ACORN COMPUTER

Speech upgrade instructions

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The BBC Microcomputer Speech upgrade instructions

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Foreword

These upgrade instructions are for the use of persons fitting the speech upgrade kit to any model of the BBC Microcomputer. The speech upgrade kit should contain the following component parts (see assembly drawings).

1. These instructions.
2. The Speech System User Guide.
3. Speech synthesiser, IC – TMS 5220 (IC99).
4. Phrase ROM A, IC – TMS 6100 (IC98).
5. 15-way, single sided edgecard socket.
6. 15-way, single sided edgecard socket.
7. 10-way right angle wafer plug.
8. 10-way connecting lead with sockets fitted.
9. 100nF disc ceramic capacitor.
10. 100nF disc ceramic capacitor.
11. Stranded wire length 20mm.
12. ROM slot cover.
13. 100KOhm resistor.
14. 120KOhm resistor.

Read the following instructions carefully.

1 Introduction

1.1 General

The BBC Microcomputer main Printed Circuit Board currently stands at Issue 7. There should be no Issue 1 PCBs in the field, so this instruction booklet will only cover upgrading Issues 2, 3, 4 and 7. There are no track modifications required for the Issue 4 and 7 boards, whereas Issues
2 and 3 require various cuts and links. It is therefore important to identify the issue of the PCB before starting the work. The issue number appears on the PCB in the silk screen legend just to the left of the board centre. If you look there you will see:

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where X is the issue number.

1.2 Component location

It is also necessary to understand the Acorn notation for locating a point on the PCB. This is done by considering the board as a compass. Position the PCB so that the components are facing upwards and the IDC headers (PLs 8, 9, 10, 11 and 12) are closest to you. The edge furthest away from you (with the DIN sockets and modulator on it) is then *north,* to your right is *east,* to your left is *west* and nearest is *south.* Don't forget! When you turn the board over, east and west are reversed!

1.3 Replacing ROMs

The rules for when to replace the Operating System are simple. They are:

– If a machine has the OS 0.1 in four EPROMs then OS 1.2 in ROM must be fitted.
– If a machine needs a version of the OS higher than *0.1* (ie if additional ROMs are to be fitted, whether they be DFS, NFS, Speech, View or any other) then OS 1.2 in ROM must be fitted.

This should only leave the case where a straight Model A with OS 0.1 is being upgraded to a straight Model B. In this case the OS 0.1 ROM must not be replaced.

Note: Every attempt has been made to reduce the static sensitivity of the ROMs and other devices. As long as normal anti-static precautions are taken (eg avoid wearing or standing on materials like nylon) then there should be no problem. It is not necessary to have a full anti-static workstation with earthing straps etc.

2 Main PCB upgrade

2.1 Component insertion

Do not insert any ICs into the main PCB yet. These are fitted during the test procedure.

2.2 Setting the links

It is not necessary to reset any links for the speech option.

2.3 Modifying the Printed Circuit Board

The modifications to the PCB are detailed on the attached modification drawings.

Issue 2 and 3 PCBs

On the component side of the PCB:

– Cut the track between IC3 pin 16 and the through-hole 8mm to the west.
– Cut the track between IC3 pin 17 and the through-hole 10mm to the west.

On the solder side of the PCB:

– Link the through-hole 10mm to the west of IC3 pin 17 to IC3 pin 16.
– Link the through-hole 8mm to the west of IC3 pin 16 to IC3 pin 17.

These operations switch the signal lines to IC3 pins 16 and 17. Then on the solder side of the PCB:

– Cut the track between IC98 pins 13 and 14.
– Link IC98 pin 13 to PL14 pin 3 (0 volts).

Issue 4 and 7 PCBs

There are no modifications to these PCBs.

3 Keyboard PCB upgrade

3.1 Component insertion

Insert all the components as detailed on the keyboard assembly drawing.

3.2 Setting the links

There are no links to set on the keyboard.

3.3 Modifying the Printed Circuit Board

The modifications are needed on Issue 1 keyboard PCBs and are detailed on the keyboard assembly drawing. The issue number can be found at the top left-hand end of the PCB's solder side.

On the solder side of the PCB, cut the track between pins 14 and 15 of the edgecard connector. The pins are those furthest from the speaker.

On the solder side of the PCB, link pin 14 of the edgecard connector to 0 volts. This can be found on either of the capacitor legs nearest the centre of the PCB.

4 Testing the finished product

When the modifications are complete, four important tests *must* be carried out as follows:

1. Testing the ROM sockets.

— Reconnect the keyboard to the main PCB. Don't forget the new connector for PL14!
— With the computer turned *off*, test for continuity between the following points:

Edge connector pin number : 6 : 7 : 8 : 9 : 10 : 11 : 12 : 13 : 14 : 15

IC 98 pin number : 1 : 3 : 4 : 5 : 6 : 7 : 10 : 11 : 13 : 14

Note: On the edge connector, pin 1 is nearest the speaker, thus the polarising key is pin 3 and pins 4 and 5 are 'empty'.

Also check that there are no short-circuits between any of the edge connector pins.

Repeat the tests for the other edge connector.

2. Testing the speech chips.

— Insert ICs 98 and 99 as detailed on the main PCB assembly drawing.
— Turn the machine on and type:

REPEAT:SOUND-1,GET,0,0:UNTIL0 **RETURN**

Now press any key and you should hear the voice synthesis operating. If the pitch is wrong, follow the instructions in 3 below.

If there is no speech, double check the modifications and try again.

3. The pitch of the speech must be set. On Issue 4 and 7 PCBs this is a simple matter of adjusting VR2, situated just west of IC98. On Issue 2 and 3 PCBs the resistor R32 (between ICs 98 and 99) may need to be changed to achieve the best result. Two spare resistors of different values are supplied in the upgrade kit. The method for setting the pitch is

to connect a frequency meter to pin 3 of IC99 and to adjust VR2 until the meter reads 160KHz (± 100Hz), or as close as is obtainable by changing R32.

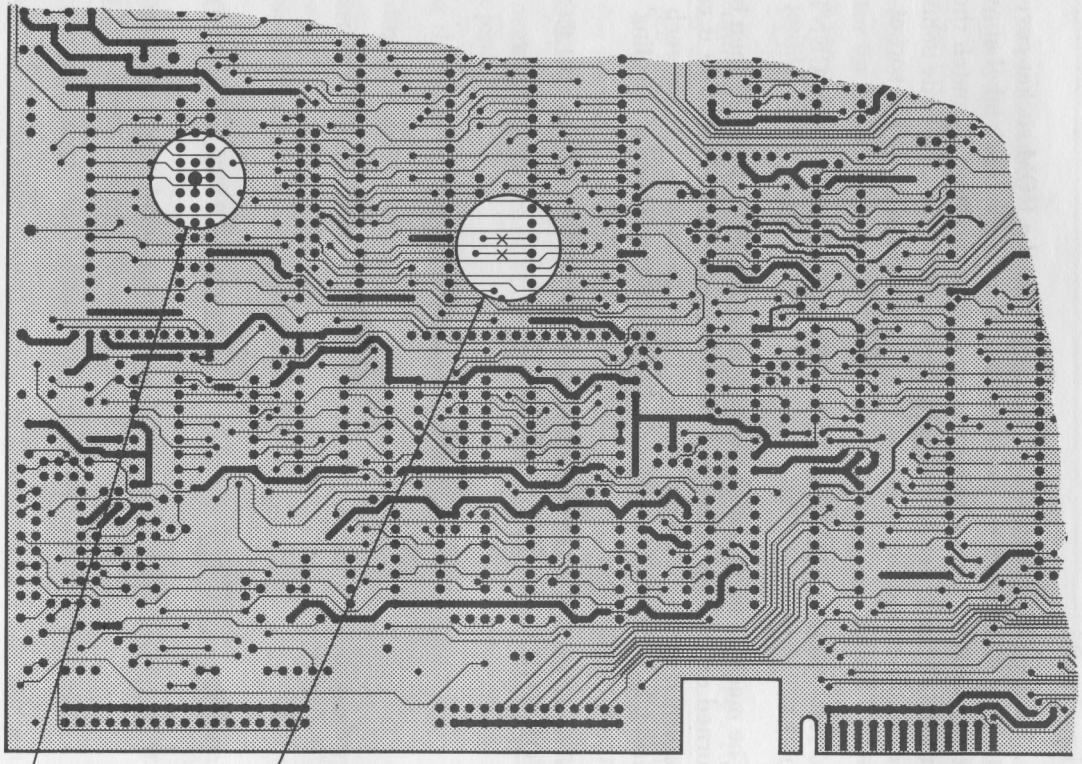
4. Reassemble the machine. Before fitting the ROM socket cover into the case lid remove the perforated section of the black label above the ROM sockets. It may be necessary to trim the label to match the case cutout. For early version cases (without a rib on the underside behind the keyboard cutout), remove the two small lugs on the ROM socket cover before fitting.

5. Note: FOR DEALERS AND APPROVED SERVICE CENTRES ONLY.

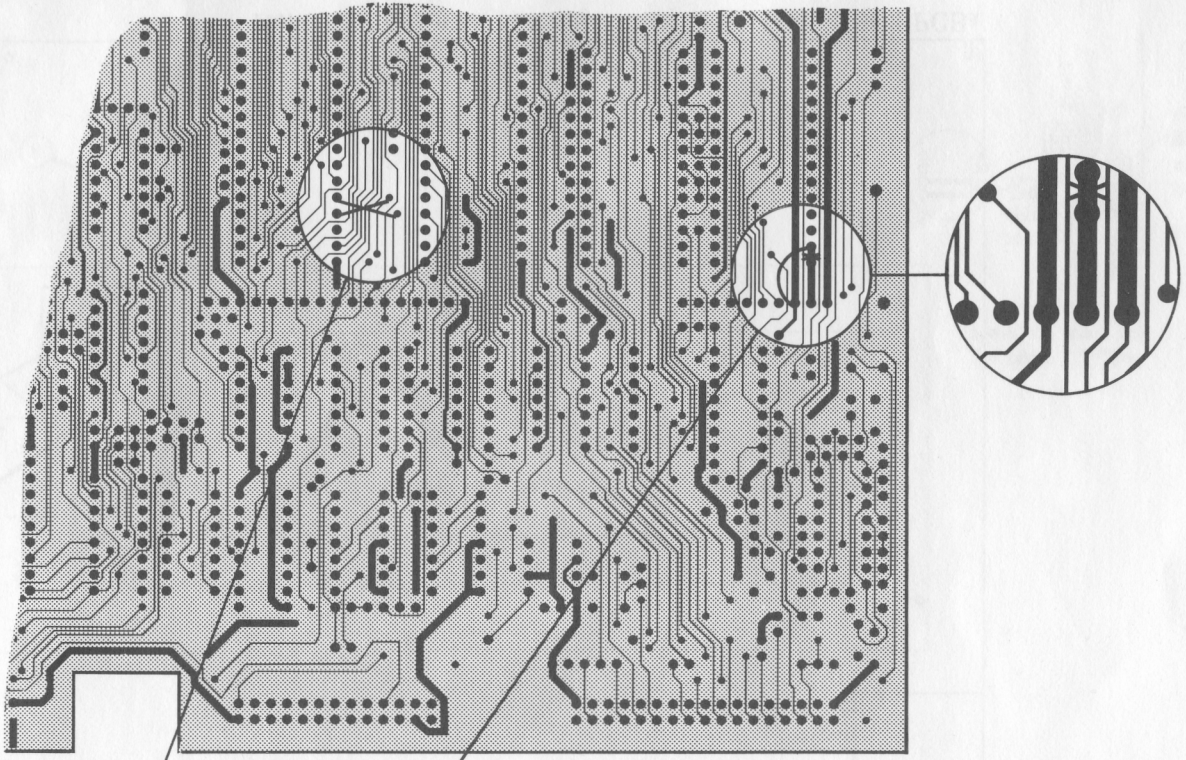
The machine must then be tested using the FIT. It should then be left turned on for four hours and re-tested using the FIT before it can be returned to the customer. The PET may be used with the speech chips fitted, but the two sound checks (E 1 and E2) will have a 'warbling' noise superimposed over the normal sound generation.

Note: ENSURE THAT THE CORRECT FIT TEST IS SELECTED FOR THE COMPUTER BEING TESTED.

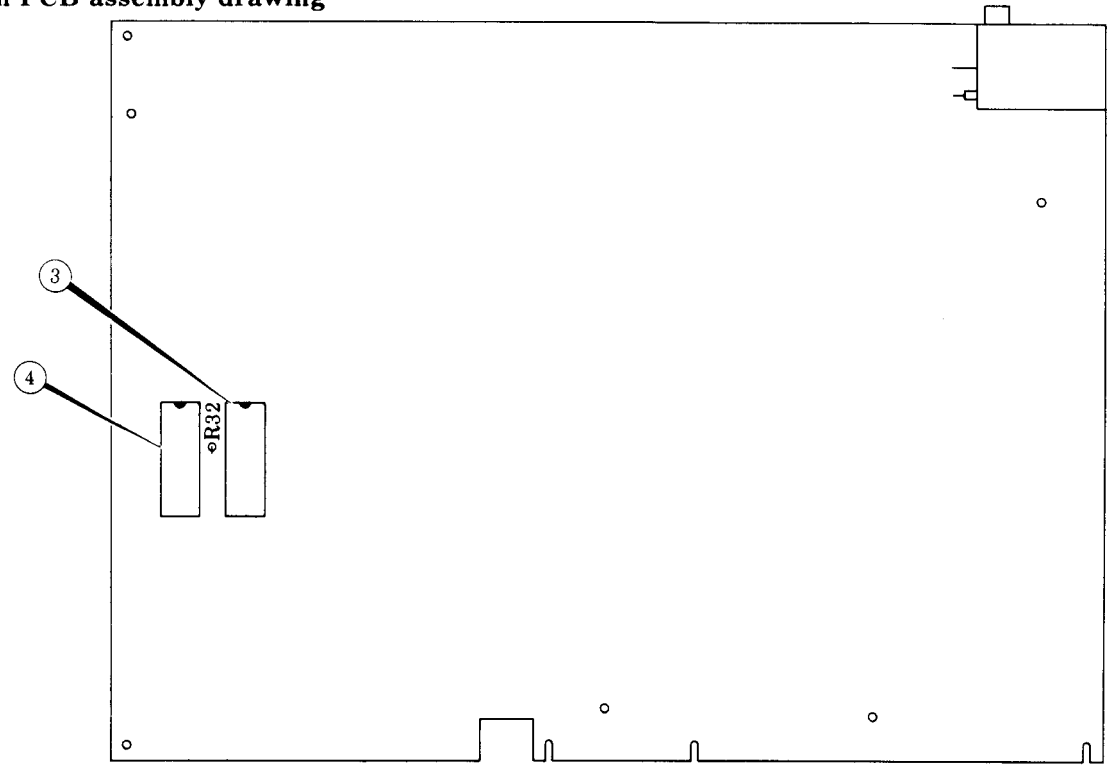
Main PCB component side modification drawing



Main PCB solder side modification drawing



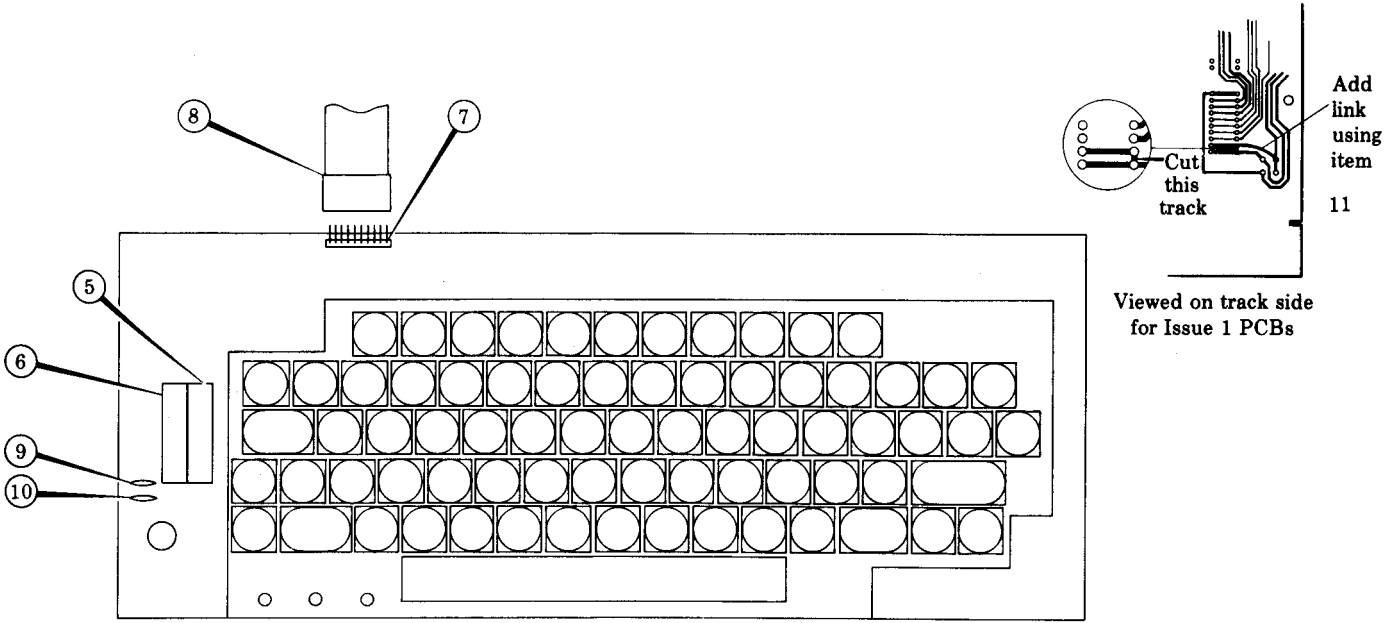
Main PCB assembly drawing



Note: R32 select on test item 13 or 14 for Issue 2 or 3 PCBs.

Numbers refer to parts listing – see Foreword.

Keyboard assembly drawing



Numbers refer to parts listing – see Foreword.

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