

HARDWARE AND INSTALLATION DETAILS

ArVis Videographics System

ARVC2 AND ARDG2 Expansion Cards

HARDWARE & INSTALLATION DETAILS  
For the ArVis Videographics System  
ARVC.2 AND ARDG.2 Expansion Cards

**HARDWARE & INSTALLATION DATA**  
**For the Arvis Videographics System**

Release 1.03

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Fig.1 Interconnections between ARVC2 & ARDG2 expansion cards

## **ARCHIMEDES 305/310/440 -- INSTALLATION OF THE GENLOCK HEADER PLUG**

### **1.1 INTRODUCTION**

The Archimedes computer was designed with an interface for connecting to video genlock and video mixing hardware from third party manufacturers. This hardware is required in order to synchronise and mix the computer generated images with video images.

The interface is via header plugs PL3A and PL3B on the main circuit board.

All production Archimedes are fitted with the 4 pin header PL3A -- this has two jumper links as shown in Fig.1. -- but unfortunately PL3B (10 pins) may not be present in the case of some production units.

The following notes indicate the procedure for fitting PL3B. Please read through them carefully before dismantling the machine -- this work should only be carried out by a competent person.

### **1.2 WARNING**

Before the main board can be removed from the machine the battery lead to the CMOS RAM has to be disconnected -- this will result in loss of the data so it is essential that an accurate record is made of ALL the configuration settings.

The original configuration settings should be listed using the \*STATUS command so that they can be restored to their initial settings after re-assembling the machine. (NOTE - a utility programme is available for reading and restoring the CMOS RAM contents. A copy of this programme will be found on the disc supplied with the ArVis videocontroller board - please refer to the document provided with this disc.)

Switch the machine OFF at the computer and power socket and remove the mains power cord BEFORE removing the cover of the computer.

Do not allow any wires or objects to enter the ventilation holes of the power supply unit.

### **1.3 DISASSEMBLY**

Remove the keyboard cable and any other signal cables and also the monitor lead. Remove the two screws at the front sides of the cover and the three screws holding the cover to the top of the rear plastic moulding. The cover can then be slid off rearwards.

Remove any expansion cards (modules) if fitted and also any blank panels at the rear of the unit. Remove the two screws securing the main board connector panel and also the backplane if this has already been fitted. The main printed circuit board will now be visible as shown in Fig.2

Unplug the four low voltage power leads (RED,YELLOW,BLACK,PURPLE) from the push on tags on the main board. Unplug the audio speaker lead, the fan lead, and the CMOS RAM battery lead from the edge of board next to the power unit. Carefully unplug the floppy disk drive ribbon cable from the main board and also the ribbon cable to the hard disc drive if this is present.

Early production Archimedes supported the main board on nylon pillars -- ease the main board upwards from the nylon mounting pillars (the top of these may need squeezing gently with pliers to disengage the 'barbs'). This is not necessary for later units which are fitted with grooved supporting blocks at the left and right board edges.

Once the board is free of the pillars (if fitted) carefully remove the board backwards from the machine.

#### **1.4 FITTING PL3B**

Locate the position of the mounting holes for PL3B as in Fig .1

It may be necessary to remove surplus solder from these holes before attempting to insert the 10 pin header plug. This must be done using a clean low wattage soldering iron with a fine bit and a proper desoldering tool or ideally using a specialised desoldering iron with a hollow tip and vacuum pump•

Take care not to damage the plated through holes on the board and to avoid any molten solder splashing onto the board.

The 10 way connector PL3B can now be inserted into the top component side of the board (long legs upwards!) and soldered in place at the rear of the board -- again taking great care not to cause solder splashes or solder bridges between adjacent pins.

Do not remove the jumper links from PL3A at this stage -- the machine should be re-assembled and checked for normal operation BEFORE connecting the genlock system.

#### **1.5 RE-ASSEMBLY**

Refit the Archimedes main board into the case ensuring that the board seats onto the nylon support pillars. Reconnect the disk ribbon connector(s), the fan lead, speaker lead and CMOS RAM battery lead.

Push the low voltage power lead connectors onto the tab terminals on the printed circuit board -- take great care to ensure the correct connections --

(RED = +5V.) (YELLOW = +12V.) (BLACK = 0V.) (PURPLE = -5v.)

The machine should now be checked for normal operation before installing the backplane and any other genlock or expansion modules. This will require reconfiguring the machine to restore the settings of the CMOS RAM.

## **1.6 RE-CONFIGURING THE CMOS RAM**

Reconnect the monitor lead, keyboard lead and power cord. Hold down the 'R' key of the keyboard and keep this pressed whilst switching the Archimedes ON at the power unit.

This will reset the configuration status of the computer to its original factory settings but may not necessarily display a picture correctly -- in this case switch OFF and then with the 'R' key down switch ON again. (Every time the machine is reset the system toggles between the state for a standard monitor and that for a high resolution monitor.)

Now list the battery backed RAM settings using the \*STATUS command. Any settings which differ from those listed before dis-assembling the machine must be re-configured using the \*CONFIGURE command -- this procedure is described in the User Guide (p.384 of the Arthur version or Appendix C of the new 440 series guide supplied with RISCOS and also in more detail in the Programmer's Reference Manual.

Alternatively you may also re-configure all the original settings of your machine using the utility programmes on the ArVis installation disc.

Reset the time and date of the internal clock.

## **1.7 FINAL ASSEMBLY**

This completes the addition of the genlock header plug PL3B to the Archimedes. The backplane and expansion cards can now be installed.



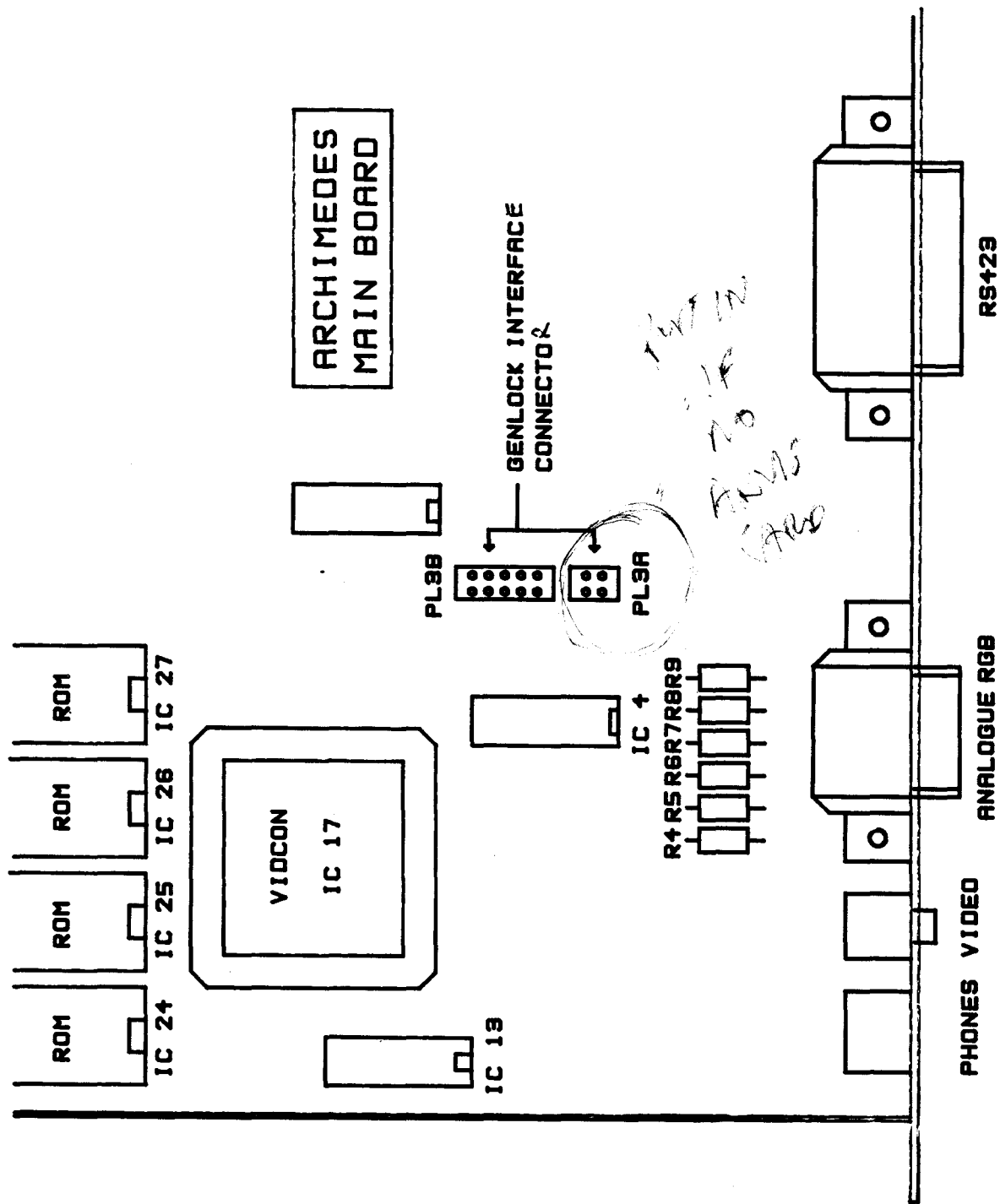


FIG 1 LOCATION OF GENLOCK INTERFACE PL3A-B

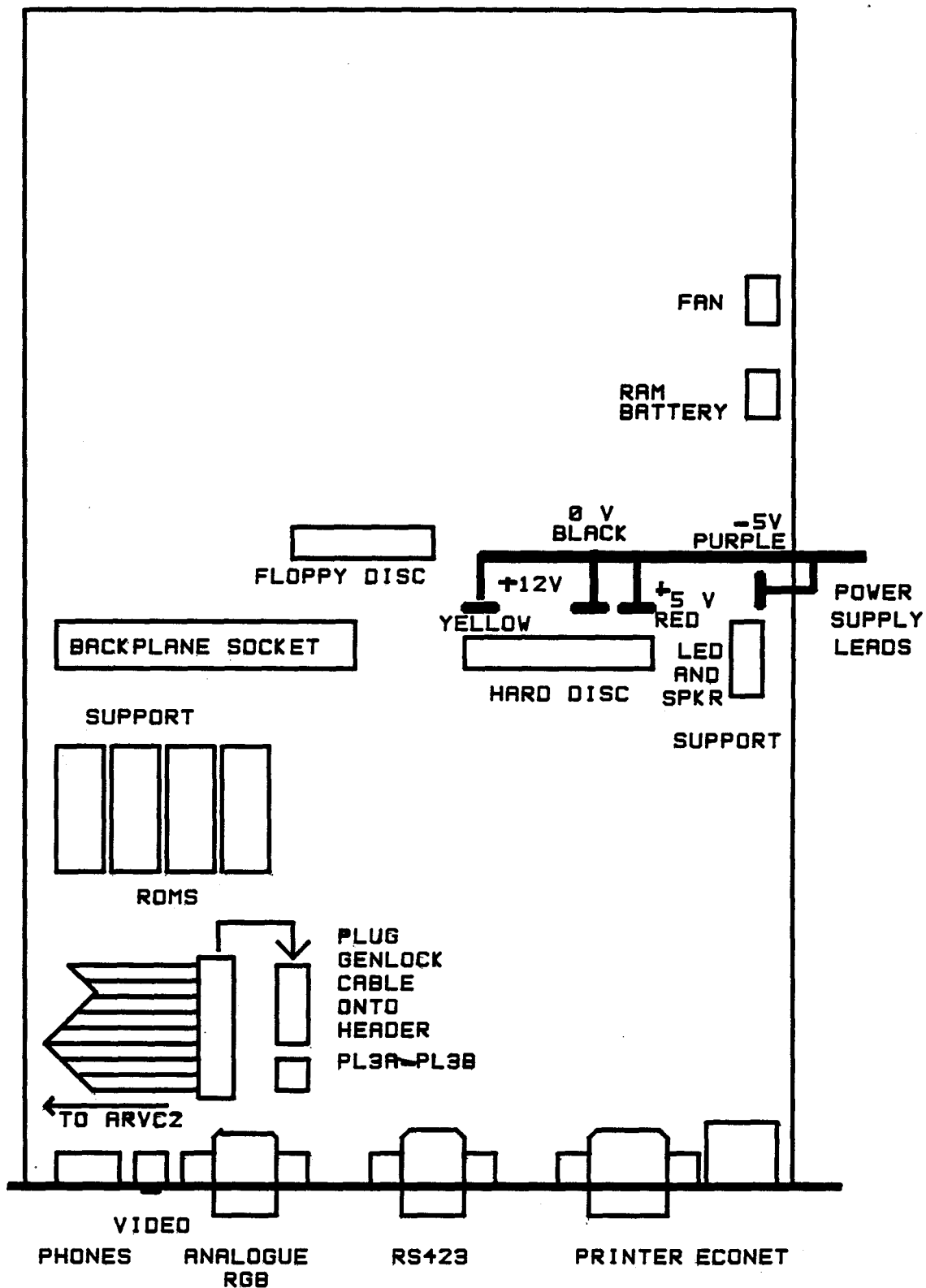


FIG 2 LOCATION OF CABLES  
AND GENLOCK CONNECTION  
ARCHIMEDES EARLY 300/400 SERIES

## **NEW ARCHIMEDES 410/420/440 SERIES GENII= HEADER INSTALLATION**

### **1.1 INTRODUCTION**

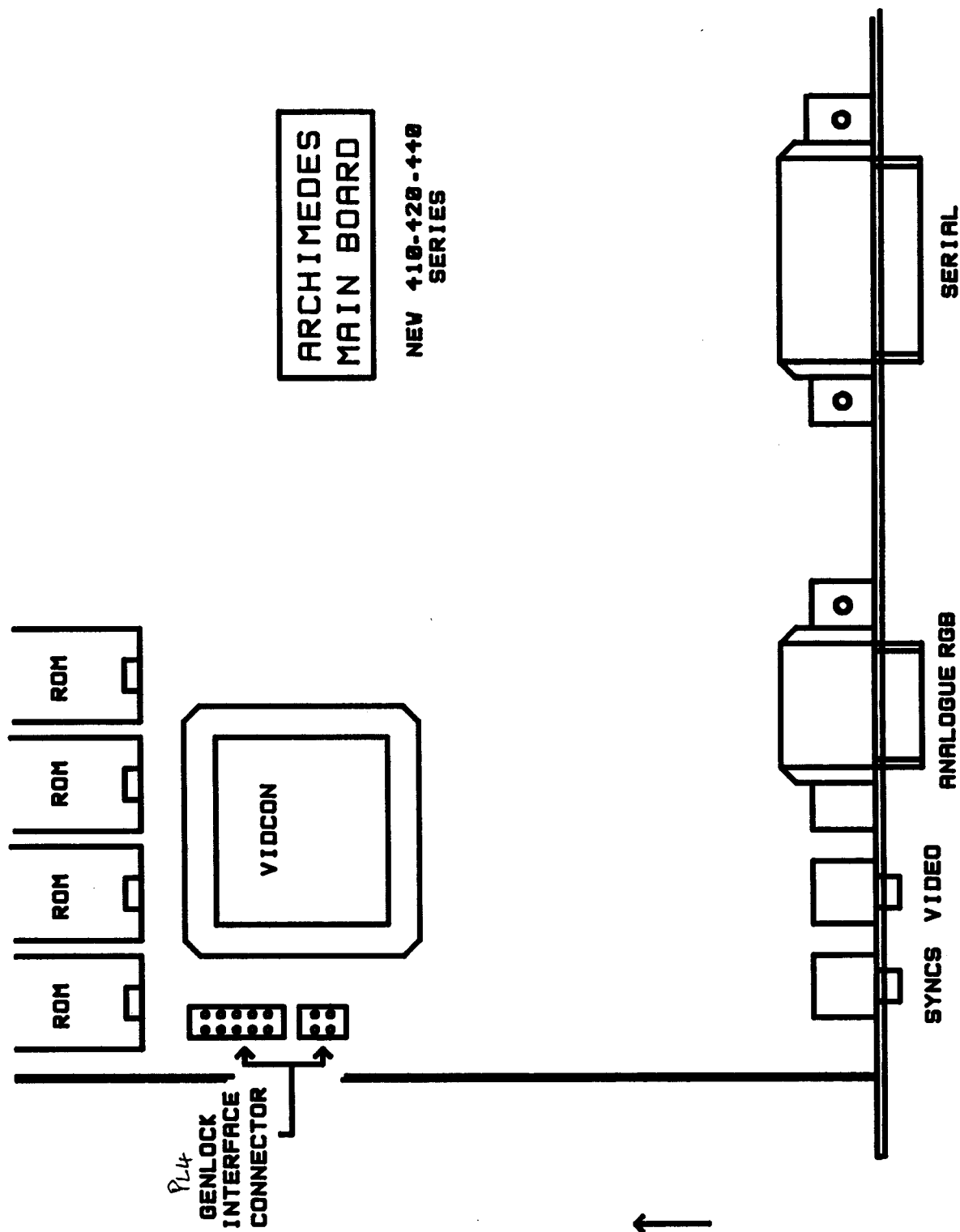
These notes are to be used in conjunction with the earlier document "ARCHIMEDES 305/310/440 -INSTALLATION OF GENLOCK HEADER PLUG"

The new Archimedes 410/420/440 computers have the same provision for genlock interfacing as in the earlier 305/310,440 series. However the connector is now referenced as plug 4 and is located at the rear left edge of the new printed circuit board instead of to the middle rear.

The power connectors are now located in a different arrangement.

The installation of a header plug should only be required for early production units -- we understand that Acorn will fit the complete connector to later machines.

Refer to the 305/310/440 installation notes for details of the installation but please use the new diagrams Fig.1 (LOCATION OF GENLOCK INTERFACE 400 SERIES) and Fig 2. (LOCATION OF CABLES AND GENLOCK CONNECTION - NEW ARCHIMEDES 410-420-440)



ARCHIMEDES  
MAIN BOARD

NEW 410-420-440  
SERIES

FIG 18 LOCATION OF GENLOCK INTERFACE 400 SERIES

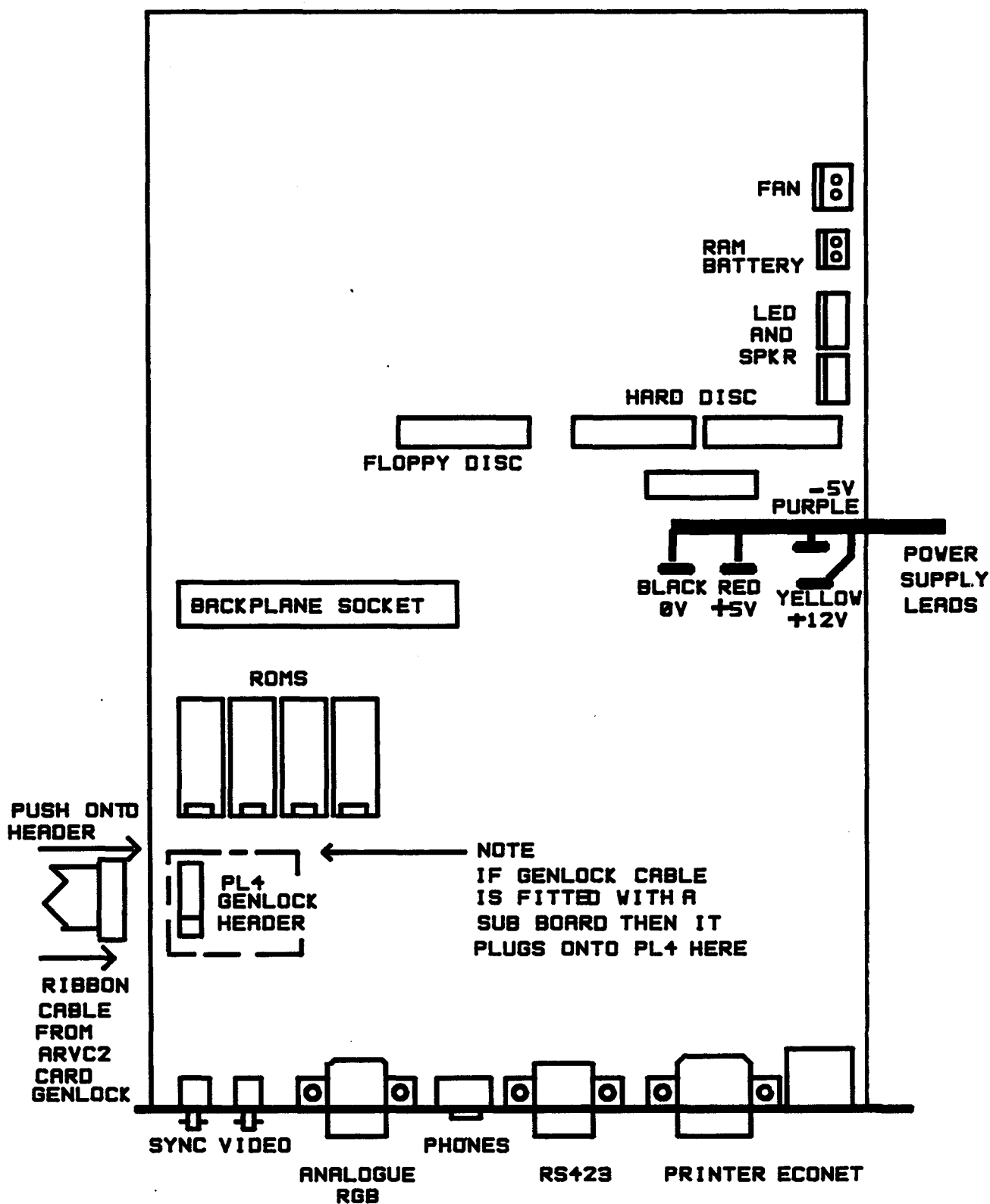


FIG 28 LOCATION OF CABLES  
AND GENLOCK CONNECTION  
NEW ARCHIMEDES 410-420-440

## THE VIDEOCONTROLLER BOARD DEMO DISC

**NOTE** This section of the handbook refers to installations where the ARVC.2 Videocontroller card is used alone as a video genlock & overlay system. In this case a single 3.5 inch floppy disc is supplied with the following files:-

\$.BARS      \$.DEMO      \$.DEM2      \$.CAP1      \$.SaveCmos      \$.WriteCmos

\$.HIP directory which contains 4 picture files for the \$.DEMO programme

\$.OLDCMOS directory in which you save Cmos RAM configuration data.etc.

If you are using a complete ArVis system with both the ARVC.2 Videocontroller card and the ARDG.2 Videographics card installed then the 'SaveCmos' and 'WriteCmos' files will be found on the OSCAR disc supplied with the Videographics card. (The main OSCAR programme also includes the colour bars in the toolkit menu and DEM2 captions in the caption menu -- keys and shadow keys can be manipulated also -- see the OSCAR software handbook).

The files are all loaded in standard ways -- first mount the drive on which the files are installed by typing \*MOUNT 0 if you are using the floppy disc in drive 0 or (usually) \*MOUNT 4 if you have transferred the files to a hard disc.

If you are working in command line mode you can use \*filename e.g. \*BARS. 'This is also possible from BASIC or alternatively use CH."filename"'.

From DESKTOP you double click the file icon (after \*MOUNT N where 'N' is the drive number).

### SaveCmos

This file enables a copy of ALL the current settings of the CMOS RAM to be stored on disk. It is provided so that the battery backed RAM data can be saved prior to disconnecting the battery (this has to be done once a year or so and also if you need to fit a genlock header plug to the main PCB).

The programme prompts for a filename prior to printing out all the current RAM data and time/date. The data is stored in a directory OLDCMOS under the given filename.

### WriteCmos

\*\*\*\* WARNING \*\*\*\*\* Use this carefully -- the programme re-writes your CMOS RAM according to the content of the data file named (in directory OLDCMOS).

The programme gives a warning message and asks for a key entry 'Y' before proceeding. You are then asked for a filename followed by a further chance to abort unless you again key 'Y'.

After this second confirmation the CMOS RAM is rewritten.

## **BARS**

This file sets up a set of 75% saturated colour bars. It provides a useful test signal for aligning the PAL encoder. -- Note that the colour bars RGB amplitudes are 75% of the maximum level.

**NOTE** The next two programmes are only supplied when the ARVC.2 is used as a single system without the ARDG.2 Videographics card. In this case the 'KEY' link on the ARVC.2 expansion card must be set to the 70 position to enable the three position KEY switch on the rear panel of the ARDG.2.

The 3 way KEY switch should be set to the middle position (S) to ensure that both the supremacy key and the shadow key modes are active for first demo 'DEM2'. The second programme 'DEMO' requires the KEY switch to be set to the top (MICRO) position.

## **DEM2**

This programme sets up a simple caption which illustrates the use of the supremacy bit to control the keyed colours and also the applications of the shadow key. The caption will be keyed over the video signal applied to the videocontroller input connector.

Exit from the caption to a blank screen by pressing the SPACE bar. -- Any other key will toggle the supremacy bit for colour 8 ON/OFF. In this example colour 8 is used to paint the grey area surrounding the ArVis caption. This will become 'transparent' when the supremacy bit for colour 8 is unset (0).

The shadow key areas can be switched on and off by moving the KEY switch between the 'S' position (middle) and the 'KEY' position (bottom).

## **DEMO**

The disk also has a cycling demonstration of Mode 15 frames digitised from live video by the ArVis Videographics card.

Ensure that the KEY switch is in the top 'MICRO' position.

Once loaded (\*DEMO etc.) the images will automatically recycle until you press the ESCAPE key

## **THE ArVis VIDEOCONTROLLER/GENLOCK CARD ARVC.2**

### **1.1 INTRODUCTION**

The ARVC.2 is an expansion card version of the earlier ARVC.1 videocontroller board which was designed to mount behind the backplane (to save podule space in early 300 series machines limited to 2 expansion slots.) The new card has optional expansion boards for PAL encoding and computer controlled fades.

The ARVC.2 Videocontroller expansion card genlocks the Archimedes RGB display to an external composite video signal. The single width card has a high quality PAL decoder and vision mixing system to oombine the Archimedes RGB graphics display with the picture signal -- the combined images are then available as a separate RGB output which can be displayed on the standard Archimedes colour monitor.

A PAL encoded output is also available from an optional plug on circuit board.

In addition to the normal facility for fast key insertion of the computer graphics over the video signal using the supremacy bit there is also a second 'shadow key' mode which provides contrast reduction of the background picture in designated pixel areas -- this can be used to create drop-shadow titles and boxed sub-titles.

The ARVC.2 videocontroller/genlock expansion card provides a complete system for combining computer generated text and graphics with live video from a camera, tuner, videodisc or videotape player.

The ARVC.2 expansion card is also designed to interface with the ArVis Videographics card ARDG.2 which extends the Archimedes display from 256 to 32,000 colours and provides a real-time very high quality, full colour video digitiser and frame-store.

### **2.1 ARCHIMEDES GENLOCK HEADER PLUG**

The ARVC.2 Videocontroller genlocks the Archimedes computer via a ribbon cable which plugs onto the genlock connector header located on the main printed circuit board.

Although Aorn made provision for this connector on the printed circuit boards of the 305/310 and 440 series computers you will probably find that part of the header connector is not actually fitted to your machine.

Some early production units of the new 410/420/440 machines may also not be fitted with the full connector. We understand that later production units will have the complete connector already in place.

Please refer to Section 1 of this manual "Archimedes 305/310/440 -INSTALLATION OF THE GENLOCK HEADER PLUG" for details of how to fit this connector to the early 305/310/440 machines. Installation for the new 410/420/440 series is similar - the main difference being the actual physical location of the connector which is now mounted near the rear left hand edge of the board instead of in the middle area.



A spare header plug is included in the videocontroller expansion card kit -- if necessary you should fit this at this stage and then ensure that the Archimedes is restored to normal operation BEFORE fitting the videocontroller expansion card.

### **3.1 INSTALLATION OF THE ARVC.2 VIDEOCONTROLLER CARD**

Ensure that the machine is disconnected from the mains supply by removing the power cord.

The Videocontroller Expansion card plugs onto a 2 slot or 4 slot backplane. A 4 slot backplane will be required if you are also fitting an ArVis Videographics Expansion Card. A fan MUST be fitted as recommended by Acorn.

If you are purchasing a 4 slot backplane to fit into a 300 series machine we recommend that you should obtain a well designed multilayer version.

The ARVC.2 expansion card can be fitted with an optional PAL encoder sub-board and also a computer fader interface sub-board. These can be plugged onto the ARVC.2 main board after it has been installed.

The normal position for the ARVC.2 Videocontroller card is in slot 0 of the backplane. This is the top left slot as viewed from the rear of the Archimedes computer.

The ArVis Videographics Expansion Card ARDG.2 (if fitted) then goes into slot 1 at the top right of the backplane.

### **3.2 CONNECTIONS TO THE RGB DISPLAY SIGNALS**

The Videocontroller card mixes decoded video signals with the RGB display signals from the computer and videographics expansion card (if fitted). A cable is provided to interconnect the Archimedes Analogue RGB display output to the ARVC.2 RGB input.

One end of the cable has a 9 pin D male connector which plugs into the 'ANALOGUE RGB' output socket at the bottom rear panel of the Archimedes. The other end of the cable is fitted with an 8 pin male DIN connector which plugs into the 'RGB INPUT' of the ARVC.2 Videocontroller expansion card.

The Archimedes display monitor cable must be connected to the 9 pin D socket marked 'RGB OUT' at the ARVC.2 rear panel. This socket provides analogue RGB signals at nominally 0.7 volt levels when terminated by 75 ohm loads. (The output levels can be increased to 1.0 volt peak by an internal preset control). The output from this socket will be a combination of images from the Archimedes, the ARVC.2 Videographics framestore (if fitted) and the video input.

Please note that the normal RGB output from the Archimedes is not modified by the addition of the ARVC.2 expansion card. For specialised applications it is possible to have a second monitor connected to this output in parallel with the connection into the ARVC.2 RGB input. A special cable is required -- please ask our Sales Office for a free application note.

### **3.3 INSTALLING THE GENLOCK CABLE**

The ARVC.2 is provided with a 16 way ribbon cable which plugs onto the genlock header pins on the Archimedes main board. The location of this connector is different for the early 305/310/440 and the new 410/420/440 computers. Please refer to the drawings

Remove the two links from the header plug -- keep these so that they may be replaced if the genlock cable is removed at a later date -- the Archimedes will not provide a display and must not be operated without the presence of the links or a genlock connector.

Push the genlock cable onto the header plug taking care to ensure the correct alignment of the cable and connector as shown in the drawings. Note that two of the cable connector pins are blanked off to ensure correct polarisation.

Ensure that the cable is routed in accordance with the drawing and then plug the other end of the 16 way connector onto the genlock header pins mounted on the ARVC.2 expansion card -- again taking great care to ensure the correct alignment.

### **3.4 VIDEO INPUT/OUTPUT CONNECTIONS**

The ARVC.2 connector panel has a high impedance BNC video input socket with a 75 ohm termination switch and a second BNC connector for the PAL output from the optional PE.2 PAL encoder board.

The termination switch must be ON (down) unless you are also 'bridging' the input signal to the input of another piece of video equipment such as a monitor or recorder -- this will require the use of a BNC 'T PIECE' cable splitter and in this case the termination switch should be OFF (up). A 75 ohm termination must still be used at the end of the cable run.

The ARVC.2 is designed for use with composite video signals conforming to the European PAL 625 line standard with 0.3 volt syncs. and 0.7 volt peak signal amplitudes. (For operation with Super VHS 443 component signals consult the Sales Office for advice).

### **3.5 CONNECTIONS TO A VIDEOGRAPHICS EXPANSION CARD**

The ARVC.2 card can be easily connected to the ArVis Videographics expansion card using two ribbon cables as shown in figure 1.

#### **IMPORTANT NOTE**

A CONNECTION MUST BE MADE TO THE 16 PIN RGB HEADER PLUG OF THE ARVC.2 CARD. EITHER BY CABLE TO THE ARDG.2 VIDEOGRAPHICS BOARD OR BY USING A 16 PIN SOCKET FITTED WITH LINKS FOR THE RGB SIGNAL PATHS. (The links 'bypass' the RGB path switches of the ARDG.2). Otherwise you will not have a display of the Archimedes generated graphics!

There is also a link on the ARVC.2 Videocontroller card which determines whether control of the 'KEY' and 'SHADOW KEY' functions is by means of the manual switch at the rear panel or via software controlled logic from the ARDG.2  
PLEASE ENSURE THAT THE 'KEY' LINK ON THE ARVC.2 BOARD IS SET TO THE CORRECT POSITION. See figure 2.

### 3.6 FINAL CHECKS

Before powering the machine please ensure that:-

- 1 The genlock cable has been properly installed.
- 2 The expansion card(s) are fully seated into the backplane sockets.
- 3 If the ARDG.2 is fitted then the interconnection ribbon cables are correctly located.
- 4 If the ARDG.2 is not present then there must be an RGB link connector fitted to the ARVC.2 as shown in figure 1.
- 5 The KEY control link on the ARVC.2 expansion card is set to allow for operation with/without the ARDG.2 Videographics card.
- 6 The (optional) encoder and fader expansion boards are plugged onto the ARVC.2

Replace the cover of the machine and all signal leads and the keyboard lead.  
Do NOT apply a video signal at this stage. Connect the Archimedes monitor to the normal RGB display output.

Power the machine & check that it functions normally.

### 4.1 ARVC.2 VIDEOCONTROLLER CARD OPERATION

After installing the videocontroller card the Archimedes should have been checked for normal operation from the standard display output with no cables connected to the video input.

The display monitor can now be connected to the Videocontroller RGB output. Connect the RGB signal cable to the Archimedes 'RGB ANALOGUE' display connector and to the ARVC.2 'RGB INPUT' connector.

With no video input connected the monitor should display the normal Archimedes text and graphics.

Connect a composite video signal of nominally 1v. peak amplitude to the BNC input connector the 75 ohm termination switch should be ON (unless the signal is bridged to other video equipment that provides the correct termination -consult our technical department if in doubt).

If you have fitted the ARDG.2 Videographics card then control of the key functions will be by software and you should ignore the next section (4.2) -this refers to the hardware switch at the rear of the panel -- this is

automatically bypassed when the ARDG.2 is linked to the ARVC.2.

#### **4.2 KEY/SHADOW KEY CONTROL SWITCH**

The ARVC.2 Videocontroller card has a 3 way KEY control switch mounted at the left hand side of the connector panel (See Fig.3)

The switch will only function when the ARVC.2 is used alone -- it is bypassed when the ARVC.2 is connected to the ARDG.2 Videographics card.

The switch has three positions labelled 'MICRO' 'S' 'KEY'

MICRO (top)	The videocontroller output will be switched to show the normal Archimedes text/grsphics display irrespective of the supremacy key and shadow key flags.
S (middle)	This position selects both shadow and normal key modes. The output will show the background video picture except for pixels corresponding to colour numbers with the supremacy key flag bits set -- these pixels form the foreground image. Also pixels selected for shadow key use will not appear in the output image but will cause contrast reduction of the corresponding picture pixels.
KEY (bottom)	Normal supremacy keys are enabled as in the middle position of the switch but the shadow key is disabled.

#### **4.3 SUPREMACY KEY**

The supremacy 'KEY' function is enabled by an application programme such as 'OSCAR' or \*ARVIMAGE commands supplied with the ARDG.2 Videographics card or (when the ARDG.2 is not used) by setting the switch at the rear panel of the ARVC.2 to the 'S' or 'KEY' positions.

The supremacy key mode controls how the ArVis system switches automatically between a foreground image from the Archimedes graphics and a background image from the video input.

For every displayed point in the picture the selection between graphics and video pixels is determined by the supremacy bit architecture of the Archimedes operating system.

The Archimedes display hardware has 16 colour registers to hold the colour palette values for the 16 colours used in MODE12 etc. (Note that for the 256 colour modes there are still only 16 registers and therefore each register controls a group of 16 actual colours).

Each of the 32 bit colour registers has 12 bits to determine the red, green, blue components of the associated colour number and also an additional 'supremacy' bit used by the videocontroller key switch.

The supremacy bits for the 16 registers are seperately controlled by software but they are logically 'Wed together to produce one single bit to control the

key switch hardware.

Any single Archimedes pixel can only have one possible logical colour number associated with it and when that pixel is scanned to the output display it will become a displayed pixel provided that the KEY is ON and the supremacy bit for that colour number is also set (1).

VDU statements can be used to set the supremacy bit e.g. VDU 19,1,p,r,g,b sets up the physical colours associated with logical colour '1'. If 'p' is set to 16 then the key supremacy bit is unset and if 'p' is 144 then the bit is SET and the colour will key. In both cases the values of 'r,g,b' (in increments of 16 on a scale up to 255) determine the absolute colour of the logical colour.

The software module of the ARDG.2 Videographics card supports \*ARVKEYSET commands – see the software manual supplied with the card.

See the Acorn User Guide and Reference Manuals for more details.

#### **4.4 SHADOW KEY**

The ArVis videocontroller board has a second key system which allows certain pixels in the Archimedes display to produce a shadow effect in the background picture. This is particularly useful for creating a 'box' surround to subtitles and also for generating true 'drop-shadow' edges for titles.

Any logical colour can be used to define the drop shadow pixels by setting the red component 'r' in the VDU19,1,p,r,g,b command to one unit (i.e 'r' must be in the range 16 to 31 for the current Archimedes machines). The value of 'p' must be set to 16 and the factors 'g' and 'b' may have any values.

When the ARDG.2 Videographics card is installed the shadow key is enabled or disabled by applications software such as OSCAR or by using a \*ARVSHADOW command.

If the ARDG.2 card is not used then the shadow effect is only enabled when the KEY switch on the videocontroller connector panel is in the middle position marked 'S'.

Note also that because 'p' is set to 16 the supremacy bit is unset so that the logical colour used for shadow key does not itself appear in the videocontrollers' screen output.

Another use of the shadow key is to 'spotlight' effect an area of the video picture by plotting a moveable rectangle or circle using shadow key pixels for the background and a non-key colour for the rectangle or circle fill.

#### **4.5 SOFTWARE CONTROL OF THE VIDEOCONTROLLER BOARD**

There are two ways in which the videocontroller board may be switched by software.

1. If the Videographics card is fitted – in this case the key system is automatically extended. The Videographics card contains a

relocatable software module with \* commands to control the keys.

2. By making a direct logic connection to the genlock sub-board from a sub-board or other expansion card -- please ask if you need advice.

### 5.1 \*TV CONFIGURATIONS

The Archimedes can produce both interlaced and non-interlaced displays -- according to the setting of the \*TV configuration which may be \*TV 0,0 for interlace ON and \*TV 0,1 for interlace OFF.

The output from the videocontroller RGB socket has syncs. which are derived directly from the video input when the machine is genlocked - these will therefore be INTERLACED when genlocked to a normal 625 line professional grade signal.

Applications software should normally include a \*TV 0,0 command (followed by a mode change) to switch interlace ON during genlock to interlaced sources.

When you are not using an external video source and the system is not genlocked you should use the non-interlaced mode (\*TV 0,1) to reduce flicker on short persistence monitors.

The videocontroller RGB output socket has Archimedes syncs. when genlock is OFF ( video signal removed) -- the syncs will then be interlaced or non-interlaced according to the \*TV configuration.

The sync. output from the standard Archimedes RGB display socket ALWAYS provides ARC syncs irrespective of whether the machine is genlocked or not --- if you wish to use a second monitor connected to this socket then you MUST set the interlace mode to INTERLACED when genlocked to interlaced video inputs. (OR NON interlaced if you are locking the syncs to a non interlaced source - e.g another Archimedes) .

If you fail to do this you can expect vertical jitter on your second display due to the fact that the genlock is constantly re-setting the 624 line Arc. syncs to keep them in step with the 625 line video input.

For 2 monitor applications you should take the sync. signal for BOTH monitors from the ARVC.2 Videocontroller RGB output socket.

Be careful in your choice of video sources - some do not operate to the 625 line European standard . Other unsuitable sources may include low cost television pattern and test generators which often produce totally non standard sync. signals which are only suitable for monitor alignment.

YOU CANNOT PRODUCE 625 LINE GENLOCKED PAL SIGNALS FROM HIGH SCAN FREQUENCY MULTISYNC MODES DUE TO THE TOTAL INCOMPATIBILITY BETWEEN THE VIDEO LINE FREQUENCY AND THE COMPUTERS DISPLAY SCAN FREQUENCY. MODES 12, 15 & 24 are most useful.

**5.2 FLYWHEEL SYNC** The standard Archimedes monitor has a long time constant flywheel timebase -- you may find that this causes 'hooking' at the top of picture when genlocked to some videotape machines. These monitors can be fitted with a short timeconstant 'VCR' switch -- please ask for an application note.

BACK PLANE

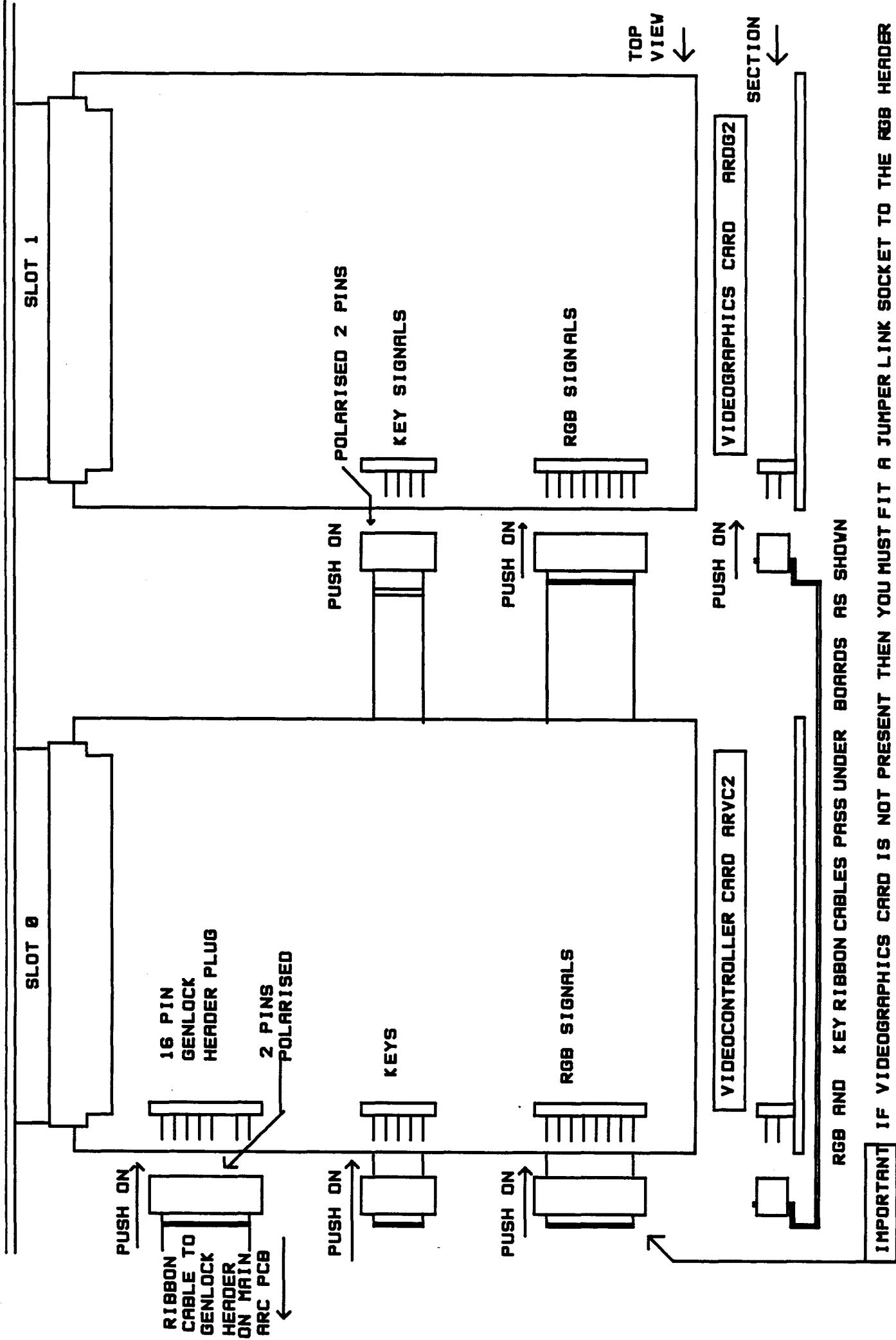


FIG 1 INTERCONNECTIONS BETWEEN ARVC2 AND ARDG2 EXPANSION CARDS

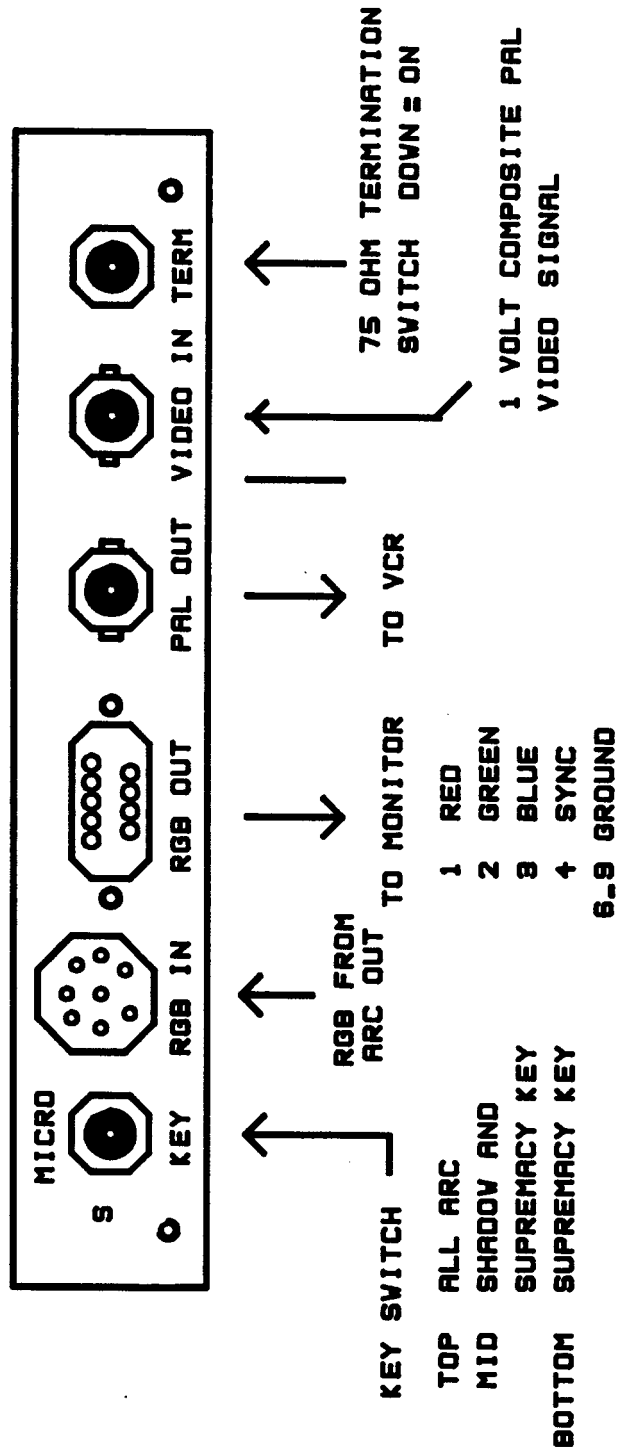


FIG 3 ARVC2 VIDEOCONTROLLER CONNECTOR PANEL



## **THE ARVIS PAL ENCODER BOARD - INSTALLATION & OPERATION**

### **1.1 INTRODUCTION**

The ARVIS PAL encoder board type PE.2 is used to convert standard RGB component signals from the display output of the Archimedes to the European PAL composite colour video standard. This board is an optional 'plug on' expansion for the ARVC.2 Videocontroller/Genlock card.

PAL signals are required where a videotape recording is to be made from the Archimedes output, or for driving studio vision mixing equipment and composite video distribution and cable networks.

Luminance delay compensation is included together with cross-colour filtering to minimise the edge effects inherent in the PAL coding standard.

The unit is supplied factory aligned but preset controls are provided to allow for independent adjustment of red, green, blue channel balance, luminance level, chroma amplitude, burst amplitude and position.

The colour subcarrier is generated by a crystal oscillator which will free run when the encoder is used alone. For genlock applications (when the encoder board is connected to the ArVis videocontroller board) the colour sub-carrier is locked to the colour burst of the incoming composite video reference.

When colour genlocked (chroma-locked) the phase of the output colour burst can be adjusted relative to that of the incoming reference burst over a 360 degree range by means of a slide switch (180 degrees) and a multiturn helical fine phase control. This is an essential feature for studio applications where the board is genlocked to an incoming composite (CVBS) or black-burst waveform and the output is fed into a vision mixing channel.

Composite output levels are at lv.p.p. when terminated by a 75 ohm load.

### **2.1 GENERAL INSTALLATION NOTES**

**WARNING** Isolate the Archimedes from the power supply by switching off the supply and removing the power cord BEFORE REMOVING THE COVER.

The ARPE2 is easily fitted to an existing ARVC2 Videocontroller/Genlock board. The card plugs directly onto sockets 1 and 2 of the ARVC2 as shown in the drawing "PAL ENCODER ARPE2 LOCATION AND PRESETS".

Please take great care to ensure that the plug pins of the ARPE2 are correctly aligned with the sockets on the ARVC.2 main board. No further installation is required -- the PAL encoded output should now be available from the PAL OUT BNC socket which is already fitted to the ARVC.2 rear panel.

You may find that if you need to remove the ARVC.2 from the Archimedes that it is easiest to unplug the ARPE2 sub-board from the ARVC.2 prior to unplugging the latter from the backplane.

### 3.1 PAL ENCODER -- OPERATION

The video output from the encoder generates 2 volts p.p. with a source impedance of 75 ohms (nominal). This is a common European standard for video signals and the normal working level of 1volt p.p. will be achieved when the output is driving a monitor or other piece of video equipment which has an INPUT impedance of 75 ohms.

100% colour saturation will be achieved from 0.7v. RED GREEN & BLUE drives from the Videocontroller card. This level will be reached when the Archimedes colour palette values are set to their maximum values (e.g. COLOUR 1,255,0,0 sets colour 1 to 100% red).

Because of the limitations inherent in the way that PAL signals are encoded you may find that videotape recordings of images containing fully saturated colours exhibit colour noise and visible edge effects (these are some of the reasons why new encoding standards have been developed for satellite broadcasting and for the introduction of the Super VHS (SVHS)).

As a recommendation we suggest that you set your colour palettes for about 75% of maximum values for saturated colours (e.g. COLOUR 1,190,0,0) will give a 75% red. White and light (desaturated) colours may have up to 100 luminance levels (equal values of red,green,blue) -- e.g. COLOUR 7,255,255,255 will generate white with 0.7volt amplitude (plus 0.3v syncs) from input red,green and blue levels at 0.7v. A saturation preset control has been provided on the board.

### 3.2 CONTROLS

Figure 2 shows the location of the preset controls - these are factory aligned and we recommend that you do not alter them unless you have a good working knowledge of the PAL television standard and also access to a PAL vectorscope.

The functions of the controls are labelled in figure 2. Please telephone our service department if further advice is required.

For genlock applications the video input signal must include a normal PAL colour burst. In this case the output subcarrier is locked to the incoming colour burst and the output colour burst can be altered in phase relative to the incoming burst by the use of the jumper links (see preset Y of Fig.2)

The jumper links give 180 degrees of phase reversal. A multiturn potentiometer (preset number 10) allows fine phase control over a range of approximately 200 degrees.

The colour phase controls together give a range of adjustment of approximately 360 degrees so that the composite signal from the PAL encoder may be correctly phased to the input of studio vision mixers etc.

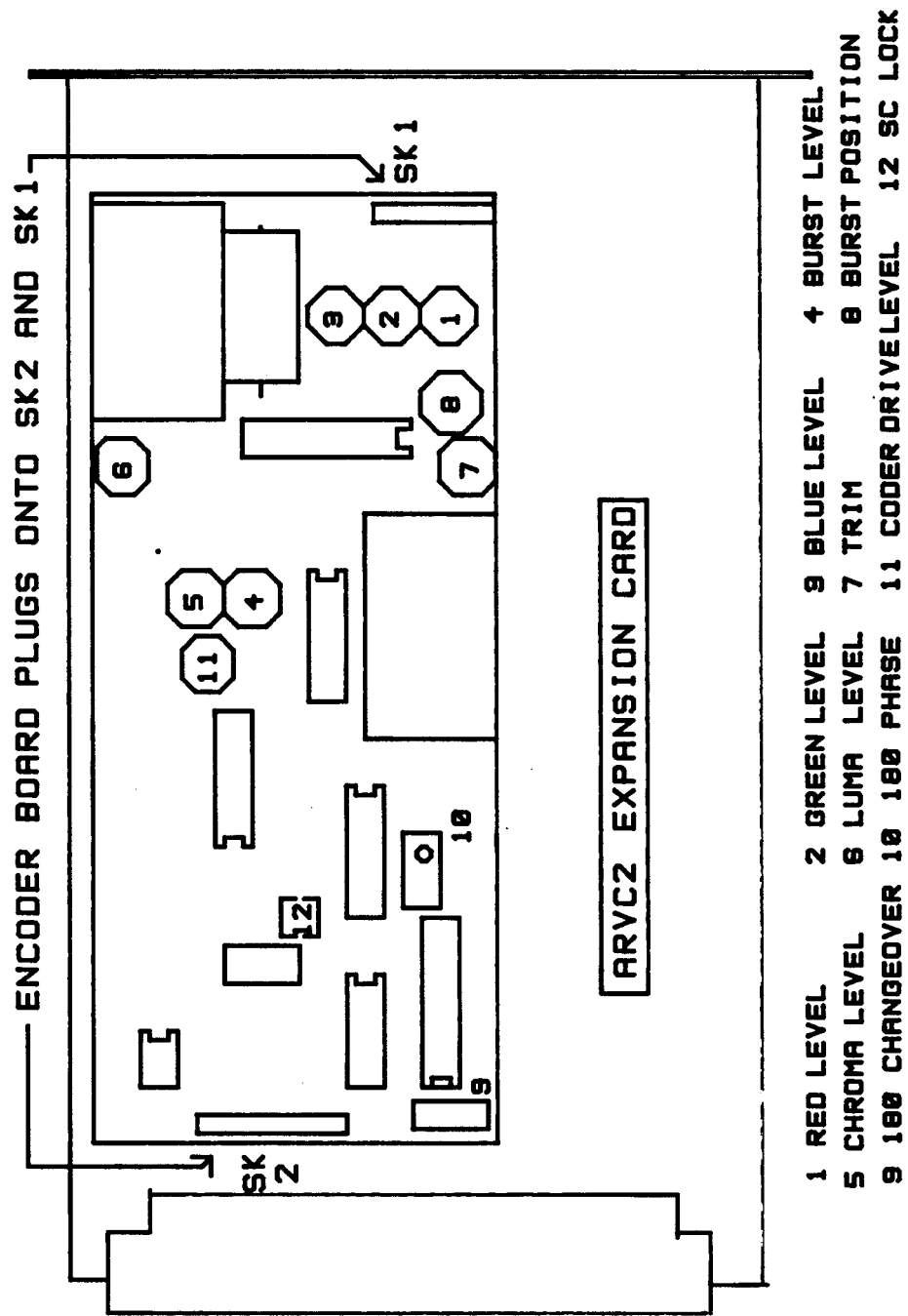


FIG 2 PAL ENCODER ARPE2 LOCATION AND PRESETS

## THE ARVIS VIDEOGRAPHICS EXPANSION CARD ARDG.2

### INTRODUCTION

The ArVis Videographics expansion card provides a major enhancement to the graphics capabilities of the Archimedes.

The hardware includes a real-time colour frame-grabber to digitise live colour video inputs from a camera, tuner or recorder. The module has a 384K byte X 16 bit video framestore memory, and a dedicated display generator to create high resolution video images with 32,000 simultaneous colours.

A ROM on the module contains downloadable software to control the digitiser and to exchange data between the framestore and the Archimedes -- a wide range of operating commands are provided for incorporation into user's own programmes. The disc based OSCAR software supplied with the videographics module has an extensive set of picture editing routines.

The ArVis Videographics card provides a powerful tool for the aquisition, manipulation and creation of full colour video images and will enable the Archimedes to be used in applications previously the exclusive domain of very expensive specialised video workstations.

The combination of the ArVis Videographics card ARDG.2 and the Videocontroller card ARVC.2 provides the following enhancements to the Archimedes:-

- Full genlock to external 625 line signals - both colour and monochrome.

- Decoding of PAL picture signals to RGB with all further processing at RGB levels to preserve the full bandwidth of the computer graphics.

- Simultaneous display and combination of the three image planes - live video, digitiser/framestore output and the normal Archimedes RGB output. The standard Archimedes monitor can be used to display all outputs including monochrome as well as colour digitiser modes. A PAL encoded output with phaseable subcarrier is available by fitting the optional ARPE2 RGB/PAL encoder board to the ARVC.2. The ARVIS system also caters for the later addition of a fourth image plane generated by a computer controlled teletex decoder board.

- Image planes are combined under software control using a wide selection of key and wipe effects including shadow keys for enhanced sub-titling applications.

- The ArVis videographics framestore extends the number of simultaneous colours which can be displayed from 256 to over 32 thousand thus allowing for the storage, creation and manipulation of video picture quality images and the combination of these with the normal Archimedes images and live video.

- The framestore operates in real time and can be used for a variety of

stroboscopic and freeze frame video effects. A powerful feature is the ability to dynamically change the bit coding structures of the framestore input and the display driver output to switch between various positive, negative, monochrome, hi-res colour, mode15 colour and false colour operations.

The Archimedes operating system has full bidirectional access to the content of the framestore independently of the display refresh and images can be stored and retrieved through the normal filing systems.

The bit coding structures for 16 bit hi-res colour have been carefully chosen to maintain compatability with the 8 bit lower resolution 256 colour modes of the Archimedes.

Frames can be created by the ARVIS videographics podule at full colour video resolution but copies of these frames can easily be produced on disc at standard Mode 15 resolution for use in PRO-ART and other proprietry paint programmes. These Mode 15 frames can also be displayed by other Archimedes machines not fitted with the ARVIS videographics podule.

The Archimedes can paint computer generated images directly to the framestore which has 640 x 256 pixel structure exactly matching the Archimedes Mode 15 spatial resolution.

Of particular importance for video studio applications is the fact that the framestore display can be zoomed to match the height and width of the FULL video raster thus enabling the output to be combined with normal video images in a professional manner.

## **1.1 APPLICATIONS**

The ArVis Videographics and Videocontroller system incorporates many unique features not found in other systems or basic monochrome 'digitisers'.

In addition to the ability to capture and display high quality colour video images in real time, the system adds additional image planes to the Archimedes and expands the number of colours from 256 to 32000 thus any video image could theoretically be created directly by the computer!

The ability to dynamically combine high quality colour video images with the direct output of the Archimedes and live video has many applications in television studios, commercial video photography, discotheques, interactive video systems etc.

The facility to aquire, store, retrieve, analyse and combine still photographic type images with computer generated text and graphics can be utilised for point of sales displays, video-slide presentations, medical and scientific analysis and measurement, security applications, etc.

### 1.3. The ArVis VIDEOGRAPHICS EXPANSION CARD - SPECIFICATION

The ArVis Videographics card is a single width module which occupies a single backplane slot in a standard Archimedes computer. The card has extensive hardware facilities constructed on two printed circuit boards with a total of 42 LSI integrated circuits of which 14 are specially customised devices.

The card adds a powerful videographics facility to the Archimedes and includes the following features:-

Accepts an RGB video input via a D connector on or decoded PAL video from the ArVis videocontroller/genlock board choice is made by a link on the board.

Clamps the colour video signals prior to digitising with triple high speed A/D convertors.

The digitised video is manipulated both before and after the frame-store to various bit patterns including 4 & 6 bit monochrome, 16 bit high-res colour, false colour, & Archimedes Model5 colour with the option of both positive & negative coding.

Video is digitised in real time to an Archimedes compatible 640 X 256 pixel format and stored in a 384 Kbyte 16 bit video framestore - capture time 1 field (20 milliseconds). The store can be operated in a stroboscopic fashion for live video effects use.

The videographics output can be zoomed to the full size of a 625 line broadcast video raster (52uSec X 288 scan rows) so that image can be mixed with other video signals without the restriction of the smaller image size (40uSec X 256 scan rows) inherent in the direct Archimedes graphics area.

Digitised video data is reconverted to RGB baseband signals in real time by triple D/A convertors to provide an independent 75 ohm RGB display output viewable using the standard Archimedes monitor. The digitised video is viewed in real time and can be used as a live video output even when in false colour, negative and Model5 style.

All control and memory functions on the card are software interfaced to the Archimedes operating system which can retrieve data from the framestore, write to the store and manipulate discrete pixels in the framestore at a rate of 500 thousand pixels per second.

When writing data to the store a hardware bitmask can be set to enable any or all of the 16 colour bits and there is a further choice of 15 logic algorithms - the computer can therefore combine and modify images in thousands of ways.

Digitised video can be live or from the framestore prior to conversion back to baseband RGB levels.

High speed electronic 'key' switching is provided in the final RGB video output paths so that images from the normal display output created by the Archimedes graphics can be masked and overlayed into

the videographics image -- a copy of this 2 image plane matte is then further matted in the videocontroller board with the live video signal to provide a final RGB output containing computer selected elements from all 3 image planes.

A typical application might show an Archimedes generated caption scrolling over a digitised background which itself contains transparent windows revealing a live video image. A wide variety of logic key combinations are provided - the three image planes can be matted together in over 40 different ways. Again under full computer control.

## 2 .1 INSTALLATION - GENERAL NOTES

The ArVis Videographics expansion card can be installed in a series 310 or 400 Archimedes. Machines with larger memory capacity and hard disc units are an obvious advantage where picture images are to be stored and manipulated.

The Videographics card is used together with a videocontroller card to form a double width expansion system. The cards are interconnected by two ribbon cables installed as *in* figure 1.

The cards fit into the two upper expansion slots (0 and 1).

### 2.2 FITTING THE VIDEOGRAPHICS EXPANSION CARD

Isolate the computer from the power supply before removing the cover

1. Install the ARVC2 videocontroller board in accordance with section 2 of this manual. (Use the top left slot 0 in a 4 slot backplane)  
  
**\*\*IMPORTANT** See Fig 2 of the videocontroller installation data -the 'KEY' LINK must be placed in position 'BC'.
2. Plug the two ribbon cables onto the header plugs on the videographics and videocontroller cards as shown in figure 1. -ensure correct orientation.
3. Plug the videographics card into the top right socket on the backplane (expansion slot 1).
4. Fasten the metal rear panel to the RGB socket of the videographics podule and to the videocontroller connector panel.
5. Screw the metal rear panels to the back of the Archimedes
6. Replace the Archimedes cover.
7. Connect the display monitor to the Videocontroller RGB output socket ( top left rear panel).
8. Connect a PAL 625 line lv. composite video signal to the VIDEO IN ( BNC) socket and ensure that the termination switch is ON (unless you are using a bridging arrangement).

Switch the power on.

If everything is O.K the monitor will display the video image for a few seconds after switching ON. As soon as the Archimedes has down-loaded the software from the Videographics card the display will change to show the direct Archimeds display.

If your machine is configured for language 4 (BASIC) then you should see "ArVis VideoGraphics XXXX" in the display (XXXX is the version number).



Whichever node you start up in you should use the \* command

```
* PODULES
```

to list the podules

This should show ArVis VideoGraphics Podule as the installed podule in slot 1.

Now list the software modules using \*MODULES

The list of modules should include 'ArvisGraphics'

In case of difficulty check that the relocatable module list includes the entry 'Podule' --- if this is missing you MUST reinstate it as it is the software which is used to download software from the podules!

You should now be able to run the disc based OSCAR software as described in the ArVis Reference manual.

### 3.1 RGB MONITOR SOCKETS

When the ArVis Videographics Podule has been installed there are now three RGB output sockets at the rear of the machine.

- 1 The original Archimedes RGB output at the bottom left
- 2 The 'AUX RGB' socket on the videographics expansion module
- 3 The 'RGB OUT' socket on the videocontroller connector panel

The original Archimedes Analogue RGB socket will display the normal output generated by the Archimedes video controller chip -- this will normally be WIMP windows and caption material when running OSCAR. The sync. signal from this socket is ALWAYS generated by the Archimedes timing generators and may not necessarily be correct when genlocked (if the machine is configured for NON interlace when genlocked to an interlaced signal.) Consult Section 5 of the Videocontroller board installation notes for more details.

The connector on the videographics module provides an RGB output from the combination of the framestore/Archimedes image planes. This is a true buffered output and need not be terminated. The connector can also be used for certain specialised applications for a direct RGB input drive to the digitiser -consult our technical department for further details.

The main output from the videocontroller board is taken from the 'RGB OUT' connector at the rear of the ARVC.2 Videocontroller card.

This 9 pin D connector has a true 75 ohm output with a level of nominally 0.7v p.p. for the R,G,B outputs. The sync. signal is switched to Archimedes syncs. when NOT genlocked (No video input) and provides separated video syncs from the video input reference when genlocked.

### **3.2 DIGITISER PRESET CONTROLS**

The Digitiser on the ArVis videographics card has a number of preset potentiometers located at the edge of the board. These are used to set the fine colour balance of the digitiser and are NOT OPERATIONAL CONTROLS.

The digitiser is carefully aligned at the factory for lv. p.p. video signals and ND ATTEMPT MUST BE MADE TO ALTER THE PRESET CONTROLS which will inevitably lead to an out of balance setting.

If these controls have been altered the videographics unit may have to be returned to the factory for re-balancing unless you have access to specialised equipment. This service will be charged at time cost plus carriage.

### **3.3 VIDEO LEVELS**

The digitiser part of the system has been accurately aligned so that a 1 volt sawtooth (700mV video, 300mv sync.) input to the 'VIDEO IN' connector just drives the red, green, blue levels to the clipping point (top binary value).

If your digitised video pictures exhibit areas where the detail is 'burnt out' then you are probably using an excessive input video level and this should be reduced at source. If in doubt check your source levels with an oscilloscope.

