OPERATORS MANUAL
MAGNI SYSTEMS, INC.
MODEL 4004/4005
VIDEO GRAPHICS GENLOCK/ENCODER SYSTEM
FOR THE AMIGA™ 2000

MAGNI

OPERATOR'S MANUAL

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MODEL 4004/4005

VIDEO GRAPHICS GENLOCK/ENCODER SYSTEM

FOR THE AMIGA™ B2000

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Schematic and Illustrations

FCC NOTICE

WARNING: This equipment generates, uses and can radiate radio
frequency energy and if not installed and used in accordance with
the instruction manual, may cause interference with radio
communications. It has been tested and found to comply with the
limits for a Class A computing device pursuant to Subpart J of
Part 15 of FCC rules, which are designed to provide reasonable
protection against such interference when operating in a
commercial environment. Operation of this equipment in a
residential area is likely to cause interference in which case
the user at his own expense will be required to take whatever
measures may be required to correct the interference.
**NOTE: Use of any other video cable other than the one provided
may cause interference to Radio or Television reception. Do not
substitute any other cable.**

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│ //////////////////////////////  WHERE TO FIND IT  ////////////////////////////// │
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QUICK-START PROCEDURE: SEE THE BLUE LEGAL SIZED SHEET INCLUDED
                        WITH THE MANUAL.

HARDWARE INSTALLATION: SEE PAGE 2-1.

SOFTWARE INSTALLATION: SEE PAGE 3-7.

HARDWARE TROUBLESHOOTING: SEE PAGE 3-9

SOFTWARE TROUBLESHOOTING: SEE PAGE 3-22

GRAPHICS OUTPUT

```
SW 8    O   => C
SW 7    O   => C
SW 6    O <=   C
SW 5    O   => C
SW 4    O   => C
SW 3    O <=   C
SW 2    O <=   C
SW 1    O <=   C
```

(FACTORY SETTING)

REMOTE CONTROL

```
SW 8    O   => C
SW 7    O   => C
SW 6    O   => C
SW 5    O   => C
SW 4    O   => C
SW 3    O <=   C
SW 2    O <=   C
SW 1    O <=   C
```

SOFTWARE CONTROL

```
SW 8    O <=   C
SW 7    O   => C
SW 6    O <=   C
SW 5    O   => C
SW 4    O   => C
SW 3    O <=   C
SW 2    O <=   C
SW 1    O <=   C
```

The photograph above shows the location of DIP switch SW180 on the rear panel of the 4004/4005. The diagrams to the left show the switch settings for Graphics Out (The factory setting), Remote Control and Software Control.

v
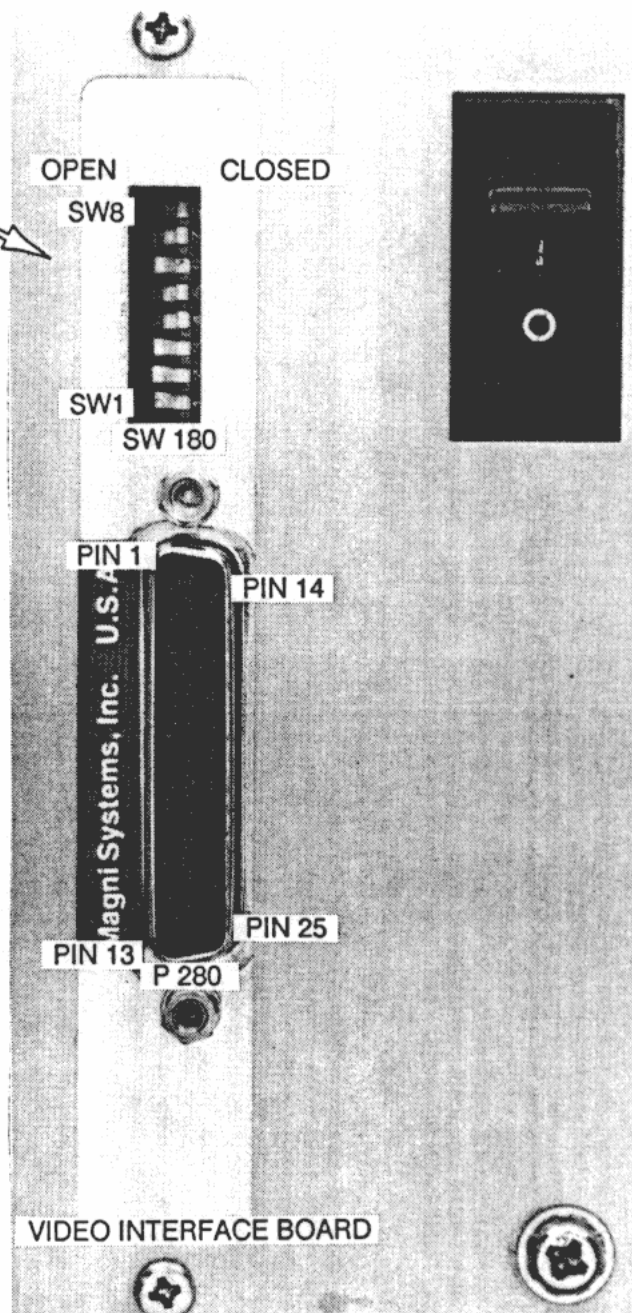
FIGURE 1.1 VIDEO INTERFACE BOARD REAR PANEL CONNECTOR
AND DIP SWITCH ASSIGNMENTS
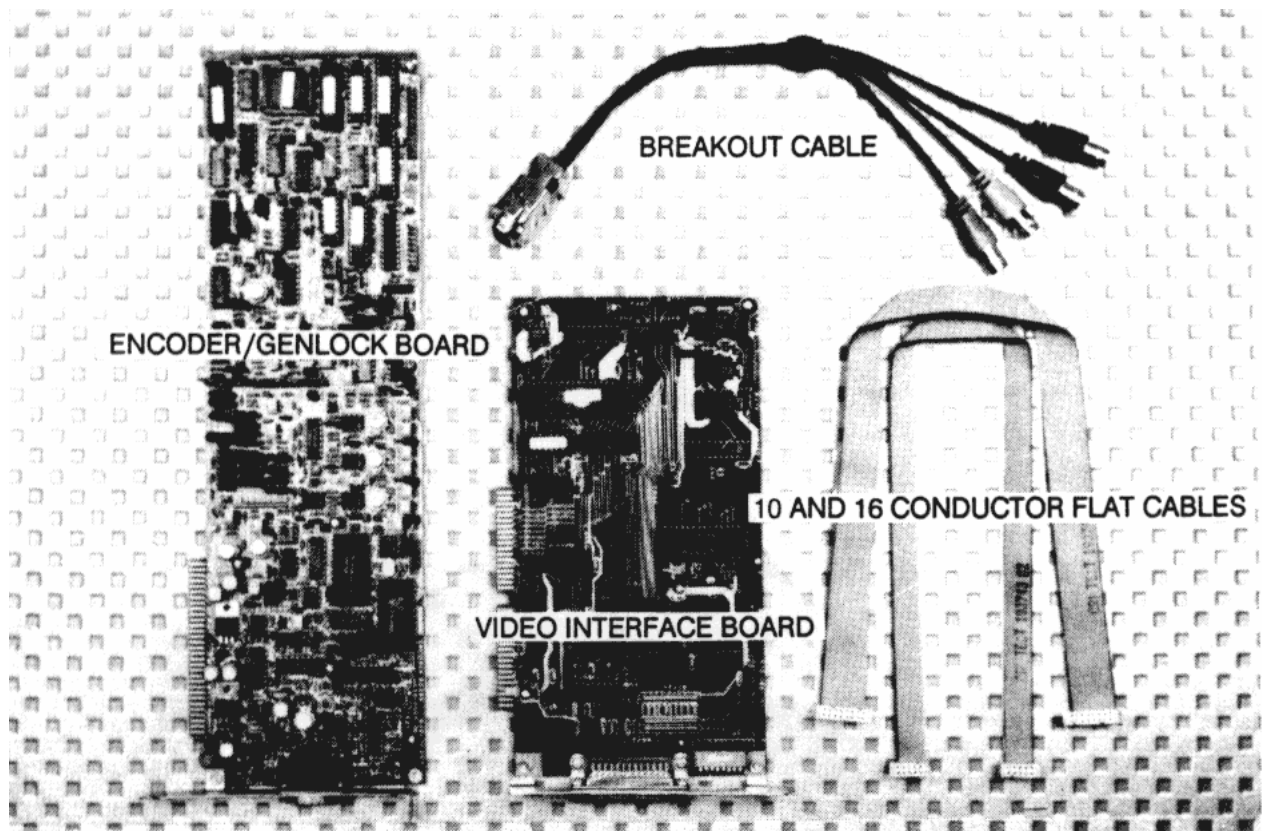
FIGURE 1.2 SUPPLIED 4004/4005 COMPONENTS
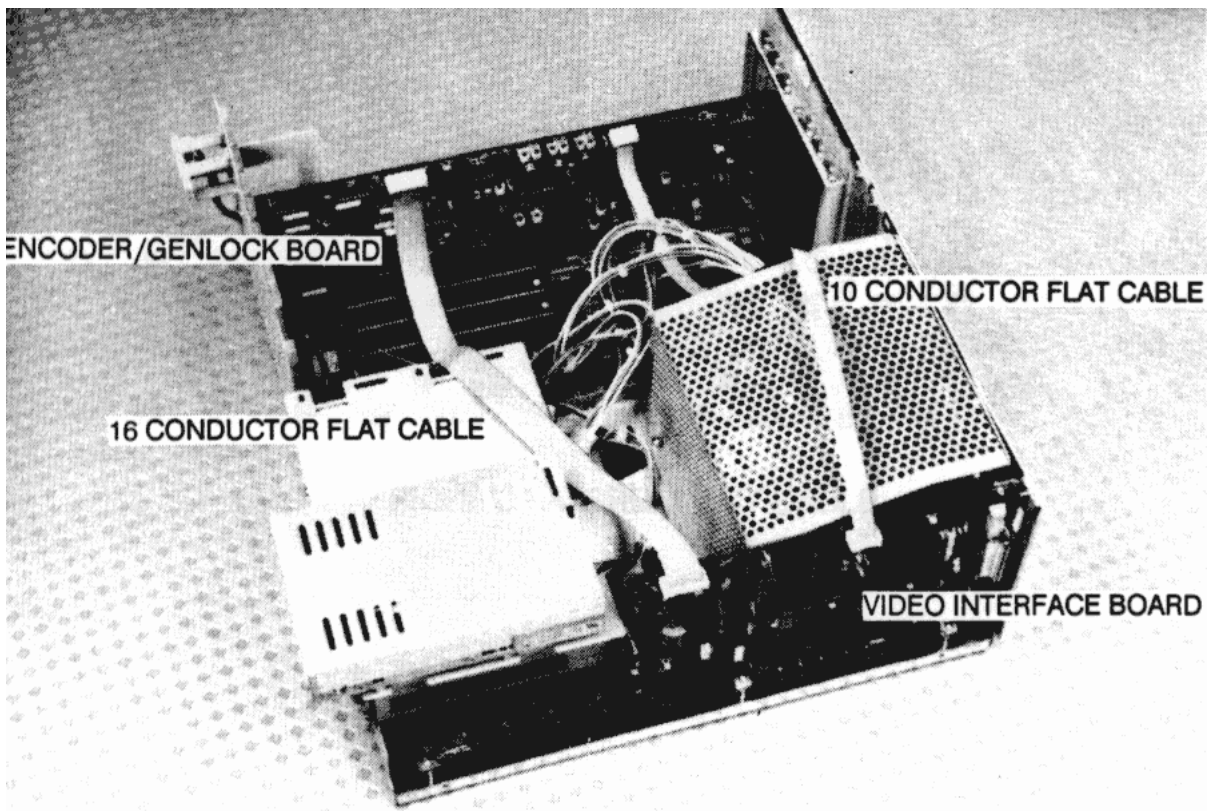
FIGURE 1.3 INSTALLED 4004/4005 SYSTEM
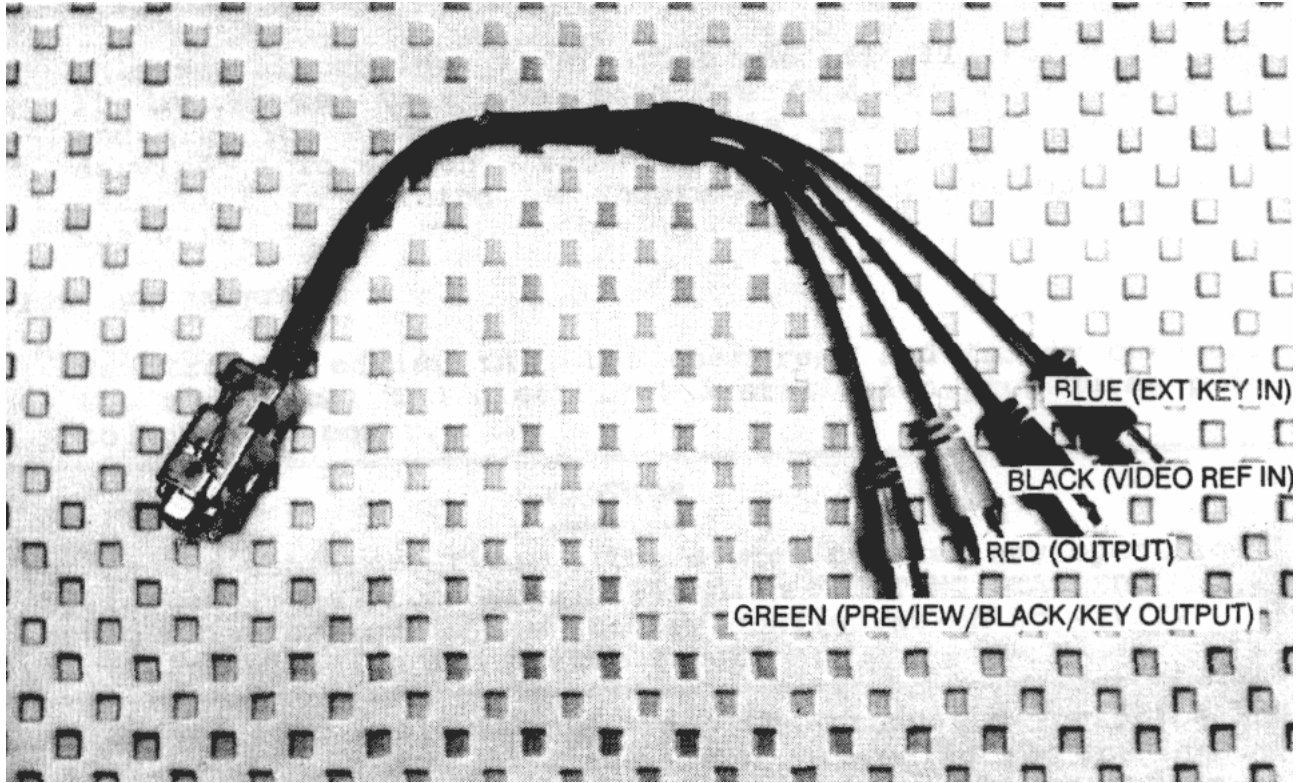
FIGURE 1.4 BREAKOUT CABLE

```
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║  ///////////////////////  MAGNI SYSTEMS, INC.  ///////////////////  ║
║  ═══════════════════════════════════════════════════════════════  ║
║   4004/4005 - SECTION 1, INTRODUCTION AND PRODUCT DESCRIPTION       ║
╚═══════════════════════════════════════════════════════════════════╝
```

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╔═══════════════════════════════════════════════════════════════════╗
║  ///////////////////////////  1.1 - INTRODUCTION  ///////////////  ║
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```

1.1.1 MODELS COVERED

4004 - NTSC Video Graphics and Genlock/Encoder System for
        Amiga® 2000/2500.
4005 - PAL Video Graphics and Genlock/Encoder System for
        Amiga® 2000/2500.

1.1.2 PURPOSE

This manual provides information specifically for operators.
It is assumed that operators are familiar with television
and graphics terms. Although this manual does not contain
service information, technicians will find this manual
essential in gaining an understanding of the operation of
the unit.

1.1.3 PRECAUTIONS

We strongly advise that the user read and follow carefully
the mechanical and electrical installation procedures prior
to applying power.

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║                            CAUTION                                 ║
║                            ───────                                 ║
║                                                                    ║
║  Before the user reconfigures the system to meet any specific      ║
║  application, the procedure outlined in "GETTING STARTED"          ║
║  should be attempted in the factory configuration to verify        ║
║  proper installation and system function.                          ║
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For specific applications, read the product description and
review the block diagram; then, reconfigure the system
according to instructions in Section 3. If operation or
potential applications are still in doubt, call your dealer
or Magni Systems.

1.2.1 DESCRIPTION OF MANUAL

This manual describes the installation and operation of the 4004/4005 Video Graphics and Genlock/Encoder System. The manual also provides a "Getting Started" section for first time operators, and a System Block Diagram. Troubleshooting guides are included which encompasses the most common hardware and software operational errors, and should be reviewed prior to calling the factory if problems are encountered in operating the system.

1.2.2 MANUAL CONTENTS

Section 1 - Introduction and Product Description.

This section presents a complete overview of the 4004/4005 Video Graphics Genlock/Encoder System and a listing of the available options and accessories.

Section 2 - Installation Instructions

This section contains the hardware installation information. (Page 2-1)

Section 3 - Operation Instructions

This section contains a "Getting Started" procedure as well as system configuration instructions which are provided to give the operator insight into how to make the best use of the capabilities of the unit in a variety of situations.

This section also describes use of the Demonstration Program (Page 3-19) which shows the operator some of the capabilities of the unit. A hardware troubleshooting guide is included which provides the operator with a quick method of evaluating and rectifying problems.

This section also contains the Software Installation instructions for both floppy disk and hard disk (Page 3.7), as well as a description of software operation (Page 3.10).

Section 4 - Specifications.

This section gives detailed electrical, environmental and physical specifications.

Section 5 - System Block Diagrams, Remote Control Schematic and Illustrations.

1.3.1 PRODUCT HIGHLIGHTS

▨ Broadcast quality video directly from Amiga® graphics.

▨ Controlled edges and timing to meet broadcast standards.

▨ Full genlock with correct color framing.

▨ Black burst reference output.

▨ Video input for internal graphics keying.

▨ External key input.

▨ Internal key outputs.

▨ Video Mixer capable of manual, automatic, or software transitions.

▨ Next frame control output.

▨ Supports locked or unlocked subcarriers from VCRs.

1.3.2 SYSTEM OVERVIEW

The Magni Systems, Inc. 4004/4005 Genlockable Video Graphics and Encoder system represents a long-overdue bridge between the versatility of personal computer graphics programs and the requirements of broadcast video. The system consists of two plug-in boards, which combine with a variety of Amiga® graphics programs to yield a video output with true broadcast standard compatibility.

Characteristically, converting computer graphics to video has been a two-step process. Since the line frequency of the RGB signal produced from graphics software has been dependent solely on the computer's internal clock, it has been necessary to take the RGB signal through an external encoder and scan converter to produce NTSC or PAL compatible signals.

The Magni 4004/4005 units eliminate that extra step by providing on the plug-in genlock/encoder card the following on-board elements:

A)   Sync and black burst generators.
B)   An input genlock system.
C)   A broadcast NTSC (4004) or PAL (4005) encoder.
D)   A system clock for the Amiga® graphics.

The system pixel clock feeds into the clock of the Amiga® and takes over as the operating frequency. The Amiga® is then operating at broadcast line and field rates from an on-board phase lock loop oscillator.

Appropriate sync, burst, blanking and timing are inserted into the graphics in order for the video output of the system to correctly meet relevant transmission standards. For example, proper SC-H Phase (Subcarrier-to-horizontal sync phase) is maintained allowing the signal to be correctly color framed. (This is essential when editing video sources onto VCR's requiring correct color framing).

1.3.3   GRAPHICS CAPABILITY

The 4004/4005 Genlockable Video Graphics Encoder fully utilizes the exceptional speed, resolution and color quality of the Amiga®. Up to 4096 colors are available for the Amiga® 2000/2500. Currently available software packages indicate the Amiga® is suitable for seamless motion animation.

1.3.4   SOFTWARE SUPPORTED

The 4004/4005 supports all Amiga® software and is transparent to software operation.

1.3.5   REMOTE CONTROL

A 25 pin D connector on the rear panel of the Interface card is provided to allow for the interconnection of the Magni Systems, Inc. 4010 Remote Control Box. Most of the functions of the 4004/4005 may be operated through this connector either by the attachment of the 4010 Remote Control Box or a user-constructed remote box. (See 3.1.4, Page 3-3)

1.3.6 GENLOCK FEATURES

Genlock, critical when editing/switching or video keying are required, allows the encoded graphics to be synchronized with a reference input, which may be a composite video signal, or color black, or even such "dirty" sources as a 1/2" VHS tape. The genlock circuits will lock to color-under VTRs where sync and subcarrier are unlocked from one another. Where there is no reference input, the internal reference oscillator provides a stable frequency reference.

Four genlock modes are selectable:

A.   Separate SYNC AND BURST LOCK.

(THIS IS THE FACTORY-CONFIGURED MODE).

This is the most versatile mode, where the sync oscillator locks to an external reference sync, and the subcarrier oscillator separately locks to the external reference burst. Sync and burst need not be locked to each other. If no reference is present, the system will revert to internal reference with sync locked to subcarrier. (In this mode with reference present, the SC-H phase of the external reference will be maintained at the output, even if it is incorrect).

B.   BURST LOCK only.

This mode produces correct SC-H phase even if the external reference SC-H phase is incorrect (although it must be within 40° and stationary - i.e. external sync and subcarrier must be locked). The subcarrier oscillator locks to external reference burst, and the sync oscillator itself locks to the subcarrier oscillator to produce a regenerated sync with the correct 0° SC-H phase relationship. The sync may be offset from the input by up to 100 ns if input SC-H phase is incorrect.

C.   SYNC LOCK only.

This mode locks the sync oscillator to an external monochrome reference, while forcing the subcarrier oscillator to a stable internal reference. With internal sync and burst selected on the output, color graphics may be overlaid on a monochrome reference, but sync and subcarrier on the output will be unlocked.

D.   INTERNAL REFERENCE.

This mode directs the subcarrier oscillator to run as a
stable internal reference, and locks the sync oscillator to
the subcarrier oscillator to produce correct SC-H phase.
The output will be asynchronous to external references, and
attempts at internal keying or fading will produce drifting
or unpredictable results.

1.3.7 FADING AND KEYING

The encoder output is switchable between the following
modes:
-          Video reference only.
           Graphics only.
-          Fades between video and non-keyed graphics.
-          Fades between video and keyed graphics.
                a. With COLOR-0 key
                b. With luminance level key
                    (adjustable).
-          External key/mix Input
           (For keying/mixing graphics into video under
           external control).
-          GPI toggling of Fade ON/OFF COLOR-0-key.

Dynamic Fading Speed, Luminance Key level and Mix (static
fade) levels are firmware controlled and adjustable by means
of the 4010 Remote Control Box or by Amiga™ software.

Another mode allows Graphics to be keyed over input video by
momentarily grounding the GPI (General Purpose Interface)
input line to alternately trigger a half-second Fade-in or
Fade-out of COLOR-0-keyed graphics, (Pin 9 on connector
P280, See Section 3.2.7, Modes 3 and 4 for further
information).

Internal Key can be selected as follows:

-   COLOR-0   (COLOR-"ZERO")   for   the   Amiga™   (software
    configurable)
-   Luminance key with adjustable key level and either key-
    greater-than   (NORMAL)   or   key-less-than   (INVERSE)
    operation.   (May be controlled from the 4010 Remote
    Control Box or from software).
-   The internal key may also be jumper-selected as an
    output in place of the black burst output for operation
    with a video production switcher or a downstream keyer.

DEFINITIONS:

COLOR-0 KEY

Amiga® software allows a particular color to be defined as COLOR-0. When FORWARD key and COLOR-0 key are selected, all pixels in the graphics image except those of this color are keyed into the video output. (i.e. COLOR-0 is effectively made transparent). When INVERT key and COLOR-0 key are selected, <u>only</u> the pixels defined as COLOR-0 are keyed into the video (e.g. for the "cookie-cutter" effect).

LUMINANCE LEVEL KEY

Every pixel in the graphics image has a certain inherent brightness or "luminance". When FORWARD key, LUMINANCE key, and a particular luminance level are selected, all graphics pixels <u>brighter</u> than this are keyed into the output video. If INVERT is chosen instead of FORWARD, all graphics pixels <u>darker</u> than this are keyed into the output video.

1.3.8 VIDEO ENCODER

The unit has an extremely high quality RGB-to-composite video encoder. This encoder extracts the maximum resolution available from the Amiga®'s high resolution graphics. It also rigorously meets NTSC (EIA RS-170A) or PAL (EBU and CCIR) broadcast bandwidth standards.

A precision Digital-to-Analog Converter (DAC) on the Video Interface Board converts the 4-bit R, G, and B digital video outputs of the Amiga® to analog RGB. On the Encoder/Genlock Board, the analog RGB is transcoded to Y, B-Y, R-Y format, and the chrominance components (B-Y and R-Y) are edge-shaped to correct bandwidth requirements using linear-phase filters to produce sine-squared edges. The chrominance components then modulate quadrature subcarrier oscillator outputs and are summed and filtered to produce the modulated subcarrier.

The Luminance (Y) channel is suitably risetime limited and time-delayed to match the chrominance channels before being summed with the chrominance and color burst to produce the ENCODED VIDEO. The Y channel also feeds a key level comparator to produce a luminance key signal.

The ENCODED VIDEO can be keyed or faded to the video output through the linear switch, and may be superimposed on the black burst reference output for use as a PREVIEW GRAPHICS output.

1.3.9 OPTIONS AND ACCESSORIES

Options available at this time for the 4004/4005 Genlockable Video Graphics Encoder are:

1.3.9.1 4010 Remote Control: The 4010 Remote Control is available for users who do not wish to wire in their own ground closure and potentiometer controls to the Video Interface Card. (See Figure 5.2). The 4010 Remote Control allows analog (slider pot) control of Luminance Key Level, dynamic fade rate, and fade (or mix) level, in addition to ten push-button and rocker switch controls for different operating conditions.

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2.1.1 PACKING MATERIALS

Save the shipping carton, packing materials and the static-free plastic envelopes for repacking in the event that shipping of the unit becomes necessary.

2.1.2 SUPPLIED ITEMS

The following items are supplied as standard with the 4004/4005:

        Two Printed Circuit Boards
        Cable: Video Breakout
        Cable: 10 Conductor Flat Ribbon
        Cable: 16 Conductor Flat Ribbon
        Instruction Manual
        Magni Demonstration and Control Software Disk
        Pro Video Plus Interactive Demo Disk

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The 4004/4005 Amiga® Interface and Genlock/Encoder boards require the Video Feature slot and one slot on the IBM PC compatible buss. An Amiga® IBM Bridgeboard is not required. The boards are quickly and easily installed by following the directions in this manual.
A Phillips screwdriver will be required to remove the cover of the Amiga® and insert and remove the panels.

2.2.1 PROCEDURE: PREPARE AMIGA® FOR 4004/4005 INSTALLATION

1. Turn off the power to the Amiga® and disconnect the power cord.

2. Disconnect the monitor cable if one is present.

3. Remove the cover according to the manufacturer's instructions.

2.2.2 PROCEDURE: INSTALLATION AND CONNECTION OF 4004/4005 BOARDS.

Identify all 4004/4005 System Components from Figure 1.3.

NOTE: **Figures 5.1 through 5.8 are located in Section 5 of this manual.**

1.   Turn the Graphics Encoder Board so the metal plate and connector are facing the back of the Amiga.

   Remove one of the four rear filler panels (furthest from the power supply). (See Fig. 5.5)

2.   Position the card edge buss connector on the Graphics Encoder Board over the PC buss connector in the corresponding card slot (one of the four outermost) . The video output connector should extend through the back panel. The metal plate on the rear of the board now becomes the new filler panel.

3.   Seat the Graphics Encoder Board in the buss connector firmly.   As with any new board insertion, be very careful to properly align the buss connector socket and the gold contacts on the board or the system may fail to boot properly. If this happens, remove and reseat the board. For insertion pressure lean on the board itself not on mounted components on the board.

4.   Remove the single rear filler panel at the opposite end of the chassis adjacent to the power supply. Turn the Interface Board so the metal plate and 25-pin DB connector are facing the back of the chassis. Position the card edge bus connectors over the Video Feature connectors adjacent to the power supply (outermost). Seat the Amiga® Interface board in the bus connector firmly. Refer to comments in Step 3. (See Fig. 5.5)

5.   Secure the metal connector plates to the rear panel of the computer using the screws provided.

6. Plug the Breakout Cable into the 9-pin D connector on the Graphics Encoder Board and screw it in tight. The 9-pin D connector fits properly only one way, attempting to force the connector the wrong way may damage it. (See Fig. 5.5) The Breakout Cable BNC connector assignments are as follows:

    Red - Video Out
    Green - Preview Graphics/Black Burst/Keyout
    Blue - External Key Input
    Black - External Video Reference In

7. Select the wider of the two flat cables provided. Connect one end to the 16 pin connector (P100) on the Interface Board so that the cable side of the flat cable connector is facing up and the red stripe faces the front of the computer.

    Connect the opposite end to the 16 pin connector (P120) on the Graphics Encoder Board such that the cable side of the flat cable connector is facing down. Repeat this procedure with the narrower flat cable, so that the cable side of the flat cable connector is facing up at the 10 pin connector (P150) of the Interface Board and is facing down at the 10 pin connector (P162) of the Graphics Encoder Board. Again the red stripe should face the front of the computer.

8. Tuck the flat cables to take up the slack and replace the chassis cover.

9. Connect a 75Ω coaxial cable from the red BNC connector to a 75Ω terminated, composite video input monitor.

10. Install the power cord, turn the power on, and boot the system as usual. (See Section 3, "Getting Started").

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3.1.1 BOOTING DEMO DISK

Once installation procedures have been completed, connect a
75Ω-terminated composite input monitor to the Red BNC
output.   Powering-up the Amiga® should now produce the
standard Amiga® boot screen display.

Insert the Software Control Demo disk and follow the
instructions below to run the SHOWBARS program. The Color
Bar display may be used to verify hue and saturation
settings of the display monitor. (Note that the display is
100% saturation Color Bars)

Boot with the Control and Demo Software disk. When booted,
point with the mouse to the MAGNI disk icon and "double
click" with the left hand mouse button. When the window
appears displaying the icons in the MAGNI directory, select
the icon labled SHOWBARS, using a "double click" of the left
hand mouse button. A Color Bar screen should appear with
which the encoder can be evaluated. (For more information
about SHOWBARS, refer to Section 3.9, Utility Programs).

Connect a reference video input to the Black BNC connector
on the breakout cable. The monitor display should remain
unchanged. Proper operation of the fundamental functions of
the Genlock/Encoder Board has now been demonstrated
including Sync and Burst lock.

3.1.2 FACTORY CONFIGURATION

The 4004/4005 is factory-configured in the ENABLED mode and
will be active as soon as it is powered-up.

The 4004/4005 is also factory-configured for graphics-only
output. The genlock mode is set to independently lock to
external sync and external burst. This genlock mode is the
most versatile, accommodating external references which have
sync and subcarrier either locked or unlocked. In the
absence of an external reference, the sync oscillator will
lock to the internal subcarrier oscillator, which is
crystal-controlled to the correct NTSC (or PAL) frequency to
within 30Hz.

Also, the system comes configured with internally-generated sync and burst on the output (these may otherwise be selected from the external reference). Consequently, one need only connect the output cable (red) to a 75Ω terminated destination to obtain proper NTSC (or PAL) encoded graphics.

Connection of an external reference to the reference input (black) will cause separate sync and burst genlocking of the output to the incoming reference (even a 3/4 inch VTR output with unlocked sync and subcarrier). SC-H phase will be faithfully preserved if the reference is correctly phased.

The auxiliary output (green) is factory-configured to be Preview Graphics (can also be configured as Black Burst or Key Out).

Users should complete the following procedure to verify that the factory-configured system properly reproduces graphics on an NTSC (or PAL) display before re-configuring the system to specific needs. If incorrect operation occurs at any point in the following procedure, proceed to Troubleshooting (Section 4.3) before contacting your dealer or the factory.

3.1.3 SELF-TEST MODE

The self-test routine can be executed continuously by setting the Interface Board DIP switches to the following settings:

> #6 - closed, #7 - open, #8 - closed

The self-test routine executes the following sequence:

1. Slow fade from graphics to video (non-keyed).
2. Slow fade back to graphics (non-keyed).
3. Inverse luminance key (key-in black); key level ramping down from 100 IRE (all graphics keyed-in) to 0 IRE (all graphics keyed-out).
4. Inverse luminance key; key level ramping up from 0 IRE to 100 IRE (Black to White).
5. Normal COLOR-0 key (keyed-in everything but COLOR-0); rapid fade to video.
6. Normal COLOR-0 key; rapid fade back to graphics.
7. Normal luminance key (keyed-in white); key level ramping up from 0 IRE (all graphics keyed-in) to 100 IRE (all graphics keyed-out).
8. Normal luminance key; key level ramping down from 100IRE to 0 IRE.
9. Inverse COLOR-0 key (key-in COLOR-0 only); rapid fade to inverse video.
10. Inverse COLOR-0 key; rapid fade back to graphics. LOOPS BACK TO #1.

3.1.4 ADDING REMOTE CONTROL FUNCTIONS

The system is now ready to test remote control functions. It will be necessary to use the accessory Remote Control Box 4010, or construct similar controls in accordance with the schematic, Figure 5.2.

Connect the accessory 4010 Remote Control Box (or user-supplied controls) to the 25 pin D-connector on the back of the Interface Board. Set DIP switches 6, 7, and 8 to the closed position to enter Remote Control Mode (Fig 5.7). Power up and run the SHOWBARS program as described in Section 3.1.1. The Color Bars should appear unchanged.

3.1.5 TESTING FADE AND CUT FUNCTIONS

Set the Fade Rate control mid-range and the Fade Level control to full graphics, then effect a "Fade to Video". The monitor display should smoothly fade to the external reference. Effect a "Fade to Graphics", the monitor display should smoothly fade back to graphics at the same rate as before (if not, fully reverse the Fade Level control to verify that it was set to full graphics). Change the Fade Rate potentiometer and repeat the above to verify proper Fade Rate control operation.

Change the Fade Level control. "Fade to Graphics" should now produce a dynamic fade to a mix of graphics and reference video (mix may be controlled by Fade Level). "Fade to Video" should fade to video reference only.

Effect "Cut to Graphics" and "Cut to Video". The monitor should display graphics only and video reference only, respectively. Mix mode can be re-activated by a "Fade to Graphics".

3.1.6 TESTING KEY FUNCTIONS

Effect a "Cut to Graphics". Using the LUM/COLOR-0 switch, select Luminance Keying. Effect a "Key On". Vary the Key Level control. The monitor display should reflect full graphics keyed over video at varying levels of luminance. Select "Inverse" instead of "Forward" keying. The inverse of the graphics should be keyed, again controlled by the Key Level control.

Effect a "Cut to Video". Video reference only should be displayed. Effect a "Fade to Graphics". Keyed graphics should fade to the desired mix with video (Fade Level control).

Basic functions have now been tested, and the system is configured for internal keying and fading.

3.2   RE-CONFIGURING THE SYSTEM

Once proper system operation has been verified by completion of Section 3.1, user-specific applications may call for system reconfiguration by means of the DIP switch settings on the Interface Board and/or relocation of jumpers on the Graphics/Encoder Board for selecting the auxiliary (normally Black Burst) output.

3.2.1   SELECTING THE AUXILIARY OUTPUT

Refer to Figure 5.9 for Graphics/Encoder Board jumper configurations to select the auxiliary output (green BNC) as either BLACK BURST, KEY OUT (factory configuration), or PREVIEW GRAPHICS. Notice that jumpers P190 and P410 directly affect the auxiliary output (See Block Diagram, Figure 5.1), whereas P380 is used to enable/disable the internal key, KEY OUT should <u>not</u> be selected if internal key is enabled, or key edges may ring.

3.2.2   USING THE EXTERNAL KEY INPUT

External key control of the internal linear switch may be achieved by setting switch #4 of the SW 180 DIP switches on the Amiga® Interface board to the OPEN position as shown in Figure 5.8. A 0 mV level on the EXTERNAL KEY input (Blue BNC) will switch 100% reference video through to the output (Red BNC) and a 0.7 volt level will switch through 100% graphics. Intermediate values will produce a non-additive mix, negative values will gate through video reference (e.g. during composite blanking/sync tip).

3.2.3   USING KEY OUT FOR DOWNSTREAM KEYING

On the Encoder/Genlock board, move jumpers P410, P380 and P140, as shown in Figure 5.9 to change the output of the Green BNC to KEY OUT. To allow the External Key through the Encoder/Genlock board from the Key In (Blue BNC) to the Key Out (Green BNC), switch #4 on the SW 180 DIP should be set to the OPEN position.

3.2.4 4004/4005 ENABLE/DISABLE (DIP SWITCH 1)

This switch effectively connects and disconnects the 4004/4005 from the Amiga®. This is accomplished by switching off the 4004/4005 reference signal which allows the Amiga® to operate normally with its own internal clock.

This means in effect that the Amiga® will operate <u>as though the 4004/4005 circuit boards were not installed.</u> All video outputs will become inoperative and unstable in this mode. Note: It is recommended that switches SW6, SW7, and SW8 be set to the closed position when disabling the 4004/4005.

3.2.5 CHANGING THE GENLOCK MODE (DIP SWITCHES 2 AND 3)

The genlock modes described in Section 1.3.6 can be accessed by re-configuring the DIP switches on the Interface Board as shown in Figure 5.8. In particular, the user may wish to use the BURST LOCK mode for locked subcarrier/sync video reference to correct SC-H phase.

3.2.6 CHANGING THE SYNC AND BURST SOURCE (DIP SWITCH 5)

The system is factory-configured for internally-generated sync and burst. However, the user may choose to insert external sync and burst extracted from the video reference input by setting switch #5 of the Amiga® Interface DIP switches to the "open" position, as shown in Figure 5.8.

Note: When external sync is selected and there is no genlock reference, the outputs will have no sync.

3.2.7 SELECTING THE OPERATIONAL MODE (DIP SWITCHES 6, 7, 8)

Eight modes of operation are selectable by means of DIP switches 6, 7 and 8 of SW 180 on the rear of the Amiga® as shown in Figure 5.8. The modes are as follows:

Mode #0   This mode enables key/fade control by the 4010 or user-supplied remote control.

Mode #1   This mode forces graphics out and disables any remote control functions.

Mode #2   This mode is a self-test mode which disables remote functions and continually executes dynamic fades and key level variations (for normal and inverse key).

Mode #3   This mode selects C0L0R-0 keyed graphics over video. A fixed "fast" fade to video will happen in response to a maintained "GPI-IN" ground closure on the Video Interface Board.

"GPI-IN" closure is accomplished by connecting a shorting switch between pins 9 (GPI-IN) and 23 (GROUND) on P280 the 25 pin "D" connector (See Figure 5.7). Closing the switch will cause the keyed graphics to fade off. Likewise, opening the switch will cause the keyed graphics to fade back on.

Mode #4   This mode enables a "GPI-IN" toggle controlled fast fade on and off of the COLOR-0 keyed graphics over the video input. Every time the "GPI-IN" closure is made (i.e. strobed), the COLOR-0 keyed graphics will fade on if it was off, or it will fade off if it was on. (i.e. grounding "GPI-IN" "toggles" the fader).

This mode is intended for use with a Time Code Reader or can be activated with a momentary switch closure wired to pins 9 (GPI-IN) and 23 (GROUND) on the 25 pin "D" connector, P280. See Figure 5.2.

CAUTION: A maintained switch closure between pins 9 and 23 on the 25 pin "D" connector on the Video Interface Board in **any** mode other than 3 and 4 described above, **OR before power is applied and the system has booted in ANY mode, INCLUDING MODES 3 AND 4,** will result in improper operation of the 4004/4005.

NOTE: The FAST FADE duration is between 0.5 and 1 second.

Mode #5   Software Control Mode, 4004 only (See Section 3.4)
Mode #6   Reserved.
Mode #7   Reserved.

3.2.8 - "UPSTREAM" CONFIGURATION FOR THE 4004/4005

```
┌──────────────┐     ┌──────────────┐     ┌──────────────┐
│   STATION    │     │   STEPPED    │     │   VARIABLE   │
│    BLACK     │ ─>  │ DELAY LINE   │ ─>  │ DELAY LINE   │      REFERENCE
│    BURST     │     │  (0-1270ns)  │     │  (0-10ns)*   │
└──────────────┘     └──────────────┘     └──────────────┘
```

EXTERNAL KEY IN **

```
┌──────────────┐                              ┌──────────────────┐
│              │  <──                         │                  │
│  PRODUCTION  │                              │     AMIGA™        │
│              │  <──                         │   (TOP VIEW)     │
│  SWITCHER    │     VIDEO INPUT              │                  │
│              │                         ─>   │ BLACK (VIDEO IN) │
│              │                              │ GREEN (KEY OUT)  │
│              │                              │ RED (VIDEO OUT)  │
└──────────────┘                              └──────────────────┘
```

```
                              OPEN          CLOSED
┌──────────────────────┐   ┌──────────────────────────┐
│ ▨  REAR OF VIDEO      │   │                          │
│ INTERFACE BOARD       │   │ SW8   □     ┌─┐          │  SET TO
│ SHOWING CORRECT       │   │          □─┤ │          │  MODE 4
│ SW 180 DIP SWITCH     │   │          □─┤ │          │
│ SETTINGS.  (SEE       │   │          □─┤ │          │
│ FIGURE 2.7 IN THE     │   │       □     └─┘          │
│ MANUAL FOR MORE       │   │       □     ┌─┐          │  BURST LOCK ***
│ INFORMATION)          │   │          □─┤ │          │
│                       │   │ SW1   □     └─┘          │
└──────────────────────┘   │                      ▨   │
                           └──────────────────────────┘
```
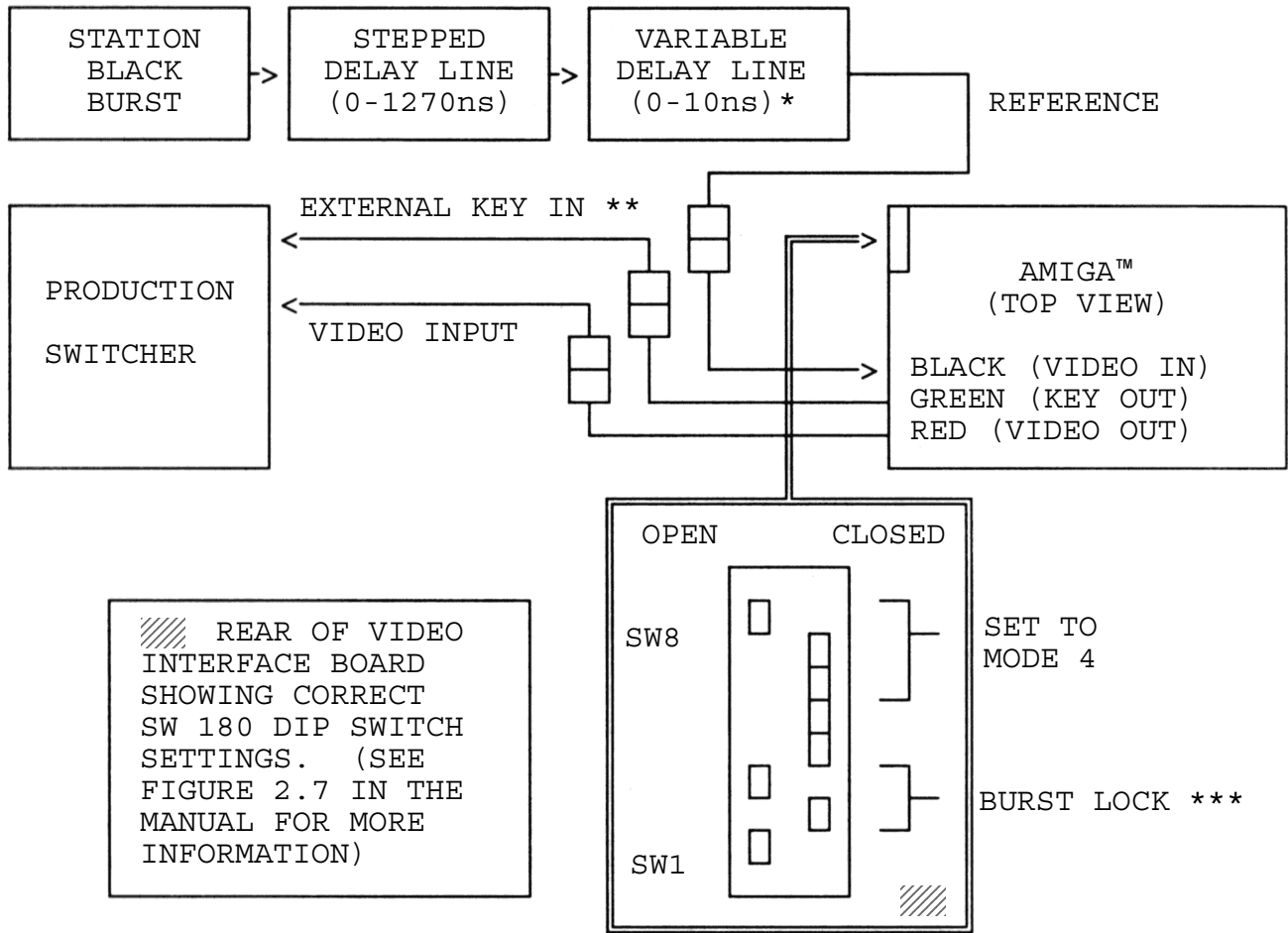
OPERATIONAL NOTES:

1.   Pins 9 and 21 of P180 must be shorted with a jumper to get graphics on the video output.

2.   The operator does not require a switcher MIX/EFFECTS in order to dissolve graphics in and out. If the key softness on the switcher is set "soft," the graphics key can be dissolved in and out by closing and opening the connection between pins 9 (GPI) and pin 21 (GND) with a switch while in modes 3 or 4 (See Section 3.2.6 for a complete description of these modes).

INSTALLATION NOTES:

* If no black burst source is available which can be individually timed for horizontal and subcarrier phase, delay lines can be inserted in the black burst line to accomplish this phasing since the output of the 4004/4005 is normally correctly SC-H phased at 0°.

The use of two delay lines (such as Allen Avionics VP1270 and VP0010) gives a total timing range of 1.28µs. and provides 0.5ns. steps throughout the range. Shorter delay lines may be substituted if less range is needed. In the event that the 4004 output is delayed to begin with, the delay lines should be added to the black burst reference used by the rest of the system, sending the un-delayed black burst to the 4004.

** Set jumpers on the 4004 for key out as shown in Figure 2.8.

*** DIP switches 2 and 3 are set to Burst Lock mode guaranteeing 0° SC-H phase on the output; however, BURST and SYNC lock mode (the factory configuration) can also be used.

The following limited troubleshooting guide is organized by symptom and possible causes with remedial action. Only problems due to improper installation are covered; contact your dealer or the factory if none of the recommended actions are effective.

Monitor Screen Dark; Amiga® Power LED ON.

1. The output (RED BNC) is not properly connected or the breakout cable is not firmly seated.
2. The Encoder/Genlock board is improperly seated or installed in the wrong slot. See installation, Steps 2 and 3.
3. There is no power to the monitor.

Monitor Gray; System Will Not Boot.

1. The ribbon cables between the Interface Board and Encoder/Genlock Board are improperly installed. Review installation Step 7. Additionally, carefully inspect all cable connectors for misalignment with printed circuit board pins and/or bent pins.
2. The Interface Board is improperly seated or in the wrong slot. See installation Step 4.
3. Check to verify that DIP switch 1 is in the proper position; 0 - ENABLED. (See Figure 5.8)

Demo/Boot Display OK With No External Reference; Unstable With External Reference.

1. Check to verify that DIP switch 1 is in the proper position; 0 - ENABLED. (See Figure 5.8)

2. The external reference video does not conform to NTSC (PAL) standards. Try a test signal generator to verify that the line frequency is within the pull range specification for the Sync Lock PLL.

Demo/Boot Display Unstable; No External Reference.

1. Check to verify that DIP switch 1 is in the proper position; 0 - ENABLED. (See Figure 5.8)

Demo/Boot Display Shows Unstable Hue (Rainbow effects).

1. The Burst Lock Oscillator may be out of adjustment.

Remote Control Functions Inoperable.

1. The DIP switches are not set to the remote control mode (SW 6, 7 and 8 must be closed or Mode 5 in Software Control with 4010 Remote Control Box enabled; See Section 3.2.4).

2. The 4010 Remote Control Cable may be improperly seated at either end.

3. The User-constructed Remote Control Box wiring may be incorrect; verify against the Remote Control Box Schematic (Fig. 5.2). Verify that the cable connection to the Interface Board is correct. Verify that the reference voltage is present across Key Level, Fade Rate, and Fade Level Potentiometers. Ensure that the corresponding pins 11, 12, and 13 of the 25 pin connector adjust from 0 to 2.5 V relative to ground as controls are operated throughout this range.

4. The Interface Board may be improperly seated or in the wrong slot; See installation Step 4.

If these suggestions fail to correct the problem, contact your dealer or the factory.

3.4.1 DEFINITIONS

1.   To "click" means to momentarily press the <u>left</u> or Selection mouse button.

2.   To "click and hold" means to press the <u>left</u> or Selection mouse button, and hold it down.

3.   The Menu button is the <u>right</u> mouse button and is used to select menu items.

3.4.2 HINTS ON USING WINDOWS

1.   To select a window, click the Selection mouse button anywhere inside it.

2.   To move the window, click and hold the Selection mouse button and drag the Title Bar.

3.4.3 HINTS ON USING MENUS

1.   To display the Menu Bar, select the List or Output window, then press and hold down the Menu button.

2.   To display the individual menus, point at the desired menu title.

3.   To choose an individual menu item, first point at the desired item (to highlight it) , then release the Menu button.

3.4.4 HINTS ON USING THE 4000 SERIES CONTROL SOFTWARE

1.   All error messages will be displayed in the Title Bar.
2.   MASTER KEYS: The <u>CONTROL</u> and <u>L-SHIFT (LEFT SHIFT)</u> keys are pressed and held <u>first</u>, <u>then</u> the final key is pressed. (HELP, DEL, ESC, etc.)
3.   Start the 4000 Series Control software <u>first</u> when running it in conjunction with another program. Because the program is resident, there is no need to use the RUN command or open another CLI window to start the second application.

3.4.5 CAUTIONS

1.   **A PRINTER OR OTHER DEVICE <u>MUST NOT</u> BE CONNECTED TO THE PARALLEL PORT ON THE COMPUTER WHILE THE OPERATOR IS USING THE 4000 SERIES CONTROL SOFTWARE.**

2.   The Magni 4000 Series Control Software operates with other software in a multi-tasking environment. If other software to be used is not designed to operate in this way, it will not function correctly.   Contact your dealer or Magni Systems for more information.

3.   The 4000 Series Control Software is primarily intended for setup of the 4004. It may not be desirable to have the on-screen display present when the encoder is being used.

3.4.6 DIP SWITCH SETTINGS

NOTE: **The switch positions and functions shown below are the factory configuration <u>plus MODE 5</u>. MODE 5 permits software control of the 4004.**

```
////////////////////////////  SW180 - DIP-SWITCH ASSIGNMENTS  ////////////////////////////

                                        FUNCTION
        SW 8  ║ O  <=   C ║  MODE ─┐
        SW 7  ║ O   =>  C ║  MODE ─┤─> SET TO MODE 5
        SW 6  ║ O  <=   C ║  MODE ─┘ (SOFTWARE CONTROL)
        SW 5  ║ O   =>  C ║  INTERNAL SYNC SOURCE
        SW 4  ║ O   =>  C ║  EXTERNAL KEY
        SW 3  ║ O  <=   C ║      ─┐
        SW 2  ║ O  <=   C ║       └ SYNC & BURST GENLOCK
        SW 1  ║ O  <=   C ║  4004/4005 ENABLE/DISABLE
```

3.5.1   FLOPPY DISK INSTALLATION INSTRUCTIONS

1.   Insert the 4000 Series Control Software disk in the DF0:
      drive.

2.   Apply power and allow the computer to boot.

3.   The Workbench™* screen will appear with a MAGNI disk icon
      in the upper right corner.

4.   Double-click the mouse button on the Magni disk icon.

5.   When the Workbench™ screen reappears, the Magni control
      panel icon and the standard System and Preferences icons
      will appear. Double-clicking the mouse on the MAGNI icon
      (labeled MC) will cause the Video Control Panel to appear on
      the screen.

6.   Move the arrow to the Title Bar at the top of the Video
      Control Panel. Press and hold the left mouse button and
      move the arrow up and down. Note that the display moves up
      and down with the arrow.

* **NOTE:**   Workbench™ software is included on the 4000 Series
                 Control Software disk as the operating environment for
                 the Video Control Panel and 4010 Remote Control.

3.5.2   HARD DRIVE INSTALLATION INSTRUCTIONS

STEP
1.   Boot the computer in the normal manner so that the hard
      drive is mounted.

2.   Insert the 4000 Series Control Software disk in the DF1:
      drive.

3.   The Workbench™* screen will appear with a MAGNI disk icon
      in the upper right corner.

4.   Double-click the mouse button on the Magni disk icon.

5.   To copy the software to the hard drive, open the "System"
      drawer by double-clicking the mouse on the System icon.

6.   Double-click on the CLI icon to open a CLI window.

7. Type: execute install.hard

    All the files associated with the Magni control software
    will be copied to a directory named MAGNI in the root
    directory of the hard drive, Dh0.

8. Type: endcli

This closes the CLI window and completes the hard drive
loading procedure.

████████ **3.6 - OPERATIONAL DESCRIPTION AND INSTRUCTIONS** ████████

3.6.1 OPERATIONAL DESCRIPTION, GENERAL INFORMATION

The 4000 Series Control Software has two modes which allow the
operator to control the 4004 Genlockable Video Graphics Encoder.
These modes are as follows:

1. The mouse-driven mode (through the use of the on-screen
    arrow controlled by a mouse)

2. The keyboard-driven mode (by commands given by function keys
    or multiple key combinations)

3.6.2 VIDEO CONTROL PANEL DESCRIPTION AND COMMAND INSTRUCTIONS

What follows is the name, keyboard command*, and description of
the functions available from the 4000 Series Control Software.

***   NOTE: In order to input keyboard commands, the FUNCTION
KEY mode (see below) must be set to permit keyboard control
of the 4000 Series Control Software.**
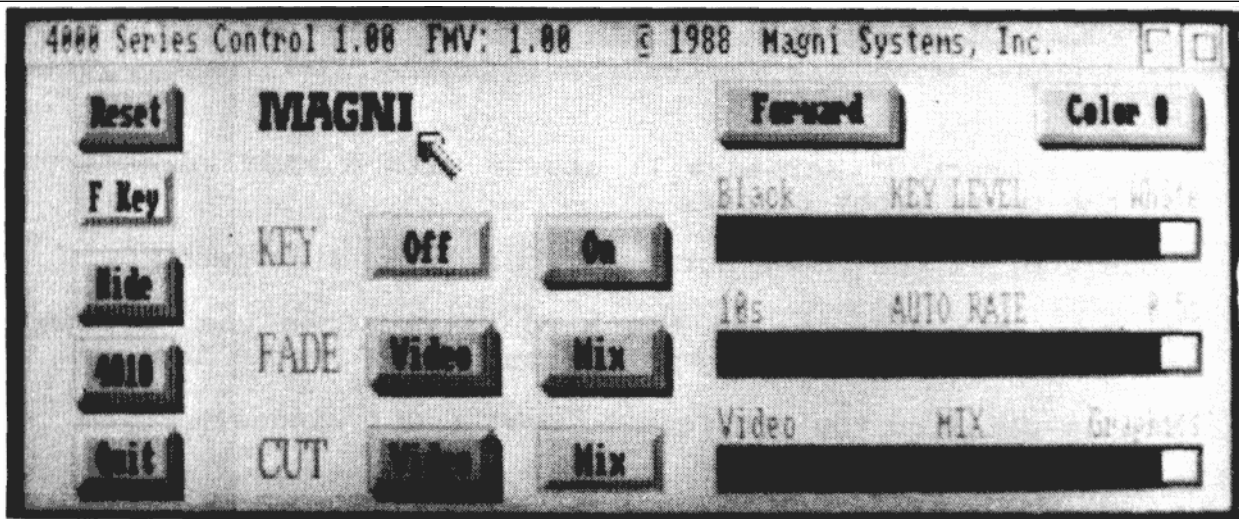
4000 SERIES CONTROL SOFTWARE ON-SCREEN DISPLAY

▨ RESET - **[CTRL][A]** (Same as "Return to Default")

    This command will reset all functions of software <u>and</u>
hardware to the default condition. It is also accomplished
by double-clicking the mouse on RESET.
NOTE: If the operator has started the RESET sequence by
clicking the mouse button once and does not wish to
continue, move the arrow away from the RESET button. (The
next button selected will automatically cancel the RESET
command).

▨ F KEY - **[CTRL] [L-SHIFT] [HELP]** - FUNCTION KEYS ON
             [CTRL][L-SHIFT][DEL] - FUNCTION KEYS OFF

    These commands will turn the FUNCTION KEY and MENU KEY
control of the 4000 Series Control Software off and on.
This allows the operator to select whether the Function and
Menu keys will command the Video Control Panel or a another
program running on Workbench™.

    In the OFF position, most key combinations used by the 4000
Series Control Software will be ignored, allowing them to be
used by other programs. In the ON position, these keys will
activate functions of the 4000 Series Control Software, but
other concurrently-running software will be locked out, even
if their window is currently active.

    NOTE: This command will <u>not</u> affect the [CTRL][L-SHIFT] key
functions. These commands will operate normally.

▨ HIDE - **[CTRL][L-SHIFT][R-SHIFT]**

    NOTE: In the above command, the operator is to hold the
CONTROL key and <u>both</u> the left and right SHIFT keys
simultaneously, then release.

    This is an off/on toggle command that allows the operator to
remove the Video Control Panel from the screen so that the
underlying graphics may be viewed and output. The keyboard
command **[CTRL][L-SHIFT][R-SHIFT]** returns the Video Control
Panel to the screen.

    (Some software requires that the above command be entered
<u>twice</u> before the Video Control Panel will appear).

▨ 4010 - **[CTRL][L-SHIFT][BACKSPACE]**

    This command instructs the Video Control Panel to reset to
the settings on the 4010 Remote Control.

▨ QUIT - **[CTRL][L-SHIFT][ESC]** (also "Save as Default")

   This command exits the Video Control Panel program and
   returns to the Workbench™ or CLI screen. In the mouse-
   driven mode, QUIT is activated by clicking the mouse twice
   on the QUIT button.

   Clicking the mouse on the QUIT button once, then selecting
   the "Save as Default" menu option will cause the current
   software panel configuration to be saved as the default
   before exiting the software.

   If the operator has started the QUIT sequence by clicking
   the mouse button once and does not wish to continue, the
   operator should move the arrow away from the QUIT button.
   (The next button selected will automatically cancel the QUIT
   command).

┌──┐
│ To restart the software program from CLI, type MC following   │
│ the > prompt. If in Workbench™, double-click the mouse   │
│ on the Magni icon.   │
└──┘

3.6.3 COMMAND DESCRIPTIONS

3.6.3.1 KEYING COMMANDS
ON - **[F6]**

   Activates Keying.

OFF - **[F5]**

   Deactivates Keying.

3.6.3.2 KEYING-RELATED FUNCTION COMMANDS

   FORWARD/INVERSE - **[F7]** - Forward
                     [F8] - Inverse

   NOTE: KEY must be ON to use this function.

   These commands switch between FORWARD and INVERSE. When the
   FORWARD function is engaged, the software selects foreground
   key (if COLOR 0 key is enabled) or graphics with luminance
   levels above the KEY LEVEL threshold (if LUM is enabled).
   INVERSE selects the background key (COLOR 0) , (if COLOR 0 is
   enabled) and graphics with luminance levels below the KEY
   LEVEL threshold (if LUM is enabled).

```
COLOR 0/LUM - [F9] - Color 0
              [F10] - Luminance
```

These commands switch between the COLOR 0 and LUM (Luminance) key modes.

```
KEY LEVEL - [SHIFT][F5] - (Toward BLACK),
            [SHIFT][F6] - (Toward WHITE)
```

This slider selects the luminance threshold for the LUM key mode. The slider can also be positioned from BLACK to WHITE levels by using the mouse.

3.6.3.3 FADE COMMANDS

VIDEO - **[F3]**

When selected, the encoded graphics, keyed or full screen, will fade to video at the rate determined by the AUTO RATE slider.

MIX - **[F4]**

When selected, the encoded graphics, keyed or full screen, will fade to the mix level set up by the MIX slide control, at the rate set up by the AUTO RATE slider.

3.6.3.4 CUT COMMANDS

VIDEO - **[F1]**

When selected, the encoder switches to video output only (with no graphics).

MIX - **[F2]**

When selected, the output is directly switched to the level of graphics/video mix setup by the MIX slider. Either keyed or full screen graphics is mixed with video.

3.6.3.5 FADE AND CUT RELATED FUNCTION COMMANDS

```
AUTO RATE - [SHIFT][F3], toward 10 sec.
            [SHIFT][F4], toward 0.5 sec.
```

This slider selects a fade rate for the automatic FADE-TO-VIDEO and FADE-TO-MIX functions. The slider can be positioned between 0.5 and 10 sec. (the fade duration time) by using the mouse.

MIX - **[SHIFT][F1],** toward video
       [SHIFT][F2], toward graphics

This slider selects the mix level between video and keyed or full screen graphics. The slider can also be positioned from no mix (full video out) to varying mix levels of keyed or full screen graphics using the mouse.

3.6.3.6 PULL DOWN MENU COMMANDS

Certain control functions on the Video Control Panel are accessible through a pull-down menu. Clicking the menu (right) mouse button causes the Title Bar to display the word OPTIONS on the left side. Holding the menu mouse button and moving the arrow over the word OPTIONS, causes the pull-down menu to appear. It remains as long as the button is held. Moving the arrow up and down the menu highlights the various options.

To select a menu item, release the Menu mouse button while the option to be selected is highlighted.

NOTE: If the menu does not appear when the menu button is pressed, click the mouse anywhere inside the Video Control Panel window and try to access the menu again.

THE OPTIONS OF THE PULL-DOWN MENU ARE AS FOLLOWS:

▨ **DEFAULT SETUP**

This menu option allows you to save current settings or return to the Video Control Panel default settings.

RETURN TO DEFAULT - **[CTRL][A]**

This command returns the panel to the default settings.

SAVE AS DEFAULT - **[CTRL][B]**

This command saves the present panel configuration as the default. The new default settings are saved in the "Magni.def" disk file.

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▨ **4010 REMOTE CONTROL**

This menu option allows the operator to select between 4010 Remote Control and Video Control Panel to control the video hardware.

ENABLE -   **[CTRL][C]**

Enables the 4010 Remote Control and disables software control of the video hardware. (While the 4010 Remote Control is active, an "R" is displayed on the right side of the Title Bar).

DISABLE - **[CTRL][D]**

Disables the 4010 Remote Control and enables software control of the video hardware. (The settings of the 4010 Remote Control will automatically transfer to the Video Control Panel).

▨ **DIP SWITCH SET**

This menu option allows the software to override the hardware DIP switch selections for Genlock Mode, Key Source, and Output Sync Source.

HARDWARE - **[CTRL][E]**

This command enables the hardware DIP switch settings. (The Genlock, Key Source, and Sync Source menus will reflect the current state of the hardware DIP switches when this option is selected).

SOFTWARE - **[CTRL][F]**

This command overrides the hardware DIP switch settings. The Genlock, Key Source, and Sync Source menus will reflect the previously defined software DIP switch selection. (While the Software DIP switches are enabled, an "S" is displayed on the right side of the Title Bar).

▨ GENLOCK MODE

These commands (used in conjunction with the DIP Switch Set commands above, and used only when software override of the hardware DIP switches is enabled) allow the selection of one of the following genlock modes: SYNC AND BURST LOCK, BURST LOCK, SYNC LOCK and INTERNAL REFERENCE.

NOTE: In the hardware DIP switch mode, the genlock mode selected by the hardware DIP switches will be displayed; however, it cannot be changed by software commands.

SYNC & BURST LOCK - **[CTRL][G]**

   This command selects the Sync and Burst genlock mode.

BURST LOCK ONLY - **[CTRL][H]**

   This command selects the Burst Lock only genlock mode.

SYNC LOCK ONLY - **[CTRL][I]**

   This command selects the Sync Lock only genlock mode.

INTERNAL REFERENCE - **[CTRL][J]**

   This command selects the Internal Reference mode (no genlock).

▨ KEY SOURCE

This option, when software override of the DIP switches is enabled, allows you to select either External Key source or Internal Key source. (In the hardware DIP switch mode, the mode selected by the hardware DIP switches is displayed; however, it cannot be changed by software commands).

EXTERNAL - **[CTRL][K]**

   This command selects External Key Source.

INTERNAL - **[CTRL][L]**

   This command selects Internal Key Source.

▧ OUTPUT SYNC SOURCE

This option, when software override of the DIP switches is enabled, allows the selection of the output sync source, either the External sync from the reference input, or the Internal sync on the video output. (If the hardware DIP switch option is selected, the selected mode is displayed; however, it cannot be changed by software commands).

EXTERNAL - **[CTRL][M]**

This command selects External Sync Source.

INTERNAL - **[CTRL][N]**

This command selects Internal Sync Source.

▧ COLOR/MONO

This option allows the operator to select either COLOR or MONO (black and white) graphics output.

COLOR - **[CTRL][O]**

Selecting this option causes the encoded graphics output to be in color.

MONO - **[CTRL][P]**

Selecting this option causes the encoded graphics output to be in monochrome. (If External Sync has been selected, the video output will still be in color).

▧ SELF TEST MODE

Selecting this option starts the Video Control Panel self-test routine. This test lasts about one minute. Double-click on RESET to abort the test.

CAUTION: Running the self-test routine will reset the system to the default panel configuration when finished.

3.7.1 Troubleshooting in the Workbench™ environment:

Problem: The mouse was double-clicked on the Magni icon, but nothing happened.

1.   Try to restart the program.

2.   Open a CLI window (in the system drawer) and type MC to start the program. This will display a message which may point out the problem.

3.   Re-boot the computer.

3.7.2 Trouble Shooting in the CLI environment:

Problem: The program won't run and the "PROGRAM ALREADY RUNNING" message is displayed.

1.   Retry starting the program.

2.   Re-boot the computer.

Problem: After a DIP switch was changed, a "FATAL ERROR" message is displayed in the Title Bar.

Any DIP switch change will cause the error. If the error message continues to appear, set the DIP switch to its previous position and wait for the system to reset.

Problem: Message displayed is "CANNOT ESTABLISH COMMUNICATION WITH VIDEO HARDWARE."

1.   Check the DIP switches. DIP switches 6, 7 and 8 must be set to MODE 5 in order for the 4000 Series Control Software to operate.

2.   Turn off the computer and reseat both hardware cards. Disconnect and reconnect the ribbon cables connecting the two cards.

3.   Re-boot the computer.

(Workbench™ and Amiga® are trademarks of Commodore-Amiga, Inc.)

```
[Fl]   CUT TO VIDEO
[F2]   CUT TO MIX
[F3]   FADE TO VIDEO
[F4]   FADE TO MIX
[F5]   KEY OFF
[F6]   KEY ON
[F7]   FORWARD KEY
[F8]   INVERSE KEY
[F9]   COLOR 0 KEY
[F10] LUMINANCE KEY
```

```
[SHIFT][Fl]   MOVES MIX SLIDE CONTROL TOWARDS VIDEO
[SHIFT][F2]   MOVES MIX SLIDE CONTROL TOWARDS GRAPHICS
[SHIFT][F3]   MOVES AUTO RATE SLIDE CONTROL TOWARDS 10 SEC.
[SHIFT][F4]   MOVES AUTO RATE SLIDE CONTROL TOWARDS 0.5 SEC.
[SHIFT][F5]   MOVES KEY LEVEL SLIDE CONTROL TOWARDS BLACK
[SHIFT][F6]   MOVES KEY LEVEL SLIDE CONTROL TOWARDS WHITE
```

```
[CTRL][L-SHIFT][DEL]        FUNCTION KEYS OFF
[CTRL][L-SHIFT][HELP]       FUNCTION KEYS ON
[CTRL][L-SHIFT][R-SHIFT]    CONTROL PANEL TOGGLE
[CTRL][L-SHIFT][ESC]        EXITS THE SOFTWARE CONTROL
[CTRL][L-SHIFT][BACKSPACE]  READ 4010 STATUS
```

```
[CTRL][A] RETURN TO DEFAULT
[CTRL][B] SAVE AS DEFAULT
[CTRL][C] ENABLE 4010
[CTRL][D] DISABLE 4010
[CTRL][E] HARDWARE DIP SWITCH CONTROL
[CTRL][F] SOFTWARE DIP SWITCH CONTROL
[CTRL][G] SYNC AND BURST LOCK
[CTRL][H] BURST LOCK ONLY
[CTRL][I] SYNC LOCK ONLY
[CTRL][J] INTERNAL REFERENCE
[CTRL][K] EXTERNAL KEY SOURCE
[CTRL][L] INTERNAL KEY SOURCE
[CTRL][M] EXTERNAL SYNC AND BLANKING
[CTRL][N] INTERNAL SYNC AND BLANKING
[CTRL][O] COLOR OUTPUT
[CTRL][P] MONOCHROME OUTPUT (BLACK AND WHITE)
```

SETLACE - Places the display in the interlace mode.
Usage: Setlace [OFF]

This program is designed to be run from CLI only.

Type: SETLACE   to place the display into the interlace mode.

Type: SETLACE OFF   to turn off the interlace display.

NOTE: The program currently runs automatically when the system is booted using the 4000 Series Control disk. This program is not resident and uses no additional memory for graphics. The screen is simply repeated one-half line down by the hardware, in the odd frame.

SHOWBARS - Displays Color Bar test patterns.

This program is designed to be run from Workbench™ only.

The picture file TESTBARS contains a Color Bar test signal and grey scale with Color 0 as the background color.

Boot with the Control and Demo Software disk. When booted, point with the mouse to the MAGNI disk icon and "double click" with the left hand mouse button. When the window appears displaying the icons in the MAGNI directory, select the icon labled SHOWBARS, using a "double click" of the left hand mouse button. A 100% Color Bar screen should appear with which the encoder can be evaluated.

Clicking the mouse in the top left corner of the display will replace the 100% Color Bars with 75% ($\pm$2%) Color Bars.

To exit the program, click the mouse (again) in the top-left corner of the display.

Displaying SHOWBARS and starting the 4 000 Series Control and Demo software using the self-test will provide a quick demonstration of the capabilities of the video system.

SHOWDEMO - A presentation of the 4000 Series Control System.

This program is designed to be run from CLI only. To start the continuously running presentation, type: SHOWDEMO
                                        and press return.

The presentation may be stopped by re-booting the computer.
NOTE: The SHOWSEG program used by this presentation is a product of Sparta, Inc., and Aegis Development, Inc., (c) 1987.

┌───┐
│ ////////////////// **4.1 - ELECTRICAL SPECIFICATIONS** ////////// │
└───┘

VIDEO INPUT CHARACTERISTICS	4004 (NTSC)	4005 (PAL)
Input Impedance	75 Ω	75 Ω
Input Return loss	>40 dB to 4.2 MHZ	>40 dB to 5 MHz

GENLOCK

Burst Lock Frequency Range	3.579545 MHz ± 50 Hz	4.43361875 MHz ± 50 Hz
Synclock Frequency Range	15.73426 kHz ± 0.15 kHz	15.625 kHz ± 0.15 kHz
Jitter	10 ns or less	10 ns or less
Internal Reference Frequency Stability	Subcarrier ± 30 Hz	
Input Color Frame Recognition	SC-H Phase 0° ±40°	

OUTPUT CHARACTERISTICS

Output Impedance	75 Ω	75 Ω
Return Loss	>34 dB to 4.2 MHz	>34 dB to 5 MHz
Luminance Amplitude	±2%	±2%
Hue	±3°	±3°
Color Saturation	±3%	±3%
Differential Gain	±1%	±1%
Differential Phase	±1°	±1°
Sync (relative to blanking)	-286 mV ±3%	-300 mV ±3%
Burst	286 mV pk-pk ±3%	300 mV pk-pk ±3%

ELECTRICAL SPECIFICATIONS (CONT.)

Blanking (DC level)	0 mV ±100 mV	0 mV ±100 mV
Peak White (Referenced to White)	714 mV	700 mV
Black Level (Referenced to Black)	53.55 mV	0 mV

Timing

Burst Frequency	3.579545 Hz nominal	4.43361875 Hz nominal
Horizontal Frequency	15.734 kHz nominal	15.625 kHz nominal
Vertical Scan Rate	59.94 Hz nominal, interlaced	50 Hz nominal, interlaced
Horizontal Blanking	10.9 µs, ±0.2 µs	12.05 µs, ±0.2 µs
Vertical Blanking Active Picture Lines	21-262 (F1) 284-525 (F2)	24-310 (F3) 336-622 (F4)
SC-H Phase	0, ±40°	0, ±40°
Encoder Bandwidth	Broadcast: 4.2 MHz (Y), 600 kHz (R-Y, B-Y) for NTSC or PAL.	

Keying (Available only on composite video output.)

External Key Input	700 mV p-p	700 mV p-p
Internal Key Transition	140 ns rise-time	
Color 0 Key	Set by Amiga Software	

Card Dimensions   Encoder: IBM XT full card slot
                                        Interface: Video Features slot

Temperature   0 - 50° C   (Operating)
                                        -55 - 75° C   (Storage)

Altitude   15,000 feet (Operating)
                                        50,000 feet (Storage)

Humidity   Withstands 90-95% relative
                                        humidity for up to 5 days

Electromagnetic Compatibility   Meets FCC EMC Rules for Class A
                                        Computing Device (Part 15,
                                        Subchapter J)

Graphic applications supported under AmigaBASIC from Microsoft®.
Multitasking provided under Amiga-DOS; Workbench, a window-
oriented user interface; CLI command line interpreter; MS-DOS
compatible with Bridgeboard.

CONTENTS OF THIS SECTION:

FIGURE 5.1 SIMPLIFIED SYSTEM BLOCK DIAGRAM
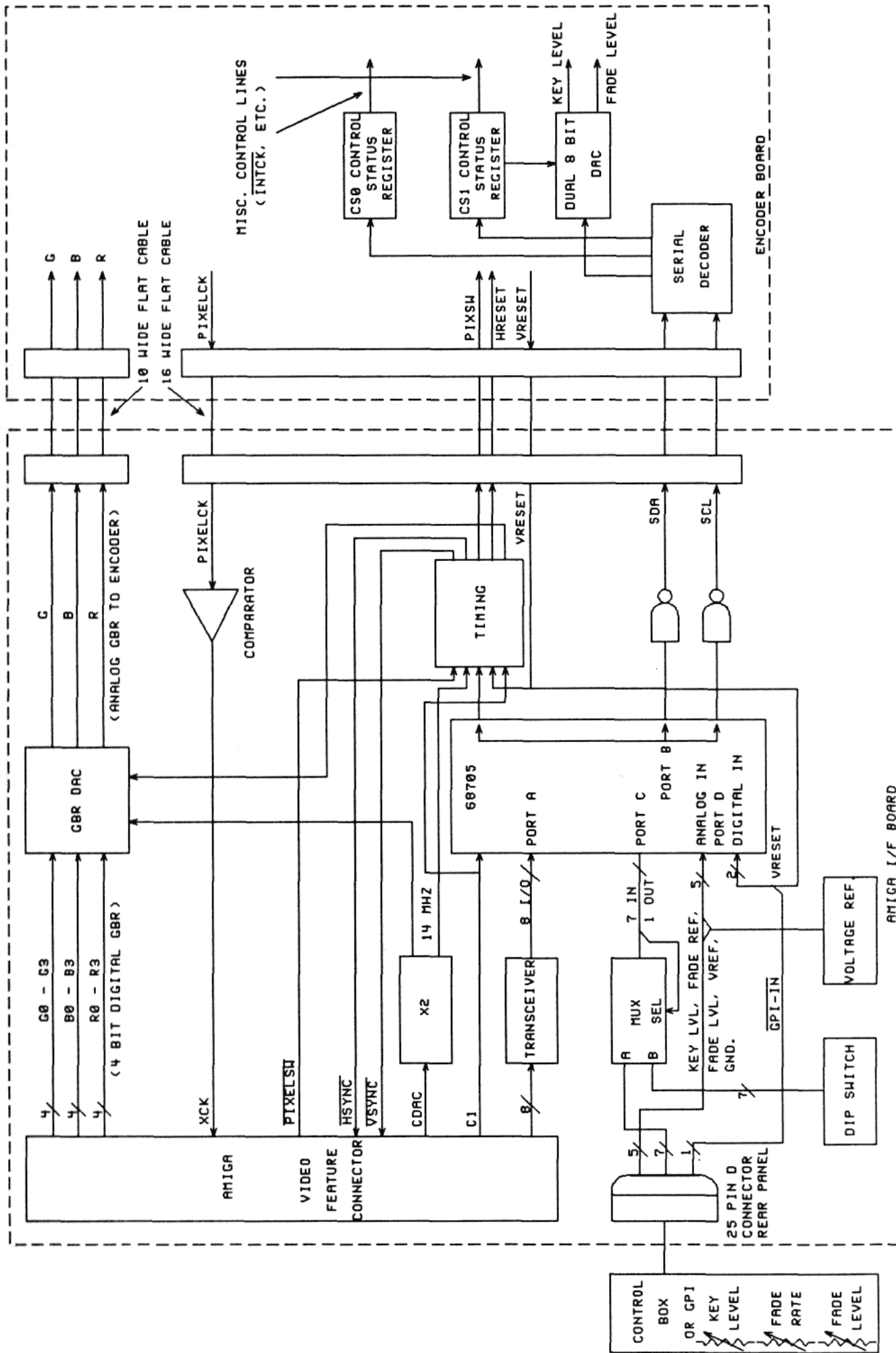
FIGURE 5.1.1 SBD PART 1 - AMIGA® INTERFACE TO ENCODER BOARD
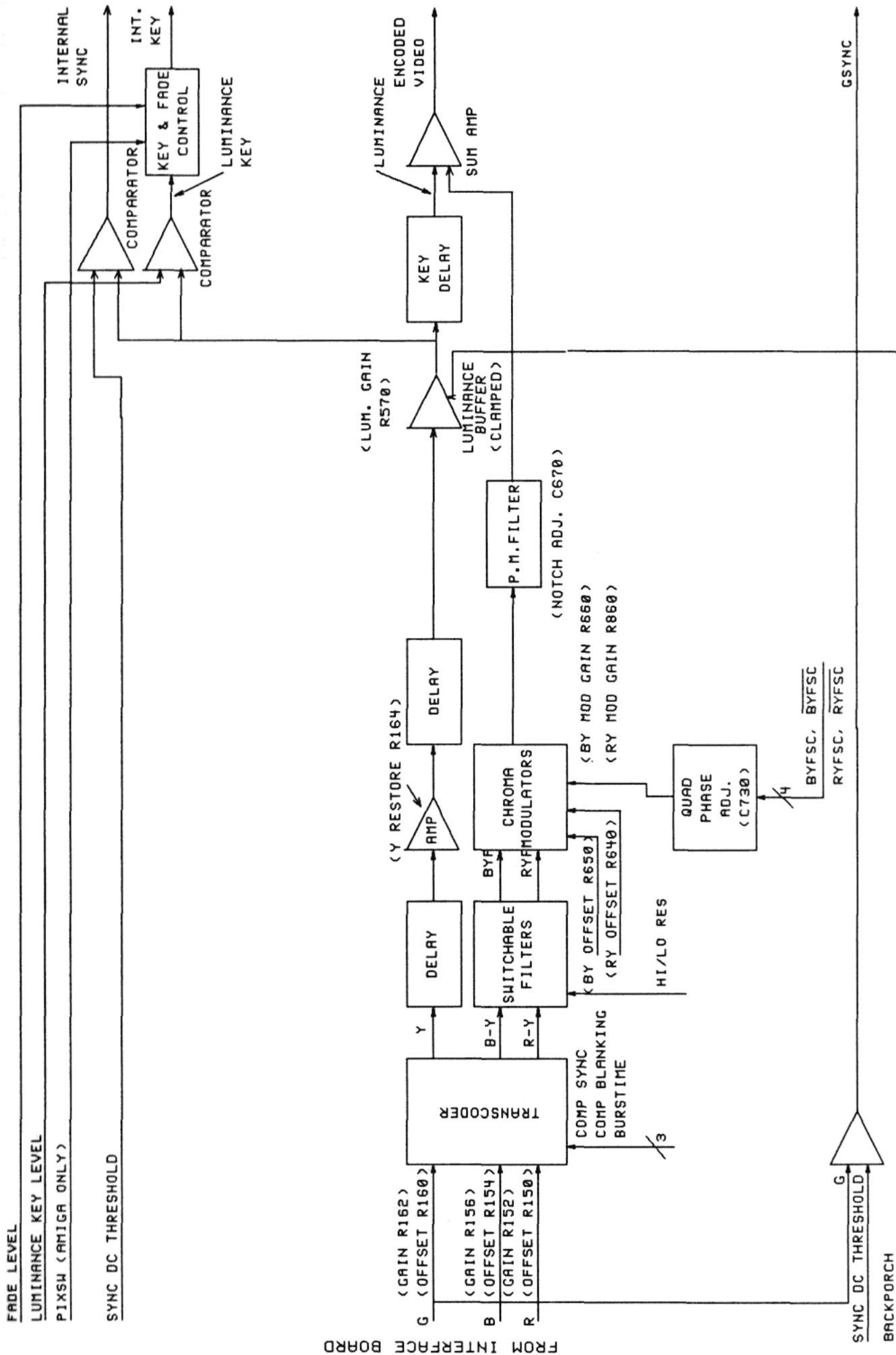
FIGURE 5.1.2 SBD PART 2 - ENCODER SECTION
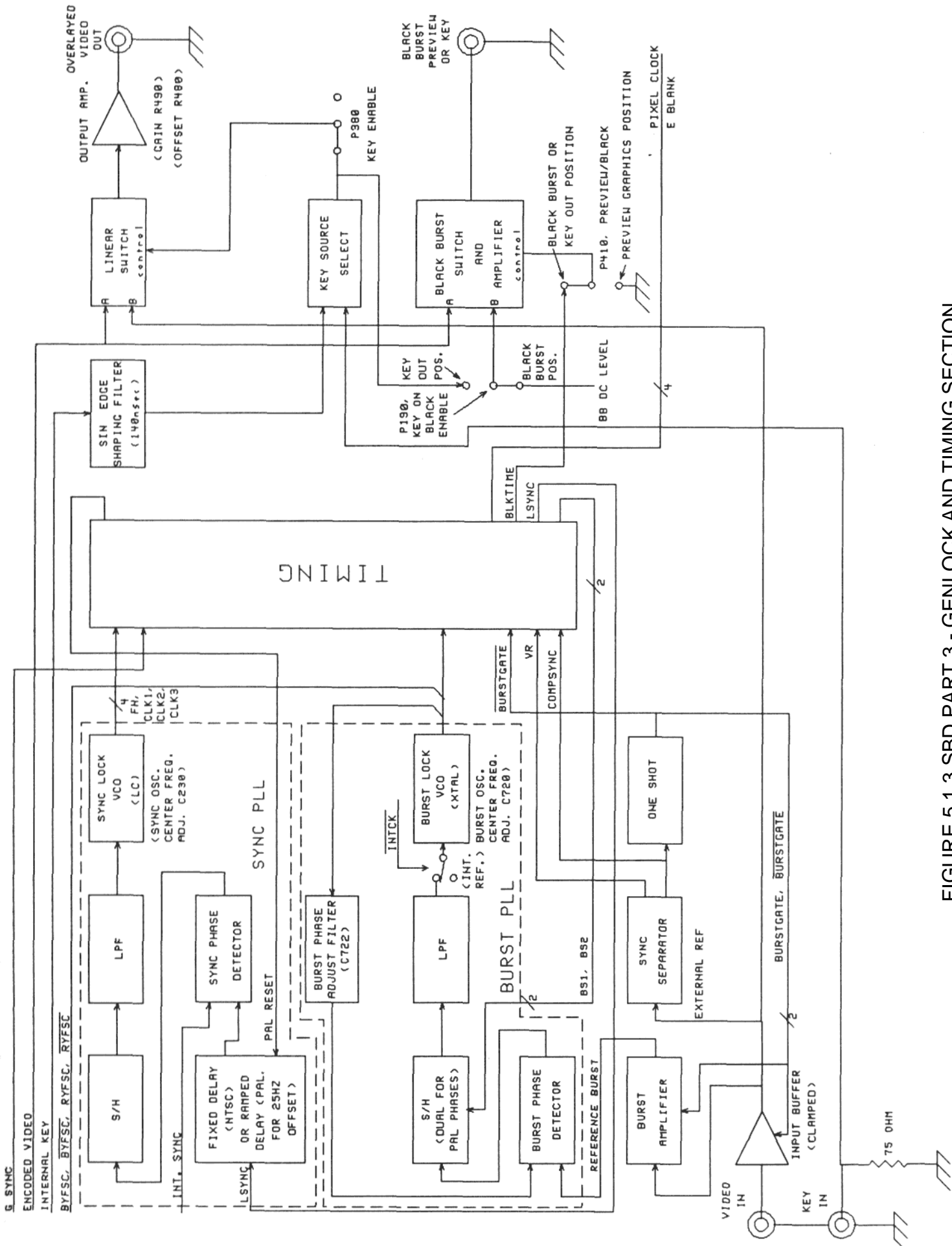
FIGURE 5.1.3 SBD PART 3 - GENLOCK AND TIMING SECTION
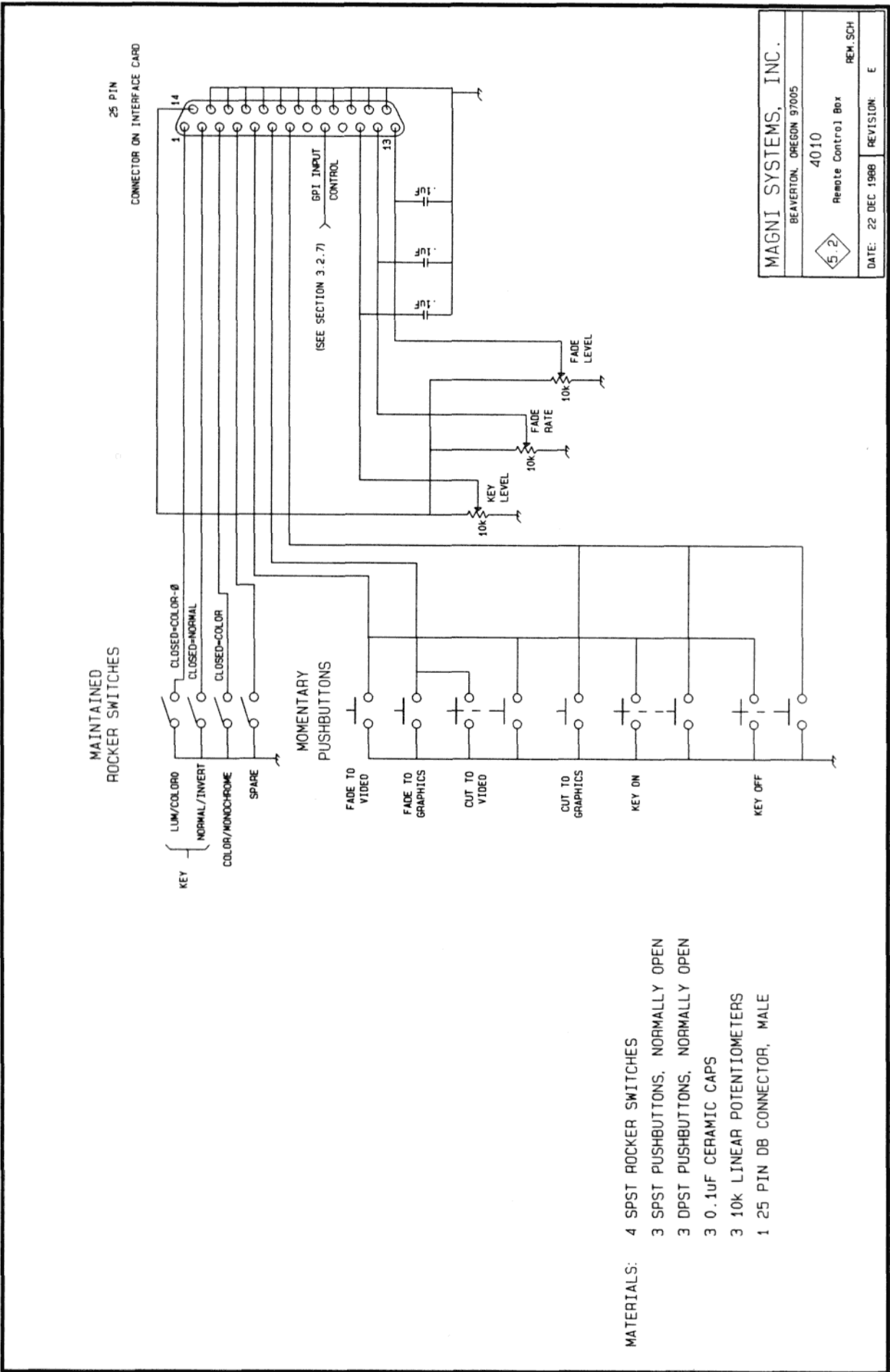
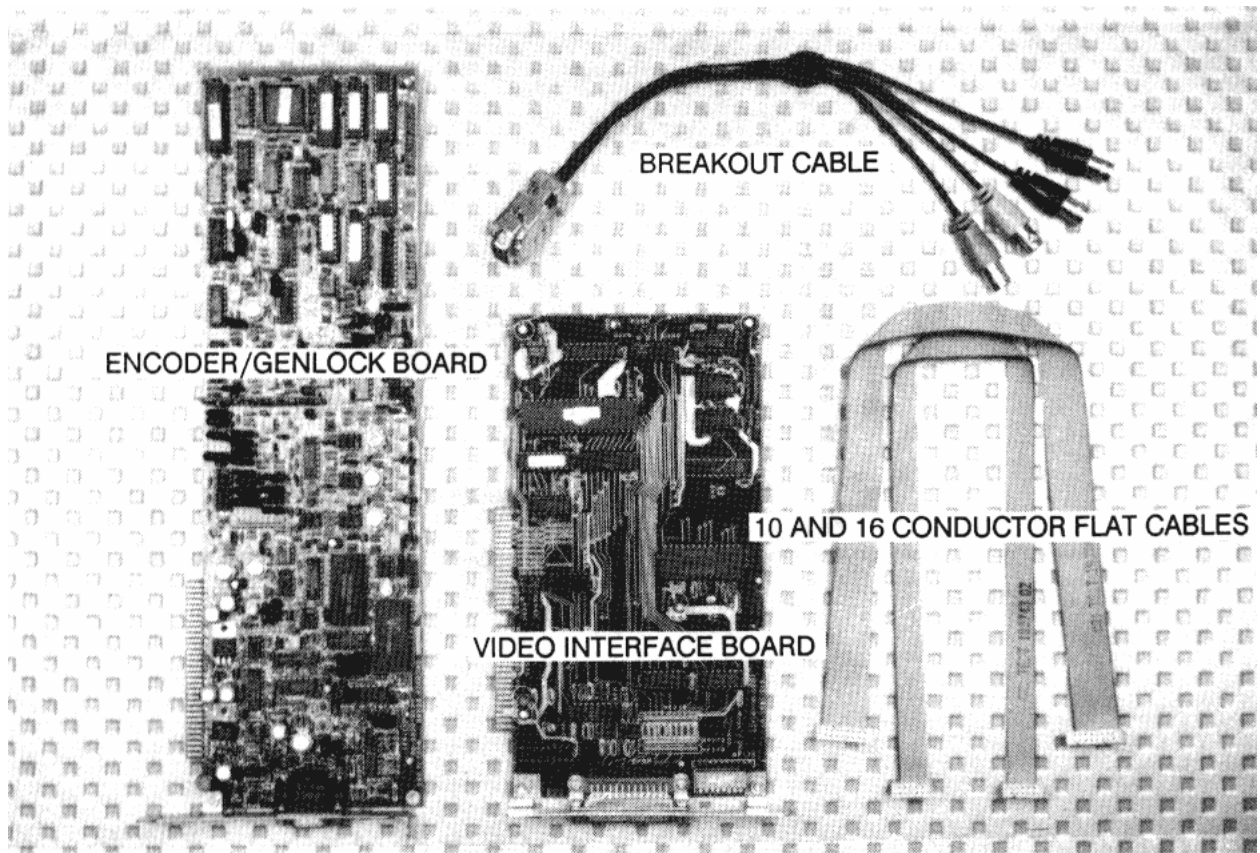FIGURE 5.2 4010 REMOTE CONTROL BOX, SCHEMATIC DIAGRAM

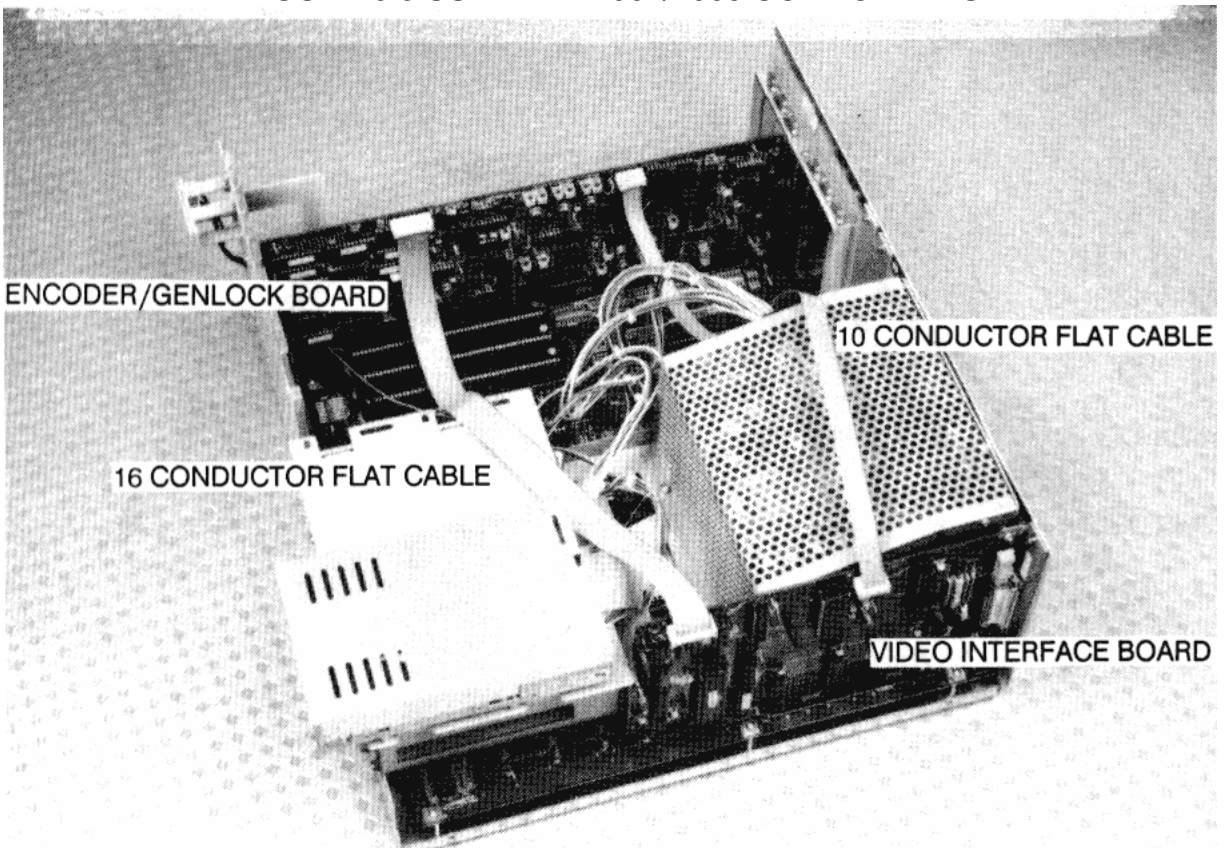FIGURE 5.3 SUPPLIED 4004/4005 COMPONENTS
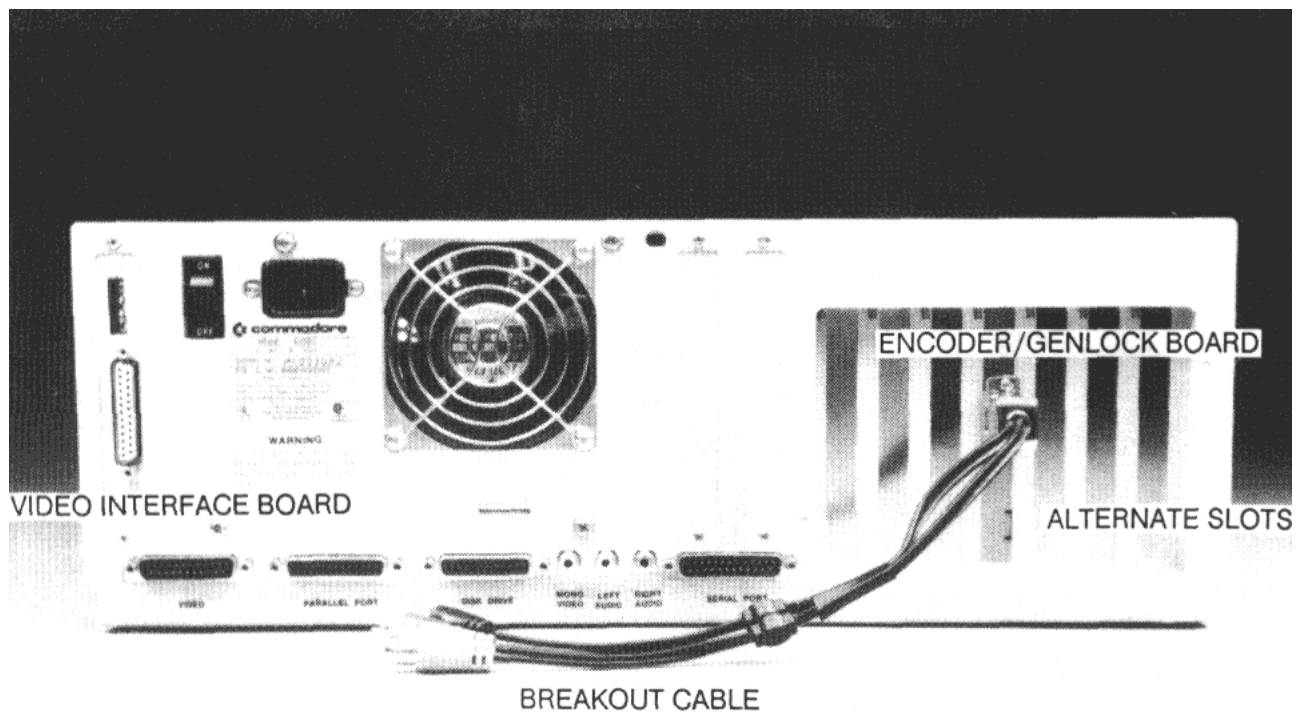

FIGURE 5.4 INSTALLED 4004/4005 SYSTEM

FIGURE 5.5 AMIGA®   REAR PANEL SHOWING VIDEO INTERFACE AND
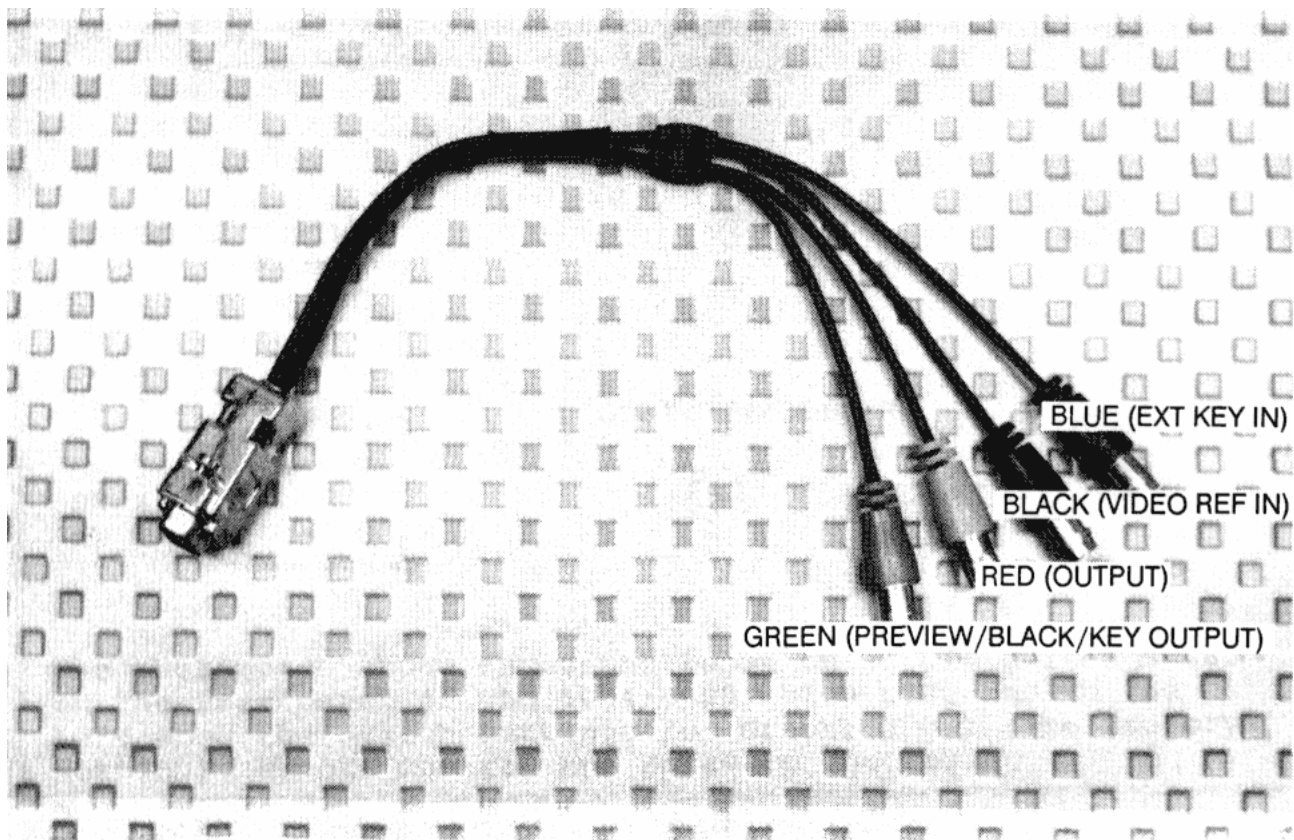ENCODER/GENLOCK BOARD PLACEMENT

FIGURE 5.6 BREAKOUT CABLE

GRAPHICS OUTPUT

```
SW 8    O   => C
SW 7    O   => C
SW 6    O <=   C
SW 5    O   => C
SW 4    O   => C
SW 3    O <=   C
SW 2    O <=   C
SW 1    O <=   C
```

(FACTORY SETTING)

OPEN   CLOSED

SW8

SW1

SW 180

PIN 1

PIN 14

Magni Systems, Inc. U.S.A.

PIN 25

PIN 13

P 280

VIDEO INTERFACE BOARD

REMOTE CONTROL

```
SW 8    O   => C
SW 7    O   => C
SW 6    O   => C
SW 5    O   => C
SW 4    O   => C
SW 3    O <=   C
SW 2    O <=   C
SW 1    O <=   C
```
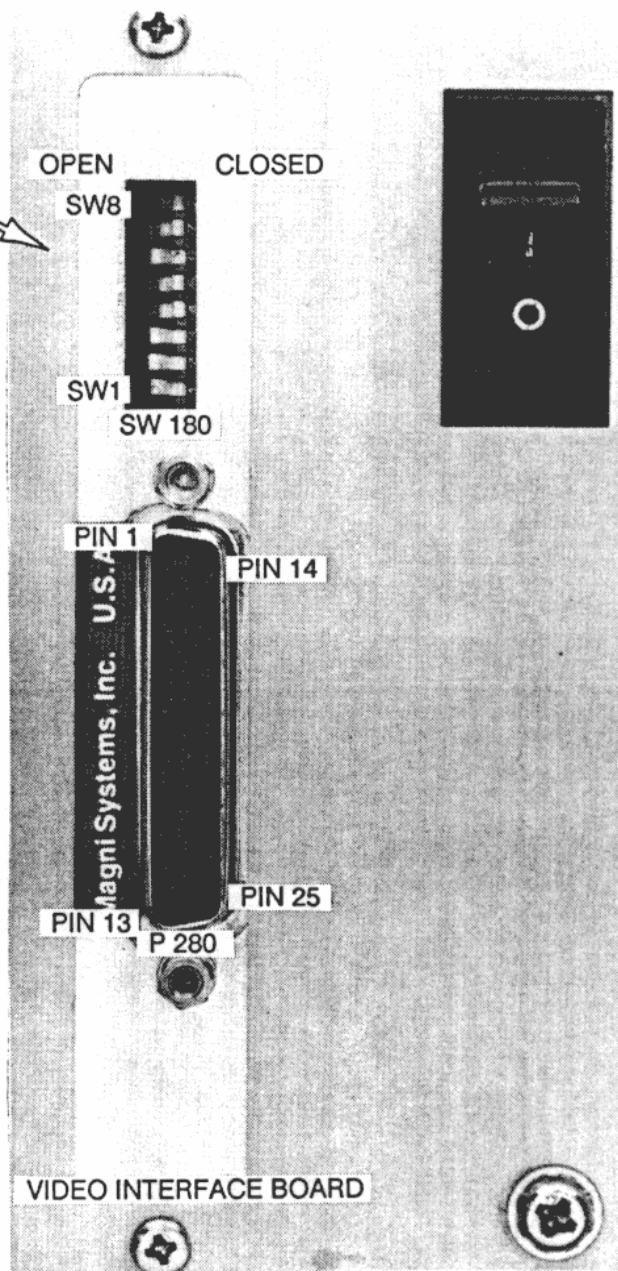
SOFTWARE CONTROL

```
SW 8    O <=   C
SW 7    O   => C
SW 6    O <=   C
SW 5    O   => C
SW 4    O   => C
SW 3    O <=   C
SW 2    O <=   C
SW 1    O <=   C
```

The photograph above shows the location of DIP switch SW180
on the rear panel of the 4004/4005. The diagrams to the
left show the switch settings for Graphics Out (The factory
setting), Remote Control and Software Control.

FIGURE 5.7 VIDEO INTERFACE BOARD REAR PANEL CONNECTOR
AND DIP SWITCH ASSIGNMENTS

```
                                        FUNCTION
      SW 8    │ O  <=   C │  MODE ─┐
      SW 7    │ O  =>   C │  MODE ─┤── GRAPHICS OUT
      SW 6    │ O  <=   C │  MODE ─┘
      SW 5    │ O  =>   C │  INTERNAL SYNC SOURCE
      SW 4    │ O  =>   C │  EXTERNAL KEY
      SW 3    │ O  <=   C │      ┐
      SW 2    │ O  <=   C │      ┘ SYNC & BURST GENLOCK
      SW 1    │ O  <=   C │  4004/4005 ENABLE/DISABLE
```

**NOTE: The switch positions and functions shown above are
         the factory configuration. To change functions,
         use the information contained in the charts below.**

SW1 4004/4005 ENABLE/DISABLE
O	ENABLED - EXTERNAL CLOCK
C	DISABLED - INTERNAL CLK

NOTE: "DISABLED" DISCONNECTS
THE 4004/4005 FROM THE AMIGA®

SW2	**SW3**	GENLOCK MODE
O	O	BURST & SYNC
C	O	BURST ONLY
O	C	SYNC ONLY
C	C	INT. REF.

SW4	
C	EXTERNAL KEY DISABLED
O	EXTERNAL KEY ENABLED

SW5	SYNC OUTPUT
C	INTERNALLY GENERATED SYNC
O	INCOMING VIDEO SYNC

SW6	**SW7**	**SW8**	OUTPUT MODE
C	C	C	MODE# 0 - REMOTE CONTROL ENABLE
O	C	C	MODE# 1 - GRAPHICS OUT
C	O	C	MODE# 2 - SELF TEST
O	O	C	MODE# 3 - COLOR-0 KEY ON (GPI OVERRIDE)
C	C	O	MODE# 4 - COLOR-0 KEY OFF (GPI TOGGLED ON/OFF)
O	C	O	MODE# 5 - SOFTWARE CONTROL
C	O	O	MODE# 6 - RESERVED
O	O	O	MODE# 7 - RESERVED

(See Section 3.2.7 for additional mode information)

FIGURE 5.8 SW180 - SWITCH ASSIGNMENTS
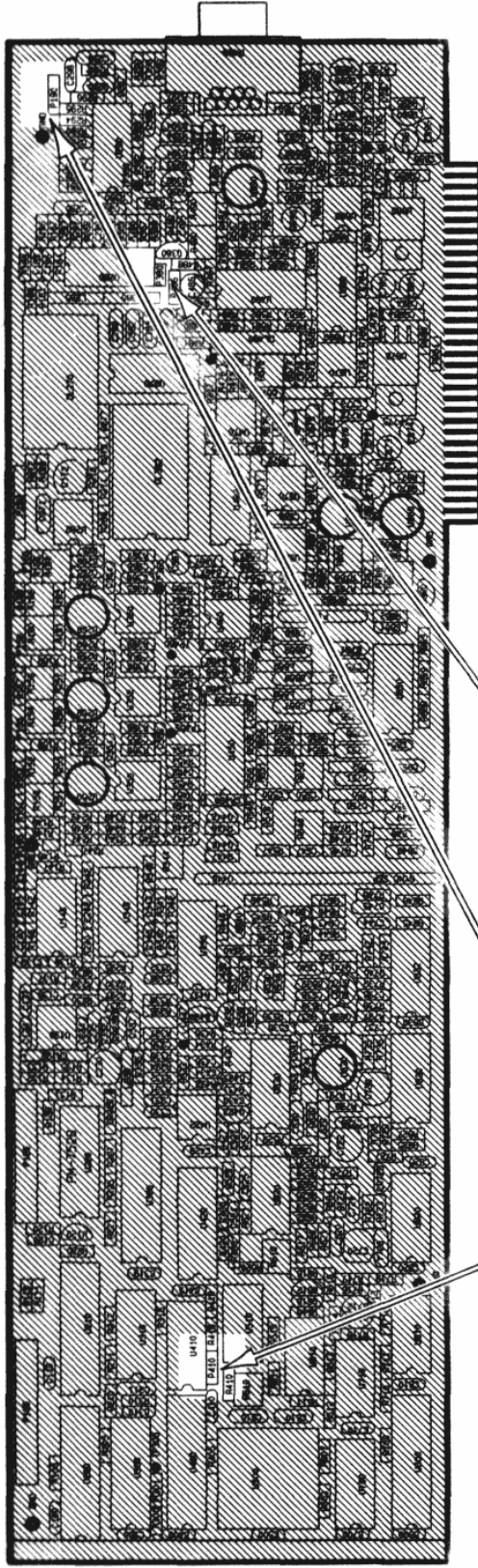
OUTPUT MODE	P410	P190	P380	RED BNC OUTPUT	GREEN BNC OUTPUT
PREVIEW GRAPHICS (SEE NOTE):	O [O O]	O [O O] O	[O O] O	Graphics + Video	Graphics Only
BLACK BURST	[O O] O	O [O O] O	[O O] O	Graphics + Video	Black Burst
KEY OUT	[O O] O	O O [O O]	O [O O]	Graphics Only	Key Out

OUTPUT CONFIGURATION TABLE.
(NOTE: THIS IS THE FACTORY CONFIGURATION)

FIGURE 5.9 ENCODER/GENLOCK BOARD JUMPER LOCATIONS

```
┌─────────────────────────────────────────────────────────────┐
│ ░░░░░░░░░    APPENDIX 1 - 4004/4005 APPLICATION NOTE:  ░░░░░░ │
│ ░░░░░░░░░   PREVENTING "ILLEGAL" COLORS ON THE IBM-PC  ░░░░░░ │
└─────────────────────────────────────────────────────────────┘
```

It is possible, using the Magni 4004/4005 Graphics Encoder, to generate "illegal" NTSC signals on the IBM-PC.

Q: Wait a minute! How can this be? I thought the Magni encoder was "broadcast quality." Doesn't that mean its signal should be legal to broadcast?

Yes, it is, given the right colors. However, any encoder can generate signals which cannot be broadcast, even though they are an accurate encoding of certain RGB colors, and can be recorded on videotape and viewed on a monitor. That is because the television broadcast system has limited "headroom" and cannot accommodate certain bright, highly saturated colors.

Q: So it's not a fault of the encoder?

No, it is just one of the compromises of the NTSC color system. It was developed during the era of black and white television, and a major design goal was compatibility with existing equipment. So NTSC allows the full range of 0% black to 100% white. But the maximum brightness level allowed for fully saturated colors (for example, a red made of only red, with no green or blue) is only 75%. This seemed like a reasonable compromise at the time, since natural scenes rarely contained bright, highly saturated colors. But no one thought much about cartoons or computer graphics, which can contain a lot of such colors.

Q: Well, I plan to put some of my material on TV, so I need to make sure it is broadcastable. How can I know which colors to avoid using?

There are two ways. First, by using a waveform monitor while you create graphics, you can see that the colors you pick do not go over the maximum white level of 100 IRE. A waveform monitor will also assure you of getting the right signal levels from your videotape or camera when recording and editing.

Also, you can use the broadcast color range chart on the final page as a guide when picking colors for your text and graphics. Each box represents a different level of blue, with every combination of red and green (vertical and horizontal scales respectively) for that level. The shaded boxes represent the "taboo" colors that encode to a non-broadcastable signal.

Using the chart as a guide, you can make up different palettes of colors that look good together, and that you know are "safe." Because the NTSC color system has much more sharpness for lights and darks than it does between hues, you will want to use colors that offer a good range of brightness values, as well as hues. To illustrate how to use the chart, let's say you want to create a light aquamarine, with a red value of 9 and a green value of 14 (or "E", if your program displays in hexadecimal). Find the box at the intersection of those values of red and green on the chart. The box contains two numbers, 11 and 7, representing the maximum and minimum values for blue. This is the "legal" range of blues for that combination of red and green; other combinations will show different values for blue. If the hue you want is not possible with that range of blues, try lowering red or green (or both) one value to give you a wider range of blue values.

If a box is completely shaded, that combination of red and green is not broadcastable for any value of blue; and if a box is blank, any value is acceptable.

RED VALUES (rows) × **GREEN VALUES** (columns)

Legal blue value ranges shown as MAX/MIN. Blank cell = ANY VALUE OK. ▨ = NO VALUE OK.

RED \ GREEN	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
15							15/2	15/3	15/5	15/6	15/8	15/9	15/11	15/13	15/14	15/15
14									15/1	15/2	15/4	15/6	15/7	15/9	15/11	▨
13											15/1	15/3	15/5	15/7	15/10	▨
12												15/1	15/3	15/6	15/9	▨
11													15/2	15/4	14/8	▨
10														15/3	13/7	▨
9														15/2	11/7	▨
8														15/1	9/8	▨
7														13/0	▨	▨
6													14/0	12/0	▨	▨
5													14/0	10/0	▨	▨
4													13/0	10/0	▨	▨
3												14/0	12/0	7/0	▨	▨
2												14/0	11/0	5/0	▨	▨
1												13/0	9/0	▨	▨	▨
0											14/0	12/0	8/0	▨	▨	▨

GREEN VALUES

RANGE OF LEGAL BLUE VALUES IN BOXES — MAX/MIN
NO VALUE OK — ▨
ANY VALUE OK — ☐

APPENDIX 1, PAGE 3