Yarrb M2

The Yarrb M2 board is a simple memory expansion board with dual 16K ROM (C-D-E-F blocks), 8 banks of utility ROM and 32K RAM (#0000 – #7FFF). This board is designed for usage in an Atom to provide a reasonable amount of memory to run most modern and classic applications and still provide a small footprint.

A. Build instructions

Building the Yarrb Mini board is quite straight forward. Just make sure that you start with the header pins on the solder side:

1. Put the 20 pin headers into the 40 pen IC socket. This way you fixate the pins so that they will fit into the CPU socket.
2. Place the headers on the solder side of the board and solder them on the component side. It is quite important that you do this before soldering the 40p CPU socket.
3. Solder the IC sockets, capacitors, resistors and voltage regulator and jumpers. Led D1 and resistor R3 are optional. J3 is optional (only used for programming the CPLD).
4. Install the IC’s in the sockets and place the jumpers.

B. Preparing the Atom

- Remove all the 2114 at the left side of the 6502.
- Remove IC5 (74LS30) and IC6 (74LS138)
- Remove the Atom roms (IC20, IC21 and IC24)
- Remove the 6502 and place it on your Yarrb board
- Solder a wire from pin 36 of the 6502 socket to pin 8 of the IC5 socket (this is the new buffer enable signal)
- Bend out pin 10 of IC44 (74LS393)
- Solder a wire from pin 13 of IC44 to pin 37 of the 6502 socket
- Remove LK3 (the interrupt from PL8) if you want to use the AtoMMC (optional)

C. Installing the board

1. Install the 6502 in the 40p socket of the Yarrb Mini board
2. Install the Yarrb Mini board into the 6502 socket on the Atom main board
3. Set jumper J4 in **RUN** position for normal operation.

As best practice I suggest to use a 40p socket with turned pins between the Atom's socket and YARRB. It makes installation easier, provides a little bit more space between the board and other components and if you break a pin you just have to replace the socket and not the header strip :-).

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D. Using the board

Jumper settings

J4: TST | RUN

When in TST mode the Atom runs Hoglet's memory test program to check the 32k RAM. Normally this test should run without errors. When errors are encountered then either your 62256 is bad or it has a timing issue. The Yarrb M2 is tested with RAM chips with an access time from 100 – 150ns. Chips with an access time of 55 or 70ns are known to cause memory faults.

In RUN mode your Atom should work normally.

J5: PROT | PROG

By default this board is designed for a 28F10 ROM chip. But you can use a 39SF010 which can be reprogrammed in circuit. To protect your ROM from being overwritten accidentally set this jumper to PROT. For 28F010 this setting is ignored because it cannot be programmed with only 5V power supply.

When using a 39SF010 you should also cut JP1 at the solder side.

Configuration registers

The Yarrb-M2 has two **write-only** configuration registers at #BFFE and #BFFF. Only the lower four bits are connected to the data bus.

BFFF: bits 0 - 2	#Axxx bank select
BFFF: bit 3	write protect for RAM at #1000 - #1FFF
BFFF: bit 4 - 7	not connected
BFFE: bit 0	clock select (0 = 1 MHz, 1 = 2 MHz)
BFFE: bit 1	turbo select (0 = turbo off, 1 = turbo on (4 MHz)
BFFE: bit 2	ROM bank select (0 = MMC, 1 = DOS or Econet)
BFFE: bit 3	enable (0) or disable (1) RAM at #A00 - #AFF
BFFE: bit 4 - 7	not connected

Clock speeds above 1 MHz are only guaranteed to work if the rest of the Atom is capable to run at 2 or 4 MHz. Devices like the 8255 and 6522 are known to be problematic at high speeds.

Disabling RAM at #A00 - #AFF allows you to connect a factory default floppy disc controller to the Atom. The CPLD takes care of driving the data bus buffer. This buffer is also enabled when accessing the I/O space from #BC00 - #BFFF.

By default the ROM will be programmed with the AtoMMC ROM at #Exxx in ROM bank 0 and AtomDOS in ROM bank 1. It is also possible to reprogram the ROM to have the Econet ROM at one of these banks. You'll need an external programmer since the ROM cannot be flashed and programmed in-circuit.

E. Circuit diagram