XTIDE project

From VCWiki

The **XT-IDE** project is a Vintage Computer forum (/web/20110422101403/http://www.vintage-computer.com/vcforum/forum.php) driven project to develop and manufacturer an **8-bit ISA IDE** controller. It allows any PC/XT class machine to use modern IDE hard drives or Compact Flash devices for long term storage.

> The project is entirely open source, from the design, schematic, layout, bill of materials, BIOS, drivers and any utilities created.

XTIDE controller on an IBM XT, running DOS 6.22 resulting in 8.4GB of total storage across multiple 2GB partitions; the maximum allowed with this OS.

This project was inspired by Scott A. Christensen's XTIDE linux project. (/web/20110422101403/http://www.mylinuxisp.com/~jdbaker/oldsite/documents/xtide.txt) Many thanks to Scott for his original design.

This page will provide links to all the resources utilized in the project.

- Technical support thread (/web/20110422101403/http://www.vintage-computer.com/vcforum/showthread.php?19591)
- Main project thread (huge!) (/web/20110422101403/http://www.vintage-computer.com/vcforum/showthread.php?t=12359)
- Index of project thread

Test results can be found here: XTIDE_TestResults

Assembly instructions can be found here: XTIDE_build_instructions

Contents

Downloads

BIOS

Latest version of Aitotat's BIOS (with utilities and source code): XTIDE Universal BIOS (/web/20110422101403/http://code.google.com/p/xtideuniversalbios/)
XT-IDE Universal BIOS discussion (/web/20110422101403/http://www.vintage-computer.com/vcforum/showthread.php?t=17986)

Latest version of Hargle's BIOS: Version 0.11 (/web/20110422101403/http://www.waste.org/~winkles/xtide_011.zip) . Last updated on the 12th of October 2009 (no longer in development).
Utilities for Hargle's BIOS (SetCard, Flasher, Setup and FindCard): XtIdeUtl.zip (/web/20110422101403/http://oldibmpc.sitesled.com/misc/XTIDEUTL.ZIP) . Last updated on the 22th of October 2009.

PCB/Schematic

The XT IDE schematic and PCB layout for KiCAD (/web/20110422101403/http://kicad.sourceforge.net/) may be found on the N8VEM wiki in the XT-IDE (/web/20110422101403/http://n8vem-sbc.pbworks.com/browse/#view=ViewFolder&param=XT-IDE) and KiCAD (/web/20110422101403/http://n8vem-sbc.pbworks.com/browse/#view=ViewFolder&param=KiCAD) folders.

Ian, over at Dangerous Prototypes (/web/20110422101403/http://dangerousprototypes.com/docs/XT_IDE_disk_controller) has taken the XTIDE controller to the next level by using CPLD's instead of 74xx ICs.

Debugging utilities

- HellTest data verification program xt_hell.zip (/web/20110422101403/http://www.waste.org/~winkles/xt_hell.zip) Documentation XTIDE_HellTest - only works on Hargle's earlier BIOS, no eINT13 support in aitotit's BIOS.
- INT 13 Monitor debugger.zip (/web/20110422101403/http://oldibmpc.sitesled.com/misc/Debugger.zip) A monotor program for manually calling most Int 13h function with the registers/buffer set to whatever you'd like
- IDentify Device utility id_dump.zip (/web/20110422101403/http://www.waste.org/~winkles/id_dump.zip) Displays ID data to the screen
- INT 13 Display test int13test.zip (/web/20110422101403/http://www.waste.org/~winkles/int13test.zip) Dumps INT 13 Fn 8 and 48 data to the screen - only works on Hargle's earlier BIOS, no eINT13 support in aitotit's BIOS.

Current status

January 2011
we are sold out again, sorry!
you can still contact jeff at silent dot net to attempt to get in the next batch, although there is no ETA as to when that will happen.
andrew lynch does still have PCBs available, so it's still possible to build one yourself.

~~current prices are:~~
~~$30 each kit~~
~~$5 shipping in the USA, $14 outside~~
~~$15 assembly fee, if you don't want to burn yourself on your soldering iron.~~

Sorry that the rest of this document is a little out of date there's lots to do, and not many people doing them. (hint, this is a wiki!)

Current To Do List

Please use the debug log to track todo items.

PCB Design Revisions

Prototype:

- Original design
- Added a Rom Enabled jumper


PCB Prototype

Revision 1:

These items have been implemented in the new design

- Added a header for an external hard-drive LED
- Added a write protect jumper
- Added an Int Select jumper allowing for it to be set to 2, 3, 4, 5 or 7
- Added a CSEL 3 position jumper.
- Shifted all the components over to make a 1/2" dead area on the left hand side of the card, and added a small skirt. This will allow for attachment of a wide variety of mounting brackets.
- Removed some unused gold teeth on the ISA connector.
- Added Silk screening on the back of the card to outline the dip settings and usage.
- Scale down the IO and ROM Memory range settings to 4 places instead of 8 (16 possibilities each)


Rev 01 PCB

Revision 2

(no timeline for completion)
This revision is still in the briefing stages and this is merely a place to list suggested changes.

- Adding DMA support, or
- Switching to memory mapped IO, which would allow for 16bit data transfers on the system bus.
- Replace the DIP switches with jumpers
- Add power header onto the card for the PS/2 Mod. 25 & 30 folk

Supported hardware

Supported Systems

The card works in just about any PC and compatible system that has an open 8 or 16 bit ISA slot. The card has been tested and is known to work on IBM PC/XT, XT clones and Tandy 1000 series of computers including the HX. There are no known compatibility issues on any reasonably IBM compatible architecture.

PATA Hard Drive Support

Most PATA hard drives work just fine with the card, but there is an occasional odd drive that just doesn't work for some reason. Essentially, if you can't find a drive that works, you aren't trying very hard.
Best results are from 8-10G drives from the 2001 era.
See this chart for known working drives (incomplete!) XTIDE_TestResults It would be really, really nice if you tested a few and added your results here. Compact Flash devices attached with a CF-IDE converter also work, although there seem to be incompatibilities with CF overall.

ATAPI Support

ATAPI/CD-ROM support is in progress. No ETA.

Hardware Settings

SW1 Settings

1234	I/O address	5678	BIOS memory address
1111	200h - 20Fh	1111	C0000 - C1FFF
1110	220h - 22Fh	1110	C4000 - C5FFF
1101	240h - 24Fh	1101	C8000 - C9FFF
1100	260h - 26Fh	1100	CC000 - CDFFF
1011	280h - 28Fh	1011	D0000 - D1FFF **(Default)**
1010	2A0h - 2AFh	1010	D4000 - D5FFF
1001	2C0h - 2CFh	1001	D8000 - D9FFF
1000	2E0h - 2EFh	1000	DC000 - DDFFF
0111	300h - 30Fh **(Default)**, warning: also common default for ethernet cards	0111	E0000 - E1FFF
0110	320h - 32Fh	0110	E4000 - E5FFF
0101	340h - 34Fh	0101	E8000 - E9FFF
0100	360h - 36Fh	0100	EC000 - EDFFF
0011	380h - 38Fh	0011	F0000 - F1FFF
0010	3A0h - 3AFh	0010	F4000 - F5FFF
0001	3C0h - 3CFh	0001	F8000 - F9FFF
0000	3E0h - 3EFh	0000	FC000 - FDFFF
0 Represents an Off position and 1 represents an On position.			
Warning: after changing I/O address range it's necessary to re-flash the BIOS			

JP Settings

JP1	On	**(Default)** Enables the onboard ROM	Off	Disables the onboard ROM
JP2	On	**(Default)** Enables the writing to the ROM	Off	Disables writing to the ROM, not necessary with EEPROMs supporting Software Data Protection, eg. AT28C64B

K1 Settings

L	**(Default)** Sets CSEL to Ground	H	Sets CSEL to VCC

IRQ Select Settings

Not fully implemented in software yet, however a jumper is present for this setting on the board.

Bill of Materials

Current list of parts required for creating your own XT-IDE controller card.
Parts sourced from Jameco Electronics (/web/20110422101403/http://www.jameco.com/webapp/wcs/stores/servlet/StoreCatalogDisplay?storeId=10001&catalogId=10001&langId=-1) . Others, such as Mouser (/web/20110422101403/http://www.mouser.com/) also supply suitable parts.

```
Qty  Jameco #   Item
1               XT-IDE PCB (get this from andrew lynch)
10   25523      CAP,MONO,.1uF,50V,20%
1    1945428    CAP,RADIAL,47uF,35V

2    45129      IC,74HCT688
1    46316      IC,74LS04
1    46607      IC,74LS138
1    47466      IC,74LS32
1    287144     IC,74F245,DIP-20
3    287195     IC,74F573,DIP-20 (part code discontinued, use 282642)
1    74827      Atmel EEPROM IC, 28C64 (get it from mouser, or CALL jameco to verify they will supply atmel, not SEEQ or Samsung eeproms

2    112214     SOCKET,IC,14PIN,DUAL WIPE
6    112248     SOCKET,IC,DUAL WIPE,20PIN
1    112272     SOCKET,IC,DUAL WIPE,28PIN
1    526205     SOCKET,IC,16 PIN,390261-4
3    112432     SOCKET,SHORTNG BLKS,RED,CLSE    (jumpers)

1    690662     RES,CF,150 OHM,1/4 WATT,5%
6    691104     RES,CF,10K OHM,1/4 WATT,5%
2    857080     MOLDED SIP,9PIN,BUSSED,10K,2%

1    333949     LED,GREEN,572NM,T-1 3/4

1    1939562    SWITCH,DIP,SPST,8-POS,16-PIN

1    53604      HEADER,RT MALE,2RW,40 CONT
1    109568     HEADER,.1 ST MALE,2RW,16PIN (break off 1 row for use on external LED)
1    109576     HEADER,.1 ST MALE,1RW,3PIN

2    2094389    SCREW,PAN HEAD,PPN4-40X1/4 (only available in bags of 100-steal some from another ISA card or go to home depot and get s

1               Keystone 9202 ISA bracket with 2 PCB mounting tabs* (mouser has them in stock currently)
```

* For local availability of the Keystone brackets, enter `9202` on the form on Keystone's webs site (/web/20110422101403/http://www.keyelco.com/order.asp) .

In the UK, parts can be sourced from Farnell (http://uk.farnell.com) or CPC. Note that Farnell's DIL sockets are expensive (doubling the component cost), but the chips can be soldered directly to the board (or sockets can be sourced cheaply from eBay). The below parts list will cost around £15.

Qty Req'd	Min Order	Farnell #	Item
10	5	1469310	CAPACITOR, 100NF, 50V; Dielectric Charac
1	5	1144626	CAPACITOR, 47UF, 35V; Capacitor Dielectr
3	1	1013901	74F FAST TTL, 74F573, DIP20, 5.5V; Logic
1	1	1013896	74F FAST TTL, 74F245, DIP20, 5.5V; No. o
1	1	1740030	LOGIC, QUAD 2-INPUT OR GATE, 14DIP; No.
1	1	1739824	LOGIC, 3-8 LINE DECODER/DEMUX, 16DIP; No
1	1	1106072	74LS, 74LS04, DIP14, 5.25V; Logic IC Cas
2	1	382504	74HCT CMOS, 74HCT688, DIP20, 5V; Compara
1	1	1390720	EEPROM PARALLEL 64K, DIP28; Memory Confi
3	10	1740370	JUMPER, WHITE, GOLD, 2WAY; Connector Typ
1	50	9339175	RESISTOR, 0.25W 5% 150R; Resistance:150o
6	50	9339060	RESISTOR, 0.25W 5% 10K; Resistance:10koh
2	1	1612533	RESISTOR NETWORK, 10KR; Resistance:10koh
1	5	1581182	LED, 5MM, 16°, SUPER-GREEN; LED Type:Sta
1	1	9479180	ROCKER SWITCH, DIL, 8WAY; Switch Type:DI
1	1	3418546	HEADER, 2ROW, 16WAY; Connector Type:Wire
1	1	8395977	HEADER, BOX, STRAIGHT, 40WAY; Connector
1	1	3417657	HEADER, 1ROW, 3WAY; Connector Type:Wire-

INT 13 Reference

See a separate page: INT 13 Reference