Instruction Manual

Tektronix

SMS 8601
NTSC/PAL to 270 Mb Decoder

071-0421-00

First Printing: November 1995
Revised Printing: November 1998

Contacting Tektronix

		Voice	Fax	Addresses	Web Site
Customer Support	North America	(800) 547-8949	(530) 478-3181	Tektronix, Inc. Tektronix Grass Valley Products P.O. Box 1114 Grass Valley, CA 95945, USA	http://www.tektronix.com
	Elsewhere	Distributor or sales office from which equipment was purchased.			
Product, Service, Sales Information	North America	(800) 547-8949	(503) 627-7275	Tektronix, Inc. Video and Networking Division P.O. Box 500 M.S. 58-965 Beaverton, OR 97077-0001, USA	http://www.tektronix.com
	Europe	44 (10) 1628 40 3300	44 (0)1628 40 3301		
	Asia	(852) 2585-6688	(852) 2802-2996		
	Japan	81 (3) 5992 0621	81 (3) 5992 9377		
	Latin America	(305) 477-5488	(305) 477-5385		

Contents

Preface

SMS 8601 Decoder

Index

Preface

About This Manual

This manual describes the features of a specific module of the SMS 8000 Series family. As part of this module family, it is subject to Safety and Regulatory Compliance described in the 8000 Series frame and power supply documentation (see the *SMS 8000 Series Frame and Power Supply manual*).

SMS 8601 Decoder

Introduction

The SMS 8000 product line consists of a 1RU frame which holds up to 4 modules. The modules provide such functions as video delay and format conversion. Modules are selected by the user to suit their particular requirements.

The SMS 8601 is an NTSC/PAL to Component Digital Converter (Decoder), which decodes a single composite analog NTSC/PAL signal to component serial digital with 4 buffered outputs.

This module can be housed in a standard SMS 8000 Frame.

Features of the 8601 are:

- NTSC/PAL to 270Mb Conversion
- 27MHz sampled 10–bit A/D Converter
- 10–bit I/O performance with high precision processing
- High quality 2 dimensional filtering
- 4 outputs
- Burst locked decoding

Function

The input analog signal is digitized with a 10–bit, 27MHz (over-sampled) A/D converter and all subsequent processing is done with 12–bit resolution. The sampling phase is horizontally locked and the demodulation subcarrier is a digital oscillator that is controlled by the microprocessor and locked with a digital burst phase detector.

The chroma separator uses a non-separable 2-D filter that uses data from 5 lines that span a space of 4 field lines with 9 pixels from each line.

Figure 1 is a simplified block diagram showing the various adjustments, DIP switch settings, and LED indicator.

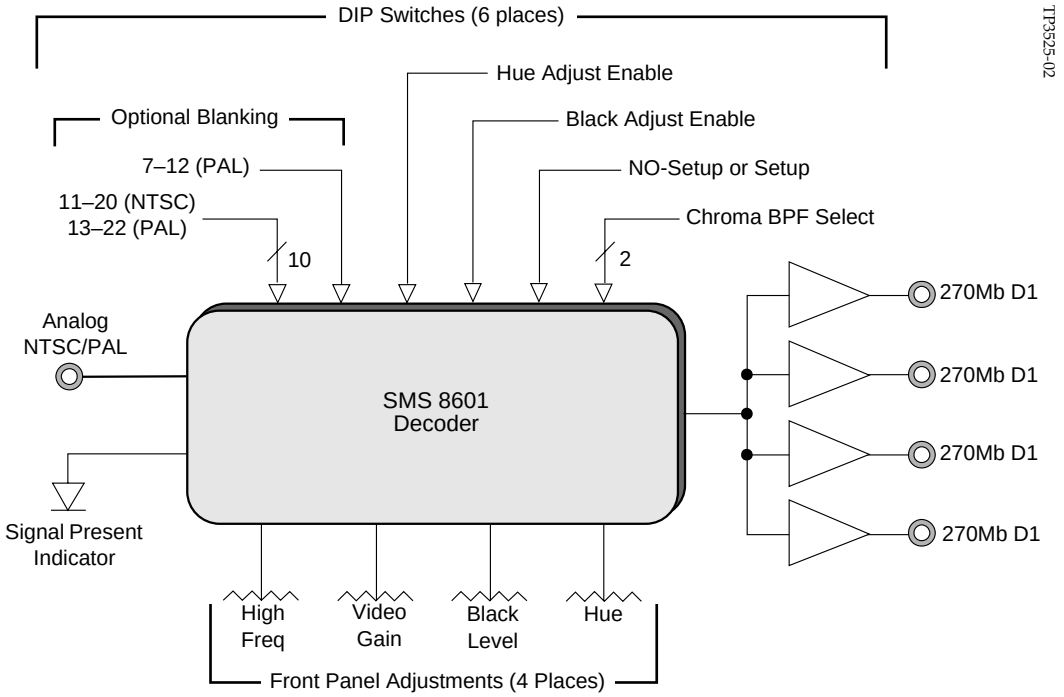

Figure 1. 8601 Simplified Block Diagram

Specifications

Specifications are subject to change without prior notice.

Table 1. SMS 8601 Specifications

Video Input Signal	
Video Signal	Composite analog video conforming to SMPTE 170M for NTSC (525 line) or CCIR 624 for PAL (625 line)
Video Impedance	75Ω
Video Return Loss	>40dB to 5.5MHz
Video Connector Type	75Ω BNC
Output Signal	
Signal Type	Serial digital video conforming to SMPTE 259M "Serial Digital Interface for 10–bit 4:2:2 Component and 4fsc Composite Digital Signals" (Includes annex E which describes PAL operation)
Number of Outputs	4
Data Type	10–bit 270MBPS serial video (D1). Timing codes for vertical active lines start at 20 for NTSC and 23 for PAL
Jitter	Conform to SMPTE 17.12/002
Impedance	75Ω
Return Loss	>15dB (5MHz to 270MHz)
Connector Type	75Ω BNC
Performance	
Luma Frequency Response	±0.05dB to 5.5MHz, –3dB to 6.3MHz
Chroma (R-Y, B-Y) Response	±0.5dB to 1.3MHz, –3dB to 2.5MHz
Group Delay Error (luma)	<5ns to 5.5MHz
Processing Accuracy	9 bits, Y channel; 8 bits, Chroma
Color Saturation/hue	<0.5% error
Chroma/Luma Gain Inequality	<1%
Chroma/Luma Crosstalk	<–50 dB
Chroma/Luma Delay Inequality	<2 ns (square sampling and digital processing produces a theoretical zero error)
Chroma/Luma Gain Inequality	<0.05dB (0.6%)
SNR (CCIR410 or EIA RS-250-B)	>60dB (includes subcarrier rejection)
Processing Delay	2 lines + 2.37µs
Luma Non-linearity	<0.15%
Low Frequency (HUM) Suppression on Inputs	>20dB chroma loop suppression at 50Hz or 60Hz
Digital Processing	
A/D Quantizing	10–bit, 27MHz (over sampled)
Chroma Filter	2-D (5-line by 9 samples) non-separable
Internal Processing	12 bits, typical
Module	
Size	SMS 8000 module
Power Consumption	<15 Watts
Temperature Range	0° to 50 ° C

Installation

This section contains:

- Module Configuration
- Module Installation
- Front Panel Features
- Rear Connector Description

Module Configuration

SMS 8000 series modules are fully aligned at the factory and normally require no adjustments in the field. If adjustments are necessary, they should be attempted only by qualified technicians using, at a minimum, the following equipment (or equivalents):

- Fluke 77 DVM
- GVG SMS 8000 Series Extender Module

Note SMS 8000 Series extender module, SMS 8000•EXT, may be used to position a module outside the frame during adjustments.

Checking Jumper Placement

When installing the 8601 module, two jumpers must be checked and/or set.

- Reset Jumper JP3
- High Frequency Response Jumper JP4

Reset Jumper

JP3 is used for factory purposes only and should be placed in the Operating Mode for normal operation.Figure 2 illustrates the setting and location for JP3.

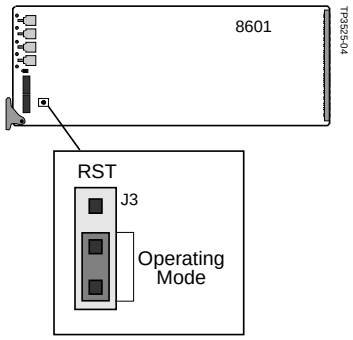

Figure 2. JP3 Jumper Setting

High Frequency Adjust

JP4 is used to allow the user to adjust the high frequency response. Place the jumper in the Enable position to adjust the High Frequency pot on the front of the module.

After adjusting, place the jumper back in the Normal position for normal operation. Figure 3 illustrates the settings and location for JP4.

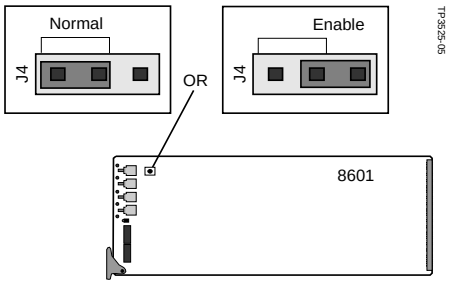

Figure 3. JP4 Jumper Settings

Module Installation

Follow the steps listed below to install a module in the SMS 8000 Frame.

1. Insert the module into the frame so that the left and right edges of the module slide inward between the card guides.
2. Press the front-panel retaining/ejecting tab in to lock the module in place.
3. Additional information concerning the frame and power supply is available in the *SMS 8000 Frame and Power Supply Manual, part number TP3465.*

Front Panel Features

The 8601 Front Panel provides a sixteen position DIP switch, a signal present LED, and four adjustable potentiometers—Video Gain, HF Gain, Black Level, and Hue. There are five test points: +5VA, +5V, –5V, +15V, and GND.

The front panel of the module is illustrated in Figure 4.

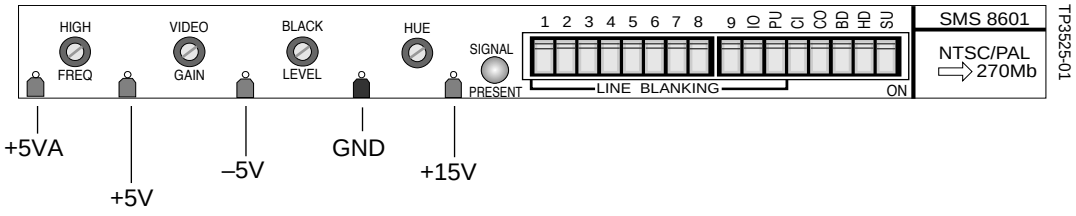

Figure 4. 8601 Module Front

S1 DIP Switch Settings

The factory default for all 16 positions of the DIP Switch is in the UP (switch off) position.

The functions of the switches are described below.

Table 2. Front Panel DIP Switch Functions

DIP Switch Segments	Function
1-10	When placed in the DOWN position these switches unblank individual lines 11 through 20 for NTSC input signals or 13/326 through 22/335 for PAL input signals.
PU	For NTSC input signals: DOWN position–line 21 of both fields is treated as part of vertical blanking. In this position, line 21 is not decoded but is passed through to the luminance channel output. There is no chroma channel output for this line. Closed caption data passes through to the luma output without any filtering. UP position–line 21 treated as part of the picture and is decoded to form luma and chroma component outputs. For PAL input signals: DOWN position–unblanks lines 6 through 12 and 319 through 325.
C1 & C0	Selects one of four chroma filters options: UP UP 2-D #3 combination of #1 and #2; default UP DOWN 2-D #2 mostly vertical (comb); minimum chroma artifacts DOWN UP 2-D #1 mostly horizontal; minimum luma artifacts DOWN DOWN 1-D #0 horizontal (notch) filter
BD	When placed in the DOWN position enables adjustment of front panel BLACK LEVEL control
HD	When placed in the DOWN position it enables adjustment of front panel HUE control
SU	Placed in the DOWN position when there is no input setup (Japan standard)

Rear Connector Description

The rear connector for each module consists of six BNCs, and one 9-pin D connector. Each SMS 8000 module uses a unique overlay which labels the connector set appropriately for the function of that module. *Refer to the SMS 8000 Series Frame and Power Supply Manual* for the rear connector sub-panel information.

Four BNCs are used for the 4 outputs, and one for the NTSC/PAL input. The first BNC and the 9-pin D connector for this module slot are not used for the 8601 application.

Rear Overlay

Ensure that the rear connector overlay is in the correct location. Figure 5 illustrates the 8601 rear connector overlay.

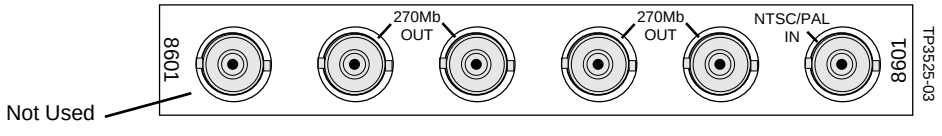

Figure 5. 8601 Rear Connector Overlay

Service

The SMS 8601 NTSC/PAL to Component Digital Converter module makes extensive use of surface-mount technology and programmed parts to achieve compact size and adherence to demanding technical specifications. Circuit modules should not be serviced in the field.

If your module is not operating correctly, troubleshoot as follows:

- Check input signals
- Check cables and connections
- Check switch positions on the front panel
- Check jumper positions on the module
- Verify that source equipment is operating correctly
- Check output connections

If the module is still not operating correctly, replace it with a known-good spare and return the faulty module to a designated Tektronix Grass Valley repair depot. See *Contacting Tektronix* in the front of this manual.

For jumper settings or adjustments, refer to the Installation section of this manual.

Index