

Instruction Manual

071-0515-00

FIRST PRINTING: **NOVEMBER 1998**

8980TLS

NTSC TO HDTV TRI-LEVEL SYNC CONVERTER

Contacting Grass Valley Group

Region	Voice	Fax	Address	Web Site
North America	(800) 547-8949 530-478-4148	(530) 478-3347	Grass Valley Group P.O. Box 599000 Nevada City, CA 95959-7900 USA	www.grassvalleygroup.com
Pacific Operations	+852-2585-6688 Support: +852-2585-6579	+852-2802-2996		
Europe, Asia, Middle East	+44 (0) 1628 403300 Support: +44 (0) 1628-405830	+44 (0) 1628 403698		

Copyright © Grass Valley Group. All rights reserved.

This document may not be copied, in whole or in part, or otherwise reproduced, except as specifically permitted under U.S. copyright law, without the prior written consent of Grass Valley Group, P.O. Box 1114, Grass Valley, CA 95945. GRASS VALLEY GROUP is a registered trademark and Grass Valley is a trademark of Grass Valley Group. All registered trademarks and trademarks are property of their respective holders. Grass Valley Group products are covered by U.S. and foreign patents, issued and pending. Product options and specifications subject to change without notice. The information in this manual is furnished for informational use only, is subject to change without notice, and should not be construed as a commitment by Grass Valley Group. Grass Valley Group assumes no responsibility or liability for any errors or inaccuracies that may appear in this publication.

Contents

Preface

About This Manual v

8980TLS NTSC to HDTV Tri-level Sync Converter

Introduction 1
 Performance 1
Functional Description 2
Specifications 3
Installation 4
 Select HDTV Standard 4
 Module Installation 5
 Cabling 6
 Loophrough Input 6
 Outputs 6
Adjustments and Indicators 7
Service 8

Index

Preface

About This Manual

This manual describes the features of a specific module of the 8900 Series Distribution Amplifier family. As part of this module family, it is subject to Safety and Regulatory Compliance described in the 8900 Series frame and power supply documentation (see the *8900 Series User's Guide*).

8980TLS NTSC to HDTV Tri-level Sync Converter

Introduction

The 8900 Series product line is a family of serial digital distribution amplifiers (DAs) and signal processors. It consists of modules that reside in a 2 rack unit frame holding up to ten modules. A variety of modules are available that can provide fanout, timing/reclocking, monitoring, or error detection and handling capabilities. Modules are selected by the user to suit their particular requirements.

The 8980TLS module is a tri-level sync converter that accepts an NTSC color black reference input and outputs four duplicate tri-level video sync signals.

Performance

Tri-level sync is the required reference signal for many HDTV devices such as VTRs and master control or production switchers. It provides the ability to extract a high precision low jitter horizontal timing reference for HDTV equipment. The 8980TLS module provides a very stable tri-level sync output locked to an NTSC input by using the NTSC color burst as its timing reference. This provides immunity from any NTSC sync timing jitter that may be present. A differential input is provided for the reference signal to provide immunity from any common mode hum or noise that may be present. An NTSC reference signal with color burst is required for proper operation.

Functional Description

Refer to [Figure 1](#) while reading this functional description. The 525-line NTSC reference input signal feeds a sync separator and a color burst phase-locked loop. The color burst phase-locked loop generates an output at six times subcarrier frequency that is locked to the incoming color burst. This six-times subcarrier frequency signal drives a counter which produces an output at 33.7 kHz which is a subharmonic of the 74.17 MHz high definition clock frequency. Another output from the color burst locked loop at two-times subcarrier frequency feeds SC/H phase tracking circuitry. This circuit resolves any timing variation between the separated horizontal sync and incoming burst phase which may be caused by reference signal SC/H phase variations. The phase corrected horizontal timing is gated with reference field timing to create an output at frame rate (29.97 Hz). This output is used to set the phase of the 33.7 kHz generator to a known value once per frame.

The high definition timing generator uses the 33.7 kHz signal as a reference to generate a clock signal for the pulse generation logic. The frame rate pulse is used by the high definition timing generator to set its phase once per frame. Timing control switches at the front of the module feed into the sync generator logic. Output pulses are produced by the sync generator logic and are shifted in time with respect to the 33.7 kHz and frame rate pulses by an amount determined by the timing controls. The logic pulses from the sync generator logic are shaped and feed an output line-driver amplifier which provides the module's four isolated outputs.

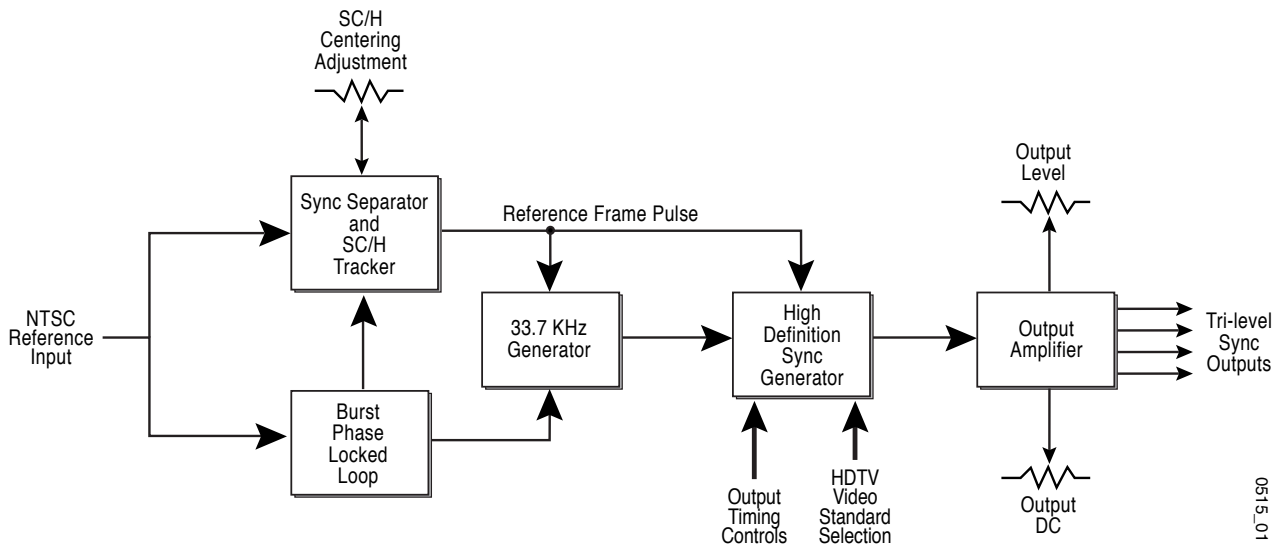


Figure 1. 8980TLS Functional Block Diagram

0515_01

Specifications

Table 1. 8980TLS Specifications

Parameter	Value
Input	
Input signal type	Looping analog 525 line NTSC color black, per SMPTE 170M
Signal level	Sync and burst each 286 mV p-p +/-6 dB
Return loss	Greater than 40 dB to 5 MHz
Maximum common mode signal	10 V p-p at 60 Hz
Outputs	
Output signal type	Four duplicate outputs of analog black with tri-level sync locked to the NTSC reference input.
Signal standards	User selectable (both at 59.94 Hz vertical frequency): 1080 active line interlaced scan conforming to SMPTE 240M or, 720 active line progressive scan per SMPTE 296M
Tri-level sync return loss	Greater than 40 dB to 10 MHz
Output to output isolation	Greater than 40 dB to 10 MHz
Tri-level sync output timing	
Output timing range	Greater than 1 video frame
Increments of adjustment	54 ns
Method of control	5 sixteen-position rotary switches on front of module
Environmental	
Operating temperature range	0 to 45° C, noncondensing
Non-operating temperature range	-40 to +70° C, noncondensing
Power Requirements	
Power dissipation	3.6 W from +12 V, 1.7 W from -12 V, total 5.3 W
Physical	
Frame	Resides in standard 2 rack unit 8900 Series frame

Installation

To install the 8980TLS module:

- Select the proper HDTV video standard.
- Insert the module in the selected frame slot.
- Cable and terminate signal ports.
- Adjust output timing to input reference

Select HDTV Standard

Jumper JP1 on the top edge of the module (see [Figure 2](#)) selects the HDTV video standard for the output signals—1080i or 720p. These signals conform to SMPTE 240M and SMPTE 296M standards, respectively.

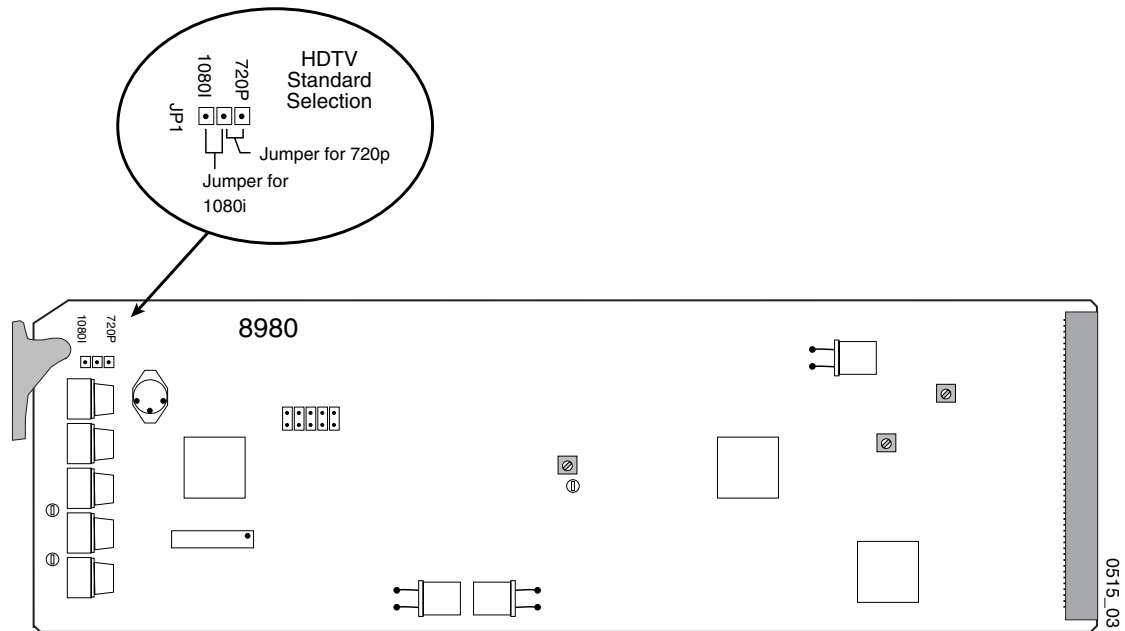


Figure 2. HDTV Video Standard Selection Jumper

Module Installation

There are ten cell locations in the frame to accommodate either analog or digital modules. These are the left ten locations. Refer to [Figure 3](#).

The two cells on the right are allocated for the power supplies. For additional information concerning the Power Supply module, refer to the Power Supply manual.

The third cell from the right is allocated for the Controller module. This module provides the interface for the forced air cover, as well as the SMPTE 269M fault reporting (health alarm) and EDH network. For additional information concerning the Controller module, refer to the Controller manual.

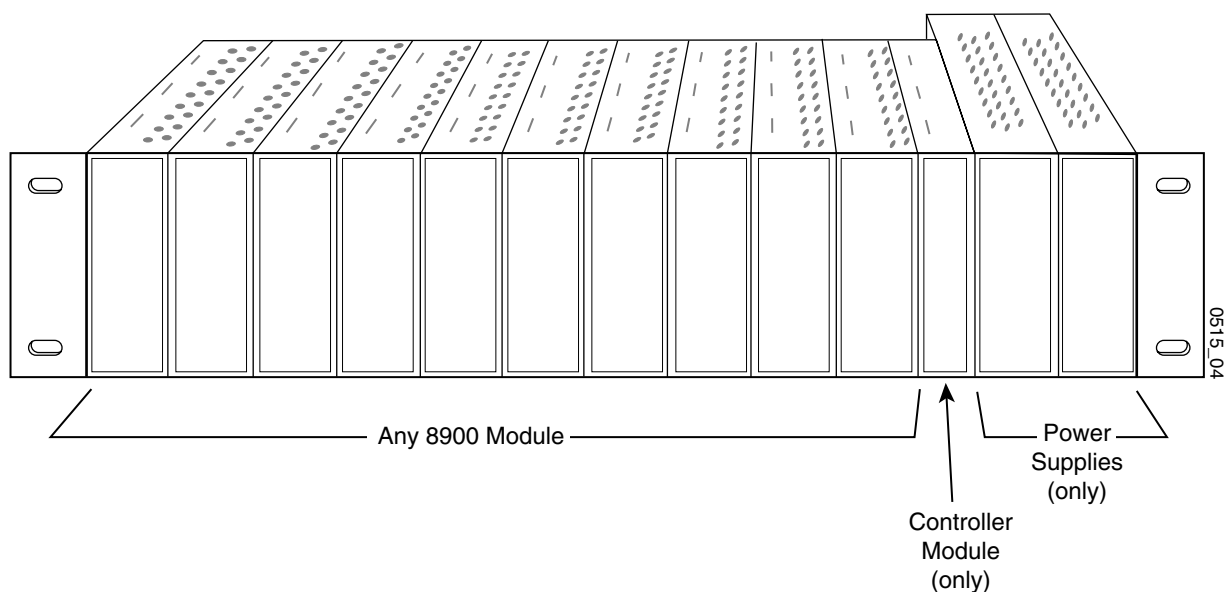


Figure 3. 8900 Series Frame

To install a module into the frame, follow these steps:

1. Insert the module into the frame, connector end first, with component side of the module facing to the right and ejector tab to the top.
2. Verify that the module connector seats properly against the backplane.
3. Press the ejector tab in to seat the module in place.

Cabling

8900 module slots are interchangeable within the frame. The maximum number of modules the frame will accept is ten. Figure 4 illustrates the rear connector plate for an 8900 Series frame.

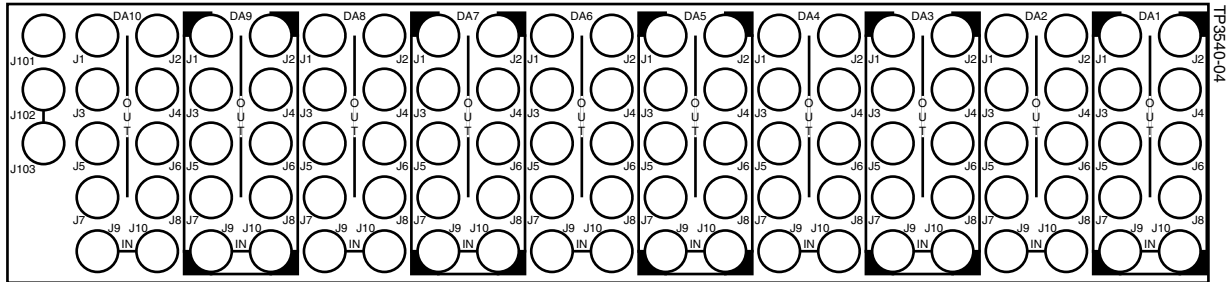


Figure 4. 8900 Series Frame Rear Connector

Loophrough Input

Connect an input source (NTSC reference color black) to one of the loophrough input connectors, J9 or J10 (See Figure 5). Terminate the unused connector into 75Ω.

Outputs

There are four duplicate outputs for the 8980TLS module—J1 through J4. The destination equipment should have an input impedance of 75 Ω unless it has loophrough inputs, in which case the loophrough inputs must be terminated into 75 Ω.

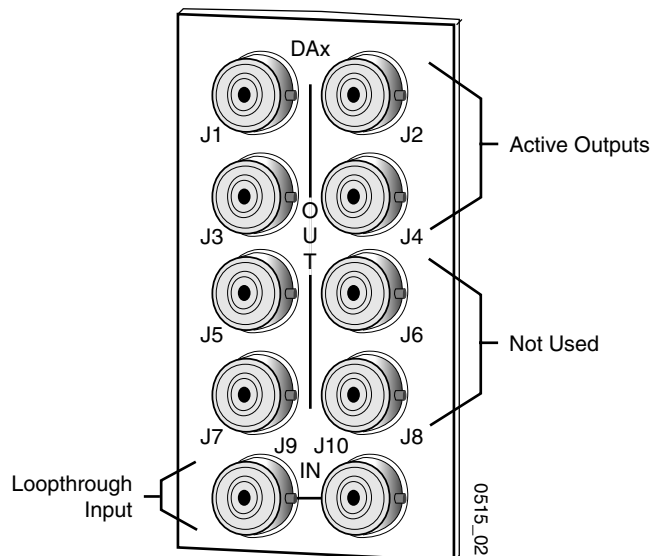


Figure 5. Typical Module Input and Outputs

Adjustments and Indicators

The 8980TLS output signal timing is adjusted relative to the input signal using switches provided on the front panel (see [Figure 6](#)). The green LED on the front of the module indicates the presence of an NTSC reference input signal.

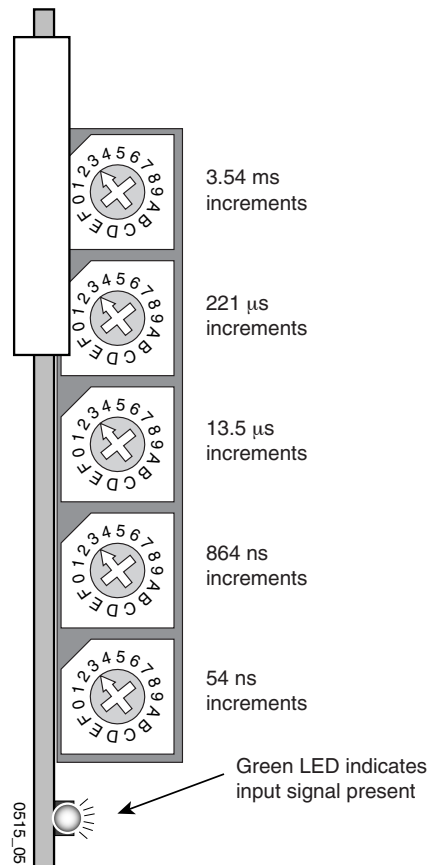


Figure 6. Timing Adjustment Rotary Switches and Signal Present LED

To adjust the timing of the outputs relative to the input reference, use the front panel switches (SW1 through SW5). There are five front panel switches. SW1 is at the top and provides output timing control in 3.54 millisecond steps. SW2 provides 221 microsecond steps. SW3 provides 13.5 microsecond steps. SW4 provides 864 nanosecond steps and SW5 (bottom switch) provides 54 nanosecond steps.

The timing of the output vertical interval first broad pulse will match the timing of the input first broad pulse in 720P with the switches set to 4, B, 5, E, and 0 (read from top to bottom). The vertical timing will match in 1080I with the switches set to 4, B, 6, 8, and 9 (top to bottom again). This can be observed by triggering an oscilloscope from the reference input vertical interval and observing the output tri-level sync. The output timing is

adjustable over a range of more than one frame. If the switch settings reach 00000 when adjusting the timing earlier, the desired output timing can be adjusted later by one frame to reach the same point. The same will be true if the timing is being adjusted later and the setting reaches FFFFF. In this case the timing can be adjusted earlier by one frame to reach the same point.

Service

The 8980TLS modules make 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, proceed as follows:

- Check frame and module power and signal present LED
- Check input signals
- Check cables and connections
- Verify that source equipment is operating correctly
- Check output connections

Refer to [Figure 7](#) for supply voltage test points that are located on the 8980TLS module.

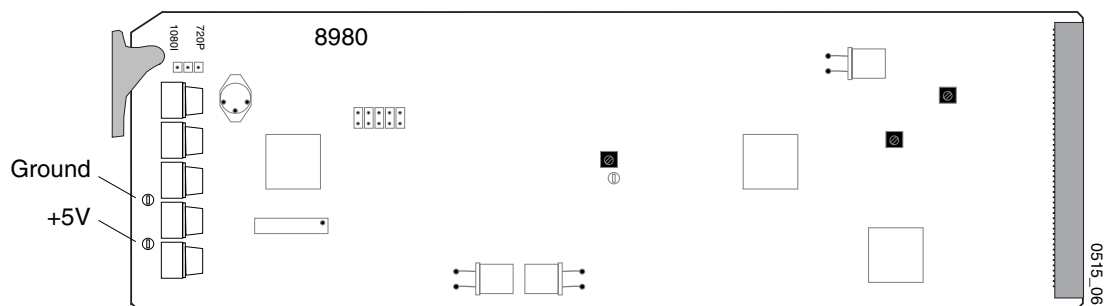


Figure 7. Voltage Test Point Locations

If the module is still not operating correctly, replace it with a known good spare and return the faulty module to a designated Grass Valley repair depot. Call your Grass Valley representative for depot location.

Refer to the [Contacting Grass Valley Group](#) at the front of this document for the Grass Valley Customer Service Information number.

Index

A

adjustments 7

C

clock signal 2

color black 6

color burst 2

common mode 1

connectors

input 6

controller module 5

F

frame 5

H

HDTV standard

selection 4

high definition timing 2

horizontal timing 1

I

impedance 6

indicator 7

input

differential 1

loophrough 6

signal present indicator 7

specification 3

J

jumper

video standards 4

M

module

controller 5

installation 5

power supply 5

N

NTSC reference 6

O

outputs

connectors 6

line driver 2

specification 3

termination 6

timing adjustment 7

video standard 4

P

phase-locked loop 2

power supply 5

R

reference signal 2

required 1

repair depot 8

S

subcarrier frequency 2

T

termination 6

testpoints 8

timing switches 7
troubleshooting 8

V

video standard selection 4