



# BeebMaster Econet Clock Installation and Operation Instructions

*The BeebMaster Econet Clock is the ultimate network clock for Econet, combining all the best features of the earlier Acorn and SJ Research models: highly configurable clock speed setting, asymmetrical clock signal generation, dual Econet sockets, detachable power supply and power-on LED. If fitted and used in accordance with these instructions, it should give many years of problem-free Econet clock generation.*

*The Clock supplied with these instructions is Issue 2 of the BeebMaster Econet Clock, based on a re-designed circuit board but retaining all the features of the earlier Issue 1 Clock. The Issue 2 Clock has been designed by Ken Lowe. The power adapter for the Issue 2 Clock is a 12V DC adapter, replacing the AC adapter of the earlier Clock.*

## **IMPORTANT SAFETY WARNING**

The BeebMaster Econet Clock is supplied with a mains power adapter. The Clock should only be used with the supplied power adapter, which must not be opened or tampered with in any way. The Clock box should not be opened whilst the Clock is connected to the mains. Please read these instructions in their entirety before powering or using the BeebMaster Econet Clock.

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# Contents

Inside the packaging, you should find:

- these instructions
- BeebMaster Econet Clock
- DC power adapter

Please report any missing items to BeebMaster at the e-mail address on the front page of these instructions.

## Installing the BeebMaster Econet Clock

These installation instructions describe how to fit the BeebMaster Econet Clock to an existing Econet network. They do not describe how to set up or test a new Econet. For information on setting up an Econet, refer to the BeebMaster website or to publications such as Acorn's *Econet Installation Guide* and *Econet Design & Installation Guide*.

The following procedure should be adopted to successfully install the BeebMaster Econet Clock:

1. Ensure that there are no other Clock units attached to the network as each network must only receive one clock signal. The exception to this is the Acorn FileStore range which generate their own clock but which will not do so if the BeebMaster Econet Clock is detected when the FileStore is started.
2. Plug the power jack on the DC power adapter into the power socket on the BeebMaster Econet Clock.
3. Plug a 5-pin DIN Econet lead into each of the Econet sockets on the BeebMaster Econet Clock.
4. The Clock must be connected to the network in such a way as to avoid creating a loop in the network cable. Plug each of these leads into two adjacent sockets outlets on the Econet cabling.
5. In the case of a network formed of linked socket boxes or BeebMaster Econet Socket Hubs, the Clock should be plugged into two adjacent socket boxes or Hubs with the two socket boxes or Hubs not connected

together by the main network cable.

6. In the case of a network formed of T-pieces, the Clock should be plugged between two adjacent T-pieces which would otherwise be connected together as part of the network.
7. For smaller networks formed of a single Econet Socket Hub, the Clock may be connected using either one or both of the socket outlets on the Clock. Please refer to the installation instructions for the *BeebMaster Econet Socket Hubs and Terminators* for more information on single Hub layout.
8. For most reliable operation, the BeebMaster Econet Clock should be connected to Econet sockets as close as possible to the middle of the network cable. The BeebMaster Econet Clock is not recommended for use on networks with a total cable length exceeding approximately 500 yards. Such networks should be split into smaller segments connected with bridges and with a separate Clock for each segment.
8. Plug the power adapter into the mains. The red LED next to the power jack should illuminate and the clock will begin working immediately.

## **Clock Speed Setting**

The speed of an Econet Clock is comprised of two elements, the “mark” and the “space”. Added together, these values constitute the “period”, which is the overall speed of the clock.

The “mark” is the time during which the Econet clock signal is transmitted, and must be long enough to reach all stations, and the “space” is the time during which data is transmitted and must be short enough so that the time between “mark” phase is not too long to cause interruptions to the clock signal transmission.

As no data is transferred during the “mark” phase, the most efficient network operation results from a clock setting with a “mark” as short as possible and a “space” as long as possible.

The BeebMaster Econet Clock generates an asymmetrical clock signal. This

means that the two elements of the clock signal, the “mark” and the “space”, may be set to different speeds, and the BeebMaster Econet Clock allows each element to be set independently of the other.

The BeebMaster Econet Clock contains two DIP switches, to set the “mark” and the “period”. The “period” is the total of the “mark” and the “space” and so the “space” element of the BeebMaster Clock speed is fixed by setting the “period” to a value higher than the “mark” setting and the difference between the “mark” and “period” settings is the “space”.

The location of these DIP switches is shown in the diagram on the back page of these instructions.

The “mark” is set using the TOP DIP switch on the BeebMaster Econet Clock circuit board. It can be set from  $\frac{1}{8}\mu\text{s}$  up to  $7\frac{7}{8}\mu\text{s}$  by moving the switches from left to right. When the switches are set to the right they are ON and the mark setting is the total of all the switches in the ON position.

Similarly, the “period” is set using the BOTTOM DIP switch on the BeebMaster Econet Clock circuit board. It can be set from  $\frac{1}{4}\mu\text{s}$  up to  $15\frac{3}{4}\mu\text{s}$  by moving the switches from left to right. When the switches are set to the right they are ON and the period setting is the total of all the switches in the ON position.

In practice, this high refinement of clock speed settings is unlikely to be required in most standard Econet network arrangements.

As supplied, the BeebMaster Econet Clock is set with a mark of  $1\mu\text{s}$  and a period of  $5\mu\text{s}$ , giving a space of  $4\mu\text{s}$ . This will be sufficient for most applications but some installations may benefit from the clock speed being refined, either by increasing or decreasing the mark in relation to the period setting or by increasing the period to give an increase to the space setting.

For reasons of safety, the lid of the BeebMaster Econet Clock must not be removed, nor should the DIP switch settings be altered, whilst the clock is connected to the mains. Unplug the DC power adapter from the mains, then the power jack and DIN cables from the Clock before removing the Clock lid and altering the settings. Always replace the lid before re-connecting the Clock to the mains power.

# Clock Positioning

## Centre Positioning

In most installations, the network will work most reliably if the Clock is positioned roughly in the centre of the network cable. Tests should be carried out to ensure that the Clock signal is being received by all stations on the network, in particular those furthest away from the Clock at each end of the network.

In addition, all stations should be able to communicate reliably with each other. Tests should be carried out to ensure that stations at the two ends of the network can communicate with each other (for instance by using \*NOTIFY, \*VIEW or \*REMOTE).

If any stations are not receiving the clock signal then the “mark” setting should be increased until the clock signal is received by all stations. For stations unable to communicate with all other stations, the “space” should be extended by increasing the “period” setting until all stations can communicate with all other stations on the network.

## Short Network Alternative

For shorter networks, the BeebMaster Econet Clock may be positioned at one end of the network with one Econet lead connected between the last socket on the network and one of the Clock sockets, and a terminator plug connected to the second socket on the Clock. For more information on this installation, please refer to the *SJ Research Network Installation Instructions*.

## Two-Station Network

In some limited circumstances, it may be desirable to set up a very short network consisting of two stations, a user station and a file server station. This might result from a temporary need to copy file from or to a file server disc when no network cabling installation is readily available, or in a more permanent situation when a file server hard disc is used essentially as a local hard disc to a user station, connected via Econet.

In these situations, it may be permissible to connect the two stations together using the BeebMaster Econet Clock. However, it must be borne in mind that as this arrangement does not provide network termination, it may be unreliable and should only be considered when a correctly wired network of sockets and terminators is not available.

## Problems and Error Messages

A sluggish output, long pauses between entries, or jumbled output of entries, from commands such as \*CAT and \*EX, when the network is otherwise idle, may be symptoms of an incorrect clock speed setting. A certain amount of trial and error must be employed in these situations and it will be helpful to attempt to increase the overall clock speed (by reducing the mark setting and the period setting gradually) and reduce the clock speed (by increasing mark and period settings) until the most reliable speed is achieved.

As a general rule, longer networks and networks with poor reliability of wiring (such as caused by using low-quality network cable or cable with many joins) will require a slower clock setting, ie. a higher overall period to the clock speed.

### No clock

If this error occurs, check the following:

1. Ensure that the Clock is correctly connected to both the mains and to the Econet by referring to the section “Installing the BeebMaster Econet Clock”. Check that the red power LED on the front of the BeebMaster Econet Clock is illuminated.
2. It is possible to set the DIP switches inside the BeebMaster Econet Clock to an “illegal” speed setting. This will result in a “No clock” error on network stations. Examples of illegal clock settings are:
  - (i) all the switches on one or both of the two DIP switches are set to OFF.
  - (ii) The “period” setting is lower than the “mark” setting.
  - (iii) The “period” setting is the same as the “mark” setting (ie. there is no “space” setting).

### Net Error

There are three main causes of this error:

1. There is station number duplication on the network (ie. two stations set to the same number) or a station is set to station 0 or station 255 which are reserved numbers.
2. The clock speed is set incorrectly (see “No clock” section above).

3. There is more than one clock signal being transmitted on the network. Power down and remove any other clock units on the same network. (Note that networks joined with bridges must have a separate clock for each bridged segment of the network). In the case of an Acorn FileStore, which can generate its own clock, power down the FileStore and re-start it with the BeebMaster Econet Clock running. This should cause the FileStore to disable its own internal clock. If this does not appear to work, the FileStore Clock may be disabled manually by referring to the procedure described in the *Acorn FileStore Service Manual*.

### **No Reply/Not Listening/Not Present**

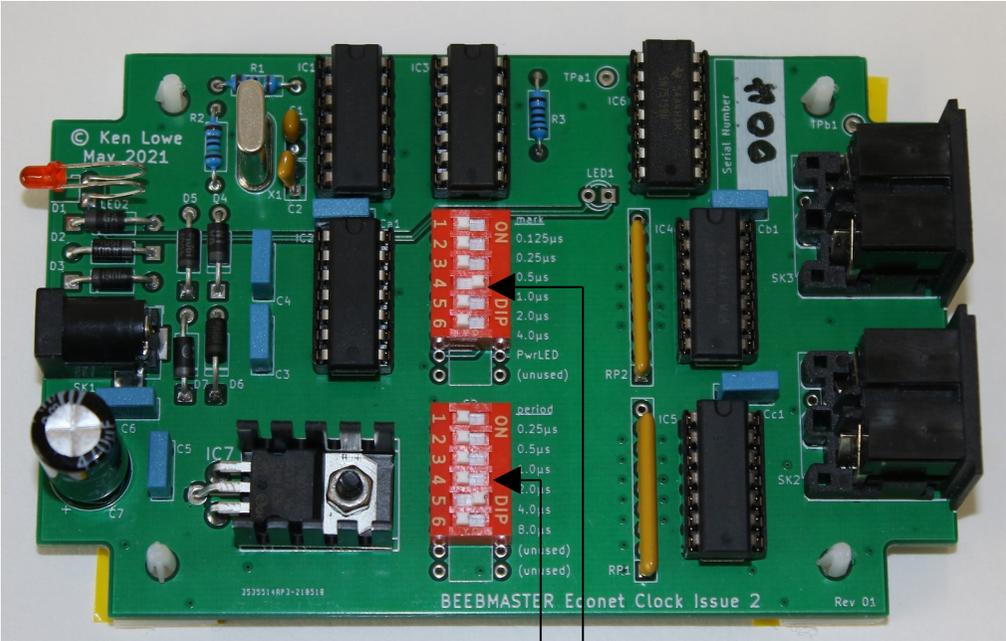
These errors, when trying to communicate with another station or the File Server, usually occur when the remote station is either busy, protected, switched off, does not exist (ie. there is no such station number on the network), or in the case of a File Server, is off-line. These matters should be checked before suspecting the clock. In some cases, an incorrect clock speed may result in No reply or Not listening errors due to the length of time involved in transmitting and receiving data from the remote station. In these circumstances, try refining the clock speed following the procedure under “No clock” above.

### **Line Jammed**

This error usually occurs as a result of incorrect or unreliable wiring of the Econet cable, or incorrect termination of the network. It may result from a continuous transmission on the Econet data lines caused by a crossed wire with one of the clock lines or from interference due to bad wiring. Check all the wiring on the network, including any terminators, socket outlets and Econet DIN leads, using a FLAT Box if possible, before suspecting the Clock.

If the above troubleshooting guide does not resolve any problems, please contact BeebMaster for further advice.

# BeebMaster Econet Clock DIP Switch Location Diagram



Mark DIP Switch

Period DIP Switch