APT PBI BIOS 1.0
For Ultimate 1MB and Incognito

As the owner or Ultimate 1MB/SIDE or Incognito, you have at your disposal an OS-compatible PBI host adapter. The APT BIOS for Ultimate and Incognito provides a complete PBI APT implementation which includes the following:

- Up to fifteen hard disk partitions, dynamically mountable/un-mountable from a selection of up to 128, compatible with bootable DOSes
- FAT-based bootable ATR mounting (up to fifteen images at once), with high speed read/write access, and drive number rotation for multi-disk titles
- Complete XDCB / DEVINFO / DISKINFO implementation, compatible with IDE Plus 2.0
- Media compatibility with IDE Plus 2.0 across all partition densities

The PBI BIOS has in fact been in a beta state since the initial release of Ultimate and Incognito, and while the beta has generally performed well, some compatibility issues were recently brought to my attention by AtariAge forum member ProWizard, who worked closely with me for a period of some ten days and helped bring about this significant driver upgrade.

INSTALLATION

To update Incognito and Ultimate PBI BIOSes to version 1.0, you have three options:

- Use the self-contained XEX updater. You can run the XEX via the SIDE loader (from a FAT partition on the CF card), from a serial disk drive, or from an APT partition.
- Run the UFLASH utility (included in the toolkit) from DOS to flash the appropriate ROM image to the PBI slot.
- Run UFLASH from the very latest version of the SIDE loader, having first copied the tool and the PBI ROM image into the FAT32 partition of your CF card.

The XEX for Ultimate PBI is UMPBI10.XEX, while ICPBI10.XEX should be used for Incognito. The ROM files follow the same naming scheme.

Note UFLASH (the universal flash tool for Ultimate and Incognito) can be launched - like the XEX updates - from a serial disk drive, APT partition, or direct from the FAT using the SIDE loader. However, UFLASH requires the very latest version of the SIDE loader (likely released around the same time as this update). Using UFLASH via the SIDE loader makes updating the Ultimate/Incognito ROM slots very simple and convenient indeed, since there is then no need to copy ROM images into APT partitions.

There is yet another way of using FAT to get the ROMs onto the A8. Booting SDX and installing the FATFS.SYS driver by KMK allows direct read-only access to "external" FAT16 partitions. The process for setting up these external partitions is described in EXTERNAL.TXT. Once you have an external FAT partition mounted, you can copy UFLASH.XEX and all required ROMs into the FAT16 partition on the PC, and then use them directly from the FAT once the CF card is in the Atari.

CHANGES IN PBI BIOS VERSION 1.0

The following changes and bug fixes have been implemented in version 1.0 of the PBI BIOS:

- SIO commands not intended for the physical or logical disk devices are now passed up the SIO chain to be dealt with by the appropriate handler. Modem drivers, etc, should now work without problems.

- Single and double density partitions are now mapped in a way compatible with IDE Plus 2.0

- Page zero locations $36-37 and $3D-$3F are now no longer used by the PBI BIOS. This has solved compatibility issues with certain disk-based SpartaDOS versions and RealDOS, not to mention a number of bootable game and demo ATRs.

- The ATR subsystem now handles "non-standard" ATR files, which is to say those double-density ATRs with 384 bytes of "padding" directly after the three single-density boot sectors. This change, again, has solved numerous compatibility issues with ATR versions of DOSes, games and demos.

- External partition entries are now checked against the corresponding MBR entries prior to mounting, the idea being that the external partition becomes invalid if its MBR partition entry no longer exists or has moved.

- Sector transfer now includes "cheap" checks for DRQ going low early (owing to a double read), as described to me by KMK. Loop unrolling has ensured that this extra check does not adversely impact performance. The BIOS therefore will now issue retries if a sector transfer encounters a skipped read or a double read or multiple instances of one or the other, but not an equal number of skipped and double reads.

- Bugs in ATR sector caching and contiguous read/write optimisation have been fixed. The symptoms of those bugs would most commonly be noticed when using multiple ATRs at the same time (and, say, attempting to copy between them).

- The status command now returns floppy-compatible information in DVSTAT+1. This increases compatibility with bootable ATR-based games and demos.

- Driver "splash" information is now displayed at every boot if the base bank of SpartaDOS X is present. Moreover, driver information for all compatible APT BIOSes (such as the one for IDEa) will be displayed, even if multiple controllers are simultaneously present.

- ATR read/write performance has been somewhat improved, with 512bps ATR reads under SpartaDOS X now topping out at around 27KB/s.

- MyDOS, SpartaDOS and other bootable disk-based DOSes now boot correctly from partitions or ATRs when SpartaDOS X is disabled. The machine can now power up to SpartaDOS 3.x, for example, from the hard disk without issue.

- Incompatible APT revisions and partition mappings and types are rejected.

- The SIO status command now returns 4 bytes to the address in DBUFLO/HI rather than returning the bytes to DVSTAT regardless of the buffer address specified in the DCB.

- The mounting API no longer includes sanity checks for mounting volumes on already occupied drive numbers or for multiple mounts of the same partition ID. These checks have been delegated to the mounting software, as has any functionality for writing dynamic mounts to disk (which is not currently implemented in the mounting tool anyway).

- PERCOM block now returns proper floppy information for ATRs when disk image size corresponds to common physical floppy disk geometry. Therefore, 90KB ATRs, for example, will be recognized at SS/SD floppies by MyDOS, rather than high capacity drives.

- A dummy format command is implemented by the ATR handler so that DOSes which insist on performing a physical disk format before writing out an empty directory can initialize a disk. This may prove useful for the ad-hoc creation of game save disks, etc.
- With SIDE2, as well as on every SIO access, hot-swapping is checked on system Reset. If the card was pulled and re-inserted immediately prior to Reset being pressed, the partition table will be re-read from the hard disk.

OTHER TOOLKIT CHANGES

As well as the changes to the driver mentioned above, great pains have been taken to ensure that the entire toolkit functions (where applicable) with SpartaDOS 3.x and MyDOS. Unless otherwise stated, all programs in the APT toolkit work well with most DOSes available for the Atari 8-bit. FDISK, MATR, etc, are NOT dependant on the use of SpartaDOS X, despite the fact they appear on the CAR: device in the distribution.

Of course, a number of new APT tools have been written to complement the new drivers, and these are separately documented.

USAGE NOTES

Although use of the APT BIOS should be relatively intuitive owing to the nature of the tools which support it, a few things may not be obvious:

- Pressing *Select+Reset* cold-starts the machine.
- Holding Select at start-up causes the boot drive assignment to be ignored (therefore, the machine will always boot from drive 1 when Select is held)
- Holding Shift on start-up or Reset causes the partition table to be re-read from the disk. The table is not refreshed every time Reset is pressed (nor even every time the machine is rebooted) because doing this would obliterate any mounted ATRs or dynamic partition mounts. So - to return the system to its "FDISKed", cold-power up state, press Shift and Reset.

It should be noted that when rebooting the machine with *Select+Reset*, one has to release Select fairly quickly once the reboot has been instigated, otherwise the system will ignore the boot drive setting when it restarts. One may wish to use the "C" cold start feature of the Ultimate/Incognito BIOS menu if this proves difficult to negotiate.

CREDITS

Thanks to Candle, Phaeron, KMK, Larry, Hias, Kyle and Steve Carden.

Special thanks go to AtariAge forum member ProWizard for his invaluable assistance in testing the BIOSes and drivers and identifying problems which required attention. His detailed and pragmatic bug reports, friendly disposition and excellent communication skills made some very hard work somewhat more enjoyable than it otherwise would have been. Indeed, were it not for ProWizard, some of the issues might never have been brought to my attention at all.

Thank you!

FEEDBACK

Should you encounter any bugs or issues (quite possible in v.1.0 software), please do not hesitate to report them to me, Jon, at fjc@atari8.co.uk. The entire motivation behind the recent scrupulous troubleshooting and testing was to provide the best possible experience with already excellent hardware. To quote ProWizard: good hardware is nothing without good software.

Finally, if you enjoy the software and would like to show your appreciation and encourage me to continue developing it, please consider making a donation at www.atari8.co.uk/donate/, since I enjoy no licensing arrangements whatsoever with the OEMs of Ultimate, Incognito, SIDE or MyIDE.

Best wishes

FJC, 25 February 2014