

This is one of 2 documents that might assist you in 'experimenting' with an X/Lisa with more than 2Mb of Ram. The Lisa design provides direct support for 2Mb maximum, so a few modifications need to be made to go further. These modifications are somewhat 'tacked on' which means they rely on certain assumptions about the operating system (See CPU mods).

Problems with MacWorks Plus and 4 Mb RAM: I've had some interaction with Chuck about going to a full 4Mb and he sounds like he might get to it one day, but he seems pretty busy. At the moment, he maps out the \$3E0000 page, which screws up the video if there was ram there, so the maximum amount of memory currently workable is \$3E0000 or 3.875 Mb. The machine I'm typing this on is in this configuration. I'm not sure how much trouble it is worth to get that extra 128k.

RAM boards: To get more than 2Mb of ram, you currently need two memory boards (high and low). I have made and well tested these modifications to LRambo style modified Apple 512k boards. Modifications for the AST RamStak have been tested a little.

Good luck. Let me know if this 'documentation' is lacking in some critical respect. James MacPhail
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Ram board modifications: The following modifications make the 2Mb (nominal) memory boards sensitive to A21. The boards are not slot dependent after the mod. If used with an unmodified CPU board, only the high board will work. Note that the quick memory search at power on does not write to memory above 2Mb. The full memory test (while the memory board icon is displayed) does write to all the ram. If you interrupt the test after a cold start, the parity in the upper board is not validated, so the system will soon crash with a memory board error. To avoid this, you must let the self test run to completion every time you cold start (unless you have diddled the parity to save ram).

LRambo boards: Low 2Mb: I assume you start with a working 2Mb LRambo style board. Bring A21 from the edge connector pin 50 to U10E-9. Connect U10E-10 & 11 & 14 (+5V). Use the inverted A21 from U10E-8 as BDSL (connect to pins 1 & 4 [not 5] of where U14A used to be)

LRambo boards: High 2Mb: I assume you start with a working 2Mb LRambo style board. Bring A21 from the edge connector pin 50 and use it as BDSL (connect to pins 1 & 4 [not 5] of where U14A used to be), see Special Mods below.

AST RamStak boards: Low 2Mb: Cut the trace connecting U10D-15 to U12C-2 and U12A-1, isolating U10D. Bring A21 from the edge connector pin 50 and connect it to U12C-12. Connect U10D-15 to U12C-13. Connect U12C-11 to U12C-2 (and U12A-1).

AST RamStak boards: High 2Mb (or part of): Cut the trace connecting U10D-15 to U12C-2 and U12A-1, isolating U10D. Bring A21 from the edge connector pin 50 and connect it to U10E-12. Connect U10D-15 to U10B-12. Connect U10B-13 & 14 (+5V). Connect U10B-11 to U10E-13 and RP1-4. Connect U10E-11 to U12C-2 (and U12A-1). See Special Mods below.

Special Mods for 3.875 Mb: At present, MacWorks (up to version 1.0.15) does not support more memory than 3.875 Mb, in fact it doesn't work at all with 4Mb.

If you are using a RamStak board for the High 2Mb board, you can solve this problem by not installing the High 512k of Ram. ie. remove the RAM chips in row E. This results in 3.5 Mb total. You can install the row when a version of MacWorks arrives that supports a full 4Mb.

If you are using an LRambo board for the High 2Mb board, you can solve this problem with the following additional Mod. Cut pin 15 of U13A from the board so that it is no longer grounded. Connect U13A-9 to U12B-6. Connect U10E-9 to U12B-1 (A17). Connect U10E-10 to U12B-2 (A18). Connect U10E-11 & 14 (+5V). Connect U10E-8 to U13A-15. This disables this board in the highest 128k, resulting in 3.875 Mb total. You can undo this mod when a version of MacWorks arrives that supports a full 4Mb.

