14 Carlton Road Romford Essex RM2 5BD Telephone Romford 64954

COMPUTER USER AIDS

HI RES! HI RES!

The High Resolution Board is made for easy connection to any UK101 or Superboard computer (and later to Video Genie, TRS 80 and many other micros). The board represents a turning point in the availablity of software for the UK101 as it allows the easy conversion of High Resolution software to suit this machine.

Connection is made via a suitable 40 pin Jumper (not supplied) to the expansion port J1. The machine is not affected in any way, current expansions (Graphics, Sound etc.) are not made redundant as the board simply appears as a further 6K block of Ram. To be truly ACORN ATOM compatible the board resides at 8000 Hex so ATOM software can be easily converted.

The board offers the following features:-

* Four different alphanumeric modes
* Reverse Video on all alphanumerics
* Eight graphic display modes
* 64 x 64, 128 x 64, 128 x 96, 128 x 192, 256 x 192 graphics modes
* 6K on board low power RAM. (6116 based)
* Complete software control via on board PIA

Obviously with a board of this type software backup is essential and in the long term this decides the eventual value for money of the system. CUA has already started the conversion of ATOM software to work with the UK101, the latest being ATOM INVADERS a superb machine code game that acts as a great demonstration of the software that now becomes readily available for the UK101. Unlike other software for the UK101 this uses HI RES to the full, with optional colour if a modulator is later fitted.

APPLE software can also, in many cases, be converted to work with the new system.

If you would like to order one of these units then please fill out the form below, although we will endevour to fulfill all orders as quickly as possible please allow up to 14 days for delivery.

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THE HIGH RESOLUTION BOARD

The impressive list of features that the board can offer have been achieved by the careful use of the latest Ram chips and video display generators. The board is based on the well known 6847 IC that takes care of all the picture production etc. As you may already know this chip is used by the Acorn Atom to achieve all its graphic and alpha numeric displays. Because we have used this IC it means that it will now be possible to convert Acorn Atom programs for use on the 101, obviously there will still be some differences between the software but wherever possible we have tried to keep our new system as Atom standard as we could. There have to be some differences as we have said and these are basically the location and use of the PIA chip in order to control the display formats and the keyboard and its decoding. These problems being known it should prove to be an easy task for any experienced machine code programmer to alter the minor amounts of code that have to be changed. BASIC programs will present less of a problem and we hope that everyone will be able to take these and use them on our HI RES system.

As the boards have been produced we have found that the entire system is going to be much more flexible than we had initially imagined, the use of the board and its features will take a lot of time to be fully explored, we would be grateful for any details you may give us on your own developments and applications, we can add these to the relevent articles in the newsletter. We have already started work on the Colour board and this too appears to be more 'interesting' than we first thought as we produce this and other software or hardware for the system we will keep you informed.

CONNECTION TO YOUR COMPUTER

Refering to the component layout place the board with the J1 socket to the left of the board. The J1 plugs directly into the expansion socket in the usual manner, the 8T28 chips should be connected on the UK101 in order to allow the correct passage of data to and from the HI RES board. If these are not fitted then they could possibly be linked out across the data lines, there is an 8304 data bus buffer on the PCB and this will provide suitable buffering if this is the only addition to your machine.

Having connected J1 now hook up a suitable 5V power line to the board. The input is on the top of the PCB and a seperate OV line is also provided so that an external PSU could be used if you wish. If not then the power can happily be provided by the UK101 and could be taken from the main board at any convenient point.

Finally you will have to connect the video output from the UK101 to the HI RES board and then connect the HI RES board to your monitor or modulator. The video input comes from pin 12 of the J2 expansion socket and goes directly to the pin marked IN on the board. Screened cable should be used here and for all other video connections.

IF YOU HAVE A MONITOR then you merely take the monitor line to the pin marked OUT on the PCB. No other connections are required.

IF YOU HAVE A TELEVISION then you will have to take the video output from the board and connect it to the modulator. This also invloves breaking the video connection to the modulator and this is simply achieved by either cutting or desoldering the pin indicated in Figs C & D and connecting the new video output to the input of the modulator. Again these are all the connections that are required, all timing, decoding and switching is taken care of on board,

SWITCHING IT ON

Briefly check the connections once again before turning on the power,

you should be able to RESET the computer with or without the HI RES board connected. You will notice that it is now possible to switch between the two video displays using the switch on the board. There may be some differences between the two sync pulses so you will probably have to adjust the horizontal control of your Monitor or TV in order to hold the picture steady.

As soon as you have done this try loading the demonstration software.

THE DEMONSTRATION TAPE

This is recorded at 300 BAUD and contains three seperate programs, the first is a short machine code routine that provides the board with PLOT and CLEAR SCREEN facilities. It is loaded using RESET ML in the normal way. After this you can RESET and in BASIC load the program supplied. When you run this you will have to switch to the High Resolution screen so that you can see exactly whats going on. The display should clear and the first program draws a 3D pattern. This program takes a long time to complete (about 10 minutes) so don't expect to see the pattern to develop for a while. The time taken is not because of the speed of the plot command but merely the number of calculation that BASIC has to do in order to calculate the points. After waiting you should see the 3D pattern quite clearly, the mode used is the highest resolution and indicates the type of display you can generate. Having produced this pattern the program immediately drops through to the next piece of software, a simple Etch a sketch. Pressing key 5 will switch the board through its various display modes, the other commands are shown below.

Key 1 = Move line left

Key 2 = Move line right

Key 3 = Move line up

Key 4 = Move line down

Key 5 = Switch to new graphic mode

Key 6 = Clear screen

Note that the program is only checking for the line moving off screen and when it does so it just RUNs the program again. This of course starts off the whole 3D drawing again so either don't go off the edges of the screen or change the RUN command to a RUN9000!

Obviously the software provided is only very simple and indicates only a fraction of the capabilities of the board. The boards have only been produced recently and we are currently finishing the HI RES plot and DRAW commands to suit this new version of the board. These commands will give you the remainder of the commands to get the system completely Atom compatible. We will, of course, release this new software just as soon as we can.

The original machine code program that you loaded in is also a utility for use in your own programs. These are called by using the USR command in BASIC and uses three locations to hold the various vectors required. The utility supports the following features.

a) Plot command on any HI RES screen using X,Y Coordinates

b) UNPLOT or INVERT again using X and Y

c) Clear screen

d) Set or Unset check, for usein machine code programs.

The vectors are as follows.

X position @ 02F3 hex or 755 decimal

Y position @ 02F5 hex or 757 decimal

and the various commands in 02F1 or 753 decimal. Storing 0 here sets the PLOT, a 1 sets the Invert and a 3 sets a clear screen.

The routine is called by a USR jump to 02F0, ie. POKE11,15x16:POKE12,2 and then X=USR(X) when the vectors have been poked as required. The simple Etch a sketch should indicate the use of this program quite clearly, this being located from 9000 onwards in the Demonstration BASIC program.

MEMORY USAGE

As you can see the board contains three 6116 Rams, these being 2K by 8bits in structure. This of course means that 6K of space is required for the Ram on the machine. A further 2K is also taken for the on board Eprom, although this is not implemented in the board as it is supplied. The PIA is located within the top 15 bytes of this Eprom so the entire board may be considered to occupy an 8K block from 8000-9FFF in hex. This is 32768 and 32768 + 6144 in decimal. The memory usage is arranged in the same manner as the original UK101 screen in that the top of the screen is the lowest screen address and it works its way down to the highest address at the bottom right hand corner. You can use the Ram in exactly the same manner as any other Ram on the UK101 and the HI RES process is completely invisible to the machine itself. Exactly as the 101 display the screen is arranged as a row of bytes, 32 per line. In order, therefore, to decend by one line you add 32 to your current screen location and the POKE in your new character. Obviously working out the bits in every character is going to be quite a job in itself so we provide the utility to make things easier. As you will see there are 192 lines down the full HI RES screen, with32 x 8 bits on each line this gives us the HI RES display mode of 256 x 192 possible points. All or none of these points may be set at one time. When using the utility you will be able to utilise the entire 6K of Ram on the board. You will also see that it is possible to PLOT off the screen when using some of the lower resolution modes, this is possible because the chip automatically limits its Ram usage to cater for the resolution required. In order that the BASE position stays the same the bottom pages of the 6K are removed as they are no longer required. The data stored there is still valid and may be recalled to the screen by switching to a higher mode, but watch out for the Clear screen as this simply clears the entire 6K block of Ram.

Some users may wish to relocate the board at some stage, doing so will

prevent the board from being Atom compatible any longer, however if this is not important the method of relocation is described later.

DISPLAY MODE SETTING

As mentioned there are various display modes that can be called by the User in his/her own programs. There are some 20 or so different modes and these are all set using the on board PIA. The address of this chip is 9FF0 hex or 40944 decimal. To change the display modes you simply alter the data at this location, the PIA latches this data onto the 6847 chip and this in turn alters the display format as required.

Not all of the outputs of the PIA are actually connected to 'useful' lines on the 6847 and there are 8 ports that are not utilised at all. These could be used later to provide the HI RES board with further software control if you want. There is plently of flexibility left for the user, and to get the best from this device you will require a data sheet for the 6821. For our purposes it is sufficient to know the connections that are used and their functions with regard to the final display that we achieve.

Assuming that you are POKEing various values into the 40944 location you will be able to alter the display as follows:-

Bit Ø = Selects between two alpha display colours or between two colour sets in semigraphics 6 and full graphics. (Colours appear as grey)

Bit 1 = Together with Bit 2 and Bit 3, these control the eight graphic display modes.

Bit 4 = Inverts in all Alpha modes

Bit 5 = Selects between alpha and semigraphics in alpha mode

Bit 6 = Switches between alpha and graphics modes ('1'4'0')

Bit 7 = Field Synchronization, goes low at the bottom of the active display area.

They are all fairly straightforward in use and you can easily get the hang of the modes and their possible combinations by POKEing the different

bit patterns into the PIA location. The only 'non onvious' bit is the FS one, the line is not an input but rather an output from the 6847 itself. This is used for timing your screen moves and POKES to coincide with the fly back period of the television scan. To do this takes a lot of intricate programming and requires the computer to wait for this bit to go low before carrying out the screen movement. The advantage of this being that the noise that you normally get when pushing a lot of data to or from the screen is reduced significantly. This can also be used for timing anything you may require to be put to the screen within a nominated period. The bit is often used within Atom programs in order to keep screen noise down to a minimum.

CIRCUIT OPERATION

The board, as you will now be aware, is centered around the 6847 chip itself and as we have mentioned this takes care of all the actual display. The Ram is also available to the UK101for use in the usual way so the two processors have to be seperated in some way, this is achieved by the use of an address and data bus buffer set, made up of two 81LS95s and a single 8304 IC. These are taken control of by the UK101 when it needs to place information in the Ram, or for that matter read it out. The 8000 address is decoded by means of one 74LS138, IC6.This is further decoded into 2K blocks by the use of a further 74LS138 on the other side of the buffers. Buffer timing etc. is produced by the use of ½ a 74LS139 and this combined with a couple of nand gates also provides a pulse that interrupts the 6847 whilst a data transition is occuring. In all situations the 101 has priority over the 6847 and so it is quite possible to stop the IC whilst it is half way down the screen, for this reason a field sync output is provided from the 6847.

The PIA requires its own decoding an in order to keep the chip count low and the entire memory map within an 8K block this is decoded by means of virtually a single chip, 74LS133, to the last 15 addresses of the

board. It only actually requires 4 addresses rather than 15 but we couldn't think of a better or cheaper way of implementing this on the board, within our memory space restrictions.
The video output is taken from the 6847 via a simple amplifier consisting of two BF241 transistors. The final output is sent in turn to a changeover switch so that it can be alternated with the existing UK101 picture. We had intended to use 7475 data bus latches in place of the 6821, however, with the FS requirement this was not possible. As a result you have a selection of spare I/O lines for your own use.

RELOCATION OF THE BOARD

The problems associated with the relocation of the board are twofold, the hardware change and the software conversion. All references to the memory map and software switch must be altered in any program, this as has been pointed out this will prove to be a problem if you later need to alter Atom software.
The hardware changes involve switching the address lines to suit your new location, it would be nice just to take the new location from another point on the main LS138 but this unfortunately decodes addresses in the 8000-FFFF range which is really not a lot of use to UK101 users if they intend to keep BASIC in Rom etc. The answer lies in feeding a different address line to this ls138 and to the LS133 for the PIA address as well. This is obviously dependent upon where you wish to locate the board. Try the board at its current location and if you find that there are some compatability problems then you may wish to carry out this address modification. If you do then you can contact CUA for some further technical help with this.

THE PICTURE

The display produced by the board is Atom in shape and size and may

not happily switch between the 101 when feeding into your television. With monitors the problems tend to be much less obvious as the monitor is more tolerant to picture changes. In some cases you may need to alter the output of the HI RES board in order to cater for rounding difficulties in your modulator and Television. This may be achieved by fitting a preset potentiometer between the negative side of C2 and the top of R5 on the HI RES board, this will allow you to tune in the picture and to compensate for any differences you may find.

There are some precautions that you should take into account when setting up your new system.

i) Keep the board well away from magnetic fields, especially the transformer, mains cables and other sources of hum.

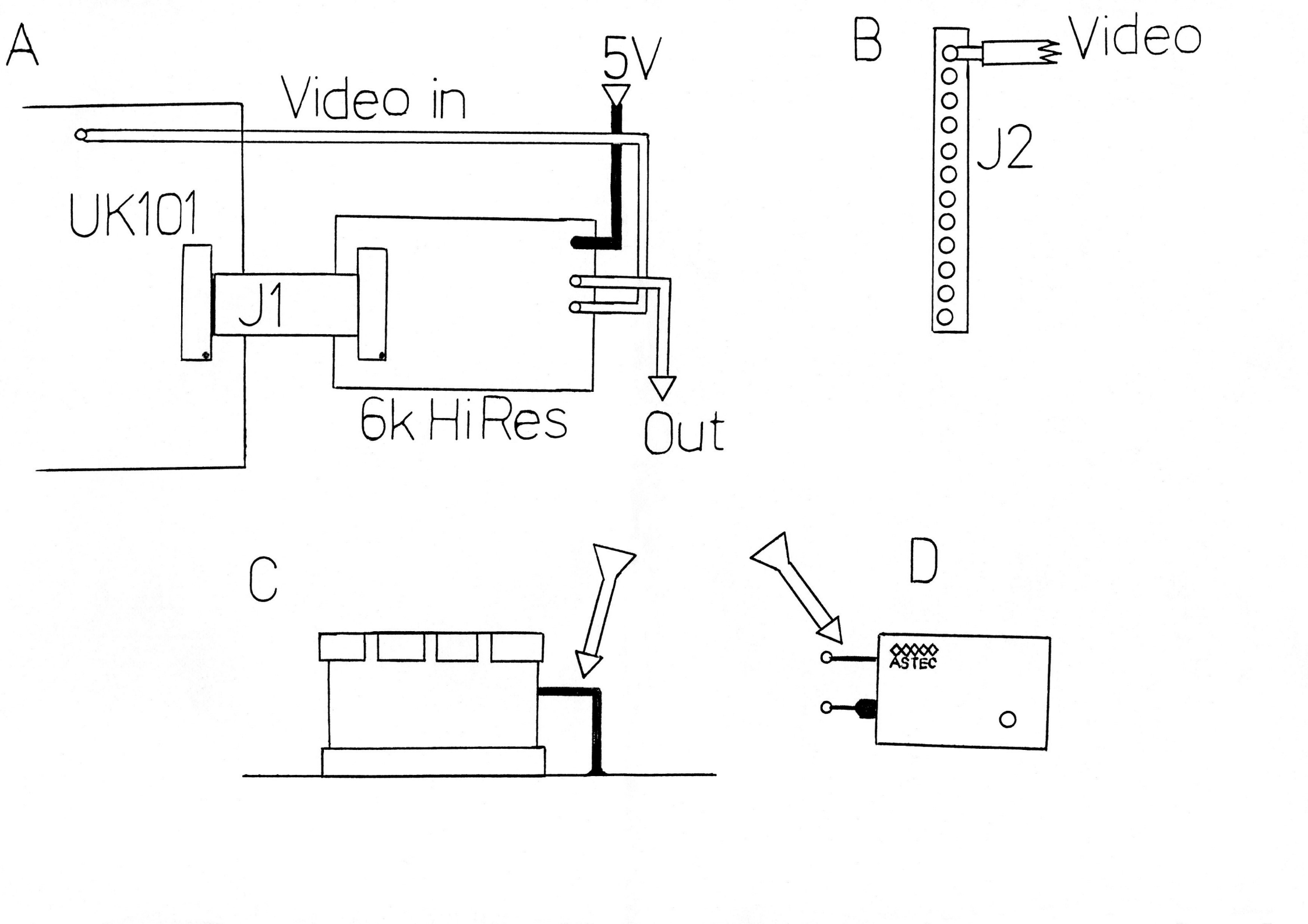
ii) Try and keep the video leads as short as possible, screened wherever you can.

iii) Remember that the Television has to switch from a single on bit to an off in a very short period of time. With non HI RES graphics the blurring that occurs will be hardly noticeable, however, with a high resolution picture tha amount of information being displayed is far more complex. For best results you really should use a monitor.

FUTURE EXPANSION OPTIONS

As we said at the start the board has so many possibilities that over the next few months we hope to produce further hard/software additions for this particular board, the most important being the population of that 2716 socket with the remainder of the PLOT, DRAW routines. A colour board is also important with a possible 16 colour option.

Software in the form of atom converted programs is possible and with many published HI RES programs, even from the Apple and others,conversion should be fairly straightforward.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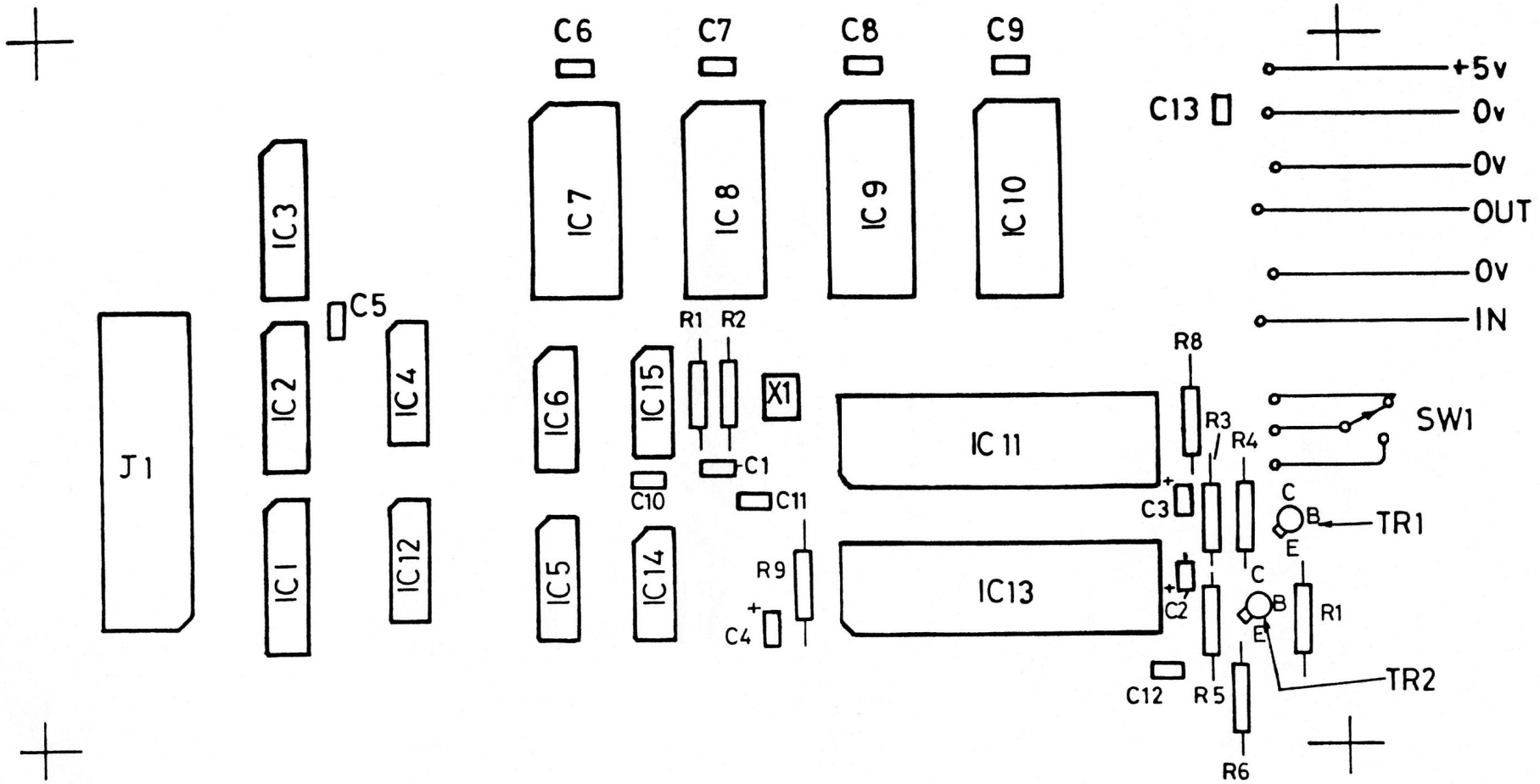

COMPONENT LAY-OUT CUA HI-RES BOARD