the plans called for two pins to be cut or desoldered to disable the internal keyboard, on my machine I tried leaving the connections intact, and found that both the internal and external keyboards were able to co-exist without problems. Your mileage may vary, however.

The other change I made to the plans was to create a circuit to allow the external keyboard to reset the A1200 the way god intended... with the three finger salute. This avoids having to use the internal keyboard to reset or having to wire up a separate button to perform reset. KReset.iff is an IFF picture of the external keyboard reset circuit.

... On a clear disk you can seek forever

--- Spot 1.3a Unregistered

* Origin: CALL Network Affiliate * St. Meinrad, IN * (1:3803/11.1701)

1.13 a500Fan

A500 Fan Project

BY: Wizard

WARNING: This project could damage your Amiga if done improperly. Use at your own risk!

If your A500 has the old heavy 35w power supply instead of the newer and lighter 60w one, I wouldn't even bother with this project. The A500 power supply can barely supply enough juice for the computer and an external floppy drive let alone anything else. I would hope that you have already added a BigFoot or made one from a PC power supply.

NOTE: Before starting ensure you have discharged any static electricity by touching a well grounded surface or by wearing a wrist strap.

1. Unplug all cables, and using a Torx-10 screwdriver remove the cover from your A500. After removing the cover, take off the keyboard & the RF Shield.
2. It is best to hook the fan to the power connector and not the motherboard itself. There are four metal posts sticking out of the back of the connector. The top two will be the ones used in this project. The top

left is the +12V source and the top right is the ground.

3. Cut 2, 8 inch pieces of wire. Gauge is not extremely important. Solder a male quick disconnect to one end of each wire.
4. Solder your resistor to the top left post of the power connector.
5. Solder your wires, one to the resistor and the other to the top right post as shown in the wiring~diagram.
6. Solder a female quick disconnect each wire on your fan.
7. Glue the fan, using modeling glue, hot glue gun or something similar to the lid of your A500. Position the fan so it is over the air vents (see fig#2) and that the air will be blow out of your A500. I would place the fan so that it is above your CPU, but the actual position is entirely up to you.
8. Plug the quick disconnects together making sure the black wire from the fan is connected to the top right post and the red wire from the fan is connected to the resistor which is connected to the top left post.
9. Double check all your wiring, then plug in your power supply and turn it on.
10. If the fan came on and worked as advertised. Turn the power off, unplug the power supply and reassemble your A500.

NOTE: For maximum air flow leave your RF shield off when reassembling your A500. If this bothers you, or you're paranoid the FCC will come take away your beloved Amiga. Try drilling a few holes in the shield before reassemble the computer to aid in the air flow.

1.14 Sega

Sega Joypaad Project

By: Wizard

WARNING: This project could cause damage to your Amiga if done incorrectly.
Use at your own risk!

As you may have already figured out, Sega joypads can be used on the Amiga. More and more games, like Deluxe Galaga, Leander ect.. are starting to support the extra buttons. I have been using my sons Sega controller "as-is". But as of lately I have heard rumors this could blow your CIA chips. So I dug through my old Euro mags and came up with this wiring diagram. It swaps pins 5 & 7 from

the Amiga to the Sega. I don't know what these pins represent on the Sega but on the Amiga pin 5 is middle mouse button and pin 7 is +5V. This is what I heard caused the smoking of the CIA chips was the +5V being tied to one of the buttons. If you have WB3.0, the lowlevel.library I believe has the support for the Sega Control Pads. This is according to the docs for Deluxe Galaga. I believe you must have this library installed to use the extra buttons with Deluxe Galaga. As for Leander. I have no Idea.

Wiring~Diagram

1.15 copier

Hardware Disk Copier

By: Wizard

WARNING: If done incorrectly this project could cause damage to your Amiga. Use at your own risk!

This project will show you how to make a basic Hardware Disk Copier. This is very similar to a commercial product released by Cachet Software. There is a PD program that this will work with, but I can't think of it's name off the top of my head, as I was foolish enough to buy the commercial one.

The hardware works by swapping the read/write lines between DF0: and the external disk drive (DF1: or DF2:). Just plug this thing into your external floppy port then plug your disk drive into the adapter, power up your Amiga, run your copy program and you will get a mirror copy of the original.

The only source of 23 pin connectors I know of is a place called I.C. Supply in Honolulu, HI. You'll have to get the phone # from directory assistance, since I tossed all my HI. phone books when I moved back to the mainland.

Wiring~Diagram

1.16 parnet

ParNet Adapter

This project will show you how to make a ParNet Adapter for your Amiga. Use this information at your own risk! It worked on my A2000 & my friends A4000, but I don't guarantee it will work on your setup. For more information download the entire Parnet Archive.

You must first obtain 2 unwired male to female RS-232 type breakout adapters (Radio Shack PN# 276-1403) and a fully wired DB-25 male to male cable. Cable length is usually not a problem as long as it is kept under 15 ft.

~Wiring~Diagram

You should leave pins 1, 14, 15, 16, 17, 23, 24, and 25 unconnected as shown in the wiring diagram. Also, it is very important that you build 2 adapters and NOT just bridge pins 10 & 13 on a single adapter.

1.17 Floppy

Disk Drive Interface

Design By: Moose

Docs by: Wizard

This project will show you how to build a external floppy drive interface for your Amiga. Now you have a use for all those extra internal drives you have laying around. It should work for both 3.5 & 5.25 floppies, although I have only used it for 3.5's. If you use a little imagination and some creative engineering you could make a multidrive interface and put 2 external floppies in one case! Note: if you use this on an A500 and don't get a beefed up power supply don't cry on my shoulder when your machine starts crashing for NO reason. That wimpy little power supply can barely supply enough juice for the A500 itself, let alone a couple of extra floppies.

Use This at your own risk! If this project is not done correctly it will cause severe damage to your Amiga! Like blowing open your 5V lines on your motherboard.

Wiring~Diagram

1.18 credits

Credits

I would like to thank the following people for their contributions to this project.

Ed Dumbill	Author of Heddley. Awsome AmigaGuide Editor.
Chas Wyndham	Author of the freeware pic veiwer P-View.
John Lee	For posting the Atari Trackball info on FidoNet.
John Guidry	For posting the A1200 Keyboard info on FidoNet.
Moose	For Sharing his Top Secret External Floppy interface.
Wizard	For providing most of the Hacks in this project.

If you have some Amiga hardware hacks you would like included in MAP's Issue #2, send them to me at:

E-Mail: wizard@galstar.com

MAP's (More Amiga Projects) is Freeware do what you want with it, But if you make a million bucks off of it you have to split it with me. ;-)
