

Econet Simplified Installation Kit for BBC Micro – Issue 4 & 7 Motherboards

Adding Econet to a BBC micro involves soldering many components onto the beeb motherboard. By using a widely available Econet module for the Master computer (sometimes referred to as an ADF-10 module), and a special Interface Board, this installation can be simplified significantly.

There are still some parts that need to be soldered onto the beeb motherboard to prepare it for the Interface Board. Specifically, the following will need to be soldered onto the beeb motherboard:

- SK7 - DIN5 Econet socket
- R38..R41 - Four jumper wires (or OR resistors) in place of resistors
- IC89 - 28 pin socket
- IC91 - Jumper wire between pins 11 & 12. Link S2 MUST be cut when making this modification to avoid a short circuit.
- IC94 - 14 pin socket
- IC97 - 14 pin socket

Preparing the Beeb

Make sure the mains lead is unplugged and take appropriate anti static precautions when working with the electronic equipment. Disconnect all cables from the sockets at the rear of the case, and remove any devices / cables that are installed into the expansion sockets in the well that is on the underside of the case.

Remove the four large fixing screws that hold the lid in position. Two of these screws are positioned at the rear of the case, and two are positioned on the underside of the case. Carefully lift the lid off to reveal the motherboard and keyboard. Take care when lifting off the lid, in case any hardware upgrades have been mounted to the underside of the lid.

If any upgrades have been added, these may need to be temporarily removed to gain access to the motherboard. If removing any upgrades, make sure to record the position of any flying leads that may be attached to the legs of ICs on the motherboard, so they can be re-attached to the correct position when re-assembling the computer. Take care when removing hardware that has been plugged into existing sockets on the beeb motherboard to avoid damaging any pins on the upgrade boards that are being removed. You may need to remove keyboard to help with the removal of some upgrades.

The keyboard will also need to be removed in order to access the motherboard. The keyboard is held in place by two small screws on the underside of the case, within the well, and two associated nuts either side of the keyboard. When slackening off the screws, make sure to keep hold of the nuts so they don't drop when split from the screws. Once the screws are removed, gently disconnect the 17 way ribbon cable from the beeb motherboard, and lift the keyboard away slightly to reveal the wire for the speaker connection. Unplug this wire from the motherboard, and then lay the keyboard aside.

You will now need to remove the fixing screws and fibre / plastic washers that hold the motherboard to the base of the case. There are three screws across the front edge of the PCB, close to the expansion sockets, and a further two at the rear edge. There may additionally be two smaller screws

holding the analogue in socket to the motherboard. If these are in position, then they will also need to be removed.

Disconnect the power supply wires from the motherboard. There should be three sets of red / black wires that carry the main 5v supply to the motherboard, and a single purple wire that carries the -5v supply to the audio and serial port circuitry. Take care when removing the wires not to snap the pin that is soldered to the motherboard.

Finally, you will need to desolder the wire that connects between the motherboard and the centre pin of the composite video socket at the rear of the case. Once you have desoldered this wire, unscrew and remove the socket from the case. Take care not to lose the serrated washer and nut when removing the socket.

The motherboard should now be free to be lifted out from the case. Slide the motherboard forward slightly, so the protruding parts of the analogue in and UHF sockets at the rear of the motherboard sit fully within the case. Lift up the rear of the motherboard, and pull out so that the sockets on the front edge of the motherboard come clear of the case.

Installing the Econet components

Now that you have removed the motherboard, you need to add the various components. The component positions are shown in Figure 1.

1. Start with the four jumper wires that should be installed positions R38, R39, R40 and R41.
2. Then add the jumper wire between pins 11 & 12 on IC91.
3. Then cut the S2 jumper. You may wish to desolder the two cut sections of this jumper, but this is not essential.
4. Next install the three sockets at IC89, IC94 and IC97.
5. Finally add the DIN5 socket at SK7.

Preparing the Interface Board

Each beeb that is attached to the Econet network must have a unique station ID. The interface board has an 8 way DIP switch that is used to set the Econet station ID for the beeb that it is to be used with. Sliding the switch to the right 'ON' position will have an additive effect on the station ID. There is a number printed on the PCB to the right of the DIP switch that indicates the additive value of that particular switch. With all switches OFF, the station ID would be 0, and with all switches ON, the Station ID would be 255. Please note, however, that you should avoid using IDs 0, 239, 254 & 255 as these are reserved for other purpose.

The interface board can now be plugged into the newly installed sockets on the beeb motherboard. To do this, line up the two rows of 14 pins on the underside of the interface board with the 28 pin socket at IC89. The single row of 7 pins on the underside of the interface board should then align with the left hand side of socket IC97. Finally, the two rows of 4 pins on the underside of the interface board should align with the bottom half of socket IC94. Once the board is aligned, push firmly into position. Care should be taken when installing and removing the interface board, as the pins are quite delicate and will snap off if bent.

Completing the installation

Once the Interface Board has been plugged into the beeb motherboard you will want to install an appropriate NFS ROM into a spare ROM socket. ROM sockets are located at the front right hand corner of the beeb motherboard. There is space in this area for 4 ROMs. One of these is usually set aside for BASIC, and another may be assigned for a file system ROM (eg DFS or MMFS). If there are no spare slots, then you will need to remove one of the existing ROMs, unless you have a ROM expansion board, in which case you can install the ROM into that board instead.

If you have a floppy disk controller in your beeb, then you will probably already have a DFS ROM installed in your motherboard. If the floppy disk controller is an 8271 device (check IC 78), then you can use a combined DFS & NFS ROM. This combined ROM is referred to as the DNFS ROM. If you already have this ROM installed, then you will not need to install any further ROMs. If you don't already have the DNFS ROM installed, then you may want to consider using that in place of your current DFS ROM.

If your floppy disk controller is 177x based (in which case you will likely have a small daughter board plugged into IC78) then you will have to install a separate NFS ROM since there isn't a combined DFS / NFS ROM that works with the 177x based floppy disk controller. You can still use the DNFS ROM, and only the NFS part of this ROM will be initialised as the 8271 hardware isn't present.

Once you've installed your (D)NFS ROM, the motherboard should be placed back into the case, and re-assembled following the reverse order of the dis-assembly. Make sure that any upgrades are re-instated and that all flying leads are re-attached to the correct IC pins. Make sure to align the keyboard ribbon correctly with the socket, as the computer will not boot if the keyboard is not present, or if the keyboard pins are misaligned.

Testing the new hardware

Once the beeb has been re-assembled you can power it up. If it fails to power up correctly, double check all the connections, and in particular the position of flying leads from any hardware upgrades. Also check that you haven't reversed the red and black power leads from the PSU.

If the computer boots up ok, you should be greeted with the familiar BBC Computer message. One of the lines underneath this message should indicate the active file system. If Econet is not identified as the active file system, this may just be because of the position in which file system ROMs have been installed. In this case, try resetting your beeb whilst holding down the 'N' key. If everything is working as it should, the startup message should include a line showing Econet as the active file system, along with the Econet station ID that you set previously via the DIP switches. If you don't have the computer attached to an Econet network, the startup message will also report 'No Clock'. This is correct for a system that is not attached to a network.

Figure 1 – Position of components to be installed

