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# ARM system

user guide

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## ARM Evaluation System

**Acorn OEM Products**

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## Important Information

### Wiring the Mains Plug

**WARNING:** *The ARM Evaluation System must be earthed.*

The wires in the mains lead are coloured in accordance with the following code:

<i>Green and yellow</i>	Earth
<i>Blue</i>	Neutral
<i>Brown</i>	Live

As the colours of the wires may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

- The wire which is coloured *green and yellow* must be connected to the terminal in your plug which is marked by the letter E, or by the safety earth symbol or which is identified by being coloured green, or green and yellow.
- The wire which is coloured *blue* must be connected to the terminal which is marked with the letter N, or coloured black.
- The wire which is coloured *brown* must be connected to the terminal which is marked with the letter L, or coloured red.

If the socket outlet available is not suitable for the plug supplied, the plug should be cut off and the appropriate one fitted and wired as previously noted. The moulded plug which was cut off should be disposed of as it would be a potential shock hazard if it were to be plugged in with the cut off end of the mains cord exposed. The moulded plug must be used with the fuse and fuse carrier firmly in place. The fuse carrier is of the same basic colour (though not necessarily the same shade of that colour) as the coloured insert in the base of the plug. Different manufacturers' plugs and fuse carriers are not interchangeable. In the event of loss of the fuse carrier, the moulded plug **MUST NOT** be used. Either replace the moulded plug with another conventional plug (wired as previously described) or obtain a replacement fuse carrier from an authorised Acorn dealer. In the event of the fuse blowing, it should be replaced, after clearing any faults, with a 5 amp fuse that is ASTA approved to BSI 1362.

### Exposure

Like all electronic equipment, the ARM Evaluation System should not be exposed to direct sunlight or moisture for long periods.

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# 1. Introduction

The ARM microprocessor is mounted on an evaluation board which runs as a co-processor to a BBC Model B or BBC Master Series microcomputer and supporting peripherals.

This document defines the complete evaluation system, comprising either of the computers mentioned above, the ARM co-processor, supporting disc drives, monitor, interconnecting cables, ROMs and documentation.

It describes how to install and operate the system and provides a check-list of the required component parts, discs and documentation.

An operational description of the co-processor is also given.

The discs included in the Evaluation system are Acorn ADFS format discs. If your equipment is unable to read these discs you should purchase the following two items from an authorised Acorn dealer.

Product Code	Product name
ANB29	ADFS ROM kit
ANB28	1770 Upgrade kit

Clearly if your system already has a 1770 disc controller then only ANB29 will be required.

## 2. System components

An evaluation system should be made up of the ARM Evaluation system itself plus a number of other components. A complete system should be made up of the following elements:

- (1) A BBC Model B or BBC Master microcomputer computer
- (2) ARM co-processor
- (3) A monitor
- (4) A twin, double density, double sided, 5.25 inch disc drive
- (5) A Winchester disc unit with a suggested minimum of 10 Mbytes capacity
- (6) Interconnecting cables:

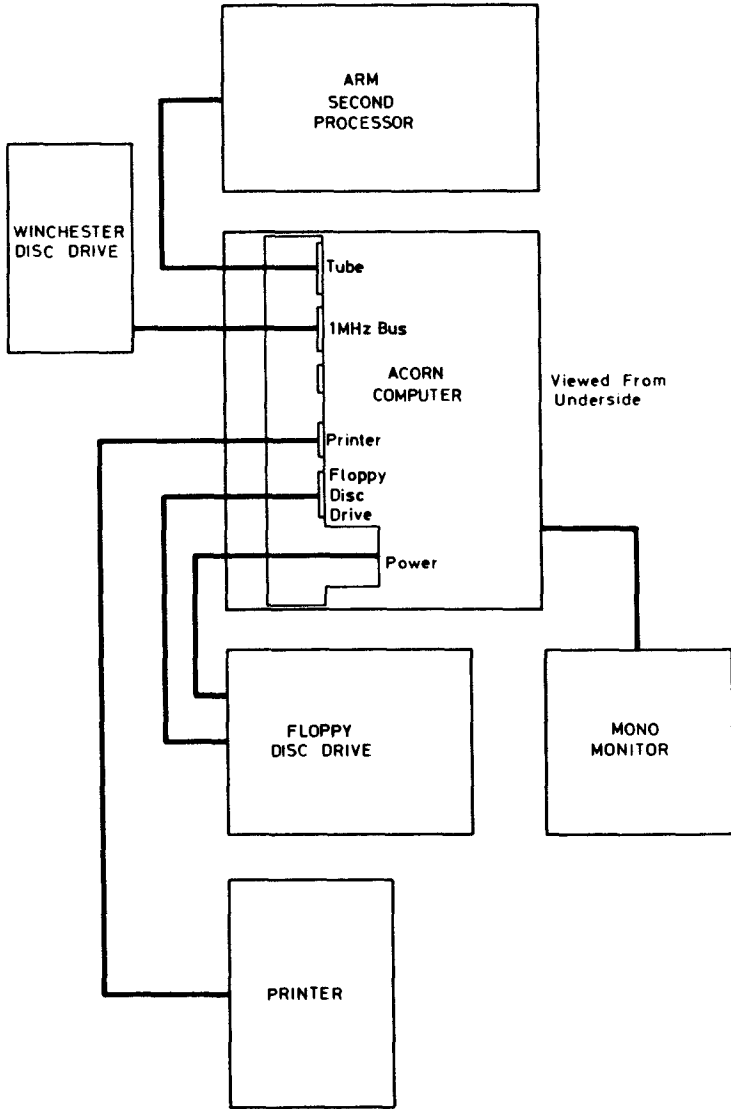
The cable for the connection between the ARM co-processor and the ACORN computer is supplied with the ARM co-processor. It is captive at the ARM end with a connector at the other end for attachment to the TUBE I/O socket on the ACORN computer. Otherwise, all the connections are made in the usual manner using the standard cables supplied with each unit.

- (7) The software, all of which is supplied on 5.25 inch floppy discs, is as follows:
  - ASSEMBLER
  - UTILITIES
  - TWIN
  - BBC BASIC
  - LISP
  - PROLOG
  - FORTRAN
  - C

- (8) The system documentation is as follows:
- *ARM software reference manual*
  - *ARM hardware reference manual*
  - *ARM ASSEMBLER reference manual*
  - *ARM UTILITIES reference manual*
  - *TWIN reference manual*
  - *BBC BASIC reference manual*
  - *Cambridge LISP reference manual*
  - *PROLOG reference manual*
  - *FORTRAN 77 reference manual*
  - *C reference manual*

### 3. Installation

Connect the units together as indicated in the diagram.



The cable supplied with the co-processor is captive at the co-processor end and has a 40-way IDC connector at the other end which plugs into the interface, under the BBC Model B or BBC Master microcomputer, marked TUBE. The co-processor has a separate mains lead for connection to a 240 V 50 Hz mains supply.

The co-processor has a mains switch and fuseholder mounted on its rear panel. The fuse rating is 1.6 A.

If the Micro to be used is other than a Master Series Micro then, before the system can be used, the DNFS ROM included in the hardware package may need to be fitted to your machine.

This will be the case if your machine does not have Econet software fitted, or has not previously had a second processor used with it. For instructions on how to fit ROM software to your machine see appendix A of this manual.

## 4. Operation

The units should be switched on in the following order:

All equipment excluding the ARM evaluation system first, then switch on the ARM second processor and press **[BREAK]** while depressing the **[CTRL]** key.

All the discs included with the system contain information on the files they contain. This information is held in a README file which can be examined in one of two ways.

- Execute the file using the *\*EXEC filename* command.
- if your floppy drive is selected as your current drive (see your filing system manual) by placing each disc in that drive and pressing **[BREAK]** while depressing the **[SHIFT]** key.

The files required should be copied from the discs to the Winchester using the directory structures indicated in each disc's README file.

# 5. Appendix A

## 5.1 ROM software

### 5.1.1 BBC Microcomputer Model B and B+

This ROM software is compatible with both the BBC Microcomputer Model B and the BBC Microcomputer Model B+ (except on any specific points which may be mentioned in the detailed document accompanying the product). The details of fitting ROMs in your computer depend on which of the two types you have, and this appendix covers installation in either. Each section is headed with the machine to which it applies. Care should be taken to read all the sections which apply to your machines. If you are not happy about inserting ROMs yourself then an Acorn dealer will be able to do it for you.

### 5.1.2 Inserting ROMs

#### BBC Microcomputer Model B+

ROMs may be placed in any spare sideways ROM (or paged ROM) socket. These are located at the rear left-hand side of the circuit board inside the BBC Microcomputer casing.

- (1) To get to the board, undo the four large screws on the casing. Two of these are underneath the computer, and the other two can be found on the back.
- (2) Locate the group of eight large sockets, one or more of which will already contain chips. The socket at the rear right of the group (identified on the board as IC71) contains the operating system/BASIC chip. The five remaining sockets in the rear group of six (IC62, IC68, IC35, IC44, IC57) are sideways ROM sockets. The two other large sockets in front of the group of six (identified as IC29 and IC37) are for speech system chips and not for sideways ROMs. ROMs will not work and are likely to be damaged if inserted in these sockets.

Read the section overleaf about the operating priority of the sideways ROM sockets in the BBC Microcomputer Model B+, and then insert the ROM as described in the section entitled 'Inserting the chip' (below).

### **BBC Microcomputer Model B**

ROMs may be placed in any spare sideways ROM (or paged ROM) socket. These are located on the front right-hand side of the circuit board inside the BBC Microcomputer casing.

- (1) To get to the board, ensure that the computer is disconnected from the mains supply and undo the four large screws normally marked 'FIX'. Two of these are underneath the computer, and the other two can be found on the back.
- (2) Once the top is removed, release the bolts holding down the keyboard assembly. These are located on either side of the keyboard. Most machines have two bolts, but some have three.
- (3) Carefully displace the keyboard, rotating it clockwise through about 20 degrees so that the front right-hand side of the circuit board is accessible. There should be no need to remove the multi-wire connector to the main board.
- (4) Locate the row of five large sockets, one or more of which will already be occupied by chips. The four right-hand sockets (identified on the board as IC52, IC88, IC100, IC101) are sideways ROM sockets. The fifth from the right is the operating system socket (IC51).

Read the section below about the operation priority of the sideways ROM sockets in the BBC Microcomputer Model B, and then insert the ROM as described in the section entitled 'Inserting the chip' (below).



### 5.1.3 Sideways ROMs' operating priorities

#### BBC Microcomputer Model B+

The sideways ROM sockets have what is known as operating priority. Essentially this means that the language (COMAL, ISO-Pascal, VIEW and so on) which has the highest operating priority will be the one which is entered when the machine is switched on or after a hard reset ( `CTRL` `BREAK` ) is performed. The operating priority also governs which ROM will respond to a '\*' command if more than one is programmed to do so. The machine is supplied with BASIC in the highest priority position and this will need to be changed if you wish to default to another language.

Each of the sockets is given a priority ranging from 0 to 15, where 15 is the highest priority and 0 the lowest. As supplied, the priorities of the sideways ROM sockets are as follows: IC71 - 15, IC68 - 11, IC62 - 9, IC57 - 7, IC44 - 5, IC35 - 3. The missing numbers are for use when the sockets are configured to take 32K ROMs rather than 8K or 16K. This will not normally apply, but if you need to configure a socket for a 32K device details are given at the end of this leaflet.

If you wish to default to a language other than BASIC it is necessary to change the priority of IC71 and this is done by moving link S13 which is located slightly to the right of the group of ROM sockets. This consists of three pins, the front two of which are joined by the link itself. To change the operating priority of IC71 from 15 to 1 gently lift the link from the front two pins and replace it over the rear two. BASIC will now be the lowest priority language and the machine will default to the language with the highest priority. It is, of course, possible to enter BASIC by using the command \*BASIC.

In the case of products which come on two 16K ROMs (such as Logo or ISO-Pascal) the priority of the language will be that of the higher of the two ROMs, and unless the documentation with the pack specifically says otherwise the relative position of the two ROMs does not matter.

## BBC Microcomputer Model B

The four sideways ROM sockets have an operating priority decreasing from right to left: on a hard reset ( **CTRL** **BREAK** ) or when the computer is switched on, the language chip in the rightmost ROM socket takes priority over the others. So the position of the ROM to be fitted in relation to the BASIC ROM, for example, will determine whether your machine starts up in BASIC or in the language which is being fitted.

If you want to start up in BASIC and get to the other systems from there (using the appropriate '\*' command given in the documentation for the systems) then you must insert your other ROMs to the left of the BASIC chip. If the BASIC chip is in IC52 then it will be necessary to move it further to the right to leave lower priority sockets for other systems.

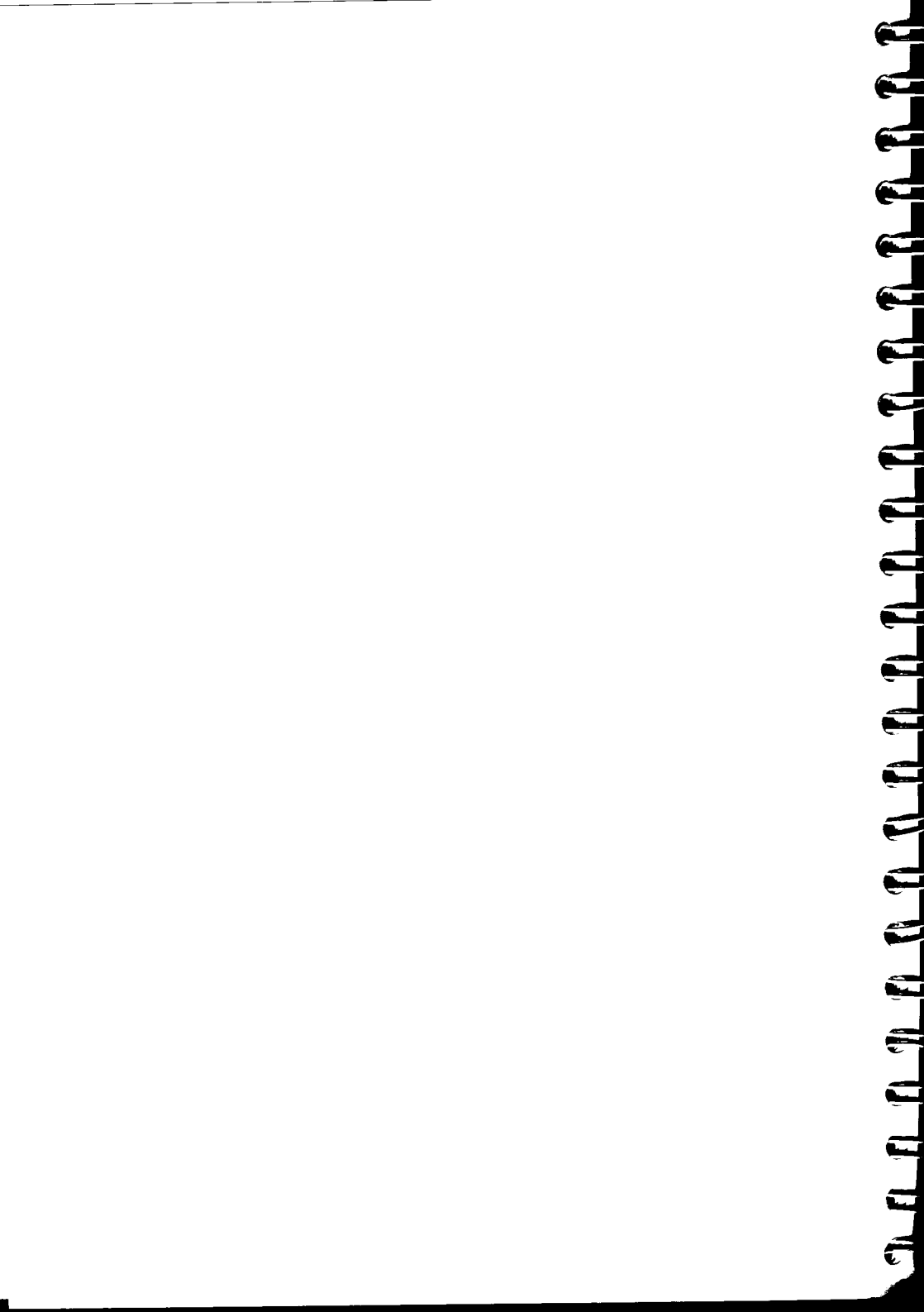
Those who use the computer primarily with systems other than BASIC can enter the preferred system when the machine is turned on by inserting the chip in the furthest socket to the right of all the sideways ROMs present.

In the case of products which come on two 16K ROMs (such as Logo or ISO-Pascal) the priority of the language will be that of the higher of the two ROMs, and unless the documentation with the pack specifically says otherwise the relative position of the two ROMs does not matter.

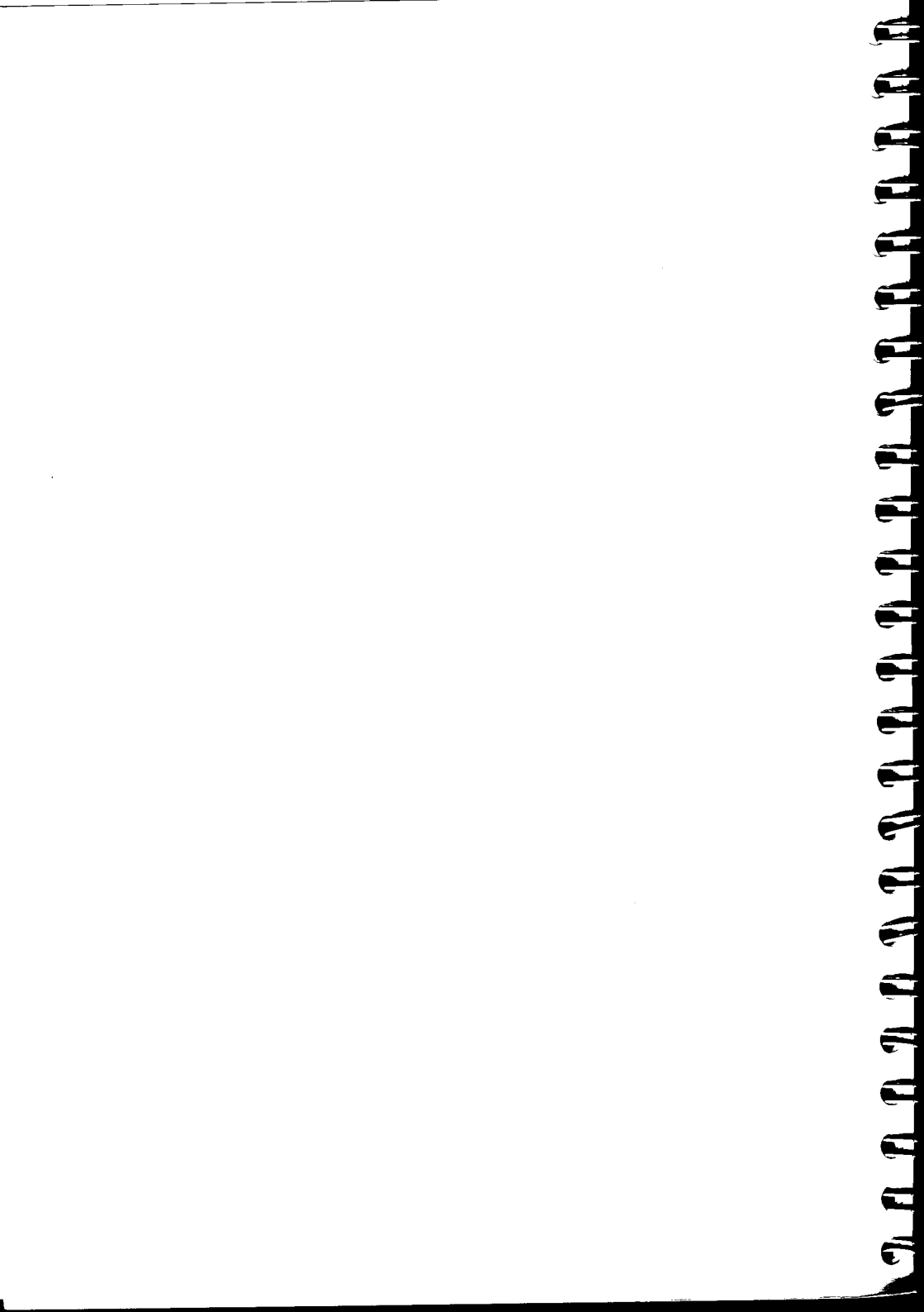
## 5.1.4 Inserting the chip

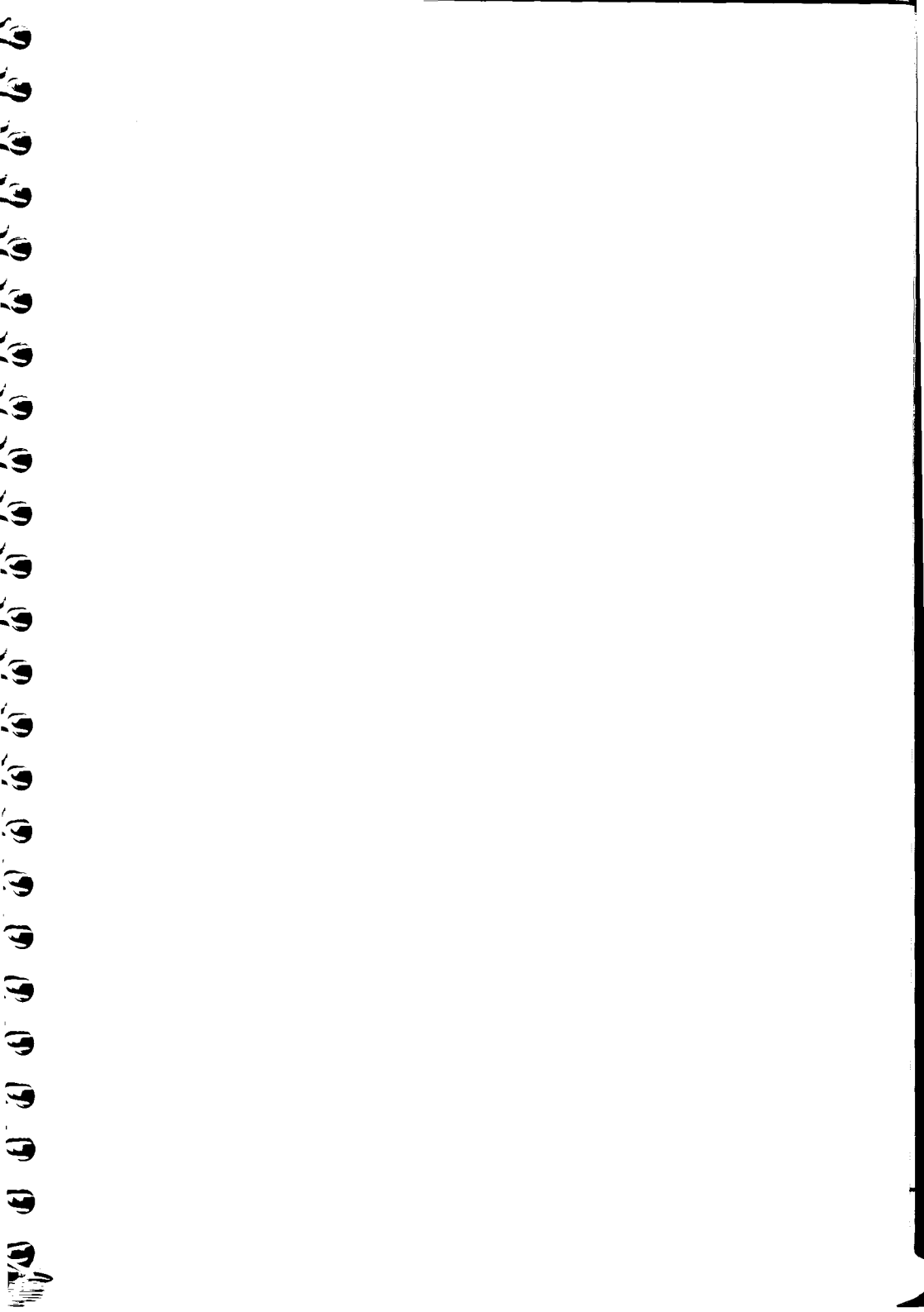
### BBC Microcomputer Model B+ and Model B

- (1) Before taking the chip from its protective packaging, identify Pin 1 on the chip. It is either marked with a dot on the top in the corner of Pin 1, or the semi-circular notch at one end of the chip identifies the end nearest Pin 1 which is on the left if the notch is held upwards.
- (2) Hold the ends of the chip between finger and thumb, and line up all the pins over the destination socket. Pin 1 and the notch should point towards the back of the computer casing.
- (3) Now apply firm pressure to the chip, but do not force it. When the chip is in place it may appear to be slightly raised. Check that all the pins have entered the socket and that none are bent out or underneath.









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