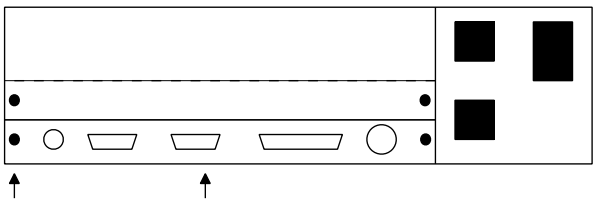
Fitting the RISC OS carrier board to an A305, A310 or A440

The A3000 and 400/1 series computers are all capable of having a new, larger version of RISC OS fitted very easily, because the necessary address lines can be routed through to the sockets by means of links. The purpose of this board is to similarly allow a replacement ROM set to be installed in an A305/A310 or A440. It is compatible with memory upgrades, provided that it will physically fit. (A310 RAM boards from Watford Electronics do require some modification however - contact IFEL for details). Installation will necessitate the removal of the main PCB. A small amount of soldering is required too, and this alone may invalidate any warranty on your machine. Because fitting is beyond the control of IFEL, no responsibility can be accepted for any loss or damage the circuit board. **These can cut through tracks completely, so beware.**



Rear view of the computer showing the positions of the screws locating the metal plates. The arrows indicate the location of two

Important. Examine the carrier board itself. It may appear to be damaged, or incomplete in that not all the pins are soldered. This is deliberate. The only pins which need to be soldered are the ones at either end, and any others which have a track leading to them. *Pins marked with a small cross are intentionally snipped off, so please do not return it as defective!*

1 You must start by removing the main PCB from the casing. Disconnect the computer from the mains, and remove the five screws locating the lid. Three are located along the rear edge at the top, and the remaining two at the side. Take off the lid and place it aside. (It slides off to the rear. Sometimes it helps to spring the sides outwards slightly, to prevent it from gripping the rest of the case).

2 Remove any expansion cards which are present. This normally involves removing two screws in a metal plate at the rear, and the card can then be unplugged from the backplane. Sometimes there will be cables attached to the card, and these will have to be detached first. Make sure you make a note of which one goes where, and exactly how each fits. Connectors are often "polarised", so that they cannot be connected incorrectly. The backplane itself should be removed by undoing the two screws attaching the metal bar to the casing. It should be possible to simply lay the backplane on top of the power supply without disconnecting the power cables from it.

3 The main PCB must now be taken out, and you have a choice of sliding it out either forwards (ie under the metal drive support) or backwards. It does not matter which method is selected, and it is really a question of personal preference. The are slight variations in the way that the machines are put together, and this can influence the "best" way of doing it. (Taking the board out under the drive bar is easy enough. In brief, you would need to undo the six hexagonal fasteners which secure the circuit board to the back panel, and remove the front facia by taking out the five self-tappers. Note that sometimes you will need to desolder the two wires connected to the "Mono video" output.) But we assume here that the board will be removed from the rear.

4 Accordingly, locate the metal plate at the rear face of the computer (the one with eg "Mono Video" and "Analogue RGB" written on it). Take out the two bolts at each end of this plate. Also remove the metal plate immediately above this one by taking out the two securing screws. Of course, this will not be necessary if there were originally some expansion cards in this position.

5 Important. Two self-tapping screws should now be taken out, and the next diagram shows their approximate position. The purpose of this step is simply to ensure that the sharp ends cannot damage

6 Various leads now have to be disconnected from the PCB, so that it can be completely removed from the rest of the machine. A general guideline is always to pull on the connector itself, rather than tugging at the wires. First of all disconnect the four leads from the power supply to the circuit board. They are normally coloured purple (-5V), red (+5V), black (0V) and yellow (+12V). The computer will probably be ruined if they are reconnected incorrectly, so make a written or mental note of the connections. Also disconnect the following; a) the short piece of ribbon cable joining the PCB to the floppy drive, b) the battery nest, and c) the connector which joins the group of 4 wires emanating from the front panel to the main circuit board. Finally, unplug the fan connector if appropriate. HINT. Sometimes the fan connector is covered by the hard disc making access difficult. If this is the case, then either unbolt the hard disc or, more simply, wait until the board is being manoeuvred out of the computer.

7 Examine the method used to support the board in the computer. At the time of writing there are two known systems, one being white plastic "runners", and the other being spring loaded pillars protruding through holes near the edge of the board. To free the latter, you will require a pair of fine pliers to squeeze the tip together, while at the same time pulling the board upwards slightly. HINT. One of the pillars is between the RISC OS chips and the backplane connector, and as such is rather inaccessible. Nevertheless it is quite simple to release, providing you have a suitable pair of pliers. Scrabbling at it with the wrong tool can easily lead to damaged tracks on the PCB.

8 It should now be possible to carefully ease the board rearwards out of the casing. Watch out for components catching on corners or edges. Some boards have a small plastic support pushed through a hole in the middle, and this should be removed. You are now ready to install the carrier board.

Installation

1 Identify the four RISC OS chips. These are arranged next to each other immediately behind the long white backplane connector. Observe carefully how they are fitted into the sockets. Each chip has a notch and/or a stripe down one side to indicate the polarity, and the component will be ruined if it is reinserted incorrectly. The notch should be pointing to the rear of the machine and the stripe, if present, should be to the left when viewed from the front of the machine. Furthermore the chips are not identical, so be sure to note the correct order. The devices do in fact carry a unique number on them.

2 Carefully remove these four chips. A popular method is to use a flat screwdriver for this purpose. This is entirely acceptable

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IFEL, 21 Glenfield Road, Glenholt, Plymouth PL6 7LL. Tel (01752) 777106

providing care is taken. Work cautiously, easing one end out slightly, then the other. Be careful not to damage tracks on the main board.

3 Take the main PCB and arrange it so that downward pressure can be applied to the RISC OS sockets without bending the board. Now align the pins of the carrier board over the empty sockets. The set of links should be on the left when viewed from the front of the machine.

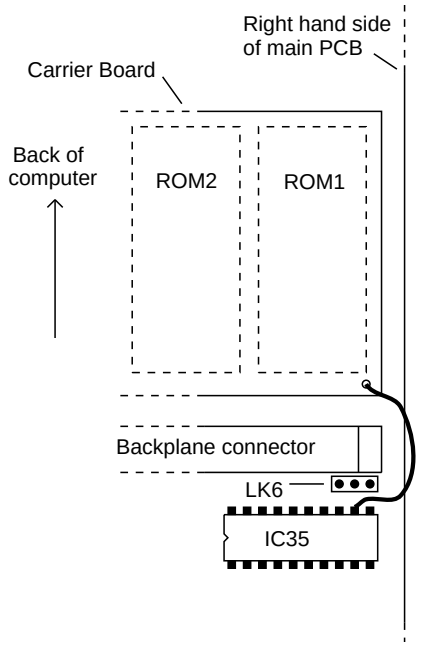
4 Push the carrier board into the sockets. Both the carrier board and the main PCB are fairly robust, but neither is unbreakable. A certain amount of common sense is needed in order to judge exactly how hard to press. You should be aiming to get the thick/thin junction of the pins roughly level with the top of the original RISC OS sockets, and preferably a bit below. A good rule is that the bottom surface of the RCB should be no more than 7.5mm from the top surface of the main circuit board. View the RCB from different angles to make sure that it is in evenly. Pressing down with a small block of wood can help to even out the force (or indeed localise it as required). There is a small capacitor between two of the sockets on the main PCB, and this may need to be bent out of the way. Something else to watch incidentally is the leads of the components on the solder side of the board. These are often bent over, and it is possible that the downward pressure could bend them even further and cause a short circuit. It is up to you to make sure that this does not occur. The work surface should ideally be slightly resilient to minimise this risk.

5 Locate IC28, very close to the end of the white backplane connector. It is marked 74HC573 or similar. Solder the yellow, white and green leads to pins 18, 17 and 16 respectively. It is probably easiest to attach them in the order just given. The leads are normally far too long, and they should be trimmed to something more suitable. The wires should not be taught, but on the other hand an excessive length looks messy. If you are not familiar with the numbering on ICs then the diagram below will help you. It goes without saying that you must be very careful not to cause any shorts during the soldering process, and remember that these components are sensitive to excessive heat.

6 This step is optional. The carrier board is capable of accommodating ROMs up to 8M bit capacity. RISC OS 3 is currently supplied on 4M bit ROMs however, and it is only necessary to attach the green, white and yellow wires in order to use RISC OS 3. In other words, if you simply want to use RISC OS 3 and do not foresee upgrading again, then you can go straight to step 7.

It is possible of course that RISC OS 4 might eventually be released. This could be supplied on 8M bit ROMs, and the RCB has been designed to allow for this possibility. It is only necessary to wire in another address line, and this is done by connecting pin 12 on IC35 to the hole marked A21 on the carrier board. The

8M ROM option.
This diagram shows part of the RCB and backplane connector. IC35 is immediately in front of the latter. Use a short piece of wire to join pin 12 on IC35 to A21 on the RCB. The connection to IC35 is a little awkward, due to the presence of LK6 nearby. It helps to remove the link before attempting to solder the wire.



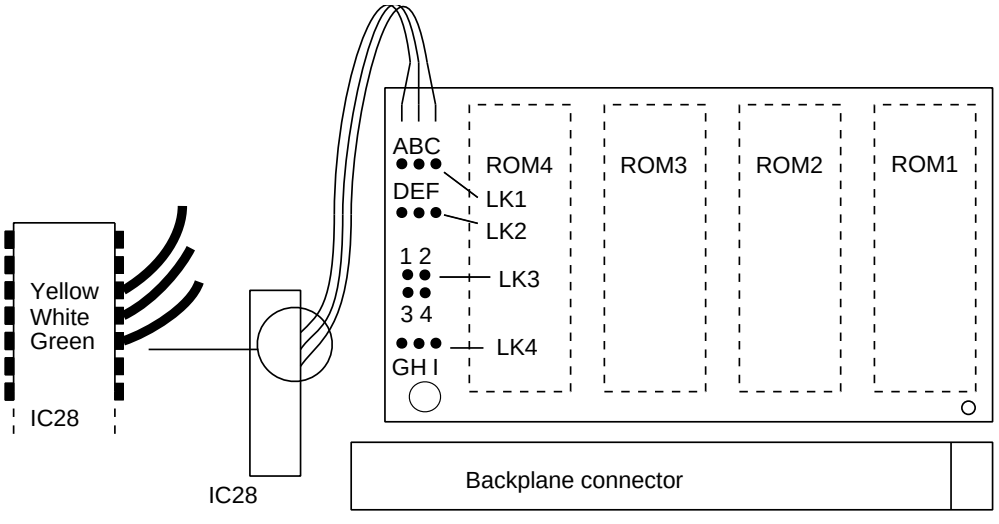
7 Put the main PCB back into the casing. Push the four RISC OS chips into their sockets, noting the correct polarity and order. Observe also that the original 28 pin chips leave two unused holes in each row, and these holes face the rear.

Link settings.

Link settings are very straightforward (but ignore any reference to link 12 in the Acorn fitting details). The general idea is that any pin may be joined to its immediate neighbour by means of a "jumper". For instance, pin A could be joined to pin B on link 1, and would be indicated by A-B. These are the most common

OS type	Link 1	Link 2	Link4	Link 3
RISC OS 2	B-C	E-F	H-I	1-2 and 3-4
RISC OS 3	A-B	D-E	H-I	1-3 and 2-4

Important. Some carrier boards have 5 capacitors on them (1 under each ROM and another by link 4), and these must be removed when using 32-pin chips. If you do not have a suitable pair of cutters, this can be done by rocking them to and fro until



ROM type (Link 3)

512K EPROM, non JEDEC
1M ROM/EPROM
1-2,3-4

JEDEC 1/2/4/8M

Size	LK1	LK2	LK4
512K	B-C	E-F	H-I
1M	B-C	E-F	H-I
2M	B-C	D-E	H-I
4M	A-B	D-E	H-I
8M	A-B	D-E	G-H

IFEL, 21 Glenfield Road, Glenholt, Plymouth PL6 7LL. Tel (01752) 777106