Model 8025
Digital Video Keyer

Instruction Manual

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INFORMATION TO USERS IN EUROPE

NOTE

CISPR 22 CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to the European Union EMC directive. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

INFORMATION TO USERS IN THE U.S.A.

NOTE

FCC CLASS A DIGITAL DEVICE OR PERIPHERAL

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

WARNING

Changes or Modifications not expressly approved by Evertz Microsystems Ltd. could void the user's authority to operate the equipment.

Use of unshielded plugs or cables may cause radiation interference. Properly shielded interface cables with the shield connected to the chassis ground of the device must be used.

REVISION HISTORY

REVISION	DESCRIPTION	DATE
1.0	Original issue - preliminary release	Sept. 93
1.1	Revised to add 4Fsc support	Dec. 93
1.2	Installations drawings revised	May 94
1.3	Updated for Version B units	Sept 94
1.4	Technical Description chapter added Schematic drawings, component layouts & parts lists inserted	Feb. 95

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1. OVERVIEW

The Model 8025 Digital video keyer provides a cost effective method of keying vertical Interval time code or other similar signals into the digital video bitstream.

Features:

- Keys directly into digital video bitstream
- Accepts 525 or 625 component (4:2:2) or composite (4Fsc) digital video signals
- Parallel digital video input and output standard
- Optional Serial digital video input provides automatic cable equalization on cable lengths up to 200 meters of low loss coax such as Belden 8281
- Optional Serial digital video output provides two separate outputs.
- Reference sync output extracted from the digital video to gen lock equipment which is providing the key signals
- Keyer bypass mode allows video to pass through without keying any signal in
- Built in digital video bar generator can be used for quickly verifying the connections through your digital video system.
- Rack mountable
- 8 or 10 bit resolution
- 8 digit Alpha-numeric display, with 8 push buttons
- User setups programmed from the front panel make it easy to reconfigure the 8025 for different applications. Configuration is recalled from non-volatile memory on power up
- Optional Analog composite monitor output

1.1. HOW TO USE THIS MANUAL

This manual is organized into 4 chapters : Overview, Installation, and Operation, Technical Description.

If you are currently an owner of the Evertz 4025 Film Footage Encoder, you will find special information on connecting your digital keyer to the 4025 marked with the following symbol in the margin.

Items of special note for all users are marked with a double box like this.

1.2. DEFINITIONS

AES (Audio Engineering Society): A professional organization that recommends standards for the audio industries.

AES/EBU: Informal name for a digital audio standard established jointly by the Audio Engineering Society and the European Broadcasting Union organizations.

ANALOG: An Adjective describing any signal that varies continuously as opposed to a digital signal that contains discrete levels representing digits 0 and 1.

A-TO D CONVERTER (ANALOG-TO-DIGITAL): A circuit that uses digital sampling to convert an analog signal into a digital representation of that signal.

BIT: A binary representation of 0 or 1. One of the quantized levels of a pixel.

BIT PARALLEL: Byte-wise transmission of digital video down a multi-conductor cable where each pair of wires carries a single bit. This standard is covered under SMPTE 125M, EBU 3267-E and CCIR 656.

BIT SERIAL: Bit-wise transmission of digital video down a single conductor such as coaxial cable. May also be sent through fiber optics. This standard is covered under SMPTE 259M and CCIR 656.

BIT STREAM: A continuous series of bits transmitted on a line.

BNC: Abbreviation of "baby N connector". A cable connector used extensively in television systems.

BYTE: A complete set of quantized levels containing all the bits. Bytes consisting of 8 to 10 bits per sample are typical in digital video systems.

CABLE EQUALIZATION: The process of altering the frequency response of a video amplifier to compensate for high frequency losses in coaxial cable.

CCIR (International Radio Consultative Committee) An international standards committee.

CCIR-601: An international standard for component digital television from which was derived SMPTE 125M and EBU 3246-E standards. CCIR-601 defines the sampling systems, matrix values and filter

characteristics for both Y, B-Y, R-Y and RGB component digital television signals.

CCIR-656 The physical parallel and serial interconnect scheme for CCIR-601. CCIR-656 defines the parallel connector pinouts as well as the blanking, sync and multiplexing schemes used in both parallel and serial interfaces. It reflects definitions found in EBU Tech 3267 (for 625 line systems) and SMPTE 125M (parallel 525 line systems) and SMPTE 259M (serial 525 line systems).

COMPONENT ANALOG: The non-encoded output of a camera, video tape recorder, etc., consisting of the three primary colour signals: red, green, and blue (RGB) that together convey all necessary picture information. In some component video formats these three components have been translated into a luminance signal and two colour difference signals, for example Y, B-Y, R-Y.

COMPONENT DIGITAL: A digital representation of a component analog signal set, most often Y, B-Y, R-Y. The encoding parameters are specified by CCIR-601. The parallel interface is specified by CCIR-656 and SMPTE 125M.

COMPOSITE ANALOG: An encoded video signal such as NTSC or PAL video, that includes horizontal and vertical synchronizing information.

COMPOSITE DIGITAL: A digitally encoded video signal, such as NTSC or PAL video, that includes horizontal and vertical synchronizing information.

D1: A component digital video recording format that uses data conforming to the CCIR-601 standard. Records on 19 mm magnetic tape. (Often used incorrectly to refer to component digital video.)

D2: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 19 mm magnetic tape. (Often used incorrectly to refer to composite digital video.)

D3: A composite digital video recording format that uses data conforming to SMPTE 244M. Records on 1/2" magnetic tape.

EBU (European Broadcasting Union): An organization of European broadcasters that among other activities provides technical recommendations for the 625/50 line television systems.

EBU TECH 3267-E: The EBU recommendation for the parallel interface of 625 line digital video signal. This is a revision of the earlier

EBU Tech 3246-E standard which was in turn derived from CCIR-601.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream.

PIXEL: The smallest distinguishable and resolvable area in a video image. A single point on the screen. In digital video, a single sample of the picture. Derived from the words *picture element*.

RESOLUTION: The number of bits (four, eight, ten, etc.) determines the resolution of the signal. Eight bits is the minimum resolution for broadcast television signals.

4 bits = a resolution of 1 in 16.
8 bits = a resolution of 1 in 256.
10 bits = a resolution of 1 in 1024.

SERIAL DIGITAL: Digital information that is transmitted in serial form. Often used informally to refer to serial digital television signals.

SMPTE (Society of Motion Picture and Television Engineers): A professional organization that recommends standards for the film and television industries.

SMPTE 125M: The SMPTE standard for bit parallel digital interface for component video signals. SMPTE 125M defines the parameters required to generate and distribute component video signals on a parallel interface.

SMPTE 244M: The SMPTE standard for bit parallel digital interface for composite video signals. SMPTE 244M defines the parameters required to generate and distribute composite video signals on a parallel interface.

SMPTE 259M: The SMPTE standard for 525 line serial digital component and composite interfaces.

TRS: Timing reference signals used in composite digital systems. (It is four words long).

TRS-ID: Abbreviation for "Timing Reference Signal Identification". A reference signal used to maintain timing in composite digital systems. (It is four words long.)

4:2:2 A commonly used term for a component digital video format. The details of the format are specified in the CCIR-601 standard. The numerals 4:2:2 denote the ratio of the sampling frequencies of the luminance channel to the two colour difference channels. For every four luminance samples, there are two samples of each colour difference channel.

4Fsc	Four times subcarrier sampling rate uses in composite digital systems. In NTSC this is 14.3 MHz. In PAL this is 17.7 MHz.

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2. INSTALLATION

2.1. REAR PANEL

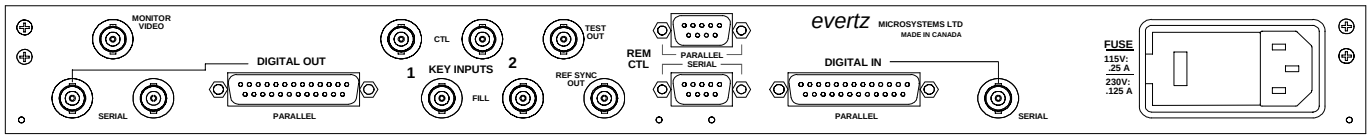

Figure 2-1: 8025 Rear Panel

The following sections describe the purpose of the rear panel connectors of the 8025. Sections 2.1.1 to 2.1.6 describe the specific signals that should be connected to the 8025. Figure 2-6 to Figure 2-9 give sample connection diagrams for connecting the 8025 Digital Video Keyer to your 4025 Film Footage Encoder.

2.1.1. Digital Video Input Connections

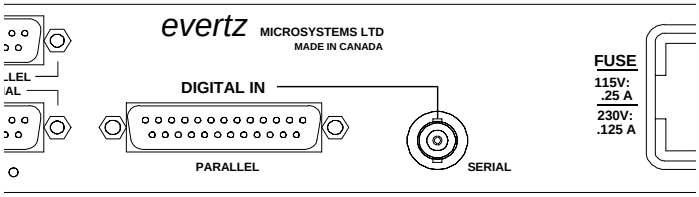

Figure 2-2: Digital Video Input Connectors

Selection of the active digital video input is controlled from the front panel. The serial digital video input is optional and may not be fitted on your unit.

PARALLEL: A Female 25 pin D connector for input of 8 or 10 bit parallel digital video signals compatible with the SMPTE 125M, SMPTE 244M or EBU Tech 3267-E standards.

SERIAL: A BNC connector for input of 10 bit serial digital video signals compatible with the SMPTE 259M standard.

2.1.2. Digital Video Output Connections

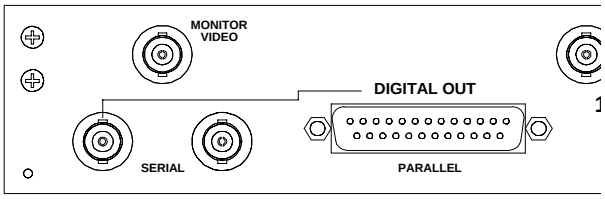

Figure 2-3: Digital Video Output Rear Panel Connections

Both the serial and parallel outputs contain the selected input video with data keyed in by Keyer 2. The serial digital video output is optional and may not be fitted on your unit.

PARALLEL: A Female 25 pin D connector for output of 8 or 10 bit parallel digital video signals compatible with the SMPTE 125M, SMPTE 244M or EBU Tech 3267-E standards. This video will be the selected video input with data inserted onto it.

SERIAL: Two BNC connectors for output of 10 bit serial digital video signals compatible with the SMPTE 259M standard. This video will be the selected video input with data inserted onto it.

2.1.3. Keyer Interface Connectors

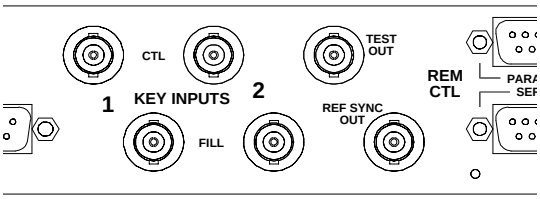

Figure 2-4: Keyer Rear Panel Connections

CTL 1 A BNC connector for input of a TTL level Key signal. This active low signal is used to determine when Keyer 1 will be active.

FILL 1 A BNC connector for input of a TTL level Key Fill signal. This signal is inserted into the digital video path assigned to Keyer 1 when the KEY CTL 1 signal is low.

CTL 2 A BNC connector for input of a TTL level Key signal. This active low signal is used to determine when Keyer 2 will be active.

FILL 2 A BNC connector for input of a TTL level Key Fill signal. This signal is inserted into the digital video path assigned to Keyer 2 when the KEY CTL 2 signal is low.

On 8025 units with an 8 digit display there was a labeling error on the rear panel connections. The actual functions of the CTL and Fill connectors are reversed. The FILL2 connector is actually the one labelled CTL 2 and the CTL 2 connector is actually the one labeled FILL 2.

REF SYNC OUT A BNC connector for output of an analog reference sync signal, extracted from the digital video input. This signal is used to genlock the equipment that is generating the keyer control and fill signals.

TEST OUT A BNC connector for output of test signals from the 8025. This signal is used for various diagnostics purposes, and is not required for normal operation.

2.1.4. Analog Monitor Connections

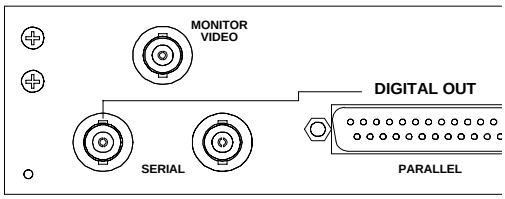

Figure 2-5: Analog Monitor Rear Panel Connections

The analog composite monitor output is optional and may not be fitted on your unit.

MONITOR VIDEO: A BNC output of the optional composite analog encoder. The input to this encoder can be selected from either the keyer 1 or keyer digital video path.

2.1.5. Remote Control Connections

SERIAL: A 9 pin female 'D' connector for connection to a computer for remote control of the 8025. (Future use)

PARALLEL: A 9 pin female 'D' connector for connection to 'closure to ground' remote control signals. (Future use)

2.1.6. Power Connections

LINE: The 8025 may be set for either 115v/60 Hz or 230v/50 Hz AC operation. The voltage selector switch is accessible on the rear

panel. The line voltage connector contains an integral slow blow fuse (and a spare one).

2.2. MOUNTING

The 8025 Digital Video Keyer is equipped with a rack mounting tray and fits into a standard 19 inch by 1 3/4 inch (483 mm x 45 mm) rack space. The 8025 may be removed from the rack mounting tray if rack mounting is not desired.

2.3. POWER REQUIREMENTS

2.3.1. Selecting the Correct Mains Voltage

Power requirements are 115 or 230 volts AC at 50 or 60 Hz, switch selectable on the rear panel. Power should be applied by connecting a 3 wire grounding type power supply cord to the power entry module on the rear panel. The power cord should be minimum 18 AWG wire size, type SVT marked VW-1, maximum 2.5 m in length.

Before connecting the line power, be sure to select the proper line voltage. Also, check that the line fuse is rated for the correct value marked on the rear panel.

The power entry module combines a standard IEC 320 power inlet connector, voltage selector switch, two 5 x 20 mm fuse holders (one active, one spare) and an EMI line filter.

To change the mains voltage setting, open the cover of the power entry module using a small screwdriver. Remove the drum selector switch, and re-insert it so that the desired voltage is visible through the opening on the mains connector cover. Check that the correct fuse is in use as shown in section below.

2.3.2. Changing the Fuse

The fuse holder is located inside the power entry module. To change the fuse, open the cover of the power entry module using a small screwdriver. The fuse holder on the bottom contains the active fuse. The one at the top contains a spare fuse. Pull the bottom fuse holder out and place a fuse of the correct value in it. Use slo blo (time delay) 5 x 20 mm fuses rated for 250 Volts with the following current ratings:

For 115 Volt operation	250 mA

For 230 Volt operation 125 mA

Make sure that the arrow is pointing down when you replace the fuse holder. Close the door on the power entry module and connect the mains voltage.

Never replace with a fuse of greater value.

2.4. CONNECTING THE DIGITAL VIDEO

2.4.1. Video Input

The 8025 requires that a digital video source be connected to either the PARALLEL or SERIAL video inputs. (The SERIAL digital video input is optional and may not be fitted on your unit.) Selection of either the PARALLEL or SERIAL input is accomplished on the front panel, if the serial input option is installed.

The 8025 may be configured to accept either 525 or 625 digital video in either component (4:2:2) or composite (4Fsc) format. Selection of the correct video type is accomplished using the front panel menu system.

As of the time of this writing the PAL composite (4Fsc) video format is not supported.

The SER and PAR LED's indicate which input is active and if there is video present. When either the SER or PAR LED is blinking it indicates that there is no video present on the selected input. (See section **Error! Reference source not found.** for information on selecting the video input setting).

The VIDEO TYPE parameter on the front panel menu must be set correctly to match the video input. (See section **Error! Reference source not found.** for information on changing the video type setting).

2.4.2. Video Output

The 8025 has two internal video paths that may be assigned to either Keyer 1 or Keyer 2. One path leads to the PARALLEL Video output, and the other path leads to the SERIAL Video output. (The serial output is optional and may not be fitted on your unit.)

As of the time of this writing only Keyer 2 is supported. Keyer 2 is always assigned to both the serial and parallel outputs

The PARALLEL digital video output contains the video from the selected input with data keyed in by Keyer 2. Connect this output to any input on your system that accepts 8 or 10 bit digital video in the selected format.

The SERIAL outputs contain the video from the selected input with data keyed in by Keyer 2. Connect one of these outputs to any input on your system that accepts 8 or 10 bit SERIAL digital video in the selected format. Two identical SERIAL digital video outputs are provided.

2.5. CONNECTING THE KEYER CONTROLS

2.5.1. Connecting the Reference Sync Output

The 8025 extracts a composite sync from the input digital video bitstream and outputs this analog video level signal on the REF SYNC output BNC. The REF SYNC output has been re-timed to compensate for the internal delays in decoding the SYNC from the digital video. The REF SYNC must be connected to the input video or genlock input connector on the device that is generating the KEY FILL and KEY CTL data.

2.5.2. Connecting the Keyer Control and Fill

The 8025 accepts two signals to drive the keyer. Identical inputs are provided for each of the keyers in the 8025.

Provision is made for two independent keyer paths inside the 8025. However at this time only keyer 2 is implemented. All references to Keyer 1 throughout this manual should be ignored at this time.

The KEY CTL is an active low signal that controls where in a line and which lines in the field the keyer will be active. The KEY FILL contains the actual pixel data that will be keyed in to the digital video bitstream. When the KEY CTL signal is active (low) the 8025 samples the KEY FILL signal at each digital clock and keys in a digital black value if the KEY FILL is low and a digital white value if the Key FILL is high. The exact data values that are keyed in depend on the video type and standard that have been selected from the front panel of the 8025.

To avoid sampling problems caused by slight differences in the digital video clock rate and the KEY FILL pixel rate, it is recommended that the

Key Fill pixel clock be synchronized to the REF SYNC out from the 8025 where possible.

2.6. CONNECTING THE 8025 TO A 4025 FILM FOOTAGE ENCODER

There are two different versions of 8025 hardware. Version A has an 8 digit display located on the right hand side of the gray front panel. Version B has an 12 digit display located in the middle of the black front panel. The silk screening on version A rear panel had the Key CTL and Key Fill inputs reversed. Please use the correct configuration drawing for the version you have to confirm that you have the right connections.

There are two different methods of configuring the 4025 Film Footage Encoder to work with the 8025 Digital Keyer. The first method is the preferred configuration and is used where you want to key VITC into either Component or Composite digital signals only. The other configuration is useful particularly in composite digital facilities where you want to use the 4025 for both analog and digital keying. Sections 2.6.1 and 2.6.2 describe these configurations in further detail. Figure 2-6 to Figure 2-9 gives sample connection diagrams for connecting the 8025 Digital Video Keyer to your 4025 Film Footage Encoder in each of these configurations.

2.6.1. Connecting the 4025 and 8025 for Digital VITC Keying

Figure 2-6 (version A) and Figure 2-7 (version B) show the typical connections required when using the 8025 in conjunction with the 4025 Film Footage Encoder for digital VITC keying. This is the preferred configuration when using the 8025 and 4025.

The 4025 has internal jumpers located on the 6231 VITC keyer submodule (top board in the centre location) which must be configured to permit its operation in this mode. Remove the shorting jumpers from JPC1 and JPD1 and install them on JPA1 and JPB1. Also make sure that Jumper J33 on the 7006 I/O board is not installed.

Consult your 4025 manual section 5.3.1 and 5.3.5 for further information on how to change the jumpers.
Connect the REF SYNC OUT of the 8025 to the GEN VIDEO IN of the 4025 and terminate it. Connect KEY CTL 2 of the 8025 to the 4025's VITC OUT B and KEY FILL 2 of the 8025 to the 4025 VITC OUT A.

The 8025 must be set up to use TTL level input levels for the KEY controls. This mode is accessible by using the Engineering Format menu and setting the CTL LVL setting to Lvl ttl. See section 3.2 of this manual.

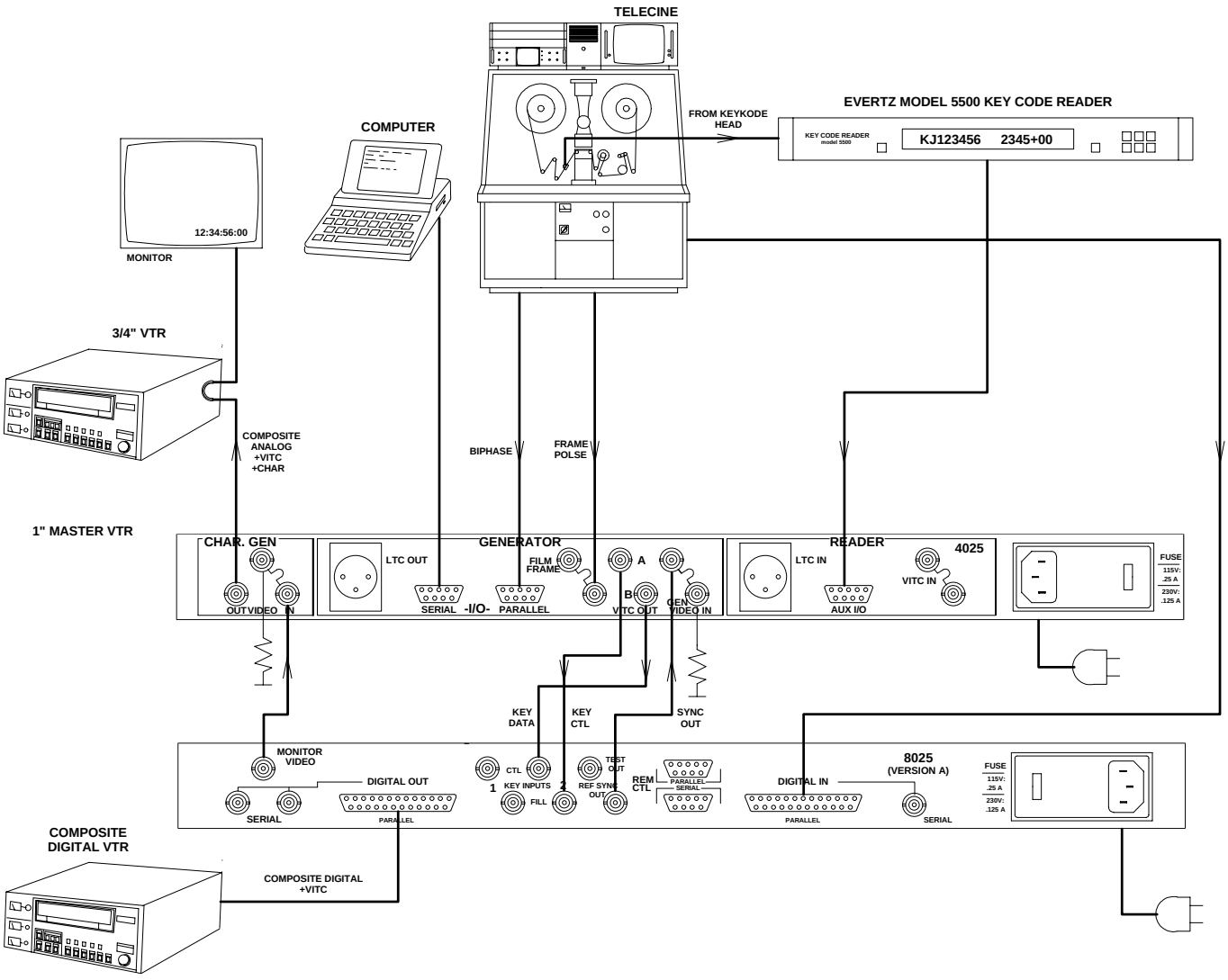

Figure 2-6: Connections to a 4025 Film Footage Encoder for Digital VITC Keying (version A with 8 digit display)

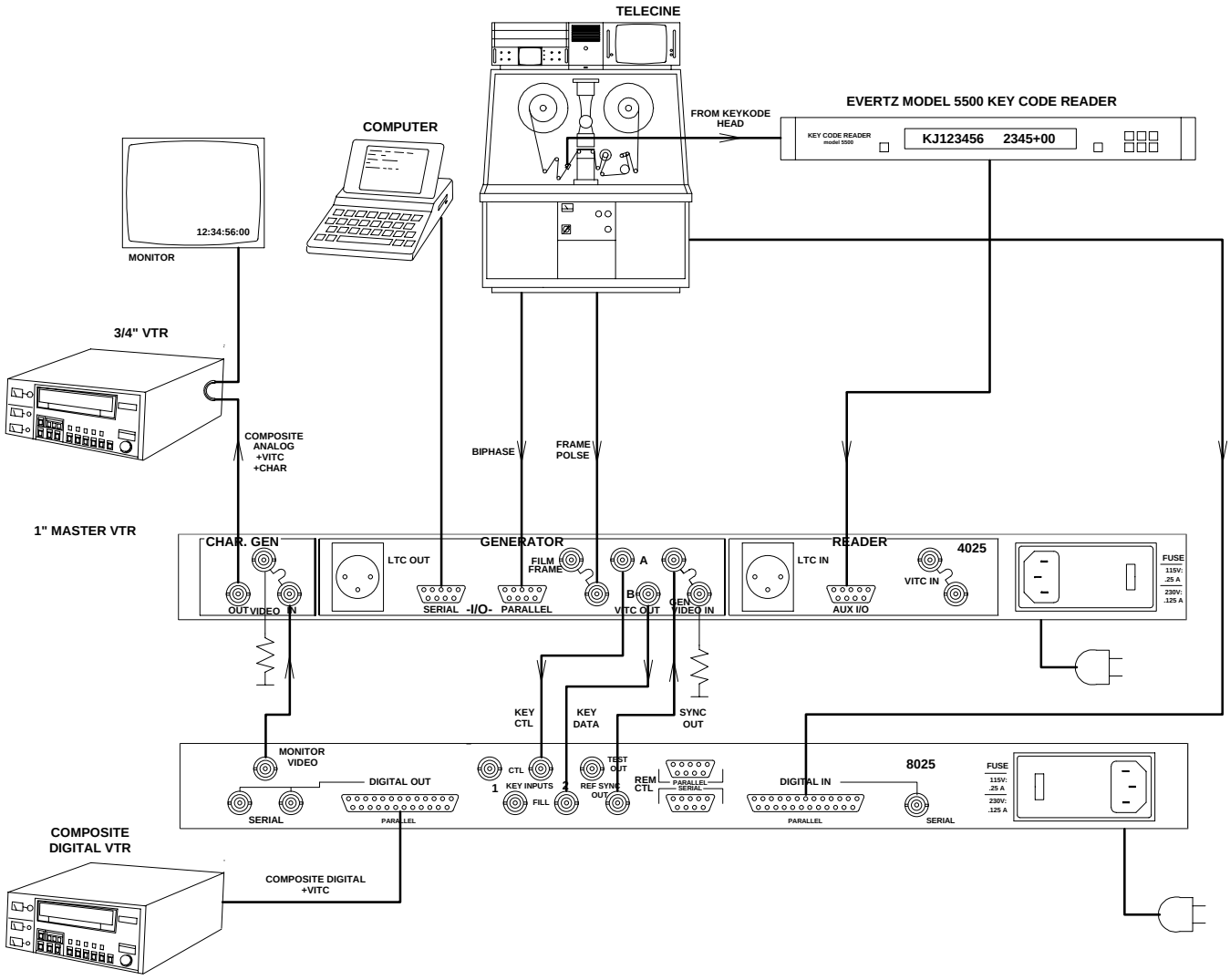

Figure 2-7: Connections to a 4025 Film Footage Encoder for Digital VITC Keying (version B with 12 digit display)

2.6.2. Connecting the 4025 and 8025 for Digital and Analog VITC Keying

Figure 2-8 (version A) and Figure 2-9 (version B) show the typical connections required when using the 8025 in conjunction with the 4025 Film Footage Encoder in a mixed digital and analog environment. This configuration requires that the digital video input to the 8025 and the analog video input to the 4025 are in time with each other.

In this mode, the 4025 act as an analog keyer and the 8025 keyer extracts the VITC from the analog video and keys it into the digital bitstream. The 4025 has internal jumpers located on the 6231 VITC keyer submodule (top board in the centre location) which must be configured to permit its operation in the analog mode. Remove the shorting jumpers from JPA1

and JPB1 and install them on JPC1 and JPD1. (Consult your 4025 manual section 5.3.1 and 5.3.5 for further information on how to change the jumpers.)

Connect the program video to the GEN VIDEO IN of the 4025 and terminate it. Connect KEY CTL 2 of the 8025 to the 4025's VITC OUT B and terminate the KEY FILL 2 of the 8025.

The 8025 must be set up to use Video level input levels for the KEY controls. This mode is accessible by using the Engineering Format menu and setting the CTL LVL setting to Lvl vid. See section 3.2 of this manual.

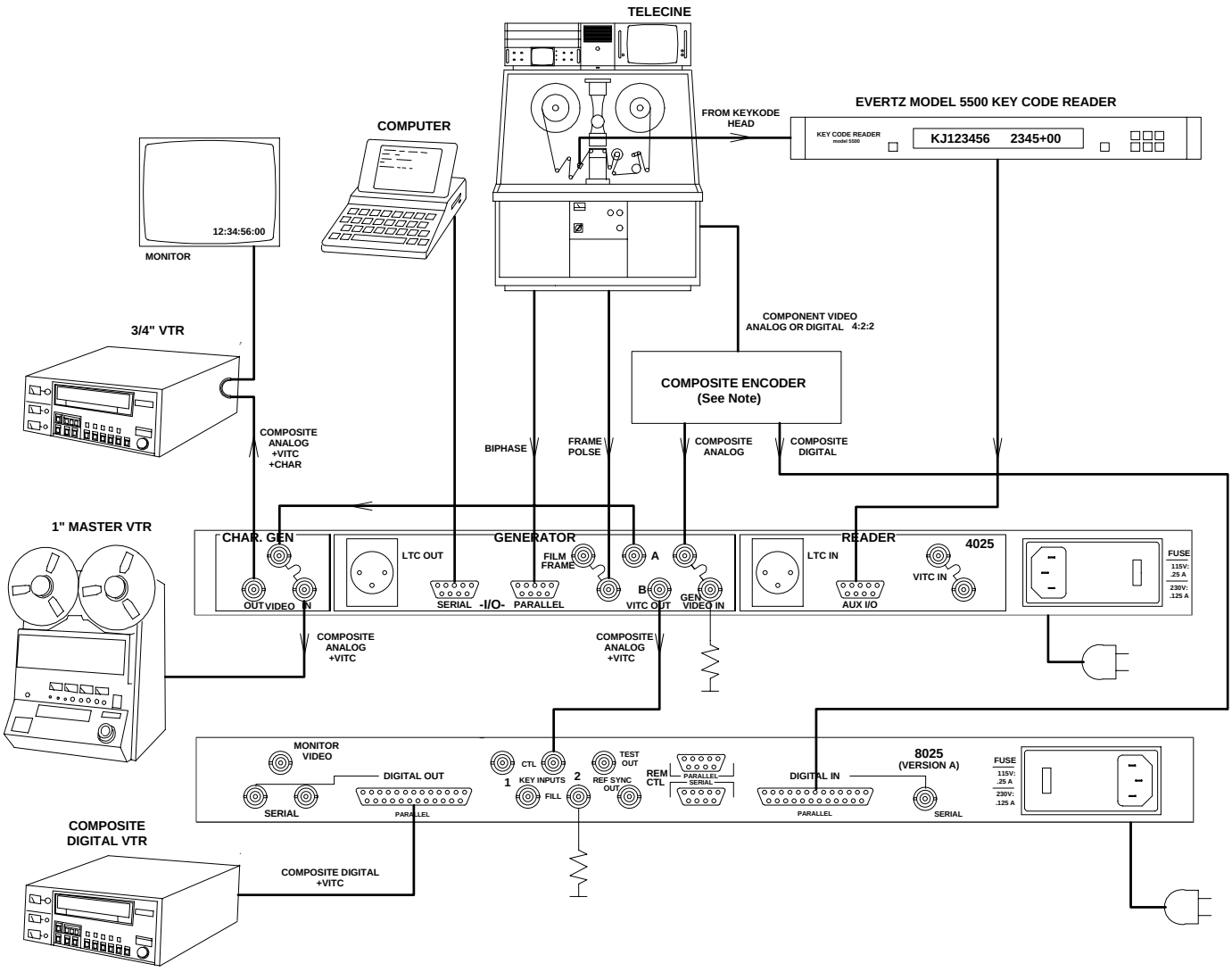

Figure 2-8: Connections to a 4025 for Digital and Analog VITC Keying (version A with 8 digit display)

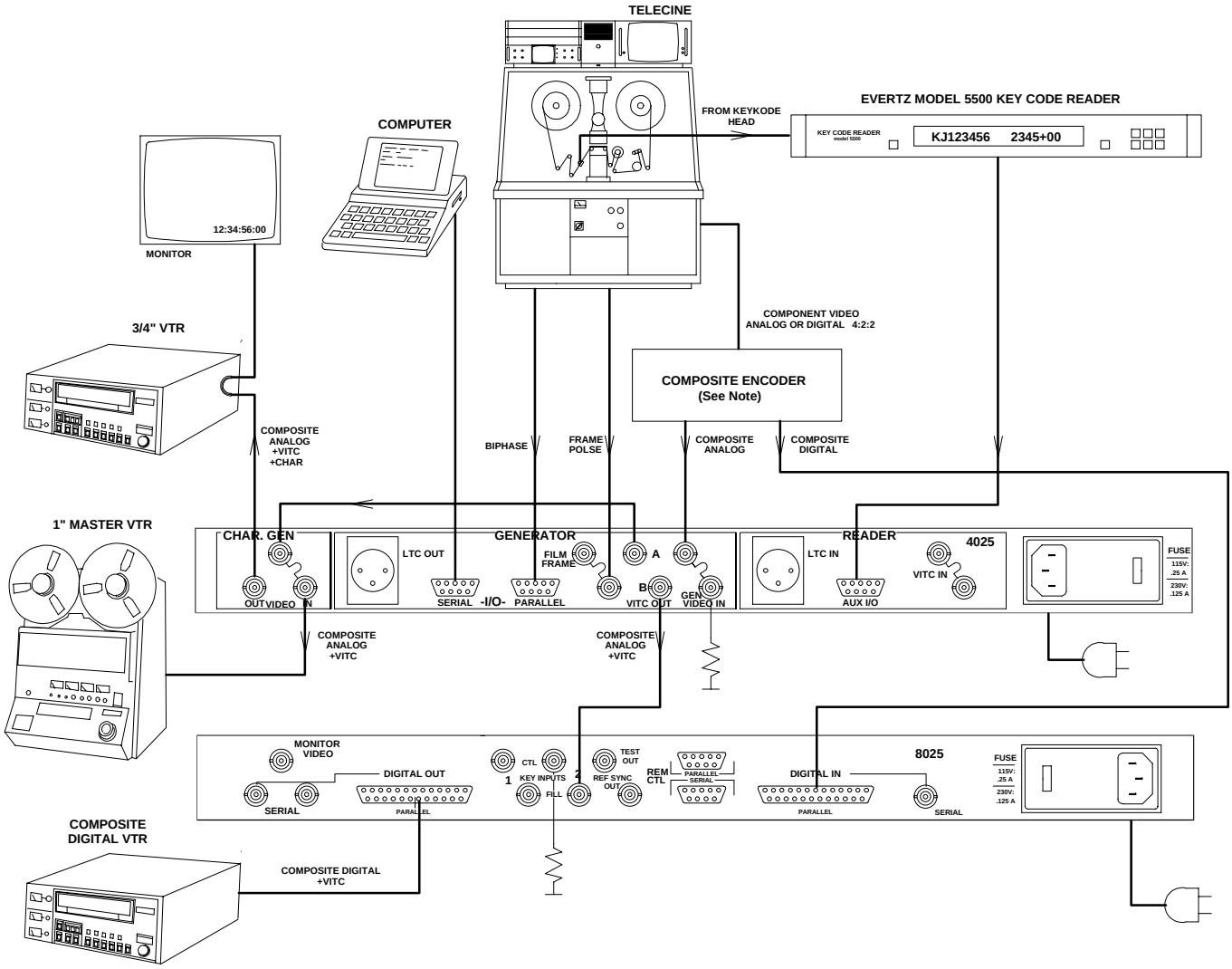

Figure 2-9: Connections to a 4025 for Digital and Analog VITC Keying (version B with 12 digit display)

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3. HOW TO OPERATE DIGITAL VIDEO KEYER

3.1. AN OVERVIEW OF KEY AND DISPLAY FUNCTIONS

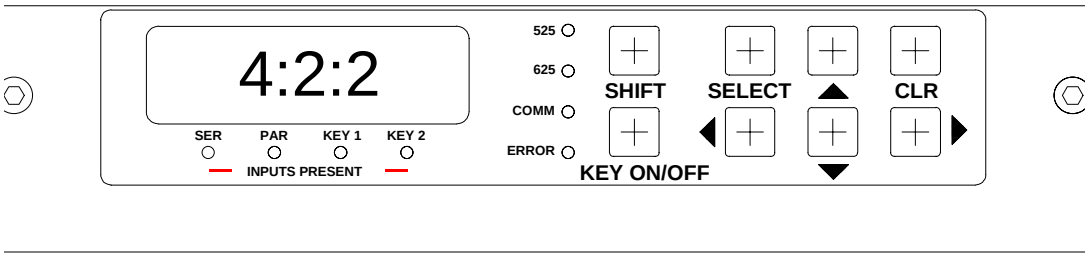

Figure 3-1: Version A Front Panel Layout

Figure 3-2: Version B Front Panel Layout

There are two different versions of 8025 hardware. Version A has an 8 digit display located on the right hand side of the gray front panel. Version B has an 12 digit display located in the middle of the black front panel. The operating instructions in chapter 3 relate to the version B units. References to version A will be shown in brackets.

The display area consists of an 12 (8 for version A) digit alphanumeric display, 8 LED status indicators and an 8 pushbutton keypad.

The keypad is used to control the front panel menu system, and to provide a global Keyer disable. When the **SHIFT** key is held down, the meanings of some of the keys are modified, gaining quick access to a wider variety of functions. (Throughout this manual **SHIFT +** indicates that you should hold down the **SHIFT** key while pressing the second key.)

A front panel programming menu provides a quick and simple method of configuring the 8025 Digital Video Keyer for your application.

Section 3.2 gives detailed information on the specific operations required to control the 8025.

3.1.1. The Setup Pushbutton Group

The Setup key group consists of the **SELECT, SETUP** (**CLEAR** for version A) and ←, →, ↑, ↓ keys and is used to navigate the front panel programming menu system.

For version A units press the ↑ & ↓ keys to enter the Setup mode. Pressing the ↑key starts at the bottom of the menu tree. Pressing the ↓ key starts at the top of the menu tree. Press the **SHIFT + ↑ & SHIFT + ↓** keys to enter the Engineering Setup mode. The Engineering Setup Mode provides additional configuration items which should only be used by qualified engineering personnel

For version B units press the **SETUP** key to enter the Setup mode. Press the **SHIFT + SETUP** keys to enter the Engineering Setup mode. The Engineering Setup Mode provides additional configuration items which should only be used by qualified engineering personnel.

The 8025 will automatically return to the operating mode if no key presses are made for several seconds.

↑ ↓ When in either of the Setup modes, the ↑ & ↓ arrow keys are used to move up or down the main items in the menu system.

← → When in either of the Setup modes the ← & → keys are used to show the choices for the current item in the menu system.

SELECT When in either of the Setup modes the **SELECT** key is used to activate the current choice for the selected item.

SETUP (CLEAR for version A) Exits the Setup mode or the Engineering Setup mode and returns to operating mode. The selected video type (4:2:2: or 4 Fs) and the output mode (Key or Bars) will be shown on the front panel.

3.1.2. The Function Pushbutton Group

The function key group consists of the Key On/Off pushbutton.

Provision is made for two independent keyer paths inside the 8025. However at this time only keyer 2 is implemented. All references to Keyer 1 throughout this manual should be ignored at this time.

KEY ON / OFF Turns both Keyer 1 and Keyer 2 off. When the keyer is Off, the 8025 will merely clock the digital video through its internal registers and route it to the appropriate output (serial or parallel).

3.1.3. An Overview of the Status Indicators

There are 8 status indicators located on the front panel that show operational status of the 8025 at a glance.

SER Indicates that the video input is from the serial input. If it is blinking, it indicates that the Serial video input is selected, but a valid digital video signal is not present.

PAR Indicates that the video input is from the parallel input. If it is blinking, it indicates that the parallel video input is selected, but a valid digital video signal is not present.

KEY 1 Indicates that Keyer 1 is enabled. (Keyer 1 is not Implemented at this time)

KEY 2 Indicates that Keyer 2 is enabled.

525 Indicates that video standard selected is 525 lines (NTSC)

625 Indicates that video standard selected is 625 lines (PAL)

4:2:2 Indicates that video type selected is component digital video.

4 Fsc Indicates that video type selected is composite digital video.

3.1.4. Front Panel Operating Messages

The front panel display is used to indicate the current operating mode of the 8025 as shown below.

422 BLACK Component black generator
422 BARS Component bars generator
422 KEYER Component Keyer (keyer enabled)
422 THRU Component Keyer (keyer disabled)
422 EQU Component serial input equalizer test pattern generator
422 PLL Component serial input phase locked loop test pattern generator

4Fs BLACK Composite black generator
4Fs BARS Composite bars generator
4Fs KEYER Composite Keyer (keyer enabled**)**
4Fs THRU Composite Keyer (keyer disabled**)**

When in the Setup modes, the front panel is used to display the current menu item and selected option.

3.1.5. An Overview of the Front Panel Programming Menu

The key to the operational flexibility of the 8025 Digital Video Keyer lies in the front panel programming menu system. The programming menu system uses the 8 digit alphanumeric display and provides a quick, intuitive method of configuring 8025 Digital Video Keyer, guiding you to the correct setup for your application. The six keys in the Setup key group (**SELECT**, **SETUP (CLEAR** for version A)**,** 🡐 🡒 🡑 🡓) are used to cycle through the various items on the programming menu.

The 8025 menu system consists of a main menu with two or more choices for each menu item. Figure 3-3: Overview is an overview of the front panel menu system, and shows all the menu items and where you will find the menu choices. Note that some menu choices may be not be active depending on the programmed mode of operation.

To enter the front panel programming menus, press the **SETUP** key (🡑 or 🡓 keys for version A

The two vertical arrow keys (🡑, 🡓) allow you to move vertically within the menu tree. When you have selected the desired menu item, press the 🡒 key to reveal the choices for that item. The choice that is currently selected will be blinking. When you have selected the desired sub menu choice press the **SELECT** key to save your choice.

When you have made all the desired changes, press the **SETUP** key (**CLEAR** key for version A) to return to the normal display mode.

Each of the menu items is described in the section, with an explanation of what each choice does. Some items will not be shown depending on what options you have installed, and whether you are in the Engineering Setup mode or not.

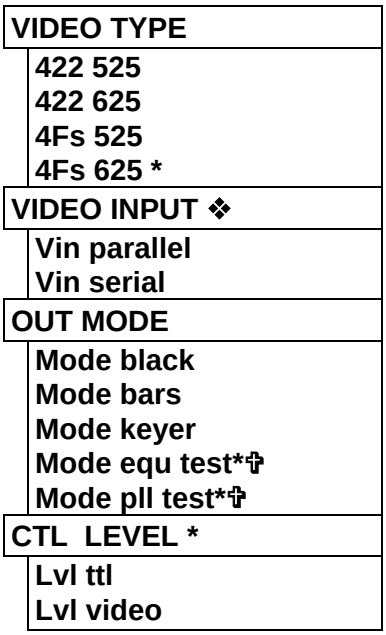

Figure 3-3: Overview of the 8025 Programming Menu System

* Indicates menu items available in Engineering mode only

❖ Indicates menu items available when both serial and parallel video inputs available

✞ Indicates menu items available when in 422 video type

3.2. PROGRAMMING THE 8025 OPERATIONAL MODES

The front panel menu is used to configure the basic operational modes of the 8025 Digital Video Keyer such as selecting which video input will be used, what type of video is present, etc.

VIDEO TYPE Is used to program the 8025 for the digital video format.

Select **422 525** for operation with component video with a line rate of 525 lines per field. Conforming to SMPTE 125M.

Select **422 625** for operation with component video with a line rate of 625 lines per field. Conforming to EBU Tech 3267-E (1992) or the 4:2:2 level of CCIR recommendation 601.

Select **4Fs 525** for operation with composite video formats conforming to the SMPTE 244M.

As of the time of this writing the PAL composite (4Fsc) video format is not supported.

VIDEO IN Is used to select whether the serial or parallel digital video input will be active.

If your unit is not fitted with the Serial input option then the VIDEO IN menu item will not be shown.

Select **Vin parallel** to activate the parallel video input.

Select **Vin serial** to activate the serial video input.

OUT MODE Is used to select whether the keyer, on the internal pattern generator will be available on the output

Select **Mode bars** to activate the internal bar generator.

Select **Mode black** to activate the internal black generator.

Select **Mode keyer** to activate the keyer. The video output will be the selected video input signal with the data keyed into it. When the keyer mode is active, the keyer may be enabled or disabled by using the **KEYER ON/OFF** key (when you are not in Setup mode!). The **KEY 2** status LED will be on when the keyer mode is active and the keyer is enabled.

The following additional choices are available when you are in Engineering Setup Mode.

Select **Mode equ test** to activate the serial input equalizer test pattern generator.

Select **Mode pll test** to activate the serial input phase locked loop test pattern generator.

CTL LEVEL Is used to select the type of signal used for the Key Ctl and Key Fill signals. This item is only required on installation and should not be changed unless the connections to the 8025 are physically altered.

If you are using the 8025 in conjunction with a 4025 the following settings should be used. If the 4025 is set for digital mode, use TTL levels. If the 4025 is set for analogue mode, use the Video levels.

Select **Lvl ttl** if you are using TTL level signals for Key CTL and Key Fill.

Select **Lvl video** if you are using Video level signals for Key CTL and Key Fill.

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4. TECHNICAL DESCRIPTION

4.1. OVERVIEW

The model 8025 Digital Video Keyer combines the latest LSI technology with sophisticated microcontroller firmware to provide a powerful, flexible keyer system. The 8025 received VITC signals from an external VITC generator and inserts the VITC data into the digital video bitstream.

The optional composite analog monitor output provides a low cost method of verifying the correct insertion of the VITC data when it is connected to a VITC reader/character inserter..

The front panel alphanumeric display is used to configure various items. The 8025's menu system consists of a main menu with two or more choices on each menu item. An Engineering menu mode gains access to additional items that are normally only required at installation time. See section **Error! Reference source not found.** for a complete description of the programming menu.

4.2. JUMPERS AND SWITCHES

Component layout drawing 8025-80 shows the location and function of the switches and jumpers inside the model 8025. The jumper positions marked in **bold** face type are the default settings.

4.2.1. DIP Switch Functions

The main circuit board of the model 8025 contains an 8 position DIP switch which is used to invoke various diagnostic and calibrations functions. The functions of each switch are described below.

Switch	Name	Normal	Function when Open	Function when Closed
1	Ser In	Open		Serial Input Hardware installed
2	Ser Out	Open		Serial Output Hardware installed
3	Mon	Open		Monitor hardware installed
4	Factory Reset	Open		Resets 8025 to factory defaults on power up
5	Not Used	Open		
6	Quick Boot	Open		Faster Boot up
7	Not used	Open		
8	Not used	Open		

Figure 4-1: DIP Switch Functions

4.2.2. Jumper Functions - Main Board

All jumpers except JP9 are printed circuit board links and are installed in the default position. To change the position, the board link must be cut and a wire link must be installed in the desired location.

JP1	LCA Size	**A**	3042
		B	3064
JP3	EPROM Size	**512**	Board link installed connects MCU EPROM U19 Address A15 to microprocessor A15 for use with 512K size EPROM.
		256	Board link installed connects MCU EPROM U19 Address A15 to +5 volts for use with 256K size EPROM.
JP4	EPROM CE	**Pin 2,3**	Board link installed connects Char EPROM CE to ground.
		Pins 1,2	Board link installed connects Char EPROM CE to +5 Volts after LCA loads.
JP5			Not installed for 8025
JP10,11,12,13			Not installed for 8025

4.3. CIRCUIT DESCRIPTION

The model 8025 is a microcontroller based device functionally divided into the following hardware subsystems:

1 Microcontroller & I/O
2 Display and Pushbuttons
3 Parallel Digital Video Input and Output
4 Test Generator Oscillator
5 Input Multiplexer and Keyer LCA
6 Serial Digital Video Input
7 Serial Digital Video Output
8 Analog Composite Monitor (optional)

The microcontroller, serial and parallel video inputs and outputs, and keyer LCA circuits are all contained on the main circuit card (8025). The display and keypad circuitry is contained on a separate circuit board (5220) which plugs into the main board via a twenty conductor ribbon cable. The optional analog composite monitor circuitry is contained on a separate circuit board (8026) which plugs into the main board via a forty-four pin header. The relevant schematic drawings are shown in brackets for each section of the circuit. The heart of the model 8025 circuitry is a programmable logic array (LCA) device (U17) which contains the keyer circuitry and the support circuitry for addressing various devices on the board.

4.3.1. Microcontroller (8025-36)

At the heart of the model 8025 keyer is an 8032 microcontroller, (MCU) U19. Its three 8 bit bi-directional ports and 8 bit bus provide peripheral interfacing to the rest of the circuits. Program memory is contained on EPROM U21. Scratch pad and data RAM are provided internally by the MCU. An onboard oscillator, also part of the MCU, is crystal controlled. Its' 11.52 MHz frequency is internally divided by 12, resulting in a processor operating frequency of 960 KHz. Address decoder U23 provides decoded chip enables to each of the peripheral devices on the board. Addressable latches U24 and U34 provide mode select control lines used throughout the board.

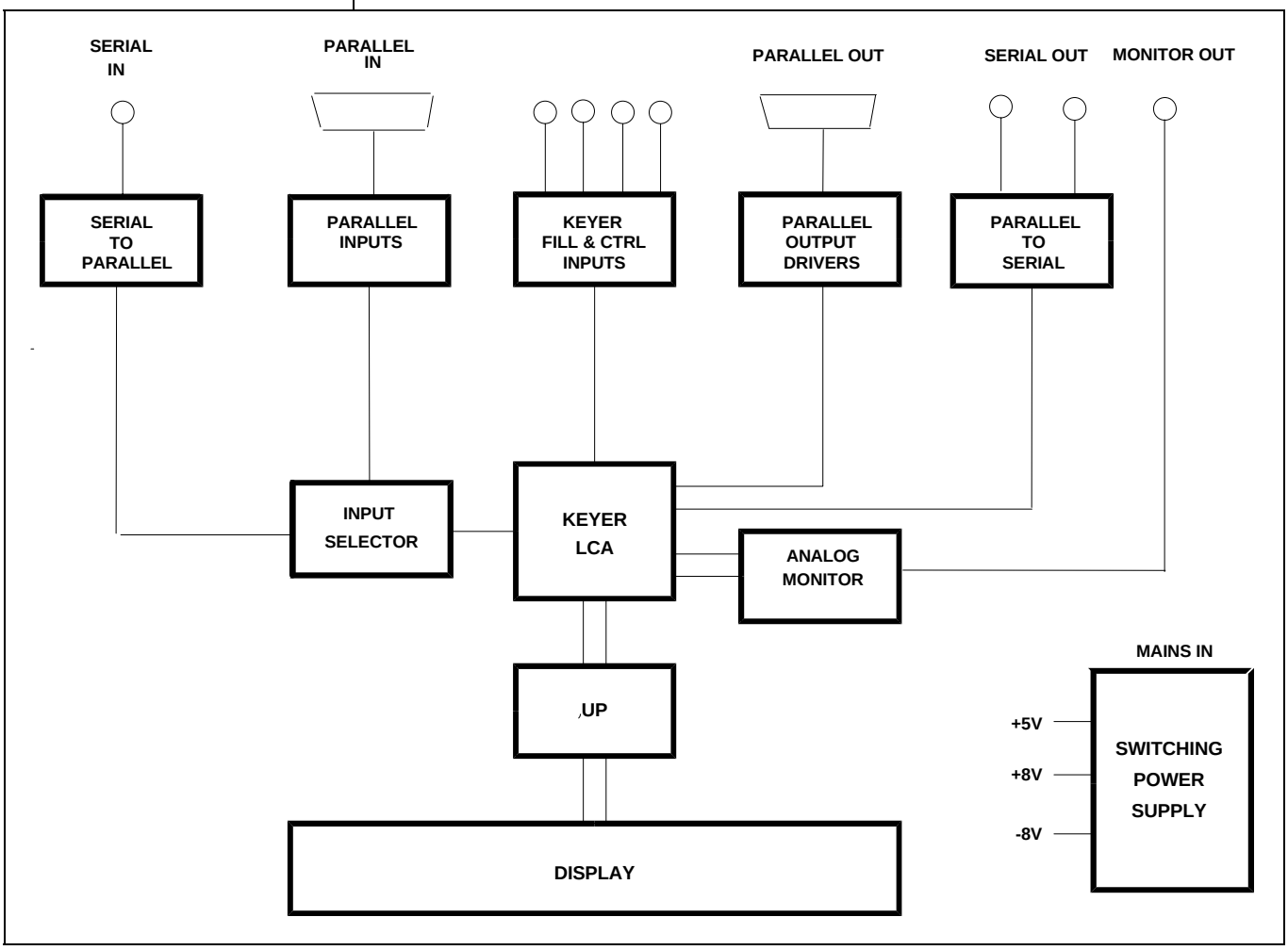

Figure 4-2: Block Diagram

4.3.2. Front Panel Display and Pushbuttons (5220-31)

A 12 digit alphanumeric display, and a 8 button keypad are contained on a separate circuit card (5220) which is connected to the main circuit board via a 20 conductor ribbon cable.

The 12 digit display is self scanning and contains its own character display memory. Data is written to the displays once per frame. Address Latch U1 generates chip enable and address information to the display devices to allow the MCU to write data to the display and control registers.

The status LED's are controlled by interface driver U3. This driver is accessed with a serial clock and data stream once per frame. When all the LED information has been shifted into the driver, it is latched there by the LEDSTB signal from the MCU (display header pin 10).

LED diagnostics can be invoked by holding down any Key on power up. When any key is pressed, all the front panel LED's should come on. To exit LED test mode, remove and re-apply power to the unit.

The 8 push buttons are arranged in a 8 x 2 matrix. Data from 8 keys at a time is latched into U2 by signal SH/LD on U2 pin 1. Address decoder U1 selects which set of 8 switches is latched into U2 using enable lines A0 and A1. Each time a key is pressed, the MCU firmware generates a key scan code corresponding to the position of the key in the key matrix.

4.3.3. Parallel Digital Video Input and Output (8025-31)

The parallel video input circuitry consists of 25 pin D connector J1, and ECL to TTL translators U 1,U2, and U3. These translators convert the incoming SMPTE 125 ECL level clock and data signals to TTL compatible levels used throughout the rest of the 8025. These TTL level signals are fed to the A inputs of input multiplexes U7, U8, and U9. To conserve power the ECL to TTL translators are powered by relays PRLY1 and PRLY2 only when the parallel inputs are selected (using the setup menus).

The parallel video output circuitry consists of TTL to ECL translators U4, U5, and U6 and 25 pin D connector J2. These translators convert the TTL level signals used throughout the 8025 to the ECL levels specified in SMPTE 125. Parallel data is always available regardless of which input is selected.

4.3.4. Test Generator Oscillator (8025-37)

A three frequency crystal oscillator is used to provide the sample clock rate signals required for the 8025 to generator various test signals. Other versions of the 8025 circuitry utilize all three frequencies, but the 8025 only uses the 27.000 MHz frequency. To calibrate the oscillator set the output mode to BAR GEN. Trim capacitor VC2 adjusts the frequency of the 27 MHz oscillator which is available on U 31 pin 8.

4.3.5. Serial Digital Video Input (8025-33)

The serial digital input circuitry is based on the Gennum Genlinx Serial Digital Video chip set. The 9005 receiver/equalizer provides automatic cable equalization and clock extraction form the serial digital signal. It provides a balanced ECL level recovered clock and data signals to the

9000 decoder. The 9000 decoder de-serializes the signal and provides a parallel clock and 10 bits of parallel data to the input multiplexer. The parallel data is fed to input B of the input multiplexer U7, U8, and U9. The serial input integrated circuits are powered by regulator U16 only when the serial input is selected on the setup menu.

The 9005 receiver is capable of working with 143 MHz composite NTSC, 173 MHz composite PAL or 270 MHz component video data rates. The capture frequency of the 9005 is set by trim pots VR2 for 270 MHz, VR1 for 143 MHz, and VR3 for 173 MHz. The 8025 works only in the 270 MHz component format so only VR2 is relevant. The capture range can be adjusted with the following procedure.

1. Connect a digital volt meter set on a 10 volt range to the Loop filter test point LF (located at the rear left corner of the 8025 board).

2. Connect a serial digital video signal to the serial input of the 8025. Connect the serial output of the 8025 to a digital monitor, or connect the analog monitor output to an analog monitor.

3. Configure the 8025 to 422 Keyer. The input test signal should now be visible on your monitor. If it is not then still proceed with step 4.

4. Rotate trimpot VR2 fully clockwise. Slowly rotate VR2 counter clockwise monitoring the loop filter voltage on the digital volt meter. Continue turning VR2 until the picture appears. Note the voltage on the LF test point.

5. Continue rotating VR2 until the loop filter voltage is 200 mVolts above the voltage measures in step 4.

4.3.6. Serial Digital Video Output (8025-34)

The serial digital output circuitry is based on the Gennum Genlinx chip set, and consists of the 9002 encoder and 9008 cable driver. The 9002 receives TTL level parallel data and clock signals from the keyer LCA and encodes the data into the SMPTE 259 specified bitstream. Cable driver 9008 receives the serial data from the 9002. The output of the 9008 is adjustable using trim pot VR7, and is nominally set to 800 mVolt p-p. Two identical serial outputs are provided.

4.3.7. Input Multiplexer and Keyer LCA (8025-32, 8025-25, 8025-37)

The heart of the 8025 is the Keyer LCA U17. Input video from either the serial or parallel input is selected by the input multiplexer circuitry U7, U8, and U9 and fed to the inputs of the keyer LCA.

The LCA generates a composite sync output extracted from the digital bitstream. This sync out is used to provide a timing reference for the closed caption generator supplying the key fill signal to the 8025.

The two KEY CTL and KEY FILL inputs provide an interface between the keyer LCA and the external equipment providing the signals to be keyed.

They can be configured to work with either TTL or video levels. To calibrate the threshold levels in the video input mode, set up the CTL LEVEL to the video level setting using the engineering menus. Adjust trimpot VR8 and VR9 so that test points RV1 and RV2 are set at 0.3 volts respectively.

4.3.8. Analog Composite Monitor (8026-31, 8026-32)

The composite analog monitor output circuitry is contained on a submodule located to the right of the unit. Parallel digital video from the LCA is fed up the header to the encoder integrated circuit U1. This device converts the component digital signals to composite analog, and provides a video output amplifier to drive a analog monitor.

To adjust the video level of the analog output, connect a test pattern source (e.g. colour bars) to the digital video input of the 8025. Adjust the **GAIN** trimpot (VR1) so that the output amplitude of the colour bar signal is 1 volt p-p.