

Model 5600MSC Master Clock/SPG

Instruction Manual

© Copyright 2003, - 2006

EVERTZ MICROSYSTEMS LTD.

5288 John Lucas Drive,
Burlington, Ontario,
Canada L7L 5Z9

Phone: 905-335-3700

Sales: sales@evertz.com

Tech Support: service@evertz.com

Web Page: <http://www.evertz.com>

Fax: 905-335-3573



Fax: 905-335-0909

Version 1.6.2 October 2006

The material contained in this manual consists of information that is the property of Evertz Microsystems and is intended solely for the use of purchasers of the 5600MSC Master Clock/SPG. Evertz Microsystems expressly prohibits the use of this manual for any purpose other than the operation of the 5600MSC.

All rights reserved. No part of this publication may be reproduced without the express written permission of Evertz Microsystems Ltd. Copies of this manual can be ordered from your Evertz dealer or from Evertz Microsystems.

IMPORTANT SAFETY INSTRUCTIONS

	<p>The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user to the presence of uninsulated “Dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.</p>
	<p>The exclamation point within an equi-lateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature ac-companying the product.</p>

- Read this information
- Keep these instructions.
- Heed all warnings.
- Follow all instructions.
- Do not use this apparatus near water
- Clean only with dry cloth.
- Do not block any ventilation openings. Install in accordance with the manufacturer’s instructions.
- Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades with one wider than other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong is provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
- Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles and the point where they exit from the apparatus.
- Only use attachments/accessories specified by the manufacturer
- Unplug this apparatus during lightning storms or when unused for long periods of time.
- Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.

WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC – SHOCK, DO NOT EXPOSE THIS APPARATUS TO RAIN OR MOSITURE”

WARNING

DO NOT EXPOSE THIS EQUIPMENT TO DRIPPING OR SPLASHING AND ENSURE THAT NO OBJECTS FILLED WITH LIQUIDS, SUCH AS VASES, ARE PLACED ON THE EQUIPMENT”

WARNING

TO COMPLETELY DISCONNECT THIS EQUIPMENT FROM THE AC MAINS, DISCONNECT THE POWER SUPPLY CORD PLUG FROM THE AC RECEPTACLE”

WARNING

THE MAINS PLUG OF THE POWER SUPPLY CORD SHALL REMAIN READILY OPERABLE”

INFORMATION TO USERS IN EUROPE

NOTE

This equipment with the CE marking complies with both the EMC Directive (89/336/EEC) and the Low Voltage Directive (73/23/EEC) issued by the Commission of the European Community.

Compliance with these directives implies conformity to the following European standards:

- EN60065 Product Safety
- EN55103-1 Electromagnetic Interference Class A (Emission)
- EN55103-2 Electromagnetic Susceptibility (Immunity)

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

NOTICE TO MODEM USERS IN THE USA

The 5600MSC Master Clock/Sync Generator complies with the FCC Rules Part 68. The 5600MSC is designed to be used on standard device telephone lines. It connects to the telephone line by means of a standard jack called the USOC RJ11C and should be connected to the telephone network with a FCC compliant telephone cord and modular plug.

It is not necessary to notify the telephone company before connecting the modem in the 5600MSC. However, the telephone company may request the telephone number to which the 5600MSC modem is connected and the FCC registration number and ringer equivalence number (REN), both of which are on the label on the rear panel.

The REN is used to determine the number of devices you may legally connect to your telephone line. In most areas, the sum of the REN of all devices connected to one line must not exceed five (5.0). You should contact your telephone company to determine the maximum REN for your calling area.

The 5600MSC may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

If the modem in the 5600MSC is malfunctioning, it may affect the telephone lines. In this case, disconnect the modem until the source of the difficulty is traced.

IMPORTANT INSTALLATION NOTICE

FOR A RELIABLE TELEPHONE CONNECTION TO THE MODEM IN THIS 5600MSC A DIRECT TELEPHONE LINE MUST BE USED. THIS LINE MUST NOT PASS THROUGH A PBX OR SIMILAR KEY DEVICE.

REVISION HISTORY

<u>REVISION</u>	<u>DESCRIPTION</u>	<u>DATE</u>
0.1	Preliminary version Overview and Installation only	Jan 03
0.2	Added Operating instructions, Specifications	Jan 03
0.3	Minor typographical corrections	Feb 03
0.9	Preliminary release of major revision updated to new menu structure	Aug 03
1.0	Major revision updated to new menu structure of firmware version 1.2 build 6	Aug 03
1.1	Added info on connecting two units together in Synchro mode, Added specs for on Genlock input – note non-terminating	Sep 03
1.2	Added info on NTP, Added 1 Hz, 6 Hz and PAL Colour frame sync signals	Jan 04
1.3	Added info Modem Option – new menus added firmware version 1.3 build 6	Feb 04
1.4	Added new menus and status displays for firmware version 1.3 build 14	May 04
1.4.1	Fixed typographical errors and formatting	Sep 04
1.4.2	Fixed typographical error in section 3.6.7.5.	Jan 05
1.5	Updated to features to firmware version 1.5	Oct 05
1.6	Updated to features of firmware version 1.6	Apr 06
1.6.1	Fix typos, add info about changing battery, add Support for tri-level sync genlock	Aug 06
1.6.2	Add support for Word Clock output	Oct 06

Information contained in this manual is believed to be accurate and reliable. However, Evertz assumes no responsibility for the use thereof nor for the rights of third parties, which may be effected in any way by the use thereof. Any representations in this document concerning performance of Evertz products are for informational use only and are not warranties of future performance, either express or implied. The only warranty offered by Evertz in relation to this product is the Evertz standard limited warranty, stated in the sales contract or order confirmation form.

Although every attempt has been made to accurately describe the features, installation and operation of this product in this manual, no warranty is granted nor liability assumed in relation to any errors or omissions unless specifically undertaken in the Evertz sales contract or order confirmation. Information contained in this manual is periodically updated and changes will be incorporated into subsequent editions. If you encounter an error, please notify Evertz Customer Service department. Evertz reserves the right, without notice or liability, to make changes in equipment design or specifications.

TABLE OF CONTENTS

1. OVERVIEW	1-1
1.1. HOW TO USE THIS MANUAL.....	1-3
1.2. DEFINITIONS.....	1-4
2. INSTALLATION	2-1
2.1. REAR PANEL	2-1
2.1.1. 10 MHz Connections	2-1
2.1.2. Reference Video Connections	2-1
2.1.3. Sync Outputs	2-1
2.1.4. Ethernet Connections	2-1
2.1.5. Linear Time Code Connections	2-3
2.1.6. Serial Port and Modem Connections	2-3
2.1.7. Parallel Remote Control and Auxiliary Connections	2-4
2.1.8. Analog Audio and Video Test Generator Connections (STG Option).....	2-5
2.1.9. SDI Test Generator Connections (STG Option)	2-6
2.1.10. HD SDI Test Generator Connections (HTG Option).....	2-6
2.1.11. Audio Word Clock Connections (WC Option)	2-6
2.1.12. Power Connections	2-6
2.2. MOUNTING	2-7
2.3. CONNECTING THE GENERAL PURPOSE INPUTS AND OUTPUTS.....	2-7
2.4. CONNECTING THE SERIAL PORTS IN SYNCHRO MODE	2-8
2.5. GPS RECEIVER INSTALLATION (G OPTION)	2-8
2.5.1. Mounting the GPS Smart Antenna	2-8
2.5.2. Connecting the GPS Smart Antenna to the 5600MSC	2-10
2.5.3. System Startup	2-12
3. HOW TO OPERATE THE MASTER CLOCK/SPG	3-1
3.1. AN OVERVIEW OF KEY AND DISPLAY FUNCTIONS	3-1
3.1.1. The Setup Menu Pushbutton Group	3-1
3.1.2. The Display Button Group	3-2
3.1.3. Panel Lock Key Functions	3-2
3.1.4. Shaft Encoder Knob	3-2
3.1.5. An Overview of the Status Indicators	3-3
3.2. FRONT PANEL DISPLAY FUNCTIONS	3-4
3.2.1. Front Panel Displays	3-4
3.2.2. Special Front Panel Indicators.....	3-4
3.3. FRONT PANEL STATUS DISPLAYS.....	3-4
3.3.1. GPS Status Messages	3-5
3.3.2. Time Reference Status Messages.....	3-5

3.3.3.	Frequency Reference Status Messages.....	3-5
3.3.4.	Modem Status.....	3-6
3.3.5.	NTP Messages	3-6
3.3.6.	LTC 1 Output Power Status Messages	3-6
3.3.7.	Power Supply Status Messages	3-7
3.3.8.	GPI Input Supply Status Messages	3-7
3.3.9.	Cooling Fan Status Messages.....	3-7
3.3.10.	Synchro Status Messages	3-7
3.3.11.	Flashing LEDs	3-7
3.4.	AN OVERVIEW OF THE SETUP MENU SYSTEM	3-7
3.5.	CONFIGURING THE INPUT REFERENCES	3-9
3.5.1.	Configuring the Frequency Reference.....	3-9
3.5.2.	Configuring the Time Reference.....	3-12
3.5.3.	Setting The VITC Reader Line.....	3-14
3.5.4.	Configuring the Genlock Capture Range.....	3-14
3.5.5.	Synchronizing The System Master Oscillator to the Frequency Reference Immediately.....	3-15
3.5.6.	Configuring the Lock Speed	3-16
3.6.	CONFIGURING THE OUTPUTS.....	3-17
3.6.1.	Configuring the LTC Outputs	3-17
3.6.1.1.	Selecting Normal or Powered LTC Output (LTC1 output only)	3-18
3.6.1.2.	Setting the LTC Output Rate.....	3-18
3.6.1.3.	Selecting when the LTC Time is Synchronized to the System Time.....	3-19
3.6.1.4.	Synchronizing The LTC Time to the System Clock Immediately	3-19
3.6.1.5.	Synchronizing All The LTC and VITC Times to the System Clock Immediately	3-20
3.6.1.6.	Setting The LTC Offset	3-20
3.6.1.7.	Setting The LTC Time Zone.....	3-20
3.6.1.8.	Enabling Daylight Saving Time Compensation on the LTC Output	3-21
3.6.1.9.	Enabling the LTC Output Parity Bit	3-21
3.6.1.10.	Enabling LTC Output Colour Frame Bit	3-21
3.6.1.11.	Setting The LTC Output Level	3-21
3.6.2.	Configuring the Video Sync Outputs.....	3-21
3.6.2.1.	Selecting the Clock frequency for Each Bank of the Sync Outputs	3-22
3.6.2.2.	Selecting the Standard of the Sync Outputs	3-22
3.6.2.3.	Configuring the VITC Generator for the Colour Black Outputs	3-23
3.6.2.3.1.	Enabling VITC on the Video Output	3-23
3.6.2.3.2.	Selecting the VITC Lines.....	3-24
3.6.2.3.3.	Enabling Drop Frame Compensation on the VITC Output.....	3-24
3.6.2.3.4.	Enabling Colour Frame Compensation on the VITC Output	3-25
3.6.2.3.5.	Selecting when the VITC Time is Synchronized to the System Time	3-25
3.6.2.3.6.	Synchronizing The VITC Time to the System Clock Immediately	3-26
3.6.2.3.7.	Synchronizing The LTC and VITC Times to the System Clock Immediately	3-26
3.6.2.3.8.	Setting The VITC Offset.....	3-26
3.6.2.3.9.	Setting The VITC Time Zone	3-27
3.6.2.3.10.	Enabling Daylight Saving Time Compensation on the VITC Output.....	3-27
3.6.2.3.11.	Enabling Ten Field Pulse.....	3-28
3.6.2.4.	Setting The Phase of the Sync Outputs.....	3-28
3.6.3.	Configuring the Analog Video Test Generator Output (STG Option only)	3-30
3.6.3.1.	Selecting the Standard of the Analog Video Test Generator Output	3-30

3.6.3.2. Setting The Phase of the Analog Video Test Generator Output	3-30
3.6.3.3. Configuring the Analog Video Test Generator On Screen Message Display	3-31
3.6.3.3.1. Editing the On Screen Message Display.....	3-31
3.6.3.3.2. Positioning the On Screen Message Display	3-31
3.6.3.3.3. Enabling the On Screen Message Display.....	3-31
3.6.3.3.4. Setting the Font Size of the On Screen Message Display	3-32
3.6.3.4. Enabling the SDI Test Generator Moving Line	3-32
3.6.4. Selecting the Analog Video Test Generator Signal (STG Option only)	3-32
3.6.5. Configuring the SDI Video Test Generator Output (STG Option only)	3-34
3.6.5.1. Selecting the Standard of the SDI Video Test Generator Output	3-34
3.6.5.2. Setting The Phase of the SDI Video Test Generator Output	3-34
3.6.5.3. Configuring the SDI Video Test Generator On Screen Message Display.....	3-34
3.6.5.3.1. Editing the On Screen Message Display.....	3-35
3.6.5.3.2. Positioning the On Screen Message Display	3-35
3.6.5.3.3. Enabling the On Screen Message Display.....	3-35
3.6.5.3.4. Setting the Font Size of the On Screen Message Display	3-35
3.6.5.4. Configuring the SDI Test Generator Embedded Audio.....	3-35
3.6.5.4.1. Enabling the SDI Embedded Audio Channel in the Test Signal Output.....	3-36
3.6.5.4.2. Enabling the SDI Embedded Audio Channel in the Black Output.....	3-36
3.6.5.4.3. Setting the SDI Embedded Audio Channel Frequency	3-37
3.6.5.4.4. Configuring the Embedded Audio Level.....	3-37
3.6.5.4.5. Setting the SDI Embedded Audio Ident Mode	3-38
3.6.5.4.6. Setting the SDI Lip Sync Mode	3-38
3.6.5.5. Enabling the SDI Test Generator Moving Line	3-38
3.6.6. Selecting the SDI Video Test Generator Signal (STG Option only).....	3-38
3.6.7. Configuring the HD SDI Video Test Generator Output (HTG Option only)	3-39
3.6.7.1. Selecting the Standard of the HD SDI Video Test Generator Output	3-39
3.6.7.2. Configuring The Genlock Reference for the HD SDI Test Generator.....	3-39
3.6.7.2.1. Selecting if the HD SDI Test generator will Free Run or be Genlocked.....	3-39
3.6.7.2.2. Selecting the HD SDI Test generator Genlock Type.....	3-39
3.6.7.3. Setting The Phase of the HD SDI Video Test Generator Output	3-40
3.6.7.4. Configuring the HD SDI Video Test Generator On Screen Message Display	3-41
3.6.7.4.1. Editing the On Screen Message Display.....	3-41
3.6.7.4.2. Positioning the On Screen Message Display	3-41
3.6.7.4.3. Enabling the On Screen Message Display.....	3-41
3.6.7.4.4. Setting the Outputs for Screen Message Display	3-42
3.6.7.5. Configuring the HD SDI Test Generator Embedded Audio.....	3-42
3.6.7.5.1. Setting the Embedded Audio Group	3-42
3.6.7.5.2. Setting the Embedded Audio Frequency	3-43
3.6.7.5.3. Enabling the Embedded Audio.....	3-43
3.6.7.6. Setting the Display Time for the Signal Name Display	3-44
3.6.7.7. Configuring the HD SDI Test Generator Output Mode	3-44
3.6.7.8. Configuring the HD SDI Test Generator Colour Space	3-45
3.6.7.9. Enabling the Closed Captioning Signal.....	3-45
3.6.8. Selecting the HD SDI Video Test Generator Signal (HTG Option only)	3-45
3.6.8.1. Clean Aperture with Graticule	3-47
3.6.8.2. Production Aperture	3-47
3.6.8.3. The Grey Signals	3-47
3.6.9. Configuring the Output Global Phasing	3-47
3.6.9.1. Enabling the Global Phase Offset.....	3-47
3.6.9.2. Setting the Global Phase Offset Value	3-48

3.6.10. Configuring whether NTSC Analog Video Outputs contain Setup Pedestal.....	3-48
3.6.11. Configuring the Balanced Analog Audio Output (STG Option only)	3-48
3.6.11.1. Setting the Audio Level Sound Type.....	3-49
3.6.11.2. Setting the Time that an Audio Event will Occur.....	3-49
3.6.11.3. Setting the Audio Event Sound Type	3-50
3.6.11.4. Setting the Audio Event Sound Frequency	3-50
3.6.11.5. Setting the Audio Event Duration.....	3-50
3.6.11.6. Testing the Audio Sound.....	3-50
3.6.11.7. Setting up Audio Event Sequences	3-50
3.6.12. Configuring the DARS and AES Outputs (STG Option only).....	3-51
3.6.12.1. Setting The Phase of the AES and DARS Outputs (STG Option only).....	3-51
3.6.12.2. Setting the AES Channel Frequency	3-52
3.6.12.3. Configuring the AES Audio Level.....	3-52
3.6.12.4. Configuring the AES/DARS Lock Type.....	3-53
3.7. GENERAL CONFIGURATION ITEMS.....	3-54
3.7.1. Configuring The Serial Port Mode	3-55
3.7.2. Configuring what Items are Ignored in Syncro Rx Mode	3-56
3.7.3. Configuring The Modem (Units fitted with the M Option).....	3-56
3.7.3.1. Setting the Modem Operating Mode.....	3-57
3.7.3.2. Setting the Modem Standard	3-57
3.7.3.3. Setting the Modem Speaker Volume	3-57
3.7.3.4. Setting the Modem Phone Number to Dial	3-58
3.7.3.5. Setting the Time that the Modem will Dial Out.....	3-58
3.7.3.6. Dialling the Modem Immediately.....	3-59
3.7.3.7. Cancelling a Call in Progress.....	3-59
3.7.3.8. Setting the Number of Times the Modem will Retry a failed Call.....	3-59
3.7.4. Configuring The Function of the General Purpose Outputs.....	3-59
3.7.5. Configuring The Function of the General Purpose Inputs	3-60
3.7.6. Setting the Daylight Saving Time Rules	3-61
3.7.6.1. Setting The DST Date Entry Mode	3-62
3.7.6.2. Setting the Beginning and End of Daylight Saving Time	3-63
3.7.6.3. Setting The DST Offset.....	3-63
3.7.7. Firmware Utilities	3-63
3.7.7.1. Viewing the 5600MSC Firmware Version	3-64
3.7.7.2. Upgrading the 5600MSC Firmware	3-64
3.7.7.3. Viewing the HD Test Generator Firmware Version.....	3-64
3.7.7.4. Upgrading the HD Test Generator Firmware	3-65
3.7.8. Configuring Engineering or User Operation Modes.....	3-65
3.7.9. Saving and Storing 5600MSC Presets	3-66
3.7.10. Configuring the Internet Protocol Address.....	3-67
3.7.10.1. Setting up the Internet Protocol Address	3-67
3.7.10.2. Setting up the Internet Protocol Address Mode	3-67
3.7.10.3. Setting up the Internet Protocol Local Mask	3-67
3.7.10.4. Setting up the Internet Protocol Gateway Address	3-67
3.7.10.5. Setting up the Internet Protocol Gateway Enable.	3-68

3.7.11. Configuring the Network Time Protocol Functions (Units fitted with the T Option).....	3-68
3.7.11.1. Setting up the NTP restrictions.	3-68
3.7.11.1.1. Setting up the NTP Restriction I.P.	3-68
3.7.11.1.2. Setting up the NTP Restriction Mask.....	3-69
3.7.11.1.3. Setting up the NTP Restriction Enable.....	3-69
3.7.12. Setting The System Time When There Is No Time Reference.....	3-69
3.7.13. Setting The System Date When There Is No Time Reference.....	3-70
3.7.14. Setting The User Bits in Manual User Bit Mode	3-70
3.7.15. Setting The User Bits Mode.....	3-71
3.8. OPERATING WITH GLOBAL POSITIONING SYSTEM LOCK (G Option).....	3-72
3.8.1. The Global Positioning System Overview	3-72
3.8.2. GPS Lock Operation.....	3-72
4. TECHNICAL DESCRIPTION	4-1
4.1. SPECIFICATIONS	4-1
4.1.1. Analog Sync Outputs:.....	4-1
4.1.2. 10MHz Input and Output:	4-1
4.1.3. LTC Outputs:	4-1
4.1.4. Genlock Input	4-2
4.1.5. Communications and Control:	4-2
4.1.6. GPS Receiver (G option installed).....	4-2
4.1.7. DARS & AES Test Generator Outputs (STG option installed).....	4-3
4.1.8. Analog Composite Video Test Signal Generator (STG option installed)	4-3
4.1.9. Analog Audio Tones Generator (STG option installed)	4-3
4.1.10. SDI Test Generator Outputs (STG option installed)	4-4
4.1.11. HDTV Test Generator Outputs (HTG option installed)	4-4
4.1.12. Word Clock Output (WC option installed).....	4-4
4.1.13. Electrical	4-5
4.1.14. Physical	4-5
4.2. UPGRADING THE FIRMWARE.....	4-5
4.2.1. Overview.....	4-5
4.2.2. Terminal Program Setup.	4-5
4.2.3. Initiating Firmware Upgrade Mode Via The Front Panel.....	4-6
4.2.4. Initiating Firmware Upgrade Mode From The Terminal Program	4-6
4.2.5. Uploading the new firmware	4-7
4.2.6. Completing the Upgrade.....	4-8
4.3. SERVICING INSTRUCTIONS.....	4-8
4.3.1. Changing The Fuses	4-8
4.3.2. Replacing The Battery	4-9
4.3.2.1. Safety Guidelines and Precautions concerning the Use of 3V Lithium Batteries.....	4-9
4.3.2.2. Procedure for Replacing the Battery	4-9

5. VISTALINK® CONTROL	5-1
5.1. CONFIGURING WHAT MENUS WILL BE SEEN IN USER MODE USING VistaLINK®	5-1
5.1.1. Connecting the 5600MSC to VistaLINK®.....	5-1
5.1.2. Installing VistaLINK®.....	5-1
5.1.3. Using VistaLINK®.....	5-2

Figures

Figure 1-1: Redundant Master Clock/SPG with Auto Changeover System Diagram	1-2
Figure 2-1: 5600MSC Rear Panel	2-1
Figure 2-2: Typical GPIO Circuitry	2-7
Figure 2-3: Pole Mounting the Smart Antenna.....	2-10
Figure 2-4: Accutime 2000 Smart Antenna to 5600MSC Interface Cable (Evertz part WA-T09)	2-11
Figure 2-5: Accutime 2000 Extender Cable	2-11
Figure 3-1: Model 5600MSC Front Panel Layout	3-1
Figure 3-2: Sync Generation - GPS Frequency Reference	3-10
Figure 3-3: Sync Generation – NTSC or 59.95 Hz Video Reference	3-10
Figure 3-4: Sync Generation – PAL or 50 Hz Video Reference.....	3-10
Figure 3-5: Sync Generation – 10 MHz Reference – NTSC outputs	3-11
Figure 3-6: Sync Generation – 10 MHz Reference – PAL outputs	3-11
Figure 3-7: Sync Generation – No Reference – NTSC outputs	3-11
Figure 3-8: Sync Generation – No Reference – PAL outputs.....	3-12
Figure 3-9: Video Sync Phase Alignment in 59.94 Hz Field Rate Systems.....	3-28
Figure 3-10: Video Sync Phase Alignment in 50 Hz Field Rate Systems.....	3-29
Figure 5-1: VistaLINK® Configuration – Input Menu Pruning	5-2
Figure 5-2: VistaLINK® Configuration – Output Menu Pruning	5-3
Figure 5-3: VistaLINK® Configuration – General Menu Pruning	5-4

Tables

Table 2-1. Standard RJ45 Wiring Colour Codes.....	2-2
Table 2-2: LTC OUT Pin Definitions.....	2-3
Table 2-3: COM Port Pin Definitions	2-4
Table 2-4: GPS Serial Port Pin Definitions.....	2-4
Table 2-5: AUX I/O Pin Definitions.....	2-5
Table 2-6: DARS/AES/ANALOG Terminal Strip Pin Definitions	2-5
Table 2-7: 5600MSC-1-0-30 Synchro Cable.....	2-8
Table 3-1: Top Level of the Input Setup Menu.....	3-9
Table 3-2: Top Level of the Output Setup Menu.....	3-17
Table 3-3: 525 Line Test Signal Selection	3-33
Table 3-4: 625 Line Test Signal Selection	3-33
Table 3-5: Valid Genlock Types	3-40
Table 3-6: HD SDI Test Signal Selection	3-46
Table 3-7: Top Level of the General Setup Menu	3-54

CHAPTER 1: OVERVIEW

TABLE OF CONTENTS

1. OVERVIEW1-1

1.1. HOW TO USE THIS MANUAL..... 1-3

1.2. DEFINITIONS..... 1-4

Figures

Figure 1-1: Redundant Master Clock/SPG with Auto Changeover System Diagram 1-2

This page left intentionally blank

1. OVERVIEW

The 5600MSC Master Sync and Clock Generator, is both a broadcast quality Master SPG and a Master Clock. It provides all of the synchronizing signals needed in a 21st century TV station at the same time as solving the problem of locking the in-house master clock system to the master video sync pulse generator.

A high stability, temperature controlled oscillator, provides the 5600MSC with better than 0.5×10^{-8} (or 0.005ppm) frequency reference. The free running drift of this 10MHz reference will be less than 0.1Hz (which amounts to less than 1 millisecond time drift per day). This guarantees that any frequency drift, with time and temperature, will be within the tolerances expected from the best SPGs or master clocks available in the industry. The 5600MSC may also be referenced to an external 5 MHz or 10 MHz master oscillator if higher stability is required. Both the SPG and the Master Clock sections may be referenced to high stability time and frequency standards present in the Global Position system (GPS) by adding the GPS option. The 5600MSC provides a high stability 10MHz output reference for use by other devices.

The internal Sync pulse Generator provides two banks of three timeable outputs. These six BNC outputs may be configured to provide 6 independently timed colour black (black burst) outputs or 6 independently timed HDTV tri-level sync outputs, or 3 of each signal type. Each colour black output can optionally carry vertical interval time code (VITC) on a user specified set of lines.

When referenced to the optional GPS receiver, the start of the NTSC four field sequence, or the PAL eight field sequence, will coincide with a specific point in the GPS code. In this way, by referencing all 5600MSCs in a system to GPS, they will all be automatically locked to each other. This is ideal for applications requiring remote facility frequency, phase and time lock!

The unit also has absolute time reference support (ATR). ATR is a set of data currently being proposed by SMPTE and will be inserted onto the SMPTE 318M universal reference signal. This information gives the absolute time of the signal in seconds, and fractions of a second since the SMPTE Epoch (midnight, January 1, 1958 UTC). ATR tells when the signal was created, regardless of current time when the signal is received and provides an additional means of locking two 5600MSCs together. (This feature will be implemented when the signal is standardized by SMPTE.)

The master clock section provides a primary linear time code (LTC) output on an XLR connector and a 9 pin D connector, as well as a secondary LTC output available only on the 9 pin D connector. The time code may be set from the front panel or referenced to a number of different sources. Having two LTC outputs provides the ability to drive 24 and 30 Fps, or drop-frame and non-drop frame timecode simultaneously. Time may be externally referenced to GPS, or via modem to a high-level time source. Time derived from such sources can be offset from UTC to a specific time zone as required. When referenced to GPS or by modem, the 5600MSC can provide RFC-1305 compliant NTP via Ethernet, and operates in broadcast and server mode. GPS, NTP and Modem access are all options for the 5600MSC. The 5600MSC includes a battery backed-up real time clock to maintain its time while power is not applied to the unit.

There are two test signal generator options available. The STG option provides a composite analog video test signal output, AES and balanced analog audio tone generators and a digital audio reference output (DARS). The STG option also provides two standard definition SDI test signal outputs and two SDI black outputs. The HTG option provides two high definition SDI test signal outputs and two HD SDI black outputs. The WC option provides a 48 KHz word clock output.

All versions of the 5600MSC offer an AUX I/O port and a COM port for software upgrades and/or interconnecting two 5600MSC units (when used with the 5600ACO). An optional redundant power supply is also available.

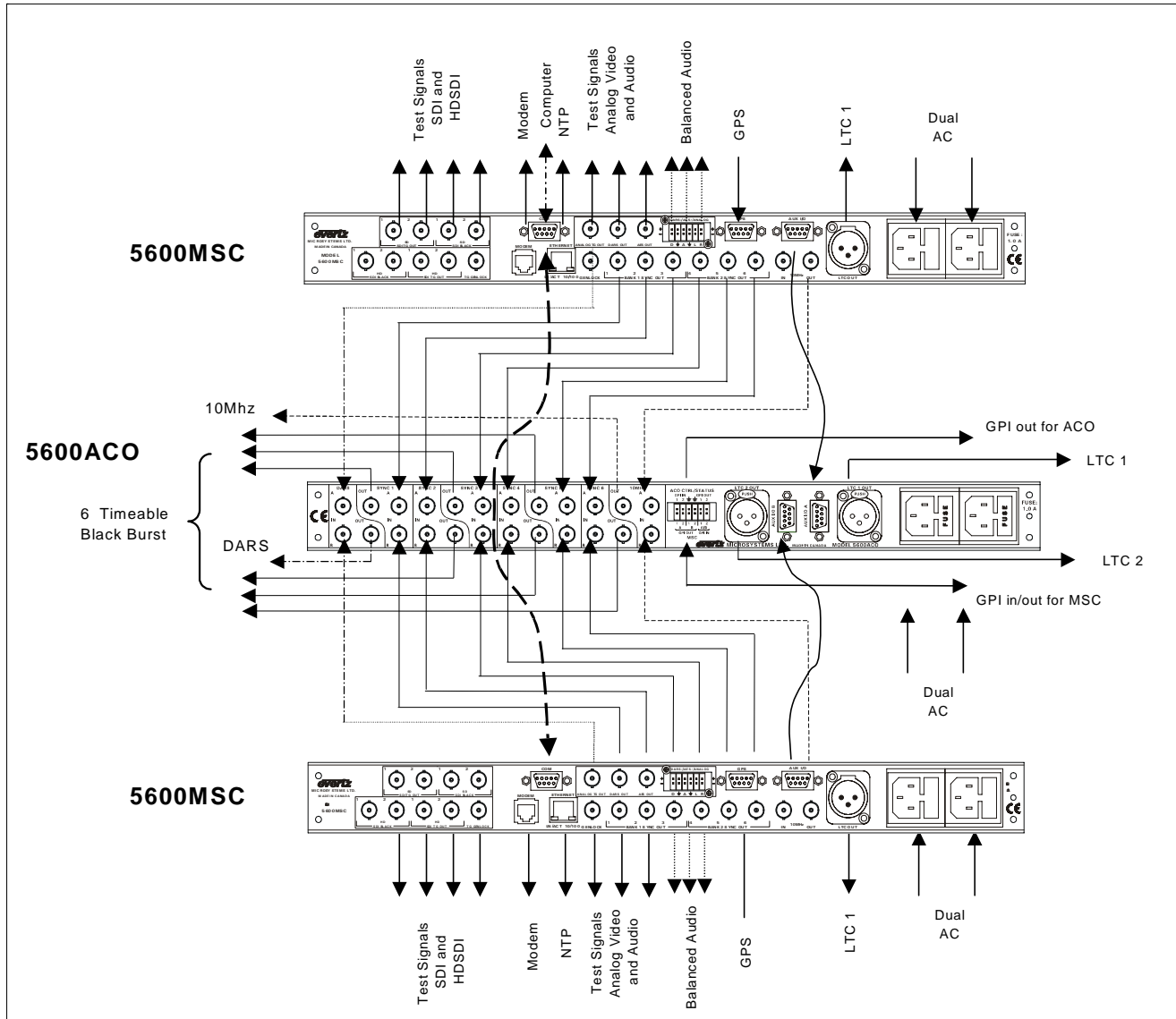


Figure 1-1: Redundant Master Clock/SPG with Auto Changeover System Diagram

Two 5600MSC units in combination with an Automatic Change Over (model 5600ACO or 5600ACO2) provide an extra degree of reliability where dual redundant installations are required. The 5600ACO provides relay changeover for the two LTC outputs, the six Sync pulse outputs, the 10 MHz reference output, the DARS output and the GPI/O interface. The 5600ACO2 provides all the functions of the 5600ACO plus relay changeover for the SDI and HDSDI Test signals and the Word Clock output. The ACO units can be run in an automatic mode providing intelligent monitoring and arbitration of the two sets of 5600MSC outputs, automatically switching to the backup 5600MSC when any of the primary 5600MSC signals fails. The 5600ACO2 unit can be programmed as to which output it will monitor in making the changeover decision. The ACO units can also be operated in manual mode, allowing

switching to either unit on demand from a GPI input or front panel switch. Two banks of LEDs provide status monitoring of the outputs from each of the 5600MSC units. A serial cable interconnecting the COM ports of the two 5600MSC units guarantees that the configuration and timing of the units are identical so that changeovers are done with minimal disruption of the plant timing reference. Figure 1-1 shows a typical configuration for a redundant system. For further information on connecting the 5600MSC in a dual redundant configuration consult the 5600ACO or 5600ACO2 manual.

Features:

- 6 independently timeable reference outputs
- Bi-level or Tri-level outputs selectable (can provide 3 tri-level HD sync. outputs and 3 black burst outputs simultaneously)
- 2 Independent LTC Time Code outputs – can be operated at different frame rates and with different offsets to the system time
- 5MHz/10MHz frequency reference input
- GPS option for frequency and time reference
- 10MHz frequency reference output
- Output frequency stability guaranteed better than 0.5×10^{-8} (or 0.005ppm)
- Modem option for time reference dial up
- 2 GPS based units will be in time and phase even when remotely separated by miles
- Optional Analog and SD test generator output, with DARS and Analog audio tone outputs
- Optional HD SDI test generator outputs
- Optional Network Time Protocol Server (NTP) server support
- Optional 48 KHz audio word clock output. Word clock may also be generated from DARS with 520DARS-W module
- 16 digit Alpha-numeric display, with 20 pushbuttons
- Rack mountable
- Optional redundant power supply
- Automatic changeover unit available for dual redundant systems applications
- 2 factory presets and 3 user presets
- VITC reader on reference input for time reference
- Ten Field Pulse is available on NTSC sync outputs.

1.1. HOW TO USE THIS MANUAL

This manual is organized into 5 chapters: Overview, Installation, Operation, Technical Information and VistaLINK[®] Control. There are individual tables of contents at the beginning of each chapter as well as an overall table of contents at the beginning of the manual to aid in finding the information you want.



Items of special note are indicated with a double box like this.

1.2. DEFINITIONS

- 4:2:2:** A commonly used term for a component digital video format. The details of the format are specified in the ITU-R601 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:** A commonly used term for a composite digital video format. The details of the format are specified in the ITU-R601 standard. The numerals 4Fsc denote that the sampling frequency is 4 times the colour subcarrier frequency (approximately 14.3 MHz for NTSC and 17.7 MHz for PAL)
- AES:** (Audio Engineering Society): A professional organization that recommends standards for the audio industries.
- AES-3:** See AES/EBU.
- AES/EBU:** Informal name for a digital audio standard established jointly by the Audio Engineering Society and the European Broadcasting Union organizations. This audio standard is formally known as AES3-1992.
- 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:** Acronym for British Naval Connector or Bayonet Nut Connector or Bayonet Neill Concelman - a coaxial cable connector used extensively in professional television systems. These connectors have a characteristic impedance of 75 ohms and are standardized by the IEC 169-8 standard.
- 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. (This organization is now known as ITU.)

CCIR-601: (This document now known as ITU-R601).

CCIR-656: (This document now known as ITU-R656).

CLIFF EFFECT: (also referred to as the 'digital cliff') This is a phenomenon found in digital video systems that describes the sudden deterioration of picture quality due to excessive bit errors, often caused by excessive cable lengths. The digital signal will be perfect even though one of its signal parameters is approaching or passing the specified limits. At a given moment however, the parameter will reach a point where the data can no longer be interpreted correctly, and the picture will be totally unrecognizable.

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. CCIR-656 and SMPTE 125M specify the parallel interface.

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.

DARS (A Digital Audio Reference Signal): A reference signal conforming to the format and electrical specification of the AES3-1992 standard, but often has only the preamble active. This signal is used for synchronization in digital audio studio applications. The recommended practice AES11-1997 gives further information on the use of a DARS reference.

DAYLIGHT SAVING TIME (DST): Daylight Saving Time (DST) or Summer Time as it is called in many countries, is a way of getting more daylight out of the summer days by advancing the clocks by one hour during the summer. Then, the sun will appear to rise one hour later in the morning when people are usually asleep anyway, at the benefit of one hour

longer evenings when awake. The sunset and sunrise are one hour later than during normal time.

DROP FRAME: A method of adjusting the nominal 30 frame per second counting rate of SMPTE 12M time code to the actual counting rate of approximately 29.97 frames per second – a difference of 1 part in 1001. This correction drops 108 frames per hour by skipping frame counts 0 and 1 at the beginning of each minute, except minutes 0, 10, 20, 30, 40 and 50.

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.

EDH Error Detection and Handling (EDH) is defined in SMPTE RP-165 as a method of determining when bit errors have occurred along the digital video path. According to RP-165, two error detection checkwords are used, one for active picture samples, and the other on a full field of samples. Three sets of flags are used to convey information regarding detected errors, to facilitate identification of faulty equipment or cabling. One set of flags is associated with each checkword, and the third is used to evaluate ancillary data integrity. The checkwords and flags are combined into a special error detection data packet that is included as ancillary data in the serial digital signal.

EMBEDDED AUDIO: Digital audio is multiplexed onto a serial digital video data stream according to the SMPTE 272M (standard definition) or SMPTE 299M (high definition) standards.

GPS: Acronym for the Global Positioning System, a satellite based navigation system operated and maintained by the U.S. Department of Defense. GPS, the most accurate technology available for marine and land navigation is emerging as the technology of choice in timing applications including site and network synchronization.

ITU: The United Nations regulatory body governing all forms of communications. ITU-R (previously CCIR) regulates the radio frequency spectrum, while ITU-T (previously CCITT) deals with the telecommunications standards.

ITU-R BT470: An international standard for The PAL composite analog television system.

ITU-R601: An international standard for component digital television from which was derived SMPTE 125M and EBU 3246-E standards. ITUR-601 defines the sampling systems, matrix values and filter characteristics for both Y, B-Y, R-Y and RGB component digital television signals. This document was formerly known as CCIR-601.

ITU-R656: The physical parallel and serial interconnect scheme for ITU-R601. ITU-R656 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). This document was formerly known as CCIR-656.

- LTC:** Linear Time Code or Longitudinal Time Code. This time and address control signal standardized by SMPTE 12M has been in widespread use in the professional video and audio industries since 1975. It is typically written on a time code or address track of a video recorder and provides an individual frame number for each video frame recorded. LTC is also commonly used to distribute time of day information to wall clocks, automation systems and other devices throughout a television facility. In regions of the world using the NTSC or similar non-integer (1/1.001) frame rates, LTC locked to the video frame rate does not maintain accurate time and must be corrected regularly when it is used convey time of day information. (See **DROP FRAME**)
- NTP:** The public domain software package called NTP (Network Time Protocol) is an implementation of the TCP/IP network protocol with the same name. NTP is now widely used around the world to achieve a high accuracy time synchronization for computers across a network. The protocol supports an accuracy of time down to nanoseconds however; the real accuracy that can be achieved also depends on the operating system and the network performance.
- 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.
- RP 168:** The SMPTE Recommended Practice for the definition of the vertical interval switching point for synchronous video switching. This recommended practice also defines a default alignment between standard definition and high definition synchronizing pulse signals.
- RP 188:** The SMPTE Recommended Practice for transmitting Time code in the ancillary data space of serial digital television signals.
- SERIAL DIGITAL (SDI):** Serial Digital Interface a standardized interface for transmitting digital television signals using a coaxial cable in serial form. Often used informally to refer to the 4:2:2 sampled standard definition serial digital television signals as specified in SMPTE 259M.
- SMPTE (Society of Motion Picture and Television Engineers):** A professional organization that recommends standards for the film and television industries.
- SMPTE 12M:** The SMPTE standard for the Time and Address Control signal in widespread use in the professional video and audio industries. SMPTE 12M defines the specifications for both Linear Time Code (LTC) and Vertical Interval Time Code (VITC).

- 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 170M:** The SMPTE standard for the NTSC Composite Analog Television signals.
- SMPTE 259M:** The SMPTE standard for the serial digital interface for standard definition 10 bit 4:2:2 component and 4Fsc composite interfaces. (often referred to as SDI)
- SMPTE 276M:** The SMPTE standard for transmission of AES digital audio over coaxial cable.
- SMPTE 274M:** The SMPTE standard for HDTV 1920 x 1080 line scanning and analog and parallel interfaces for multiple frame rates.
- SMPTE 292M:** The SMPTE standard for the serial digital interface for High Definition television signals. (often referred to as HD SDI)
- SMPTE 296M:** The SMPTE standard for HDTV 1280 x 720 line progressive images - scanning and analog and parallel interfaces.
- SMPTE 309M:** The SMPTE standard for the encoding Date and Time Zone information into SMPTE 12M Time code signals.
- 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.)
- VITC:** Vertical Interval Time Code. This time and address control signal standardized by SMPTE 12M is encoded on one or more lines in the vertical interval of standard definition television signals.

CHAPTER 2: INSTALLATION

TABLE OF CONTENTS

2. INSTALLATION	2-1
2.1. REAR PANEL	2-1
2.1.1. 10 MHz Connections	2-1
2.1.2. Reference Video Connections	2-1
2.1.3. Sync Outputs	2-1
2.1.4. Ethernet Connections	2-1
2.1.5. Linear Time Code Connections	2-3
2.1.6. Serial Port and Modem Connections	2-3
2.1.7. Parallel Remote Control and Auxiliary Connections	2-4
2.1.8. Analog Audio and Video Test Generator Connections (STG Option)	2-5
2.1.9. SDI Test Generator Connections (STG Option)	2-6
2.1.10. HD SDI Test Generator Connections (HTG Option)	2-6
2.1.11. Power Connections	2-6
2.2. MOUNTING	2-7
2.3. CONNECTING THE GENERAL PURPOSE INPUTS AND OUTPUTS	2-7
2.4. CONNECTING THE SERIAL PORTS IN SYNCHRO MODE	2-8
2.5. GPS RECEIVER INSTALLATION (G OPTION)	2-8
2.5.1. Mounting the GPS Smart Antenna	2-8
2.5.2. Connecting the GPS Smart Antenna to the 5600MSC	2-10
2.5.3. System Startup	2-12

Figures

Figure 2-1: 5600MSC Rear Panel.....2-1

Figure 2-2: Typical GPIO Circuitry.2-7

Figure 2-3: Pole Mounting the Smart Antenna..... 2-10

Figure 2-4: Accutime 2000 Smart Antenna to 5600MSC Interface Cable (Evertz part WA-T09) 2-11

Figure 2-5: Accutime 2000 Extender Cable 2-11

Tables

Table 2-1. Standard RJ45 Wiring Colour Codes.....2-2

Table 2-2: LTC OUT Pin Definitions.....2-3

Table 2-3: COM Port Pin Definitions2-4

Table 2-4: GPS Serial Port Pin Definitions.....2-4

Table 2-5: AUX I/O Pin Definitions.....2-5

Table 2-6: DARS/AES/ANALOG Terminal Strip Pin Definitions2-5

Table 2-7: 5600MSC-1-0-30 Synchro Cable.....2-8

2. INSTALLATION

2.1. REAR PANEL

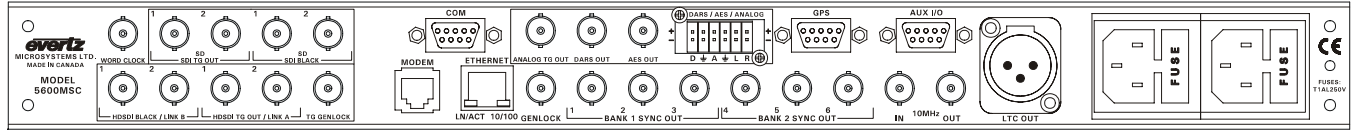


Figure 2-1: 5600MSC Rear Panel

The following sections describe the purpose of the rear panel connectors of the 5600MSC. Sections 2.1.1 to 2.1.6 describe the specific signals that should be connected to the 5600MSC.

2.1.1. 10 MHz Connections

10 MHz IN: This BNC connector is for input for 5 or 10 MHz reference. When power is off, this output will be a direct relay connection to the **10 MHz OUT**. The *FREQUENCY REF* menu item must be set to *10 MHz freq ref* in order to lock the 5600MSC master oscillator to the 10 MHz input.

10 MHz OUT: This BNC connector is for the 10 MHz output signal generated by the 5600MC. When power is off, this output will be a direct relay connection to the **10 MHz IN**. When the GPS option (G Option) is installed, this output can be referenced to the GPS frequency reference providing superior long term stability.

2.1.2. Reference Video Connections

GENLOCK: This BNC connector is for connecting an NTSC or PAL colour black or HD tri-level sync signal to be used as the frequency reference for the 5600MSC. The *FREQUENCY REF* menu item must be set to *Video freq ref* in order to lock the 5600MSC master oscillator to the genlock input. The *GL RANGE* menu item is used to set the frequency tolerance used when genlocking to the video reference. See section 3.5.1 and 3.5.4. The input is high impedance and must be properly terminated with 75 ohms using an external termination.

2.1.3. Sync Outputs

SYNC 1 to 6: These BNC connectors provide two banks of 3 sync pulse / colour black outputs that can be independently timed. The *BANK1 SETUP* and *BANK 2 SETUP* menu items on the *OUTPUT Setup* menu are used to set the types of outputs available on each bank of connectors. The *SYNC 1 OUTPUT* to *SYNC 6 OUTPUT* group of sub-menus on the *OUTPUT Setup* menu are used to configure these outputs and set up their timing. See section 3.6.2.

2.1.4. Ethernet Connections

The 5600MSC menu system can be configured using the *VistaLINK™-C* Configuration tool connected by Ethernet. (See section 3.7.10 in the *GENERAL* menu descriptions for information on configuring the IP address of the 5600MSC and section 0 for information about installing and using the *VistaLINK™*

software) When the 5600MSC is fitted with the NTP option (**T option**) it can also be used as a Network Time Protocol server connected to other devices by Ethernet. (See section 0 in the *GENERAL* menu descriptions for information on configuring the NTP functions of the 5600MSC.)

The 5600MSC is designed to be used with either 10Base-T (10 Mbps) or 100Base-TX (100 Mbps) also known as *Fast Ethernet*, twisted pair Ethernet cabling systems. When connecting for 10Base-T systems, category 3, 4, or 5 UTP cable as well as EIA/TIA – 568 100Ω STP cable may be used. When connecting for 100Base-TX systems, category 5 UTP cable is required. The cable must be “straight through” with a RJ-45 connector at each end. Make the network connection by plugging one end of the cable into the RJ-45 receptacle of the 5600MSC and the other end into a port of the supporting hub.

The straight-through RJ-45 cable can be purchased or can be constructed using the pinout information in Table 2-1. A colour code wiring table is provided in Table 2-1 for the current RJ 45 standards (AT&T 258A or EIA/TIA 258B colour coding shown). Also refer to the notes following the table for additional wiring guide information.

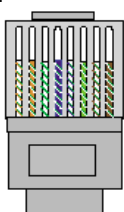
	Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
	1	Transmit +	White/Green	White/Orange	X
	2	Transmit –	Green/White or White	Orange/White or Orange	X
	3	Receive +	White/Orange	White/Green	X
	4	N/A	Blue/White or Blue	Blue/White or Blue	Not used (required)
	5	N/A	White/Blue	White/Blue	Not used (required)
	6	Receive –	Orange/White or Orange	Green/White or Green	X
	7	N/A	White/Brown	White/Brown	Not used (required)
	8	N/A	Brown/White or Brown	Brown/White or Brown	Not used (required)

Table 2-1. Standard RJ45 Wiring Colour Codes

Note the following cabling information for this wiring guide:

- Only two pairs of wires are used in the 8-pin RJ 45 connector to carry Ethernet signals.
- Even though pins 4, 5, 7 and 8 are not used, it is mandatory that they be present in the cable.
- 10BaseT and 100BaseT use the same pins, a crossover cable made for one will also work with the other.
- Pairs may be solid colours and not have a stripe.
- Category 5 cable must use Category 5 rated connectors.

The maximum cable run between the 5600MSC and the supporting hub is 300 ft (90 m). The maximum combined cable run between any two end points (i.e. 5600MSC and PC/laptop via network hub) is 675 feet (205 m).

Devices on the ethernet network continually monitor the receive data path for activity as a means of checking that the link is working correctly. When the network is idle, the devices also send a link test signal to one another to verify link integrity. The 5600MSC rear panel is fitted with two LEDs to monitor the Ethernet connection.

10/100 This Amber LED is ON when a 100Base-TX link is last detected. The LED is OFF when a 10Base-T link is last detected (the LINK LED is ON). Upon power-up the LED is OFF as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

LN/ACT This dual purpose Green LED indicates that the 5600MSC has established a valid linkage to its hub, and whether the 5600MSC is sending or receiving data. This LED will be ON when the 5600MSC has established a good link to its supporting hub. This gives you a good indication that the segment is wired correctly. The LED will BLINK when the 5600MSC is sending or receiving data. The LED will be OFF if there is no valid connection.

2.1.5. Linear Time Code Connections

The *LTC 1 OUTPUT* and *LTC 2 OUTPUT* groups of sub-menus on the *OUTPUT* Setup menu are used to configure the LTC outputs. See section 3.6.1. The output level is adjustable from approximately 0.5 V to 4 V using the *LTC Level* item on the *LTC OUTPUT* menus. (See section 3.6.1.11)

LTC OUT: A 3 pin male XLR connector for the primary SMPTE/ EBU linear time code output from the generator. 12 VDC power for downstream Evertz clocks is available on this connector (see section 3.6.1.1).

Pin #	Name	Description
1	GND	Signal Ground.
2	LTC+	Primary LTC + output
3	LTC-	Primary LTC – output

Table 2-2: LTC OUT Pin Definitions

AUX I/O: A 9 pin female 'D' connector contains a second copy of the primary LTC output as well as the secondary LTC output. The pinout of this connector is shown in Table 2-6.

2.1.6. Serial Port and Modem Connections

COM: A 9 pin female 'D' connector for connection to the RS-232/RS-422 serial communications. This port is configured for a 'straight through RS-232 connection to a PC COM port and can be used for uploading firmware to the unit or connecting two 5600MSC units together in 'synchro mode'. Table 2-3 shows the pinout of the serial port in its default RS-232 DCE configuration. See section 3.7.1 for the information on configuring the port for various applications. See section 2.4 for the information on connecting the 5600MSC units in 'synchro mode'.

Pin #	Name	Description
1	GND	Chassis ground
2	TxD	RS-232 Transmit Output
3	RxD	RS-232 Receive Input
4		
5	Sig Gnd	RS-232 Signal Ground
6		
7	RTS	RS-232 RTS Input
8	CTS	RS-232 CTS Output
9		

Table 2-3: COM Port Pin Definitions

GPS: A 9 pin female 'D' connector for connection to the optional GPS receiver (G option). Table 2-4 shows the pinout of the serial port. See section 2.4 for information about mounting and connecting the GPS receiver.

Pin #	Name	Description
1	GND	Chassis ground
2	Tx-	Transmit A (Tx-) Output
3	Rx+	Receive B (Rx+) Input
4	PPS+	1 PPS Interrupt in +
5	+VDC	+ 17 Volts DC out to supply GPS receiver
6	PPS-	1 PPS Interrupt in -
7	Tx+	Transmit B (Tx+) Output
8	Rx-	Receive A (Rx-) Input
9	GND	Chassis ground

Table 2-4: GPS Serial Port Pin Definitions

MODEM: This RJ11 jack is used to connect the optional internal modem (M option) to the telephone line, 3.7.3 in the *General* menu descriptions for information on configuring the modem functions of the 5600MSC.



IMPORTANT INSTALLATION NOTICE: For a reliable telephone connection to the modem in the 5600MSC, a direct telephone line must be used. This line must not pass through a PBX or similar key device.

2.1.7. Parallel Remote Control and Auxiliary Connections

AUX I/O: A 9 pin female 'D' connector GPI inputs and outputs and two LTC outputs. This connector is typically used to interconnect the 5600MSC to the autochangover unit (Model 5600ACO). There are also two open collector outputs that can be assigned to a variety of functions. (See section 3.7.4) The pinout of the **AUX I/O** connector is shown in Table 2-5.

Pin #	Name	Description
1	LTC+	Primary LTC + output.*
2	GPO1	GPO 1 output.
3	AUX LTC+	LTC 2 out + (LTC IN + with +L option)
4	GPI1	GPI 1 input
5	GND	Signal Ground.
6	GPI2	GPI 2 input.
7	GPO2	GPO 2 output.
8	AUX LTC-	LTC 2 out (LTC IN – with +L option)
9	LTC-	Primary LTC – output*

*12 VDC power for downstream Evertz clocks is not available on these pins

Table 2-5: AUX I/O Pin Definitions

2.1.8. Analog Audio and Video Test Generator Connections (STG Option)

ANALOG TG OUT This BNC connector has an analog composite video output compatible with the SMPTE 170M or ITU 624-4 standards. The *ANALOG TEST GEN* group of sub-menus on the *OUTPUT Setup* menu is used to configure the Analog test generator outputs. (See section 3.6.3.) The *ANALOG TEST SIGS* sub-menu on the *OUTPUT Setup* menu selects the test signal available on the **ANALOG TG OUT** connector. (See section 3.6.3.3.4.)

AES OUT This BNC connector has an unbalanced AES audio tone compatible with the AES3-1992 and SMPTE 276M standards. A balanced version of this signal is available on the **DARS/AES/ANALOG** 12 pin terminal strip. The *AUDIO EVENT 1* to *AUDIO EVENT 10* sets of sub-menus on the *OUTPUT Setup* menu are used to configure the AES audio and analog audio outputs. (See section 3.6.9.)

DARS OUT This BNC connector has an unbalanced Digital Audio Reference signal (DARS) compatible with the AES3-1992 and SMPTE 276M standards. A balanced version of this signal is available on the **DARS/AES/ANALOG** 12 pin terminal strip. The *AES/DARS OUTPUT* sub-menus on the *OUTPUT Setup* menu is used to configure the phase of the AES and DARS outputs. (See section 3.6.12.)

DARS/AES/ANALOG This 12 pin terminal strip has a balanced version of the AES and DARS signals as well as two balanced analog audio signals. The analog audio outputs will have the same tones that are present on the AES signal. The output audio cables can be secured into the removable portion of the terminal strips using a small screwdriver. The removable part of the terminal strip is then inserted into the rear panel and secured using the hold down screws. The pinout of this connector is shown in Table 2-6.

DARS OUT +	GND	AES OUT +	GND	LEFT +	RIGHT +
DARS OUT -	GND	AES OUT -	GND	LEFT -	RIGHT -

Table 2-6: DARS/AES/ANALOG Terminal Strip Pin Definitions

The *AUDIO EVENT 1* to *AUDIO EVENT 10* sets of sub-menus on the *OUTPUT Setup* menu are used to configure the AES audio and analog audio outputs. (See section

3.6.9.) The *AES/DARS OUTPUT* sub-menu on the *OUTPUT* Setup menu is used to configure the phase of the AES and DARS outputs. (See section 3.6.12.)

2.1.9. SDI Test Generator Connections (STG Option)

The *SDI TEST GEN* group of sub-menus on the *OUTPUT* Setup menu is used to configure the SDI test generator outputs. (See section 3.6.5.)

SD SDI TG OUT This pair of BNC connectors has serial component video outputs compatible with the SMPTE 259M-C standard. The *SDI TEST SIGNALS* sub-menu on the *OUTPUT* Setup menu selects the test signal available on the **SD SDI TG OUT** connectors. (See section 3.6.5.4.5.)

SD SDI BLACK This pair of BNC connectors contain a black serial component video signal compatible with the SMPTE 259M-C standard.

2.1.10. HD SDI Test Generator Connections (HTG Option)

The *HD TEST GEN* group of sub-menus on the *OUTPUT* Setup menu is used to configure the HD SDI test generator outputs. (See section 3.6.7.)

TG GEN LOCK Input BNC connector for an analog Genlock reference. The genlock signal may be a HD tri-level sync or a standard definition colour black video or 0.3 V bi-level sync. The input is terminated internally with 75 ohms and is normally connected to one of the sync outputs from the 5600MSC.

HD SDI TG OUT This pair of BNC connectors has serial component video outputs compatible with the SMPTE 292M standard. When the *HTG Output Mode* menu item is set to 4:4:4 these outputs will contain the main channel ($YC_{B(even)}C_{R(even)}$ or $GB_{(even)}R_{(even)}$) part of the test signal. The *HD TEST SIGNALS* sub-menu on the *OUTPUT* Setup menu selects the test signal available on the **HD SDI TG OUT** connectors. (See section 3.6.8.)

HD SDI BLACK This pair of BNC connectors has serial component video outputs compatible with the SMPTE 292M standard. When the *HTG Output Mode* menu item is set to 4:2:2 these outputs will contain a black video signal. When the *HTG Output Mode* menu item is set to 4:4:4 these outputs will the Alpha channel ($YC_{B(odd)}C_{R(odd)}$ or $AB_{(ODD)}R_{(odd)}$) part of the test signal.

2.1.11. Audio Word Clock Connections (WC Option)

WORD CLOCK This BNC connector has a 48 KHz word clock output. This output will be synchronous with the DARS and AES outputs if they are installed.

2.1.12. Power Connections

The 5600MSC has one or two (redundant supply is optional) universal power supplies that operate on either 100-115 or 220-240 volts AC at 50 or 60 Hz and automatically senses the input voltage. Power should be applied by connecting a 3-wire grounding type power supply cord to the power entry modules 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.

The IEC 320 power entry modules combines a standard power inlet connector, two 5 x 20 mm fuse holders and an EMI line filter. For instructions on changing the fuses see section 4.3.1.



CAUTION - TO REDUCE THE RISK OF ELECTRIC SHOCK, GROUNDING OF THE GROUND PIN OF THE MAINS PLUG MUST BE MAINTAINED

2.2. MOUNTING

The 5600MSC Master Clock/SPG is equipped with rack mounting angles and fits into a standard 19 inch by 1 3/4 inch (483 mm x 45 mm) rack space. The mounting angles may be removed if rack mounting is not desired.

2.3. CONNECTING THE GENERAL PURPOSE INPUTS AND OUTPUTS

The 9 pin **AUX I/O** connector has 2 general purpose inputs and 2 general purpose outputs. The GPI inputs are active low. This means that if you leave an input floating (not connected) then it will not be activated. Lowering the GPI input to a voltage below 0.8 volts will activate the input. The user can activate GPIs simply by connecting the GPI input pins to Ground using a button, switch, relay or an open collector transistor.

The outputs are internally pulled up to +5 volts DC. Care must be taken to limit the load to 0.5W so there is no affect on the power supply source in the frame. The functions of the general purpose outputs are set using the *GPO 1 Function* and *GPO 2 Function* menu items on the *GENERAL* Setup menu. (See section 3.7.4)

Figure 2-2 shows the circuitry for each of the I/O pins.

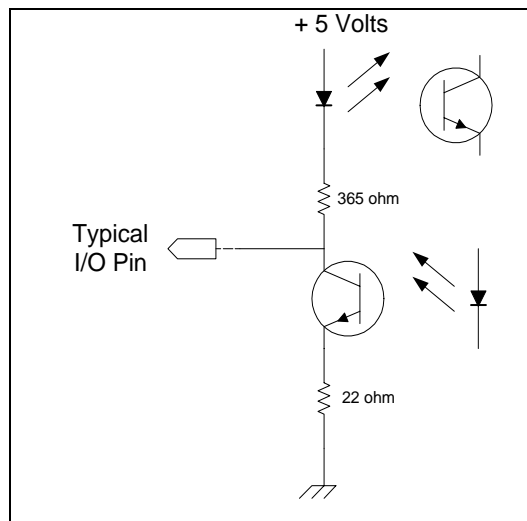


Figure 2-2: Typical GPIO Circuitry

2.4. CONNECTING THE SERIAL PORTS IN SYNCHRO MODE

In the event of a changeover occurrence, it is necessary that all outputs on one 5600MSC have the same timing as those on the other. Identical timing for both 5600MSCs is assured by locking both to the same frequency and phase source (e.g. GPS or by genlocking one to the other). Identical phasing of the independent black outputs is assured by implementing the *Syncro* mode in the 5600MSCs.

Even if you are not using the 5600MSC units with a 5600ACO changeover, you can set the time reference of one 5600MSC so that it locks to the system time of the other. See section 3.5.2.

To use this mode, connect both 5600MSC communication ports together using the 5600MSC-1-0-30 Synchro cable supplied with the 5600ACO or make your own as shown in Table 2-7. On the 5600MSC connected to the A inputs of the 5600ACO, set the Serial Port Mode to Synchro Tx. On the 5600MSC connected to the B inputs of the 5600ACO, set the Serial Port Mode to Synchro Rx. The system configuration of both units can now be accomplished by setting the menu items of the Master A unit only. Most of the menu settings on the Master B unit can be viewed but cannot be changed. These menu items will be dimmed when they are viewed on the Master B unit. Menu items of the Master B that can be changed will be shown in the normal display brightness. See section 3.7.1 for more information.

5600MSC SynchroRx End		Belden 9501	5600MSC SynchroTx End	
9 pin D Male	Pin		9 pin D Male	Pin
	1			1
TxD	2	-----1b-----	RxD	3
RxD	3	-----1a-----	TxD	2
	4			4
Gnd	5	---drain---	Gnd	5
	6			6
RTS	7		CTS	8
CTS	8		RTS	7
	9			9
Frame Gnd	Shield	---drain---	Frame Gnd	Shield

Table 2-7: 5600MSC-1-0-30 Synchro Cable

2.5. GPS RECEIVER INSTALLATION (G OPTION)

The 5600MSC units (with the +G option fitted) are designed to work with the Trimble Accutime 2000 Smart Antenna that can be located up to 1000 feet from the 5600MSC unit. The Smart Antenna houses the GPS receiver, antenna, power supply and other support circuitry in a sealed, shielded, self-contained unit with a digital interface to the main unit. The GPS Smart Antenna also receives power from the main unit through the connection cable.

2.5.1. Mounting the GPS Smart Antenna

The smart antenna's enclosure is completely waterproof and is designed for outdoor installation. It is protected against jamming signals and thus is suitable for reliable operation in most environments. Select an outdoor location for the antenna, like the roof of your building that has a relatively unobstructed view of the sky. Dense wood and concrete or metal structures will shield the antenna

from satellite signals. The antenna can receive satellite signals through glass, canvas and thin fibreglass; thus it may be mounted inside a skylight, if an outdoor location is not possible.

The smart antenna is an active-head antenna. For optimal performance, locate the smart antenna as far as possible from transmitting antennas, including radar, satellite communication equipment and cellular transmitters. When locating the antenna near a radar installation, ensure that the antenna is positioned outside of the radar's cone of transmission. Follow the same guidelines when installing the antenna near satellite communication equipment. For best results, mount the antenna at least ten feet away from satellite communication equipment. Do not mount the antenna near high vibration areas such as fan or motor housings, or near sources of heat such as exhaust stacks.

Consider the length of the cable run when selecting the location. A 50 foot cable is supplied; however, longer cables are available on special order from the factory. You may also wire a straight-through extender cable to extend the cable distance up to 200 feet. The smart antenna is designed for a pole mount with a 1" - 14 straight thread, which is a common marine antenna mount. For stationary installations a 3/4" pipe thread can be used, but a 1"-14 straight thread is recommended. Pole mounting is illustrated in Figure 2-3.

Secure the mounting pole to a solid structure so that it is oriented vertically. Thread the smart antenna onto the pole or pile and hand tighten until snug.



CAUTION: Over-tightening the smart antenna on the pole or using a tool could damage the threaded socket in the base of the antenna. In addition, do not use thread-locking compounds, since they can corrode plastic

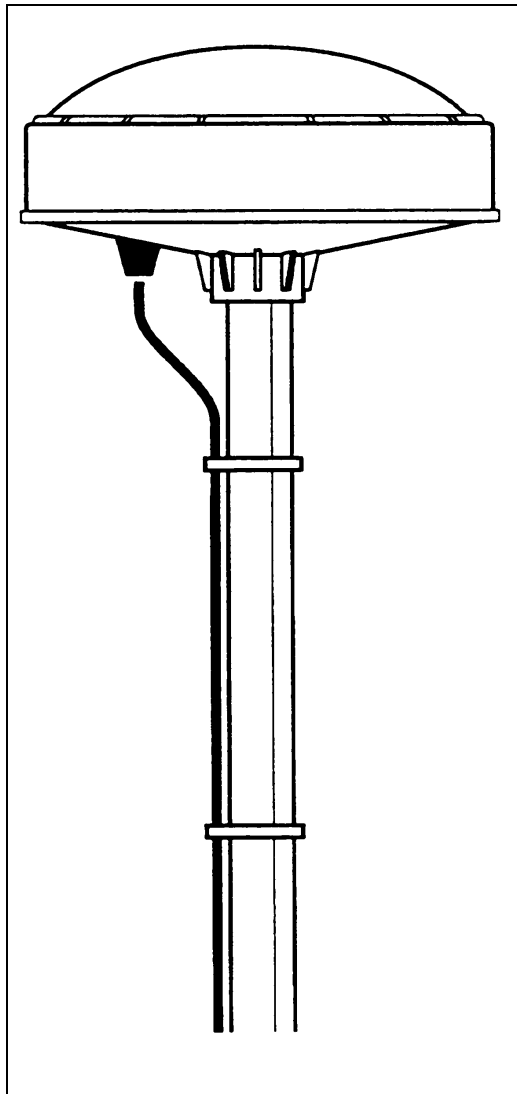


Figure 2-3: Pole Mounting the Smart Antenna

2.5.2. Connecting the GPS Smart Antenna to the 5600MSC

A standard 50 foot long interface cable (Evertz part WA-T09) is provided with the 5600MSC and the smart antenna. One end of this cable is fitted with a weather-tight 12 pin Molex connector. The other end is fitted with a 9 pin male subminiature D connector and should be connected to the GPS connector on the rear panel of the 5600MSC. The pin out of the cable is shown in Figure 2-4. If you require a longer cable, a 100 foot (Evertz part WA-T76) or 400 foot cable (Evertz part WA-T11) may be ordered from the factory. Custom length weatherproof cables can also be special ordered. Alternately, you can wire a 9 pin Extender cable as shown in Figure 2-5.

Connect the 12 pin connector on the interface cable to the smart antenna. The connector on the interface connector has a locking ring for securing the connection.



CAUTION: Over tightening the locking ring can damage the connector on the smart antenna

Route the interface cable to the location of the 5600MSC unit using the most direct path. Avoid routing the cable near hot surfaces, sharp or abrasive surfaces, or corrosive fluids or gases. Avoid sharp kinks or bends in the cable. Additional protection such as heat shrink tubing may be required to protect the cable jacket at points where the cable enters the building, especially if the opening is rough or sharp. Once the cable is run, use cable-ties to secure the cable to the pole and to provide strain relief for the connections. When securing the cable, start at the antenna and work towards the 5600MSC unit. Connect the 9 pin male D connector to the GPS connector on the rear panel of the 5600MSC. Power is provided from the 5600MSC along the interface cable to the smart antenna.

Trimble antenna Mini-Con 12 pin (female)		Evertz 5600MSC 9 pin "D" style (male)	
DC Ground	9-----	1	Frame Ground
Receive Port (R-)	2-----	2	TX A -
Transmit Port (T+)	5-----	3	RX B +
Timing pulse 1pps	11-----	4	1 PPS interrupt in +
DC Power IN	1-----	5	+17 V DC Unreg.
Timing pulse 1pps	12-----	6	1 PPS interrupt in -
Receive Port (R+)	3-----	7	TX B +
Transmit Port (T-)	4-----	8	RX A -
	-----		Shield
	-----		Drain Wire

Figure 2-4: Accutime 2000 Smart Antenna to 5600MSC Interface Cable (Evertz part WA-T09)

9 pin "D" style (female)		9 pin "D" style (male)	
Pin	Pair #	Pin	Description
7-----	1-----	7	TX B +
2-----	1-----	2	TX A -
8-----	2-----	8	RX A -
3-----	2-----	3	RX B +
4-----	3-----	4	1 PPS +
6-----	3-----	6	1 PPS -
5-----	4-----	5	+17 V DC Unreg.
1-----	4-----	1	Ground.
-----	Drain Wire-----		Shield

Figure 2-5: Accutime 2000 Extender Cable



When making your own extender cable be sure to use low capacitance twisted pair cable and adhere to the pairing shown in Figure 2-5.

2.5.3. System Startup

At power up, the smart antenna will automatically begin to acquire and track the GPS satellite signals. From a cold start, the smart antenna will normally take from 2 to 5 minutes to lock on to sufficient satellites to accurately determine the time. During this time the GPS STATUS display on the front panel will show the various stages of initialization. For complete information on configuring the 5600MSC operate with the GPS Smart antenna see section 3.8 of this manual

CHAPTER 3: OPERATION

TABLE OF CONTENTS

3. HOW TO OPERATE THE MASTER CLOCK/SPG	3-1
3.1. AN OVERVIEW OF KEY AND DISPLAY FUNCTIONS	3-1
3.1.1. The Setup Menu Pushbutton Group	3-1
3.1.2. The Display Button Group	3-2
3.1.3. Panel Lock Key Functions	3-2
3.1.4. Shaft Encoder Knob	3-2
3.1.5. An Overview of the Status Indicators	3-3
3.2. FRONT PANEL DISPLAY FUNCTIONS	3-4
3.2.1. Front Panel Displays	3-4
3.2.2. Special Front Panel Indicators	3-4
3.3. FRONT PANEL STATUS DISPLAYS	3-4
3.3.1. GPS Status Messages	3-5
3.3.2. Time Reference Status Messages	3-5
3.3.3. Frequency Reference Status Messages	3-5
3.3.4. Modem Status	3-6
3.3.5. NTP Messages	3-6
3.3.6. LTC 1 Output Power Status Messages	3-6
3.3.7. Power Supply Status Messages	3-7
3.3.8. GPI Input Supply Status Messages	3-7
3.3.9. Cooling Fan Status Messages	3-7
3.3.10. Synchro Status Messages	3-7
3.3.11. Flashing Leds	3-7
3.4. AN OVERVIEW OF THE SETUP MENU SYSTEM	3-7
3.5. CONFIGURING THE INPUT REFERENCES	3-9
3.5.1. Configuring the Frequency Reference	3-9
3.5.2. Configuring the Time Reference	3-12
3.5.3. Setting The VITC Reader Line	3-14
3.5.4. Configuring the Genlock Capture Range	3-14
3.5.5. Synchronizing The System Master Oscillator to the Frequency Reference Immediately	3-15
3.5.6. Configuring the Lock Speed	3-16
3.6. CONFIGURING THE OUTPUTS	3-17
3.6.1. Configuring the LTC Outputs	3-17
3.6.1.1. Selecting Normal or Powered LTC Output (LTC1 output only)	3-18
3.6.1.2. Setting the LTC Output Rate	3-18
3.6.1.3. Selecting when the LTC Time is Synchronized to the System Time	3-19
3.6.1.4. Synchronizing The LTC Time to the System Clock Immediately	3-19
3.6.1.5. Synchronizing All The LTC and VITC Times to the System Clock Immediately	3-20
3.6.1.6. Setting The LTC Offset	3-20
3.6.1.7. Setting The LTC Time Zone	3-20

3.6.1.8. Enabling Daylight Saving Time Compensation on the LTC Output	3-21
3.6.1.9. Enabling the LTC Output Parity Bit	3-21
3.6.1.10. Enabling LTC Output Colour Frame Bit	3-21
3.6.1.11. Setting The LTC Output Level	3-21
3.6.2. Configuring the Video Sync Outputs.....	3-21
3.6.2.1. Selecting the Clock frequency for Each Bank of the Sync Outputs	3-22
3.6.2.2. Selecting the Standard of the Sync Outputs	3-22
3.6.2.3. Configuring the VITC Generator for the Colour Black Outputs	3-23
3.6.2.3.1. Enabling VITC on the Video Output	3-23
3.6.2.3.2. Selecting the VITC Lines.....	3-24
3.6.2.3.3. Enabling Drop Frame Compensation on the VITC Output	3-24
3.6.2.3.4. Enabling Colour Frame Compensation on the VITC Output	3-25
3.6.2.3.5. Selecting when the VITC Time is Synchronized to the System Time	3-25
3.6.2.3.6. Synchronizing The VITC Time to the System Clock Immediately	3-26
3.6.2.3.7. Synchronizing The LTC and VITC Times to the System Clock Immediately	3-26
3.6.2.3.8. Setting The VITC Offset	3-26
3.6.2.3.9. Setting The VITC Time Zone	3-27
3.6.2.3.10. Enabling Daylight Saving Time Compensation on the VITC Output.....	3-27
3.6.2.3.11. Enabling Ten Field Pulse.....	3-28
3.6.2.4. Setting The Phase of the Sync Outputs	3-28
3.6.3. Configuring the Analog Video Test Generator Output (STG Option only)	3-30
3.6.3.1. Selecting the Standard of the Analog Video Test Generator Output	3-30
3.6.3.2. Setting The Phase of the Analog Video Test Generator Output	3-30
3.6.3.3. Configuring the Analog Video Test Generator On Screen Message Display	3-31
3.6.3.3.1. Editing the On Screen Message Display.....	3-31
3.6.3.3.2. Positioning the On Screen Message Display	3-31
3.6.3.3.3. Enabling the On Screen Message Display.....	3-31
3.6.3.3.4. Setting the Font Size of the On Screen Message Display	3-32
3.6.3.4. Enabling the SDI Test Generator Moving Line	3-32
3.6.4. Selecting the Analog Video Test Generator Signal (STG Option only)	3-32
3.6.5. Configuring the SDI Video Test Generator Output (STG Option only)	3-34
3.6.5.1. Selecting the Standard of the SDI Video Test Generator Output	3-34
3.6.5.2. Setting The Phase of the SDI Video Test Generator Output	3-34
3.6.5.3. Configuring the SDI Video Test Generator On Screen Message Display.....	3-34
3.6.5.3.1. Editing the On Screen Message Display.....	3-35
3.6.5.3.2. Positioning the On Screen Message Display	3-35
3.6.5.3.3. Enabling the On Screen Message Display.....	3-35
3.6.5.3.4. Setting the Font Size of the On Screen Message Display	3-35
3.6.5.4. Configuring the SDI Test Generator Embedded Audio.....	3-35
3.6.5.4.1. Enabling the SDI Embedded Audio Channel in the Test Signal Output.....	3-36
3.6.5.4.2. Enabling the SDI Embedded Audio Channel in the Black Output.....	3-36
3.6.5.4.3. Setting the SDI Embedded Audio Channel Frequency	3-37
3.6.5.4.4. Configuring the Embedded Audio Level.....	3-37
3.6.5.4.5. Setting the SDI Embedded Audio Ident Mode	3-38
3.6.5.4.6. Setting the SDI Lip Sync Mode	3-38
3.6.5.5. Enabling the SDI Test Generator Moving Line	3-38
3.6.6. Selecting the SDI Video Test Generator Signal (STG Option only).....	3-38
3.6.7. Configuring the HD SDI Video Test Generator Output (HTG Option only).....	3-39
3.6.7.1. Selecting the Standard of the HD SDI Video Test Generator Output	3-39
3.6.7.2. Configuring The Genlock Reference for the HD SDI Test Generator	3-39
3.6.7.2.1. Selecting if the HD SDI Test generator will Free Run or be Genlocked.....	3-39

3.6.7.2.2. Selecting the HD SDI Test generator Genlock Type.....	3-39
3.6.7.3. Setting The Phase of the HD SDI Video Test Generator Output	3-40
3.6.7.4. Configuring the HD SDI Video Test Generator On Screen Message Display	3-41
3.6.7.4.1. Editing the On Screen Message Display.....	3-41
3.6.7.4.2. Positioning the On Screen Message Display	3-41
3.6.7.4.3. Enabling the On Screen Message Display.....	3-41
3.6.7.4.4. Setting the Outputs for Screen Message Display	3-42
3.6.7.5. Configuring the HD SDI Test Generator Embedded Audio.....	3-42
3.6.7.5.1. Setting the Embedded Audio Group	3-42
3.6.7.5.2. Setting the Embedded Audio Frequency	3-43
3.6.7.5.3. Enabling the Embedded Audio.....	3-43
3.6.7.6. Setting the Display Time for the Signal Name Display	3-44
3.6.7.7. Configuring the HD SDI Test Generator Output Mode	3-44
3.6.7.8. Configuring the HD SDI Test Generator Colour Space	3-45
3.6.7.9. Enabling the Closed Captioning Signal.....	3-45
3.6.8. Selecting the HD SDI Video Test Generator Signal (HTG Option only)	3-45
3.6.8.1. Clean Aperture with Graticule	3-47
3.6.8.2. Production Aperture	3-47
3.6.8.3. The Grey Signals	3-47
3.6.9. Configuring the Output Global Phasing	3-47
3.6.9.1. Enabling the Global Phase Offset.....	3-47
3.6.9.2. Setting the Global Phase Offset Value	3-48
3.6.10. Configuring whether NTSC Analog Video Outputs contain Setup Pedestal.....	3-48
3.6.11. Configuring the Balanced Analog Audio Output (STG Option only)	3-48
3.6.11.1. Setting the Audio Level Sound Type.....	3-49
3.6.11.2. Setting the Time that an Audio Event will Occur.....	3-49
3.6.11.3. Setting the Audio Event Sound Type	3-50
3.6.11.4. Setting the Audio Event Sound Frequency	3-50
3.6.11.5. Setting the Audio Event Duration.....	3-50
3.6.11.6. Testing the Audio Sound.....	3-50
3.6.11.7. Setting up Audio Event Sequences	3-50
3.6.12. Configuring the DARS and AES Outputs (STG Option only).....	3-51
3.6.12.1. Setting The Phase of the AES and DARS Outputs (STG Option only).....	3-51
3.6.12.2. Setting the AES Channel Frequency	3-52
3.6.12.3. Configuring the AES Audio Level.....	3-52
3.6.12.4. Configuring the AES/DARS Lock Type.....	3-53
3.7. GENERAL CONFIGURATION ITEMS.....	3-54
3.7.1. Configuring The Serial Port Mode	3-55
3.7.2. Configuring what Items are Ignored in Syncro Rx Mode	3-56
3.7.3. Configuring The Modem (Units fitted with the M Option).....	3-56
3.7.3.1. Setting the Modem Operating Mode	3-57
3.7.3.2. Setting the Modem Standard	3-57
3.7.3.3. Setting the Modem Speaker Volume	3-57
3.7.3.4. Setting the Modem Phone Number to Dial	3-58
3.7.3.5. Setting the Time that the Modem will Dial Out.....	3-58
3.7.3.6. Dialing the Modem Immediately.....	3-59
3.7.3.7. Canceling a Call in Progress.....	3-59
3.7.3.8. Setting the Number of Times the Modem will Retry a failed Call	3-59
3.7.4. Configuring The Function of the General Purpose Outputs.....	3-59
3.7.5. Configuring The Function of the General Purpose Inputs	3-60

3.7.6. Setting the Daylight Saving Time Rules	3-61
3.7.6.1. Setting The DST Date Entry Mode	3-62
3.7.6.2. Setting the Beginning and End of Daylight Saving Time	3-63
3.7.6.3. Setting The DST Offset.....	3-63
3.7.7. Firmware Utilities	3-63
3.7.7.1. Viewing the 5600MSC Firmware Version	3-64
3.7.7.2. Upgrading the 5600MSC Firmware	3-64
3.7.7.3. Viewing the HD Test Generator Firmware Version	3-64
3.7.7.4. Upgrading the HD Test Generator Firmware	3-65
3.7.8. Configuring Engineering or User Operation Modes.....	3-65
3.7.9. Saving and Storing 5600MSC Presets	3-66
3.7.10. Configuring the Internet Protocol Address.....	3-67
3.7.10.1. Setting up the Internet Protocol Address	3-67
3.7.10.2. Setting up the Internet Protocol Address Mode	3-67
3.7.10.3. Setting up the Internet Protocol Local Mask	3-67
3.7.10.4. Setting up the Internet Protocol Gateway Address	3-67
3.7.10.5. Setting up the Internet Protocol Gateway Enable.	3-68
3.7.11. Configuring the Network Time Protocol Functions (Units fitted with the T Option).....	3-68
3.7.11.1. Setting up the NTP restrictions.	3-68
3.7.11.1.1. Setting up the NTP Restriction I.P.	3-68
3.7.11.1.2. Setting up the NTP Restriction Mask.....	3-69
3.7.11.1.3. Setting up the NTP Restriction Enable.	3-69
3.7.12. Setting The System Time When There Is No Time Reference.....	3-69
3.7.13. Setting The System Date When There Is No Time Reference	3-70
3.7.14. Setting The User Bits in Manual User Bit Mode	3-70
3.7.15. Setting The User Bits Mode.....	3-71
3.8. OPERATING WITH GLOBAL POSITIONING SYSTEM LOCK (G Option).....	3-72
3.8.1. The Global Positioning System Overview.....	3-72
3.8.2. GPS Lock Operation.....	3-72

Figures

Figure 3-1: Model 5600MSC Front Panel Layout	3-1
Figure 3-2: Sync Generation - GPS Frequency Reference	3-10
Figure 3-3: Sync Generation – NTSC or 59.95 Hz Video Reference	3-10
Figure 3-4: Sync Generation – PAL or 50 Hz Video Reference.....	3-10
Figure 3-5: Sync Generation – 10 MHz Reference – NTSC outputs	3-11
Figure 3-6: Sync Generation – 10 MHz Reference – PAL outputs	3-11
Figure 3-7: Sync Generation – No Reference – NTSC outputs.....	3-11
Figure 3-8: Sync Generation – No Reference – PAL outputs.....	3-12
Figure 3-9: Video Sync Phase Alignment in 59.94 Hz Field Rate Systems.....	3-28
Figure 3-10: Video Sync Phase Alignment in 50 Hz Field Rate Systems.....	3-29

Tables

Table 3-1: Top Level of the Input Setup Menu.....	3-9
Table 3-2: Top Level of the Output Setup Menu.....	3-17
Table 3-3: 525 Line Test Signal Selection	3-33
Table 3-4: 625 Line Test Signal Selection	3-33
Table 3-5: Valid Genlock Types	3-40
Table 3-6: HD SDI Test Signal Selection	3-46
Table 3-7: Top Level of the General Setup Menu	3-54

3. HOW TO OPERATE THE MASTER CLOCK/SPG

The model 5600MSC Master Clock/SPG combines the latest LSI technology with sophisticated embedded microcontroller firmware to provide a powerful, flexible Master Clock and Sync Pulse Generator system. The 5600MSC Master Sync and Clock Generator, is both a broadcast quality Master SPG and a Master Clock. It provides all of the synchronizing signals needed in a 21st century TV station at the same time as solving the problem of locking the in-house master clock system to the master video sync pulse generator.

3.1. AN OVERVIEW OF KEY AND DISPLAY FUNCTIONS

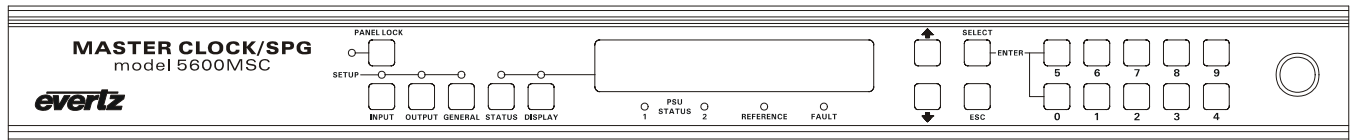


Figure 3-1: Model 5600MSC Front Panel Layout

The front panel controls consist of a 16 digit alphanumeric display, 10 LED status indicators, a 20 pushbutton keypad, and a shaft encoder knob.

The keypad is used to control the front panel *Setup* menu system, to enter numeric data such as the time and date, and to provide control of the front panel display. The shaft encoder knob is used to navigate the front panel menu system and to adjust the phasing of the sync pulse outputs.

A front panel *Setup* menu provides a quick and simple method of configuring the 5600MSC for your application. Sections 3.2 to 3.8 give detailed information on the specific operations required to control the 5600MSC.

3.1.1. The Setup Menu Pushbutton Group

The Setup pushbutton group consists of the **INPUT**, **OUTPUT**, **GENERAL**, **SELECT**, **ESC**, **↑**, **↓** keys and the **SHAFT ENCODER** knob and is used to navigate the *Setup menu* system. The **INPUT**, **OUTPUT** and **GENERAL** keys allow you to quickly go to various parts of the menu while the **SELECT**, **ESC**, **↑**, **↓** and **SHAFT ENCODER** knob are used to navigate the menu.

- | | |
|----------------|---|
| INPUT | Enters the <i>INPUT SETUP</i> menu that is used to set up various items related to the input references to the 5600MSC. (See section 3.5) |
| OUTPUT | Enters the <i>OUTPUT SETUP</i> menu that is used to set up various items related to the LTC, Sync, Audio and Video Test generator outputs of the 5600MSC. (See section 3.6) |
| GENERAL | Enters the <i>GENERAL SETUP</i> menu that is used to set up various items related to the overall operation of the 5600MSC. (See section 3.7) |
| SELECT | When in one of the <i>Setup</i> menus the SELECT key is used to move to the next lower sub-menu levels or to select a menu parameter that is to be changed. The SELECT key is also used in combination with the numeric keys to enter numeric data. |

ESC When in one of the *Setup* menus the **ESC** key is used to move to the next lower sub-menu levels or to select a menu parameter that is to be changed. The **ESC** key is also used to cancel the process of entering numeric data.

↑, ↓, SHAFT ENCODER When in one of the *Setup* menus, the **↑** and **↓** arrow keys are used to move to various items in the menu system. Turning the **SHAFT ENCODER** knob clockwise (to the right) has the same effect as pressing the **↑** key. Turning the **SHAFT ENCODER** knob counter-clockwise (to the left) has the same effect as pressing the **↓** key (See also section 3.4)

3.1.2. The Display Button Group

The Display pushbutton group consists of the **DISPLAY** and **STATUS** keys and is used to select the information being displayed on the front panel when you are not in one of the *Setup* menus. After you press either the **DISPLAY** or **STATUS** keys, you can use the **↑**, **↓** keys or the **SHAFT ENCODER** knob to select the *Status* or *Display* items.

DISPLAY Allows you to quickly view the various times being generated on the LTC and video outputs, as well as the system time and date. (See section 3.2)

STATUS Allows you to quickly view fault messages, the status of the power supplies, and GPI inputs. (See section 3.3)

3.1.3. Panel Lock Key Functions

PANEL LOCK Pressing this key will lock the front panel. The LED beside the **PANEL LOCK** key will come on indicating that the front panel keys are disabled. Pressing both the **PANEL LOCK** and **SELECT** key again will return the front panel keys to their normal functions and the PANEL LOCK LED will go Off. The **STATUS** and **DISPLAY** keys will still be functional when the PANEL LOCK is On.

3.1.4. Shaft Encoder Knob

The shaft encoder's function is to select various menu items or change the value a menu item's parameter value.

↑, ↓, SHAFT ENCODER When in one of the *Setup* menus, the **↑** and **↓** arrow keys are used to move to various items in the menu system. Turning the **SHAFT ENCODER** knob clockwise (to the right) has the same effect as pressing the **↑** key. Turning the **SHAFT ENCODER** knob counter-clockwise (to the left) has the same effect as pressing the **↓** key. Menu parameter values will increase for clockwise rotations of the knob and decrease for counter-clockwise rotations.

3.1.5. An Overview of the Status Indicators

There are 10 status indicators located on the front panel that show operational status of the 5600MSC at a glance.

PANEL LOCK This green LED indicates that the Front Panel is locked against accidental changes.

INPUT This green LED indicates that the *INPUT SETUP* menu mode is active.

OUTPUT This green LED indicates that the *OUTPUT SETUP* menu mode is active.

GENERAL This green LED indicates that the *GENERAL SETUP* menu mode is active.

STATUS This green LED indicates that the *Status* front panel display mode is active.

DISPLAY This green LED indicates that the *Normal* front panel display mode is active.

PSU STATUS 1, 2 These green LEDs indicate that the corresponding power supply is functioning normally. On units fitted with a single power supply the PSU STATUS 2 LED will be Off all the time.

REFERENCE This green LED indicates that the frequency reference selected in the *FREQUENCY REF* sub menu of the *INPUT SETUP* menu is present and the 5600MSC has locked to it.

FAULT This red LED indicates that the frequency reference selected in the in the *FREQUENCY REF* sub menu of the *INPUT SETUP* menu is missing, or that one of the power supplies or fans has failed.

The 5600MSC rear panel is fitted with two LEDs to monitor the Ethernet connection.

10/100 This Amber LED is ON when a 100Base-TX link is last detected. The LED is OFF when a 10Base-T link is last detected (the LINK LED is ON). Upon power-up the LED is OFF as the last detected rate is not known and therefore defaults to the 10Base-T state until rate detection is completed.

LN/ACT This dual purpose Green LED indicates that the 5600MSC has established a valid linkage to its hub, and whether the 5600MSC is sending or receiving data. This LED will be ON when the 5600MSC has established a good link to its supporting hub. This gives you a good indication that the segment is wired correctly. The LED will BLINK when the 5600MSC is sending or receiving data. The LED will be OFF if there is no valid connection.

3.2. FRONT PANEL DISPLAY FUNCTIONS

3.2.1. Front Panel Displays

The **DISPLAY** key is used to select what data is being displayed in the alphanumeric display. After you press the **DISPLAY** key, you can use the **↑**, **↓** keys or the shaft encoder knob to select the various *Display* items. The leftmost characters of the display indicate what is being displayed as follows:

SYS	12:34:56.00	Generator Time information
DATE	22 Jan 2003	Generator User Bit information
L1	12:34:56:78	Primary LTC Generator Output Time information
L2	12:34:56:78	Secondary LTC Generator Output Time information
V i	12:34:56:78	VITC Input Time information
S1	12:34:56:00	Sync Output 1 VITC Generator Time information
S2	12:34:56:00	Sync Output 2 VITC Generator Time information
S3	12:34:56:00	Sync Output 3 VITC Generator Time information
S4	12:34:56:00	Sync Output 4 VITC Generator Time information
S5	12:34:56:00	Sync Output 5 VITC Generator Time information
S6	12:34:56:00	Sync Output 6 VITC Generator Time information

If the +L option is used, then L1 and L2 are replaced with:

L o	12:34:56:78	LTC Generator Output Time information
L i	12:34:56:78	LTC Input Time information

3.2.2. Special Front Panel Indicators

The following special indicators are used between the seconds and frames digits of the front panel time display to identify non-drop frame and drop frame code when the time code is counting at 29.97 frames per second.

Non Drop Frame	Colon (:)
Drop Frame	Period (.)

The following special indicators are used between the hours and minutes digits of the front panel time display when the display is being adjusted for Daylight Saving Time.

DST Time Not Active	Colon (:)
DST Time Active	Period (.)

3.3. FRONT PANEL STATUS DISPLAYS

The **STATUS** key is used to enter *Status Display* mode that allows you to quickly view fault messages, the status of the power supplies, and GPI inputs on the alphanumeric display. After you press the **STATUS** key, you can use the **↑**, **↓** keys or the shaft encoder knob to select the various *Status* items. Some of the common *Status* messages are:

3.3.1. GPS Status Messages

GPS disconnected	The GPS antenna is not connected or is not functioning
GPS OK Sig = 89	The GPS antenna is connected – the signal strength is shown
8 Sats Tracked	The number of GPS satellites currently being tracked by the antenna

3.3.2. Time Reference Status Messages

Time Unlocked	The 5600MSC is not currently locked to its time reference
Time Locked	The 5600MSC is currently locked to its time reference
Time GPS Locked	The 5600MSC is currently locked to its GPS time reference
No Time Ref	The Time reference is set to <i>No Time Ref</i> .

The following messages are only valid with the +L option.

LTC In Ok	There is LTC present at the LTC input.
LTC IN Not Ok	There is no LTC present at the LTC input.

3.3.3. Frequency Reference Status Messages

Needs System Jam	This flashing display indicates that the <i>Lock Control</i> menu item is set to <i>slow lock</i> and there has been a large change in the Frequency reference (e.g. a sudden phase in the phase of the video reference). In order for the 5600MSC to lock to its frequency reference input it must perform an abrupt lock that will affect the complete system timing of the 5600MSC. In order to perform the System Jam, press the INPUT button to access the <i>Force System Jam Menu</i> item. When a system jam is needed, any LEDs that are On will be flashing. See section 3.5.5
No 5/10 MHz Ref	There is no 5 or 10 MHz Reference present
5 MHz Ref ok	There is a valid 5 MHz Reference present
10 MHz Ref ok	There is a valid 10 MHz Reference present
5/10 MHz Ref NA	The input reference selected is Video, and the range is Wide. The 5/10MHz input detection is not available because this input is bypassed.
No Video Input	There is no valid video reference present
NTSC-M In	There is a valid video reference present – display shows video standard detected
Freq Free Run	The 5600MSC is not currently locked to its frequency reference or the <i>Frequency Ref</i> menu item is set to <i>Internal freq ref</i>
xxx% Ref Lock	An indication of where the 5600MSC is in its process of locking to its frequency reference
Ref Freq xx.x%	An indication of the reference frequency compared to the internal frequency. The range is from –100% to +100%. If it is more than 90% or less than –90%, then it will flash to indicate that the reference is not good enough. This message is only valid when the Ref Lock display is showing 100% and the input frequency reference is 10/5MHz, GPS, or Video in narrow range. If the input is Video, and the 5600MSC cannot lock, the range should be set to wide.
Freq Phase Lockd	The 5600MSC is currently locked to its frequency reference.

3.3.4. Modem Status

These messages show the current modem status when a call is not in progress.

Modem booting	The modem is going through its power up sequence.
Last mdm 5d11:20	Time since last successful modem connection and time update. Shows 0 to 9 days, hours and minutes. If greater than 10 days shows Last mdm >10days
Last mdm >10days	Time since last successful modem connection greater than 10 days.
Xx sec to redial	The previous attempt failed, and the modem will try again in xx seconds.
Setting volume	The modem is changing its speaker volume

These messages show the current action when the modem is initiating a call.

Calling	The modem is dialling out.
No dial tone	There is no dial tone when the modem tries to dial out.
Connecting	The remote system has answered, and they are negotiating a connection speed.
Getting time	The modem is getting time information from a remote system.

After an attempt to connect a modem status message will appear for ten seconds. The status messages are:

FAIL TIMED OUT	No connection was established.
FAIL NO DIALTONE	No connection was established because no dial tone detected.
FAIL LINK POOR	Poor connection, data was too erratic to establish a valid time.
FAIL LOOPBACK	The loop back time was incorrect – indicates a bad telephone line.
SUCCESS	Indicates a successful connection and time update.

These messages show the current action when the modem is answering a call.

Answering	The modem is answering a remote system's incoming call, and is negotiating a connection speed.
Sending time	The modem is sending time information to a remote system.
Hanging up	The modem is hanging up, either because the call was complete, or because it timed out.

3.3.5. NTP Messages

Axxx.yyy.zzz.aaa	The current I.P. Address of the 5600MSC in decimal dot format.
Gxxx.yyy.zzz.aaa	The current I.P. Gateway Address of the 5600MSC in decimal dot format.
Mxxx.yyy.zzz.aaa	The current I.P. NetMask Address of the 5600MSC in decimal dot format.

3.3.6. LTC 1 Output Power Status Messages

These messages are only shown if the *LTC 1 Power* menu item is set to *L1 power on*. See section 3.6.1.1.

LTC Power Out OK	The LTC 1 Output Power is operating normally
LTC Overloaded	The LTC 1 Output Power is overloaded. This usually means that there is a short in the LTC 1 cabling or there are too many clocks drawing power from the LTC1 output.

3.3.7. Power Supply Status Messages

P.S. x FAIL	Power Supply 1 or 2 is not working
P.S. x OK	Power Supply 1 or 2 is working

3.3.8. GPI Input Supply Status Messages

GPIx input xxxx	Shows the state of GPI 1 or GPI2 input (high or low)
-----------------	--

3.3.9. Cooling Fan Status Messages

Fans Ok	Both of the cooling fans are working
Fan Failure	One of the cooling fans is not working
Both Fans Failed	Both of the cooling fans are not working

3.3.10. Synchro Status Messages

Synchro not RX	The synchro mode is not RX or synchro time.
Synchro link OK	The synchro mode is RX or synchro time, and receiving data ok.
Synchro link OK	The synchro mode is RX or synchro time, and not receiving data.

3.3.11. Flashing LEDs

Leds are flashing	When a system jam is needed, any LEDs that are on, will be flashing. See section 3.5.5).
-------------------	--

3.4. AN OVERVIEW OF THE SETUP MENU SYSTEM

The key to the operational flexibility of the 5600MSC lies in the *Setup* menu system. The *Setup* menu system uses the 16 digit alphanumeric display and provides a quick, intuitive method of configuring 5600MSC, guiding you to the correct setup for your application.

The 5600MSC menu system consists of three main menus with several choices for each menu item. The **INPUT**, **OUTPUT** and **GENERAL** keys allow you to quickly go to each of the three main menus, while the **SELECT**, **ESC**, **↑**, **↓** and **SHAFT ENCODER** knob are used to navigate the menu.

To enter the *INPUT SETUP* menu, press the **INPUT** key. Similarly you can enter the *OUTPUT SETUP* or *GENERAL SETUP* menus by pressing the **OUTPUT** and **GENERAL** keys respectively. Once you are in one of the three main menus, the top level menu items are shown in UPPER CASE. Use the arrow keys (**↑**, **↓**) or turn the **SHAFT ENCODER** knob to display the desired item within the top level menu and press the **SELECT** key. There may be a sub-menu layer shown in Title Case (The First Letter Of Each Word Is Capitalized). If there is another menu level, use the arrow keys (**↑**, **↓**) or turn the **SHAFT ENCODER** knob to display the desired item within the sub-menu and press the **SELECT** key to get to the bottom of the menu tree where the displayed parameters to be adjusted will be shown

in Sentence case (The first letter of the parameter is capitalized). The active value for that parameter will be shown blinking.

Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to change the value of the displayed parameter. When the value shown is not the active value the display will stop blinking. When you have selected the desired parameter value press the **SELECT** key to make that value the active value. (The display will start blinking again). Press the **ESC** key when the display is blinking to move back up the menu to the next higher level saving your selection. You can press the **ESC** key when the display is not blinking to move back up the menu to the next higher level without saving your selection. You can select other parameters from that sub-menu by using the arrow keys (↑, ↓) or turning the **SHAFT ENCODER** knob, followed by the **SELECT** key. Alternately you can move up one more menu level by pressing the **ESC** key.

When accessing some menu items, you will see the message **WARNING LIVE CONTROL** displayed on the front panel momentarily. This message warns the user that changing the values will immediately affect the item being controlled, and that they should proceed with caution. There is no need to press the **SELECT** key to save these items.

When two 5600MSC units are operating in a dual redundant configuration, the COM ports of the two units can be interconnected and one of the units can send all its menu settings to the other unit, so they are configured identically. The *Serial Port Mode* menu item on the *GENERAL SETUP* menu is used to do this. (See section 3.7.1 for further information on *Synchro Mode*)



When the *Serial Port Mode* menu item on the *GENERAL Setup* menu is set to *Syncro Rx* mode, the parameter values displayed will be dimmed, indicating that they can not be changed.

Sections 3.5 to 3.7 provide detailed descriptions of the *INPUT*, *OUTPUT* and *GENERAL SETUP* menus. The tables in these sections are arranged in an indented structure to indicate the path taken to reach the control.

3.5. CONFIGURING THE INPUT REFERENCES

The *INPUT SETUP* menu is used to set up various items related to the input references to the 5600MSC. The chart below shows the items available in the *INPUT SETUP* menu. Sections 3.5.1 to 3.5.6 give detailed information about each of the sub menus.

<i>FREQUENCY REF</i>	Configures the frequency reference type.
<i>TIME REF</i>	Configures the time reference type.
<i>INPUT VITC LINE</i>	Sets the video line that the VITC reader will look for VITC on.
<i>GENLOCK RANGE</i>	Configures the capture range of the genlock phase locked loop when the <i>FREQUENCY REF</i> is set to <i>Video ref</i> .
<i>JAM SYSTEM NOW</i>	Forces an abrupt re-locking of the master oscillator to its frequency reference. This affects the timing of all outputs and should be cautiously.
<i>LOCK CONTROL</i>	Configures whether the 5600MSC will lock to its frequency reference gradually or suddenly. Also is used to reset the phase detector.

Table 3-1: Top Level of the Input Setup Menu

3.5.1. Configuring the Frequency Reference

<i>INPUT</i>	<p>The <i>FREQUENCY REF</i> menu item is used to select the type of frequency reference being used for the 5600MSC. In all cases the sync and DARS outputs are driven from a common oscillator and therefore are clock locked to each other (i.e. they do not drift with respect to each other) When set to different reference sources and the appropriate reference is supplied, the phasing of the sync and DARS outputs is affected as shown in Figure 3-2 to Figure 3-8. Note that the DARS lock source is set using the <i>AES Lock Type</i> menu item on the <i>AES/DARS OUT</i> branch of the <i>OUTPUT</i> menu tree. (See section 3.6.12.4.)</p> <p>When set to <i>GPS freq ref</i> the master oscillator will be locked to frequency information being acquired from the GPS receiver.</p> <p>When set to <i>10 MHz freq ref</i> the master oscillator will be locked to an incoming 10 MHz or 5 MHz reference connected to the 10 MHz input connector.</p> <p>When set to <i>Video freq ref</i> the master oscillator will be locked to an incoming NTSC or PAL colour black or tri-level sync signal connected to the GENLOCK input connector. The <i>GENLOCK RANGE</i> menu item is used to select the tolerance of the master oscillator lock range when it is attempting to lock to a video reference. (See section 3.5.4)</p> <p>When set to <i>Internal freq ref</i> the master oscillator will be free running. The accuracy of the internal master oscillator is 0.01ppm that corresponds to a time drift of about 0.31 seconds per year.</p>
<i>FREQUENCY REF</i>	
<i>GPS freq ref</i>	
<i>10 MHz freq ref</i>	
<i>Video freq ref</i>	
<i>Internal freq ref</i>	

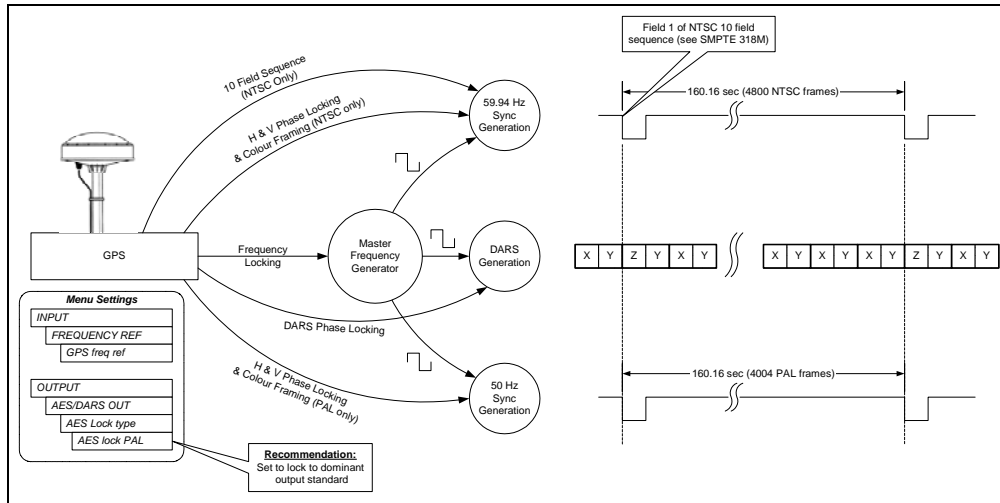


Figure 3-2: Sync Generation - GPS Frequency Reference

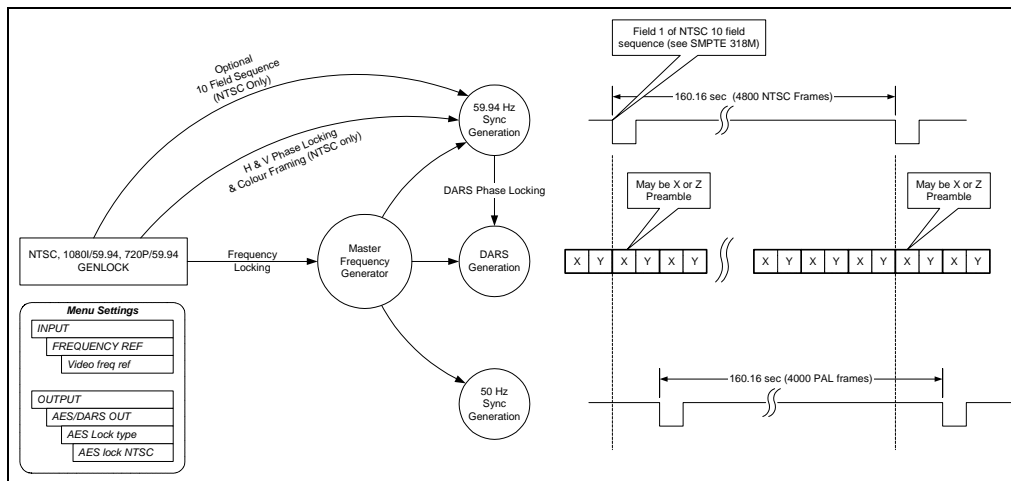


Figure 3-3: Sync Generation – NTSC or 59.95 Hz Video Reference

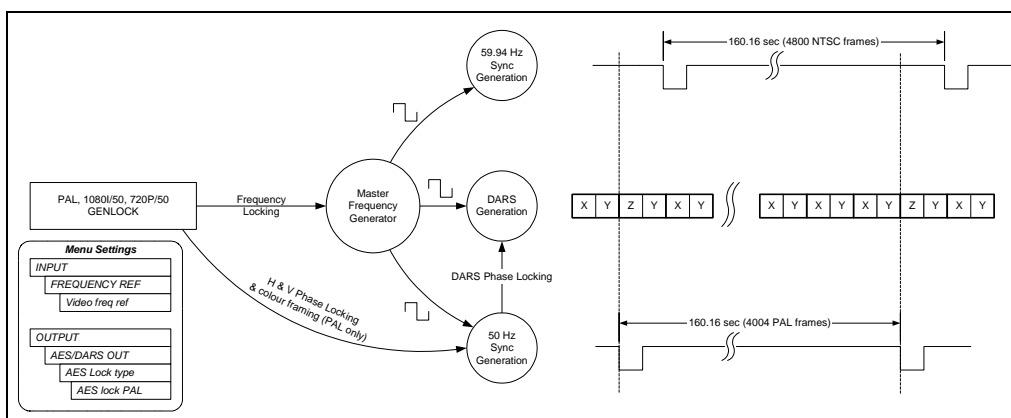


Figure 3-4: Sync Generation – PAL or 50 Hz Video Reference

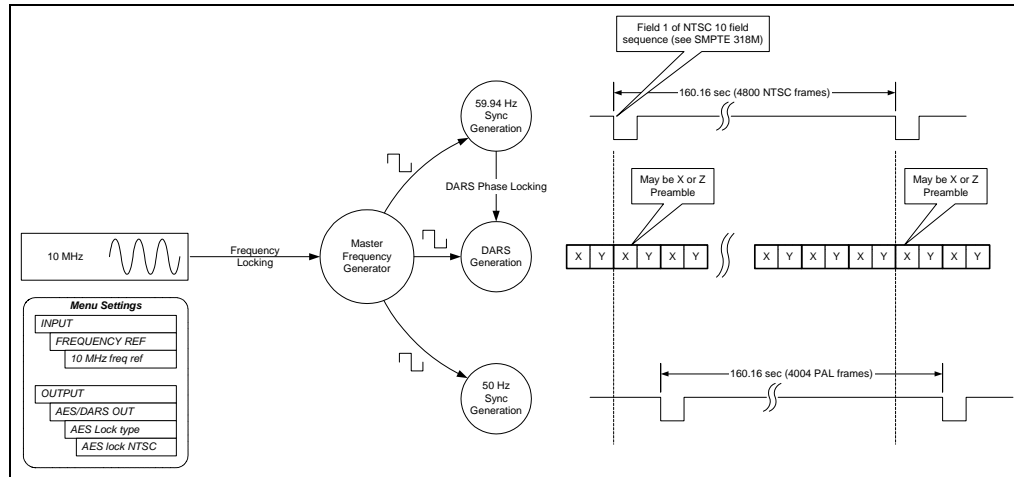


Figure 3-5: Sync Generation – 10 MHz Reference – NTSC outputs

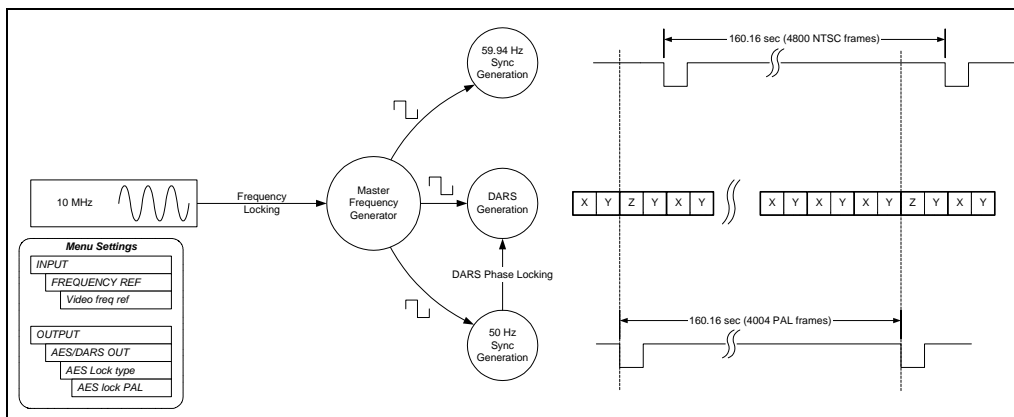


Figure 3-6: Sync Generation – 10 MHz Reference – PAL outputs

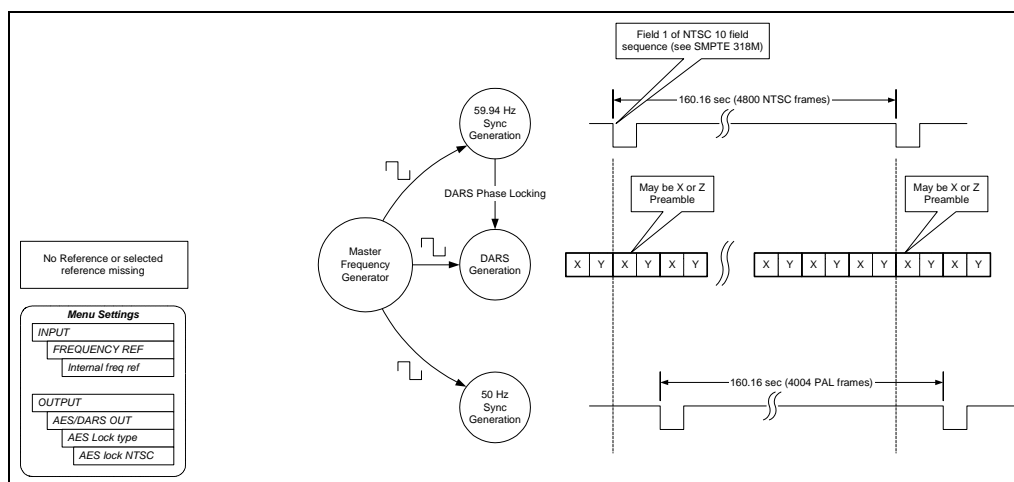


Figure 3-7: Sync Generation – No Reference – NTSC outputs

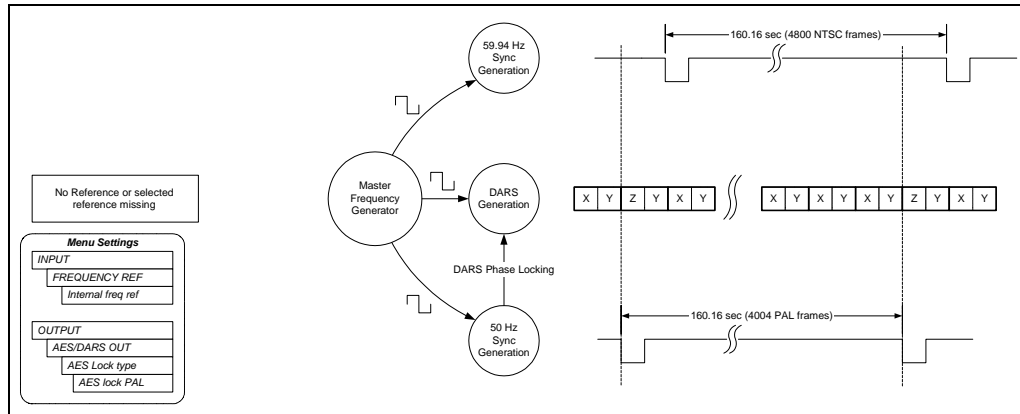


Figure 3-8: Sync Generation – No Reference – PAL outputs

3.5.2. Configuring the Time Reference

INPUT
TIME REF
GPS time ref
Modem ref
Synchro time ref
No time ref
25 LTC tm ref
25 LTC tm nd
29.97df Hz LTC tm ref
29.97df Hz LTC nd
PAL VITC tm ref
PAL VITC tm nd
NTSC VITC tm ref
NTSC VITC tm nd

The *TIME REF* menu item is used to select the type of time reference being used for the 5600MSC.

When set to *GPS time ref* the 5600MSC system time is referenced to time information being acquired from the GPS receiver. (G option required) When the *FREQUENCY REF* menu item is set to *GPS freq ref* the *TIME REF* is forced to *GPS time ref*. The front panel display will show the message **FORCED TO GPS** if you attempt to set the *TIME REF* to *Synchro time ref* or *No time ref*. See section 3.3.1 for a description of the front panel GPS status messages.

When set to *Modem time ref* the 5600MSC system time is referenced to time information being acquired through modem connections to a high-level time source. (M option required). After a successful modem call, the 5600MSC Time Locked Status will be valid for a period of ten days. After 10 days the Time Unlocked Status will become valid, and the front panel display will show the message **MANUAL INPUT JAM** when you enter the *INPUT* menus (by pressing the **INPUT** button) See section 3.7.3 for information on configuring the modem. See section 3.3.4 for a description of the front panel modem status messages.

When the *SERIAL PORT MODE* menu item is set to *Synchro rx* or *Synch time* you can set the *TIME REF* to *Synchro time ref*. to reference the 5600MSC system time to the other 5600MSC that is connected and running in *Synchro tx* mode. When the *SERIAL PORT MODE* menu item is not set to *Synchro rx* or *Synch time* the front panel display will show the message **NOT SYNCHRO RX** if you attempt to set the *TIME REF* to *Synchro time ref*. (See section 2.4 and 3.7.1)

When set to *No time ref* the unit will be free running with respect to time reference. The user must enter the initial time using the numeric keys on the front panel. After the time has been set once, the 5600MSC will use an internal battery-backed up clock to restore the time after a power disruption.

When set to *25 Hz LTC tm ref* the 5600MSC system time is referenced to time information being read at the LTC input port. The incoming time must be 25 Frames per second.

When set to *25 Hz LTC tm nd* the 5600MSC system time is referenced to time information being read at the LTC input port. The incoming time must be 25 Frames per second. The 5600MSC will not read any date information in the LTC. Use this if the incoming LTC has no date information embedded.

When set to *29.97df LTC ref* the 5600MSC system time is referenced to time information being read at the LTC input port. The incoming time must be 29.97 Frames per second drop frame.

When set to *29.97df LTC nd* the 5600MSC system time is referenced to time information being read at the LTC input port. The incoming time must be 29.97 Frames per second drop frame. The 5600MSC will not read any date information in the LTC. Use this if the incoming LTC has no date information embedded.

When set to *NTSC VITC tm ref* the 5600MSC system time is referenced to time information being read from VITC on the video genlock input when a PAL colour black genlock is supplied. The incoming VITC time must be 29.97 Frames per second drop frame.

When set to *NTSC VITC tm nd* the 5600MSC system time is referenced to time information being read from VITC on the video genlock input when a PAL colour black genlock is supplied. The incoming VITC time must be 29.97 Frames per second drop frame. The 5600MSC will not read any date information in the VITC. Use this if the incoming VITC has no date information embedded.

When set to *PAL VITC tm ref* the 5600MSC system time is referenced to time information being read from VITC on the video genlock input when a PAL colour black genlock is supplied. The incoming VITC time must be 25 Frames per second.

When set to *PAL VITC tm nd* the 5600MSC system time is referenced to time information being read from VITC on the video genlock input when a PAL colour black genlock is supplied. The incoming VITC time must be 25 Frames per second. The 5600MSC will not read any date information in the VITC. Use this if the incoming VITC has no date information embedded.



When using VITC as a time reference, the **FREQUENCY REF** menu item must be set to *Video freq ref*.

3.5.3. Setting The VITC Reader Line

INPUT
INPUT VITC LINE
Vitc in line 17

This menu item allows the user to set the video line that the VITC reader will use to read time from vertical interval time code inserted on the genlock video. This time may be used as the time reference by setting the *TIME REF* menu item to one of the VITC time sources. See section 3.5.2.

3.5.4. Configuring the Genlock Capture Range

INPUT
GENLOCK RANGE
GL range narrow
GL range wide

The *GENLOCK RANGE* menu item is used to select the tolerance of the master oscillator lock range when it is attempting to lock to a video reference. The *FREQUENCY REF* menu item must be set to *Video freq ref* in order to lock the 5600MSC to an external video reference (see section 3.5.1).

Set this menu to *GL range narrow* when the frequency stability of the genlock video is tightly controlled and within 0.1 ppm. The *LOCK CONTROL* menu item is used to select whether the 5600MSC will abruptly lock to its frequency reference or slowly rephase until it achieves a locked condition. (See section 3.5.6.)

Set this menu to *GL range wide* when the frequency stability of the genlock video is unknown.

When the *FREQUENCY REF* menu item is set to *GPS freq ref* or *10 MHz freq ref* or *Internal freq ref* the front panel display will show the message N.A. GPS FRQ REF or N.A. 10 MHZ REF or N.A. INT FRQ REF when you enter the *GENLOCK RANGE* menu item. The *GENLOCK RANGE* menu item will be set to *GL range narrow* and the front panel display will be dimmed to indicate that you can not change this menu item.

3.5.5. Synchronizing The System Master Oscillator to the Frequency Reference Immediately

INPUT
JAM SYSTEM NOW
Force System Jam
Reset Genlock

This menu item allows the user to synchronize the master system oscillator to its frequency reference. This will only be necessary when the *Lock Control* menu item is set to *slow* and there has been an abrupt change in the frequency reference (e.g. a sudden change of video phase when the *Frequency Reference* menu item is set to *Video ref*)

To synchronize all the system master oscillator to the Frequency reference immediately, press the **SELECT** button when *Force system jam* is shown on the display. The front panel display will show *SYSTEM JAMMED* for 0.6 seconds after the oscillator has been synchronized.

The internal frequency reference oscillator in the 5600MSC is calibrated at the factory to that it can quickly stabilize when power is applied to the unit. These frequency control parameters are saved in the non-volatile memory of the 5600MSC. To recalibrate the frequency locking system of the 5600MSC press the **SELECT** button when *Reset Genlock* is shown on the display. You will be prompted to make sure this is what you want to do. Recalibration may take up to 30 seconds. This must only be done when the reference is known to be stable and accurate.



Re-synchronizing the master oscillator or Resetting the genlock may disrupt the timing of all the sync outputs, and the LTC and VITC timecodes and therefore must be used with caution.

3.5.6. Configuring the Lock Speed

INPUT
LOCK CONTROL
Abrupt lock
Slow lock

The *LOCK CONTROL* menu item is used to select whether the 5600MSC will abruptly lock to its frequency reference or slowly rephase until it achieves a locked condition when the *GENLOCK RANGE* menu item is set to *GL range narrow*.

When set to *Abrupt lock* the 5600MSC will make a sudden change in internal oscillator to bring it into lock with the time and frequency reference being applied. This setting may cause disturbances to the sync and timecode outputs as the unit relocks to its reference.

When set to *Slow lock* the 5600MSC will gradually adjust its internal oscillator to bring it into lock with the time and frequency reference being applied. This setting will not cause any disturbances to the sync outputs as they rephase. If the 5600MSC detects a change in its frequency reference that is outside its frequency capture range then it will not be able to slowly rephase to the new frequency. In this case a *System Jam* will be required in order for the 5600MSC to relock to the reference. (See section 3.3.3 and 3.5.5.)

When the *GENLOCK RANGE* menu item is set to *GL range wide* the *LOCK CONTROL* menu item will be set to *Abrupt lock* and the front panel display will be dimmed to indicate that you can not change this menu item.

3.6. CONFIGURING THE OUTPUTS

The *OUTPUT SETUP* menu is used to set up various items related to the different outputs of the 5600MSC. The chart below shows the items available in the *OUTPUT SETUP* menu. Sections 3.6.1 and 3.6.2 give detailed information about each of the sub menus.

LTC 1 OUTPUT	Configures the Primary LTC output.
LTC 2 OUTPUT	Configures the Secondary LTC output.
BANK 1 SETUP	Configures the Frequency source for the Bank 1 Outputs (Sync 1, 2, & 3)
BANK 2 SETUP	Configures the Frequency source for the Bank 2 Outputs (Sync 4, 5, & 6)
SYNC 1 OUTPUT	Configures the Sync 1 Output
SYNC 2 OUTPUT	Configures the Sync 2 Output
SYNC 3 OUTPUT	Configures the Sync 3 Output
SYNC 4 OUTPUT	Configures the Sync 4 Output
SYNC 5 OUTPUT	Configures the Sync 5 Output
SYNC 6 OUTPUT	Configures the Sync 6 Output
ANALOG TEST GEN	Configures the Analog Video Test Generator output
ANALOG TEST SIGS	Selects the test signal on the Analog Video Test Generator output
SDI TEST GEN	Configures the standard definition SDI Test Generator output
SDI TEST SIGNALS	Selects the test signal on the SDI Test Generator output
HD TEST GEN	Configures the HD SDI Test Generator output
HD TEST SIGNALS	Selects the test signal on the HD SDI Test Generator output
GLOBAL PHASING	Configures the output phase of all signals, where valid
GLOBAL PEDESTAL	Configures pedestal on all signals, where valid
AUDIO LEVEL	Sets audio level for analogue audio outputs
AUDIO 1 EVENT	Configures the sound associated with Audio Event 1
AUDIO 2 EVENT	Configures the sound associated with Audio Event 2
AUDIO 3 EVENT	Configures the sound associated with Audio Event 3
AUDIO 4 EVENT	Configures the sound associated with Audio Event 4
AUDIO 5 EVENT	Configures the sound associated with Audio Event 5
AUDIO 6 EVENT	Configures the sound associated with Audio Event 6
AUDIO 7 EVENT	Configures the sound associated with Audio Event 7
AUDIO 8 EVENT	Configures the sound associated with Audio Event 8
AUDIO 9 EVENT	Configures the sound associated with Audio Event 9
AUDIO 10 EVENT	Configures the sound associated with Audio Event 10
AES/DARS OUTPUT	Configures the AES and DARS outputs

Table 3-2: Top Level of the Output Setup Menu

3.6.1. Configuring the LTC Outputs

There are two LTC outputs available on the 5600MSC. Each of the outputs can be individually configured using a similar set of menus. The *LTC power* menu item described in section 3.6.1.1 is only available in the *LTC 1 OUTPUT* menu. For the sake of simplicity only the menus for LTC output 1 will be described in the manual.

3.6.1.1. Selecting Normal or Powered LTC Output (LTC1 output only)

OUTPUT
LTC 1 OUTPUT
LTC 1 Power
L1 power off
L1 power on

This menu item controls whether the LTC 1 output available on the 3 pin XLR connector will be a standard SMPTE 12M signal or whether it will be modulated to drive Evertz 1200 series clocks operating in slave mode. The LTC 1 output on the 9 pin D connector does not have the capability of powering the 1200 series clocks. See section 3.3.6 for status messages related to the LTC1 Power.

Select *L1 power off* for all applications except driving Evertz 1200 series clocks. The LTC output level is set using the *LTC level* menu item.

Select *L1 power on* for applications where you want to transmit power along the LTC output to Evertz 1200 series clocks.

3.6.1.2. Setting the LTC Output Rate



When the *Time Reference* is set to *LTC In* or *VITC In* then the *LTC1 Rate* menu item is ignored and the *LTC 1 Rate* will be set to match the rate of the incoming LTC or VITC respectively.

OUTPUT
LTC 1 OUTPUT
LTC 1 Rate
L1 rate 30.00
L1 rate 29.97
L1 rate 29.97 df
L1 rate 25.00
L1 rate 24.00
L1 rate 23.98

This menu item sets the frame rate and counting mode of the LTC 1 output. When using time code rates that do not run at real time, in order to maintain a correlation to real time they must be resynchronized to the System time once per day. The *LTC 1 Jam Time* menu item is used to set the time when the re-synchronization will occur. This time should be chosen so that time code disruptions will have the least effect in the television plant. (See section 3.6.1.3)

Select *L1 rate 30.00* to generate time code that counts at 30 frame per second and has a bit rate of 2400 bits per second. This LTC will run at exactly real time and is often used for driving master clock systems. This time code will be asynchronous to video sync pulse outputs in the NTSC-M, 1080i/59.94, and 720p/59.94 video standards.

Select *L1 rate 29.97* to generate time code that counts at 30 frames per second and has a bit rate of approximately 2397 bits per second. This LTC will run approximately 86.3 seconds per day slower than real time. This time code will be synchronous to video sync pulse outputs in the NTSC-M, 1080i/59.94, and 720p/59.94 video standards.

Select *L1 rate 29.97 df* to generate time code that counts at a nominal 30 frames per second using the SMPTE Drop Frame counting sequence and has a bit rate of approximately 2397 bits per second. This LTC will run approximately 2.6 frames per day faster than real time. This time code will be synchronous to video sync pulse outputs in the NTSC-M, 1080i/59.94, and 720p/59.94 video standards.

Select *L1 rate 25.00* to generate time code that counts at 25 frames per second and has a bit rate of 2000 bits per second. This LTC will run at exactly real time and is often used for driving master clock systems. This time code will be synchronous to video sync pulse outputs in the PAL-B, 1080i/50, and 720p/50 video standards.

Select *L1 rate 24.00* to generate time code that counts at 24 frames per second and has a bit rate of 1920 bits per second. This LTC will run at exactly real time and will be synchronous to video sync pulse outputs in the 1080p/24sF and 1080p/24 video standards.

Select *L1 rate 23.98* to generate time code that counts at a nominal 24 frames per second and has a bit rate of approximately 1918 bits per second. This LTC will run approximately 86.3 seconds per day slower than real time. This time code will be synchronous to video sync pulse outputs in the 1080p/23.98, and 1080p/23.98sF video standards.

3.6.1.3. Selecting when the LTC Time is Synchronized to the System Time

OUTPUT
LTC 1 OUTPUT
LTC 1 Jam Time
L1 jam at 00:00

This menu item allows the user to set a time when the LTC 1 output time will be synchronized to the System Time. This synchronization is necessary once per day to maintain a long term correlation between the real time System Time when using time code rates that do not run at real time. When the *TIME REF* is set to *Gps time ref* the LTC1 output time will have to be synchronized to the system time to correct for leap seconds.

Enter the hour and minute value for the jam time using a procedure similar to that in section 3.7.12.

You can also synchronize the LTC 1 output time immediately using the *LTC 1 Jam Now* menu item (see section 3.6.1.4). You can also synchronize all the LTC and VITC time codes immediately using the *Jam LTC/VITC Now* menu item (see section 3.6.1.5).

3.6.1.4. Synchronizing The LTC Time to the System Clock Immediately

OUTPUT
LTC 1 OUTPUT
LTC 1 Jam Now
L1 force jam

This menu item allows the user to synchronize the LTC 1 output time to the System Time immediately. This synchronization will also happen once per day at the time set using the *LTC 1 Jam Time* menu (see section 3.6.1.3).

To synchronize the LTC 1 time immediately, press the **SELECT** button when *L1 force jam* is shown on the display. The front panel display will show *L1 JAMMED* for 0.6 seconds after the time has been synchronized.

3.6.1.5. Synchronizing All The LTC and VITC Times to the System Clock Immediately

OUTPUT
LTC 1 OUTPUT
Jam Ltc/Vitc Now
Force jam all

This menu item allows the user to synchronize the LTC 1, LTC 2 and all the VITC output times to the System Time immediately.

To synchronize all the LTC and VITC times immediately, press the **SELECT** button when *Force jam all* is shown on the display. The front panel display will show **LTC/VITC JAMMED** for 0.6 seconds after the time has been synchronized.

3.6.1.6. Setting The LTC Offset

OUTPUT
LTC 1 OUTPUT
LTC 1 Offset
L1 offset +0 fr

This menu item allows the user to set an offset between the system time and the LTC 1 output time. This feature is commonly used to compensate for video path delays common within a television facility. The offset value will be added to the system time along with the Time Zone offset (see section 3.6.1.7) and the Daylight Saving time correction (see section 3.6.1.8) to obtain the LTC 1 output time. To advance the LTC earlier than the system time set the offset to a negative (-) value.



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that adjusting the LTC Offset values will affect the LTC 1 output time immediately. You do not have to press the **SELECT** button to accept the new values. Use this control with caution.

3.6.1.7. Setting The LTC Time Zone

OUTPUT
LTC 1 OUTPUT
LTC 1 Tm Zone
L1 tz utc+00:00

This menu item allows the user to set a time zone offset between the system time and the LTC 1 output time. The time zone offset value is in 30 minute increments from the system time that is normally running at UTC. This time zone offset will be added to the system time along with the Daylight Saving time correction (see section 3.6.1.8) and the LTC 1 offset (see section 3.6.1.6) to obtain the LTC 1 output time.

Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to adjust the time zone. When you have selected the desired time zone, press the **SELECT** button to make this value active. The active time zone will be blinking on the front panel.

3.6.1.8. Enabling Daylight Saving Time Compensation on the LTC Output

OUTPUT
LTC 1 OUTPUT
LTC 1 DST Enable
L1 dst enabled
L1 dst disabled

This menu item allows the user to control whether Daylight Saving Time (DST) compensation will be applied to the time information on the LTC 1 output.

When set to *L1 dst disabled*, Daylight Saving Time compensation will not be applied to the LTC 1 time information.

When set to *L1 dst enabled* the rules set by the *DST RULES* menu item on the *GENERAL SETUP* menu will be used to adjust the LTC 1 time.

3.6.1.9. Enabling the LTC Output Parity Bit

OUTPUT
LTC 1 OUTPUT
LTC 1 Parity
L1 parity off
L1 parity on

This menu item allows the user to control whether parity bit is used on the LTC 1 output.

When set to *L1 parity off*, the parity bit will always be set to 0.

When set to *L1 parity on*, the parity bit will be set to give an even number of 1's in each LTC frame.

3.6.1.10. Enabling LTC Output Colour Frame Bit

OUTPUT
LTC 1 OUTPUT
LTC 1 Colr Frame
L1 cf off
L1 cf on

This menu item allows the user to control whether colour frame bit is used on the LTC 1 output.

When set to *L1 parity off*, the colour frame bit will always be set to 0.

When set to *L1 parity on*, the colour frame bit will be set to 1 to give indicate colour frame synchronization.

3.6.1.11. Setting The LTC Output Level

OUTPUT
LTC 1 OUTPUT
LTC 1 Level
L1 level = 30.4%

This menu item allows the user to adjust the LTC 1 output amplitude. The value shown does not have any correspondence to a specific peak output voltage. It only shows a percentage of output range. You will have to measure the LTC1 output voltage and set this menu item to achieve the desired output level

3.6.2. Configuring the Video Sync Outputs

There are two banks of three video sync outputs (for a total of six outputs) available on the 5600MSC. The format of each output can be set independently of each other with the restriction that all outputs in bank 1 (S1, S2, and S3) or bank 2 (S4, S5 S6) must be operating at the same clock frequency. For the sake of simplicity only the menus for Sync Bank 1 will be described in the manual.

3.6.2.1. Selecting the Clock frequency for Each Bank of the Sync Outputs

OUTPUT

BANK 1 SETUP

Bank1 sd
Bank1 hd 1.000
Bank1 hd 1.001

The *Bank 1 Setup* menu item determines the sync standards available for all outputs in bank 1. The *Bank 2 Setup* menu item determines the sync standards available for all outputs in bank 2.

The video standards available for each bank clock frequency are shown in section 3.6.2.2.



The front panel display will show **WARNING -- AFFECTS S1 S2 S3** to indicate that setting the reference clock frequency for the banks may affect the sync format of the outputs in the respective bank. Press **SELECT** acknowledge that you understand this and wish to proceed changing the Bank 1 frequency. E.g. if sync output 1 is set to PAL-M and you set the Bank 1 frequency to HD 1.000 then the sync 1 output will be immediately changed to an integer HD tri-level sync type. Use this control with caution.

3.6.2.2. Selecting the Standard of the Sync Outputs

OUTPUT

SYNC 1 OUTPUT

Sync 1 Standard
S1 NTSC-M
S1 PAL-B
S1 PAL color frm
S1 1 Hz
S1 1/1.001 Hz
S1 6/1.001 Hz

This menu item sets the video sync output format.

Colour black in the *NTSC-M* and *PAL-B* standards is available when the respective *Bank Setup* menu item is set to *SD*. When either of these standards is selected, vertical interval time code can be inserted onto the colour black output. The menu items described in section 3.6.2.3 allow you to enable the VITC or 10 field pulses on the output and configure it.

Several timing pulse outputs are also available when the respective *Bank Setup* menu item is set to *SD*. The *PAL color frm* pulse occurs every 8 fields is aligned to colour field 1 of the PAL colour field sequence. The *1Hz* pulse occurs once per second at the beginning of the second and indicates the point where the vertical syncs of 60Hz and 50Hz HD sync signals are coincident. The *1/1.001 Hz* pulse occurs nominally once per second at the beginning of the second and indicates the point where the vertical syncs of 59.94 Hz and 23.98Hz HD sync signals are coincident. The *6/1.001 Hz* pulse occurs nominally six times per second and indicates the point where the vertical syncs of 59.94 Hz and 23.98Hz HD sync signals are coincident.



The maximum voltage output of the timing pulses is approximately 1 volt p-p. Users may have to increase the amplitude of these pulses by using an Evertz equalizing DA (model 7700ADA-EQ or 500ADA-EQ) with the gain set to maximum in order to interface these pulses to other equipment.

OUTPUT
SYNC 1 OUTPUT
S1 1080i/60
S1 1080i/50
S1 1080p/24sf
S1 1080p/25
S1 720p/50
S1 720p/24
S1 1080p/24
S1 625i/48
S1 1080p/24
S1 720p/60

Tri-level sync in the 24, 25, 30 and 60 frames per second high definition standards is available when the respective *Bank Setup* menu item is set to *HD 1.000*.

OUTPUT
SYNC 1 OUTPUT
S1 1080i/59.94
S1 1080p/23.98sf
S1 720P/23.98
S1 625i.47.95
S1 1080p/23.98
S1 720p/59.94

Tri-level sync in the 23.98 and 59.94 frames per second high definition standards is available when the respective *Bank Setup* menu item is set to *HD 1.001*.

3.6.2.3. Configuring the VITC Generator for the Colour Black Outputs

3.6.2.3.1. Enabling VITC on the Video Output

OUTPUT
SYNC 1 OUTPUT
Sync 1 VITC
S1 vitc off
S1 vitc on

This menu item selects whether there will be vertical interval time code (VITC) on the sync output.

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.



When the *Time Reference* is set to *LTC In* or *VITC In* then the *VITC Enable* menu item will be forced to *vitc off* if the *Sync 1* frame rate is different than the rate of the incoming LTC or VITC respectively.

3.6.2.3.2. Selecting the VITC Lines

OUTPUT
SYNC 1 OUTPUT
Sync 1 VITC Ln 1
S1 vitc ln 1= 14

These menu items select the lines on which the VITC will be inserted when the *VITC enable* menu item is set to *VITC On*. The 5600MSC keeps track of the lines for both the PAL and NTSC video standards, you will have to set the line numbers separately for each video standard.

OUTPUT
SYNC 1 OUTPUT
Sync 1 VITC Ln 2
S1 vitc ln 2= 14

The default line values for NTSC-M are lines 14 and 16.
The default line values for PAL-B are lines 19 and 21.

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.

3.6.2.3.3. Enabling Drop Frame Compensation on the VITC Output

OUTPUT
SYNC 1 OUTPUT
Sync 1 VITC DF
S1 vitc drop frm
S1 vitc non df
S1 no pal df
S1 no vitc in hd

This menu item allows the user to control whether drop frame counting mode will be used for the Sync 1 output's VITC time.

When the Sync 1 standard is set to *NTSC-M*, there are two counting modes possible for the VITC time information. When set to *S1 vitc non df*, the Sync 1 output's VITC time will count 30 frames per second, and the drop frame flag of the VITC will not be set. When set to *S1 vitc drop frm*, the Sync 1 output's VITC time will count in the SMPTE 12M Drop Frame mode, dropping frame counts 0 and 1 of the first second of each minute except minutes 0, 10, 20, 30, 40, and 50, and the drop frame flag of the VITC will be set.

When the Sync 1 standard is set to *PAL-B*, the Sync 1 output's VITC time will count 25 frames per second, and the drop frame flag of the VITC will not be set. The menu item will show the message *S1 no pal df* when the *Sync Standard* is set to *PAL-B*.

When the *Sync 1 Standard* is set to one of the high definition video standards the menu item will show the message *S1 no vitc in hd*.

3.6.2.3.4. Enabling Colour Frame Compensation on the VITC Output

OUTPUT
SYNC 1 OUTPUT
Sync 1 VITC CF
S1 vitc cf on
S1 vitc cf off
S1 no vitc in hd

This menu item allows the user to control whether colour frame compensation will be applied to the Sync 1 output's VITC time.

When set to *CF disabled*, colour frame compensation will not be applied to the Sync 1 output's VITC time information.

When set to *CF enabled* the Sync 1 output's VITC time will be adjusted so that it's time is aligned to the colour frame sequence of the colour black output according to the SMPTE 12M rules for colour framed time code. The Colour Frame flag bit in the VITC will be set to 1.

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.

3.6.2.3.5. Selecting when the VITC Time is Synchronized to the System Time

OUTPUT
SYNC 1 OUTPUT
Sync 1 Jam Time
S1 jam at 00:00

This menu item allows the user to set a time when the Sync 1 output's VITC time will be synchronized to the System Time. This synchronization is necessary once per day to maintain a long term correlation between the real time System Time when using time code rates that do not run at real time.

When the *TIME REF* is set to *Gps time ref* the VITC output time will have to be synchronized to the system time to correct for leap seconds.

Enter the hour and minute by turning the **SHAFT ENCODER**.

You can also synchronize the Sync 1 output's VITC time immediately using the *Sync 1 Jam Now* menu item (see section 3.6.2.3.6). You can also synchronize all the LTC and VITC time codes immediately using the *Jam LTC/VITC Now* menu item (see section 3.6.2.3.7).

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.

3.6.2.3.6. Synchronizing The VITC Time to the System Clock Immediately

OUTPUT
SYNC 1 OUTPUT
Sync 1 Jam Now
S1 force jam

This menu item allows the user to synchronize the Sync 1 output's VITC time to the System Time immediately. This synchronization will also happen once per day at the time set using the *Sync 1 Jam Time* menu (see section 3.6.2.3.5).

To synchronize the Sync 1 output's VITC time immediately, press the **SELECT** button when *S1 force jam* is shown on the display. The front panel display will show *S1 JAMMED* for 0.6 seconds after the time has been synchronized.

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.

3.6.2.3.7. Synchronizing The LTC and VITC Times to the System Clock Immediately

OUTPUT
SYNC 1 OUTPUT
Jam Ltc/Vitc Now
Force jam all

This menu item allows the user to synchronize the LTC 1, LTC 2 and all the VITC output times to the System Time immediately.

To synchronize all the LTC and VITC times immediately, press the **SELECT** button when *Force jam all* is shown on the display. The front panel display will show *LTC/VITC JAMMED* for 0.6 seconds after the time has been synchronized.

3.6.2.3.8. Setting The VITC Offset

OUTPUT
SYNC 1 OUTPUT
Sync 1 Offset
S1 offset +0 fr

This menu item allows the user to set an offset between the system time and the Sync 1 output's VITC time. This feature is commonly used to compensate for video path delays common within a television facility. The offset value will be added to the system time along with the Time Zone offset (see section 3.6.2.3.9) and Daylight Saving time correction (see section 3.6.2.3.10) to obtain the Sync 1 output's VITC time. To advance the VITC earlier than the system time set the offset to a negative (-) value.

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that adjusting the VITC Offset values will affect the VITC output time immediately. You do not have to press the **SELECT** button to accept the new values. Use this control with caution.

3.6.2.3.9. Setting The VITC Time Zone

OUTPUT
SYNC 1 OUTPUT
Sync 1 Time Zone
S1 tz utc+00:00

This menu item allows the user to set a time zone offset between the system time and the Sync 1 output's VITC time. The time zone offset value is in 30 minute increments from the system time which is normally running at UTC. This time zone offset will be added to the system time along with the Daylight Saving time correction (see section 3.6.2.3.10) and the Sync 1 offset (see section 3.6.2.3.8) to obtain the Sync 1 output's VITC time.

Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to adjust the time zone. When you have selected the desired time zone, press the **SELECT** button to make this value active. The active time zone will be blinking on the front panel.

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.

3.6.2.3.10. Enabling Daylight Saving Time Compensation on the VITC Output

OUTPUT
SYNC 1 OUTPUT
Sync 1 DST En
S1 dst enabled
S1 dst disabled

This menu item allows the user to control whether Daylight Saving Time compensation will be applied to the Sync 1 output's VITC time.

When set to *S1 dst disabled*, Daylight Saving Time compensation will not be applied to the Sync 1 output's VITC time information.

When set to *S1 dst enabled* the rules set by the *DST RULES* menu item on the *GENERAL SETUP* menu will be used to adjust the Sync 1 output's VITC time.

This menu item is only applicable when the *Sync Standard* is set to the *PAL-B* or *NTSC-M* standards. The menu item will show the message *S1 no vitc in hd* when the *Sync Standard* is set to one of the high definition video standards.

3.6.2.3.11. Enabling Ten Field Pulse

OUTPUT
SYNC 1 OUTPUT
Sync 1 Ten Field
S1 ten field on
S1 ten field off

This menu item allows the user to control whether SMPTE 318M compatible ten field pulse sequence is inserted on the sync output. This pulse sequence is commonly used to synchronize the AES audio sample distribution over ten field of NTSC video.

When set to *S1 ten field off*, the ten field pulse sequence is not inserted.

When set to *S1 ten field on*, a ten field pulse sequence will be embedded if the *Sync Standard* is set to the *NTSC-M*.

This menu item is only applicable when the *Sync Standard* is set to the NTSC-M standards. The menu item will show the message *S1 no pal 10 fld* when the *Sync Standard* is set to the *PAL-B*. The menu item will show the message *S1 no hd 10 fld* when the *Sync Standard* is set to one of the high definition video standards.

3.6.2.4. Setting The Phase of the Sync Outputs

The phase of the six sync outputs can be set independent of each other. There are four registers that are used to set the phase. Figure 3-9 and Figure 3-10 show the default video sync alignment (V phase = 1, H phase = 1, fine phase = 0.0%) for 59.94 Hz and 50 Hz systems respectively.

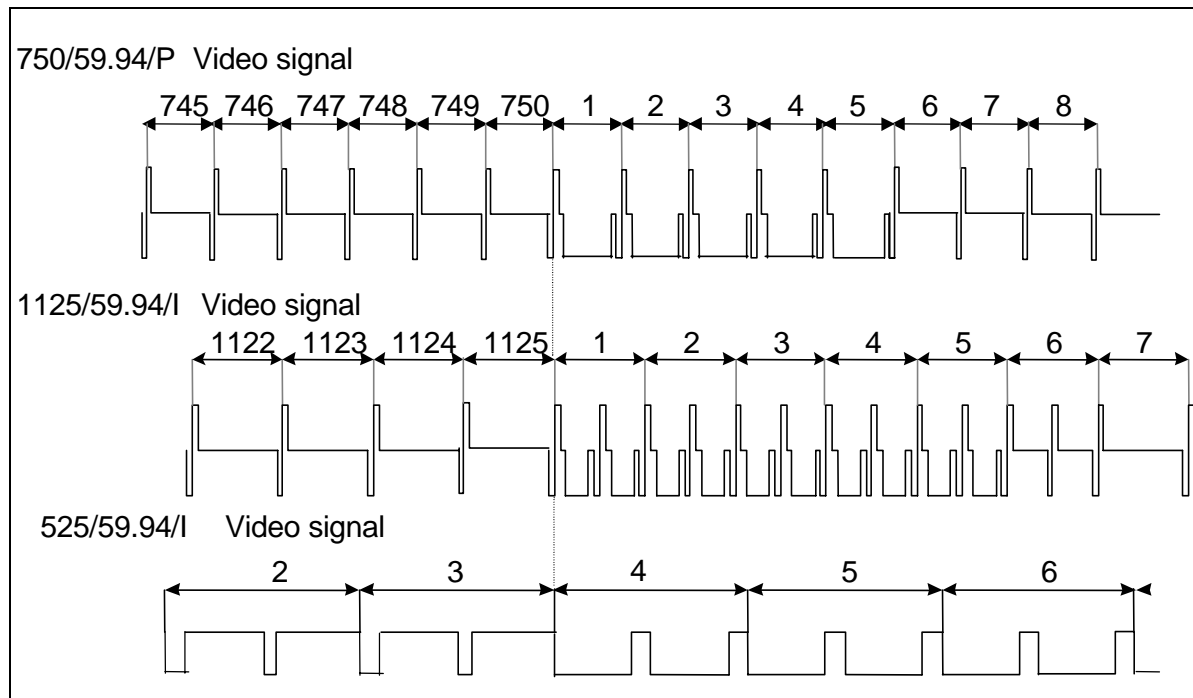


Figure 3-9: Video Sync Phase Alignment in 59.94 Hz Field Rate Systems

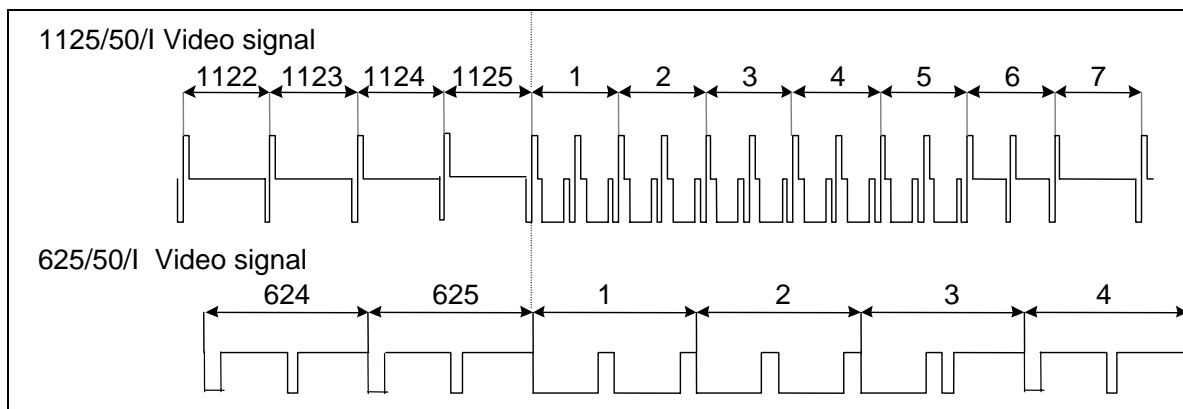


Figure 3-10: Video Sync Phase Alignment in 50 Hz Field Rate Systems



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that adjusting the Sync output phase menu items will affect the phasing of the respective Sync output immediately. You do not have to press the **SELECT** button to accept the new values. Use these controls with caution, as they will affect the overall timing of devices connected to the sync outputs.

OUTPUT
SYNC 1 OUTPUT
Sync 1 Col'r Frm
S1 col'r frm = 1

This menu item is used to set the phase of the video output in whole frames and is usually used to align the colour frame sequence in PAL and NTSC systems. For HD sync standards the value for the *Col'r frm* phase will always be 1.

OUTPUT
SYNC 1 OUTPUT
Sync 1 V Phase
S1 v phase = 1

This menu item is used to set the phase of the video output in lines.

OUTPUT
SYNC 1 OUTPUT
Sync 1 H Phase
S1 h phase = 1

This menu item is used to set the phase of the video output in samples.

OUTPUT
SYNC 1 OUTPUT
Sync 1 Fine phs
S1 fine ph= 0.0%

This menu item is used to set the phase of the video output in fractions of a sample. 100.0% is equivalent to one sample period.

When adjusting any of the above 4 phasing parameters, the display will momentarily show all of the available *Colour Frame*, *V Phase*, *H Phase*, and *Fine Phase* in sequence. After 1 second the display will revert to showing the parameter being adjusted.

For example if the Colour Frame is 2, V Phase is 255, H Phase is 7 and fine phase is 0.0% then while adjusting the H Phase upwards by 3 steps, the display will show

```
2 255 8 00.0
2 255 9 00.0
2 255 10 00.0
```

and then will return to

```
S1 h phase = 10
```

3.6.3. Configuring the Analog Video Test Generator Output (STG Option only)

3.6.3.1. Selecting the Standard of the Analog Video Test Generator Output

OUTPUT

ANALOG TEST GEN

ATG Standard

ATG NTSC-M

ATG PAL-B

This menu item sets the output format of the analog video test generator output.

3.6.3.2. Setting The Phase of the Analog Video Test Generator Output

The Analog test signal outputs will all have the same phase and can be adjusted independent of the analog colour black, and SDI and HD SDI test signal outputs. There are four registers that are used to set the phase of the Analog Test Generator output. Figure 3-9 and Figure 3-10 show the default video sync alignment for 59.94 Hz and 50 Hz systems respectively.



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that adjusting the Analog Test Generator output phase menu items will affect the phasing of the Analog Test Generator output immediately. You do not have to press the **SELECT** button to accept the new values. Use these controls with caution, as they will affect the overall timing of devices connected to the Analog Test Generator output.

OUTPUT

ANALOG TEST GEN

ATG Col'r Frm

ATG col'r frm = 1

This menu item is used to set the phase of the video output in whole frames and is usually used to align the colour frame sequence in PAL and NTSC systems.

OUTPUT

ANALOG TEST GEN

ATG V Phase

ATG vert ph = 1

This menu item is used to set the phase of the video output in lines.

OUTPUT

ANALOG TEST GEN

ATG H Phase

ATG hor Ph = 1

This menu item is used to set the phase of the video output in samples.

OUTPUT
ANALOG TEST GEN
ATG Fine phs
ATG fn ph= 0.0%

This menu item is used to set the phase of the video output in fractions of a sample. 100.0% is equivalent to one sample period.

3.6.3.3. Configuring the Analog Video Test Generator On Screen Message Display

The 5600MSC Analog Video Test generator has a programmable 16-character text message that may be used to display a source identification message or any other information on the screen.

3.6.3.3.1. Editing the On Screen Message Display

OUTPUT
ANALOG TEST GEN
ATG Message Text

The *ATG Message Text* menu item is used to edit the text message. When you enter the *ATG Message Text* menu item, the actual text message is displayed on the top line of the analog video test generator output and the front panel of the 5600MSC.

To edit the message, turn the **SHAFT ENCODER** knob to change the blinking character. Press the arrow keys (↑, ↓) to change to the next or previous character. Press the **SELECT** button when done. Note that blank spaces do not blink.

3.6.3.3.2. Positioning the On Screen Message Display

OUTPUT
ANALOG TEST GEN
ATG Message H
ATG message h 01

The *ATG Message H* menu item is used to position the text message horizontally on the character raster. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move the message horizontally. Press the **SELECT** button to save the new position or press the **ESC** button to exit the *ATG Message H* menu without saving the new position.

OUTPUT
ANALOG TEST GEN
ATG Message V
ATG message v 01

The *ATG Message V* menu item is used to position the text message vertically on the character raster. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move the message vertically. Press the **SELECT** button to save the new position or press the **ESC** button to exit the *ATG Message V* menu without saving the new position.

3.6.3.3.3. Enabling the On Screen Message Display

OUTPUT
ANALOG TEST GEN
ATG Message En
ATG message off
ATG message on

The *ATG Message En* menu item is used to turn the Analog Video Test Generator On Screen Message Display on and off.

3.6.3.3.4. Setting the Font Size of the On Screen Message Display

OUTPUT
ANALOG TEST GEN
ATG Message Font
ATG font small
ATG font large

The *ATG Message Font* menu item is used to turn set the size of the font used for the Analog Video Test Generator On Screen Message Display.

3.6.3.4. Enabling the SDI Test Generator Moving Line

OUTPUT
ANALOG TEST GEN
ATG Moving Line
ATG move In off
ATG move In on

The *ATG moving line* menu item is used to select whether there is a moving line on the Analog test generator output or not.

Select *ATG move In on* to add a horizontal black line with text in it that moves continuously from the top to the bottom of the picture. This moving line allows you to detect frozen video content.

3.6.4. Selecting the Analog Video Test Generator Signal (STG Option only)

OUTPUT
ANALOG TEST SIGS

This menu item allows you to select the test signal on the analog test signal generator output.

Use the arrow keys (↑, ↓) or turn the shaft encoder knob to select the test signal. The name of the current test signal is shown on the front panel display. Table 3-3 and Table 3-4 show the test signals that are available for the 525 and 625 line video standards. Most of the test signals are industry standard signals.



The front panel display will show **WARNING LIVE CTL** for **0.6 seconds** to indicate that changing the Analog Test Generator test signals will affect the Analog Test Generator output immediately. You do not have to press the **SELECT** button to accept the new values.

Test Signal Name	Test Signal Name
SMPTE Color bars	FCC Multiburst
75% Color bars	FCC Composite
100% Color bars	Chroma Freq. Response
Composite Signal	NTC 7 Combination
2T Pulse and Bar	NTC 7 Composite
SinX/X Pulse	Multipulse
20% White Window	60% Ext Multiburst
50% White Window	60% Multiburst
80% White Window	2.5 MHz Bowtie
100% White Window	5 Step
Y Multipulse	Y Ramp
Shallow Y Ramp	Valid ramp
Shallow Ramp	Pathological
Modulated Ramp	White
10 Y Step	Grey
10 Step	Black
Convergence Pattern	

Table 3-3: 525 Line Test Signal Selection

Test Signal Name	Test Signal Name
75% Color bars	Limited ramp
100% Color bars	5 Step
Composite Signal	Y Only 10 Step
Pathological	10 Step
Convergence Pattern	60% Y Sweep
2T 4T 20T Pulse	60% Sweep
CCIR 331	100% Y Sweep
CCIR 330	100% Sweep
CCIR 18	SinX/X Pulse
CCIR 17	60% Multiburst
Y Ramp	2.5 MHz Bowtie
Shallow Y Ramp	White
Shallow Ramp	Grey
Modulated Ramp	Black

Table 3-4: 625 Line Test Signal Selection

3.6.5. Configuring the SDI Video Test Generator Output (STG Option only)

3.6.5.1. Selecting the Standard of the SDI Video Test Generator Output

OUTPUT
SDI TEST GEN
STG Standard
STG NTSC-M
STG PAL-B

This menu item sets the output format of the SDI video test generator output.

3.6.5.2. Setting The Phase of the SDI Video Test Generator Output

The SDI black and test signal outputs will all have the same phase and can be adjusted independent of the analog colour black and analog and HD SDI test signal outputs. There are four registers that are used to set the phase of the SDI Test Generator outputs. Figure 3-9 and Figure 3-10 show the default video sync alignment for 59.94 Hz and 50 Hz systems respectively.



The front panel display will show **WARNING LIVE CTL** for **0.6 seconds** to indicate that adjusting the SDI Test Generator output phase menu items will affect the phasing of the SDI Test Generator output immediately. You do not have to press the **SELECT** button to accept the new values. Use these controls with caution, as they will affect the overall timing of devices connected to the SDI Test Generator output.

OUTPUT
SDI TEST GEN
STG V Phase
STG vert ph = 1

This menu item is used to set the phase of the video output in lines.

OUTPUT
SDI TEST GEN
STG H Phase
STG hor ph = 1

This menu item is used to set the phase of the video output in samples.

3.6.5.3. Configuring the SDI Video Test Generator On Screen Message Display

The 5600MSC SDI Video Test generator has a programmable 16-character text message that may be used to display a source identification message or any other information on the screen.

3.6.5.3.1. Editing the On Screen Message Display

OUTPUT
SDI TEST GEN
STG Message Text

The *STG Message Text* menu item is used to edit the text message. When you enter the *STG Message Text* menu item, the actual text message is displayed on the top line of the SDI video test generator output and on the front panel.

To edit the message, turn the **SHAFT ENCODER** knob to change the blinking character. Press the arrow keys (↑, ↓) to change to the next or previous character. Press the **SELECT** button when done. Note that blank spaces do not blink.

3.6.5.3.2. Positioning the On Screen Message Display

OUTPUT
SDI TEST GEN
STG Message H
STG message h 01

The *STG Message H* menu item is used to position the text message horizontally on the character raster. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move the message horizontally. Press the **SELECT** button to save the new position or press the **ESC** button to exit the *STG Message H* menu without saving the new position.

OUTPUT
SDI TEST GEN
STG Message V
STG message v 01

The *STG Message V* menu item is used to position the text message vertically on the character raster. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move the message vertically. Press the **SELECT** button to save the new position or press the **ESC** button to exit the *STG Message V* menu without saving the new position.

3.6.5.3.3. Enabling the On Screen Message Display

OUTPUT
SDI TEST GEN
STG Message En
STG message off
STG message on

The *STG Message En* menu item is used to turn the SDI Video Test Generator On Screen Message Display on and off.

3.6.5.3.4. Setting the Font Size of the On Screen Message Display

OUTPUT
SDI TEST GEN
STG Message Font
STG font small
STG font large

The *STG Message Font* menu item is used to turn set the size of the font used for the SDI Video Test Generator On Screen Message Display.

3.6.5.4. Configuring the SDI Test Generator Embedded Audio

SMPTE 272M provides for embedding four groups of 4 channels of audio into SMPTE 259M serial digital video signals. The SDI Test Generator output can have audio tones embedded on each of the sixteen channels. The following sections describe how to select the tone frequencies and the level.

3.6.5.4.1. Enabling the SDI Embedded Audio Channel in the Test Signal Output

There are identical menus for each of the 4 groups. For the sake of simplicity only the menu item for group is described in the manual.

OUTPUT
SDI TEST GEN
STG Grp 1 En
Group 1 on
Group 1 off

The *STG Grp 1 En* menu item is used to enable or disable embedding of audio group 1.

Selecting on will embed 4 channels of audio in this group.

3.6.5.4.2. Enabling the SDI Embedded Audio Channel in the Black Output



The capability of embedding silent audio on the Black output is only available on newer hardware versions. These menu items will not be available if the hardware does not support it.

There are identical menus for each of the 4 groups. For the sake of simplicity only the menu item for group is described in the manual.

OUTPUT
SDI TEST GEN
STG Grp 1 Blk En
Group 1 blk on
Group 1 blk off

The *STG Grp 1 Blk En* menu item is used to enable or disable embedding of silent audio on audio group 1.

Selecting on will embed 4 channels of audio in this group.

3.6.5.4.3. Setting the SDI Embedded Audio Channel Frequency

There are identical menus for each of the audio channels. For the sake of simplicity only the menu item for channel 1 is described in the manual.

OUTPUT
SDI TEST GEN
STG Aud 1 Freq
STG ch 1 Ident
STG ch 1 60 hz
STG ch 1 100 hz
STG ch 1 200 hz
STG ch 1 400 hz
STG ch 1 800 hz
STG ch 1 1.0 khz
STG ch 1 1.6 khz
STG ch 1 2.0 khz
STG ch 1 3.2 khz
STG ch 1 4.0 khz
STG ch 1 5.0 khz
STG ch 1 6.4 khz
STG ch 1 8.0 khz
STG ch 1 10 khz
STG ch 1 12 khz

The *STG Aud 1 Freq* menu item is used to select the frequency of the tone that will be embedded into audio channel 1.

Selecting one of these signals will set the frequency of the tone that is embedded into this channel.

When you select *Ident*, the channel will be modulated with a 1 KHz tone according to the setting of the *STG Ident Type* menu item. Ident tones can be used to identify left/right channel swaps.

3.6.5.4.4. Configuring the Embedded Audio Level

There are identical menus for each of the audio channels. For the sake of simplicity only the menu item for channel 1 is described in the manual.

OUTPUT
SDI TEST GEN
STG Aud 1 Level
STG ch 1 mute
STG ch1 -28dB
STG ch1 -26dB
...
STG ch1 -2dBFS
STG ch1 0dBFS

The *STG Aud Level* menu item is used to select the Audio level of channel 1 audio that will be embedded.

The audio level is adjustable in 2dB steps from 0dBFS to -28dBFS

3.6.5.4.5. Setting the SDI Embedded Audio Ident Mode

OUTPUT
SDI TEST GEN
STG Ident Type
Ident type tick
Ident type tone

The *STG Ident Type* menu item is used to select the type of left right ident used when the *STG AUD x Freq* menu item for a specific channel is set to *ident*.

Select *Ident tick* to use 30 msec duration burst of 1 KHz tone once per second.

Select *Ident tone* to use a continuous 1 KHz tone that decreases in level for 30 msec once every 4 seconds.

3.6.5.4.6. Setting the SDI Lip Sync Mode

OUTPUT
SDI TEST GEN
STG Lip sync
STG lip sync off
STG lip sync on

The *STG Lip sync* menu item is used to select the whether the SDI test generator output is modulated for lip sync purposes or not.

Select *STG lip sync on* to add a pulsed modulation to the SDI video and audio. The *STG lip sync* mode overrides *STG Audio Ident* and is output on the SDI, Analog and AES outputs.

3.6.5.5. Enabling the SDI Test Generator Moving Line

OUTPUT
SDI TEST GEN
STG Moving Line
STG move In off
STG move In on

The *STG Moving line* menu item is used to select the whether there is a moving line on the SDI test generator output or not.

Select *STG move In on* to add a horizontal black line with text in it that moves continuously from the top to the bottom of the picture. This moving line allows you to detect frozen video content.

3.6.6. Selecting the SDI Video Test Generator Signal (STG Option only)

OUTPUT
SDI TEST SIGNALS

This menu item allows you to select the test signal on the SDI test signal generator output.

Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to select the test signal. The name of the current test signal is shown on the front panel display. Table 3-3 and Table 3-4 show the test signals that are available for the 525 and 625 line video standards. Most of the test signals are industry standard signals.



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that changing the SDI Test Generator test signals will affect the Analog Test Generator output immediately. You do not have to press the **SELECT** button to accept the new values.

3.6.7. Configuring the HD SDI Video Test Generator Output (HTG Option only)

3.6.7.1. Selecting the Standard of the HD SDI Video Test Generator Output

OUTPUT
HD TEST GEN
HTG Standard
HTG 1080i/60
HTG 1080i/59.94
HTG 1080i/50
HTG 1080p/30
HTG 1080p/30sF
HTG 1080p/29.97
HTG 1080p/29.97s
HTG 1080p/25
HTG 1080p/25sF
HTG 1080p/24
HTG 1080p/24sF
HTG 1080p/23.98
HTG 1080p/23.98s
HTG 720p/60
HTG 720p/59.94
HTG 1035i/60
HTG 1035I/59.94
HTG 720p/50

This menu item sets the output format of the HD SDI video test generator output.



Note: 720p/50 is only available when the 5600MSC is fitted with a 7751TG2-HD Test generator Card. You can use the *Firmware* menu item on the **GENERAL** menu to determine if your unit is fitted with the 7751TG2-HD or not.

3.6.7.2. Configuring The Genlock Reference for the HD SDI Test Generator

3.6.7.2.1. Selecting if the HD SDI Test generator will Free Run or be Genlocked

OUTPUT
HD TEST GEN
HTG Genlock
HTG genlock off
HTG genlock on

This menu item sets whether the HDSDI Test generator will free run on its internal crystal oscillator or be referenced to a genlock signal from one of the 5600MSC sync outputs connected to the TG GEN LOCK input.

3.6.7.2.2. Selecting the HD SDI Test generator Genlock Type

OUTPUT
HD TEST GEN
HTG Genlock Type
HTG gl bi-level
HTG gl tri-level

This menu item sets whether the genlock signal is a HD tri-level sync or a standard definition colour black video or 0.3 V bi-level sync.

Table 3-5 gives a list of the valid reference signal types for the HD output video format you have selected.

Video Format	Valid Genlock Types	
	Bi-Level	Tri-Level
1080i/60	-----	1080i/60, 1080p/30, 1080p/30sF
1080i/59.94	NTSC-M	1080i/59.94, 1035i/59.94, 1080p/29.97, 1080p/29.97sF
1080i/50	PAL-B	1080i/50, 1080p/25, 1080p/25sF
1080p/30	-----	1080i/60, 1080p/30, 1080p/30sF
1080p/30sF	-----	1080i/60, 1080p/30, 1080p/30sF
1080p/29.97	NTSC-M	1080i/59.94, 1035i/59.94, 1080p/29.97, 1080p/29.97sF
1080p/29.97sF	NTSC-M	1080i/59.94, 1035i/59.94, 1080p/29.97, 1080p/29.97sF
1080p/25	PAL-B	1080i/50, 1080p/25, 1080p/25sF
1080p/25sF	PAL-B	1080i/50, 1080p/25, 1080p/25sF
1080p/24	-----	1080p/24, 1080p/24sF
1080p/24sF	-----	1080p/24, 1080p/24sF
1080p/23.98	-----	1080p/23.98, 1080p/23.98sF
1080p/23.98sF	-----	1080p/23.98, 1080p/23.98sF
720p/60	-----	720p/60
720p/59.94	NTSC-M	720p/59.94
720p/50	PAL-B	1080i/50, 1080p/25, 1080p/25sF
1035i/59.94	NTSC-M	1080i/59.94, 1080p/29.97, 1080p/29.97sF, 1035i/59.94

Table 3-5: Valid Genlock Types



Note: 720p/50 is only available when the 5600MSC is fitted with a 7751TG2-HD Test generator Card. You can use the *Firmware* menu item on the **GENERAL** menu to determine if your unit is fitted with the 7751TG2-HD or not.

3.6.7.3. Setting The Phase of the HD SDI Video Test Generator Output

The HD SDI black and test signal outputs will all have the same phase and can be adjusted independent of the analog colour black and analog and SDI test signal outputs. There are two registers that are used to set the phase of the HD SDI Test Generator output. Figure 3-9 and Figure 3-10 show the default video sync alignment for 59.94 Hz and 50 Hz systems respectively.



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that adjusting the HD SDI Test Generator output phase menu items will affect the phasing of the HD SDI Test Generator output immediately. You do not have to press the **SELECT** button to accept the new values. Use these controls with caution, as they will affect the overall timing of devices connected to the HD SDI Test Generator output.

OUTPUT
HD TEST GEN
HTG V Phase
HTG v phase = 1

This menu item is used to set the phase of the video output in lines.

OUTPUT
HD TEST GEN
HTG H Phase
HTG h phase = 1

This menu item is used to set the phase of the video output in samples.

3.6.7.4. Configuring the HD SDI Video Test Generator On Screen Message Display

The 5600MSC HD SDI Video Test generator has a programmable 16-character text message that may be used to display a source identification message or any other information on the screen.

3.6.7.4.1. Editing the On Screen Message Display

OUTPUT
HD TEST GEN
HTG Message Text

The *HTG Message Text* menu item is used to edit the text message. When you enter the *HD Message Text* menu item, the actual text message is displayed on the top line of the HD SDI video test generator output.

To edit the message, turn the **SHAFT ENCODER** knob to change the blinking character. Press the arrow keys (↑, ↓) to change to the next or previous character. Press the **SELECT** button when done. Note that blank spaces do not blink.

3.6.7.4.2. Positioning the On Screen Message Display

OUTPUT
HD TEST GEN
HTG Message H
HTG message h 01

The *HTG Message H* menu item is used to position the text message horizontally on the character raster. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move the message horizontally. Press the **SELECT** button to save the new position or press the **ESC** button to exit the *HTG Message H* menu without saving the new position.

OUTPUT
HD TEST GEN
HTG Message V
HTG message v 01

The *HTG Message V* menu item is used to position the text message vertically on the character raster. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to move the message vertically. Press the **SELECT** button to save the new position or press the **ESC** button to exit the *HTG Message V* menu without saving the new position.

3.6.7.4.3. Enabling the On Screen Message Display

OUTPUT
HD TEST GEN
HTG Message En
HTG message off
HTG message on

The *HTG Message En* menu item is used to turn the HD SDI Video Test Generator On Screen Message Display on and off. The message can be enabled on either the test or black outputs or on both outputs by setting the *HTG Msg Output* menu item.

3.6.7.4.4. Setting the Outputs for Screen Message Display

OUTPUT
HD TEST GEN
HTG Msg Output
HTG msg on tst
HTG msg on black
HTG msg on both

The *HTG Msg Output* menu item is used to determine which outputs of the HD SDI Video Test Generator will show the On Screen Message Display. The message can be enabled on either the test or black outputs or on both outputs.

3.6.7.5. Configuring the HD SDI Test Generator Embedded Audio

The HD SDI Test Generator output can have audio tones embedded on each of the four channels within one group. The following sections describe how to select the select embedded audio group, and the tone frequencies. The tone level is fixed at -20dBFS.

3.6.7.5.1. Setting the Embedded Audio Group

On units fitted with the 7750TG2-HD Test generator card there is one control used to set the audio embedder group.

OUTPUT
HD TEST GEN
HTG Audio Group
HTG audio off
HTG audio grp=1
HTG audio grp=2
HTG audio grp=3
HTG audio grp=4

The *HTG Audio Group* menu item is used to select the Audio Group where embedded audio will be placed. It can also be used to disable embedded audio on the HD SDI Test generator output.

On units fitted with the 7751TG2-HD Test generator card there are identical menus for each of the audio group use to enable or disable the group. For the sake of simplicity only the menu item for group 1 is described in the manual.

OUTPUT
HD TEST GEN
HTG Aud Group 1
HTG aud gr 1 off
HTG aud gr 1 on

This control is only valid in the 7751TG2-HD.
The *HTG Aud Group 1* menu item is used to enable audio group 1 embedded audio on the HD SDI Test generator output.

3.6.7.5.2. Setting the Embedded Audio Frequency

On units fitted with the 7750TG2-HD Test generator card there are 4 identical menus to set the audio signal for each of the audio channels in the group selected by the *HTG Audio Group* menu item.

On units fitted with the 7751TG2-HD Test generator card there are 16 identical menus to set the audio signal for each of the audio channels in each group. The individual audio groups are enabled using the by the *HTG Aud Group* menu items.

For the sake of simplicity only the menu item for channel 1 is described in the manual.

OUTPUT
HD TEST GEN
HTG Ch 1 Freq
HTG ch 1 mute
HTG ch 1 60 hz
HTG ch 1 100 hz
HTG ch 1 200 hz
HTG ch 1 400 hz
HTG ch 1 800 hz
HTG ch 1 1.0 khz
HTG ch 1 1.6 khz
HTG ch 1 2.0 khz
HTG ch 1 3.2 khz
HTG ch 1 4.0 khz
HTG ch 1 5.0 khz
HTG ch 1 6.4 khz
HTG ch 1 8.0 khz
HTG ch 1 10 khz

The *HD SDI Aud 1 Freq* menu item is used to select the Audio signal that will be embedded into audio channel 1 of the audio group selected by the *HTG Audio Group* parameter.

Selecting one of these signals will set the frequency of the tone that is embedded into this channel.

The Audio tones will be embedded on the Test output only when the *HTG Audio Output* menu item is set to *HTG audio on tst* or *HTG audio on b&t*. The black outputs will contain mute embedded audio *when the HTG Audio Output* menu item is set to *HTG audio on blk* or *HTG audio on b&t*.

3.6.7.5.3. Enabling the Embedded Audio

These menu choices are only available on units fitted with the 7750TG2-HD.

OUTPUT
HD TEST GEN
HTG Audio Output
HTG audio on tst
HTG audio on blk
HTG audio on b&t

The *HTG Audio Output* menu item is used to select whether the outputs of the HD SDI Test Signal Generator will contain embedded or not. Embedded audio can be enabled on either the test or black outputs or on both outputs.

The Audio tones selected by the *HTG Audio Freq menu items* will be embedded on the **HD SDI TG OUT** outputs when the *HTG Audio Output* menu item is set to *HTG audio on tst* or *HTG audio on b&t*.

The **HD SDI BLACK** outputs will contain mute embedded audio *when the HTG Audio Output* menu item is set to *HTG audio on blk* or *HTG audio on b&t*.

These menu choices are only available on units fitted with the 7751TG2-HD.

OUTPUT
HD TEST GEN
HTG Audio Output
HTG t:frq b:none
HTG t:none b:frq
HTG t:frq b:frq
HTG t:frq b:mute

The *HTG Audio Output* menu item is used to select whether the outputs of the HD SDI Test Signal Generator will contain embedded or not. Embedded audio can be enabled on either the test or black outputs or on both outputs.

The Audio tones selected by the *HTG Audio Freq* menu items will be embedded on the **HD SDI TG OUT** outputs when the *HTG Audio Output* menu item is set to *HTG t:tst b:none* or *HTG t:frq b:frq* or *HTG t:frq b:mute*.

The Audio tones selected by the *HTG Audio Freq* menu items will be embedded on the **HD SDI BLACK** outputs when the *HTG Audio Output* menu item is set to *HTG t:none b:frq* or *HTG t:frq b:frq*.

The **HD SDI BLACK** outputs will contain mute embedded audio when the *HTG Audio Output* menu item is set to *HTG t:frq b:mute*.

3.6.7.6. Setting the Display Time for the Signal Name Display

OUTPUT
HD TEST GEN
HTG Sig Name Dur
HTG sig dur = 00

The *HTG Sig Name Dur* menu is used to set the length of time the On screen signal name is displayed after the user selects a new signal. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to select a duration in seconds. Press the **SELECT** button to accept the new duration.

3.6.7.7. Configuring the HD SDI Test Generator Output Mode

OUTPUT
HD TEST GEN
HTG Output Mode
HTG mode 4:2:2
HTG mode 4:4:4

This menu item is used to select whether the HD SDI Test Generator operates in a 4:2:2 or 4:4:4 mode.

When the menu item is set to the *HTG Output 4:2:2* mode, the HD SDI Test Generator will generate 4:2:2 video. The **HD SDI TG OUT** outputs will contain the test signal and the **HD SDI BLACK** outputs will contain a black video signal.

When the menu item is set to the *HTG Output 4:4:4* mode, the HD SDI Test Generator will generate 4:4:4 video in the colour space set by the *HTG Colour Space* menu item. The **HD SDI TG OUT** outputs will contain the main channel ($YC_{B(even)}C_{R(even)}$ or $GB_{(even)}R_{(even)}$) part of the test signal. The **HD SDI BLACK** outputs will contain the Alpha channel ($YC_{B(odd)}C_{R(odd)}$ or $AB_{(odd)}R_{(odd)}$) part of the test signal.

3.6.7.8. Configuring the HD SDI Test Generator Colour Space

OUTPUT
HD TEST GEN
HTG Color Space
HTG space rgb
HTG space ycbcr

This menu item is used to select the colour space of the HD SDI Test Generator when the *HTG Output Mode* is set to 4:4:4. This menu item is not applicable when the *HTG Output Mode* is set to 4:2:2.

When the menu item is set to the *HTG space rgb*, the **HD SDI TG OUT** outputs will contain the main channel ($GB_{(even)}R_{(even)}$) part of the test signal and the **HD SDI BLACK** outputs will contain the Alpha channel ($AB_{(odd)}R_{(odd)}$) part of the test signal.

When the menu item is set to the *HTG space ycbcr*, the **HD SDI TG OUT** outputs will contain the main channel ($YC_{B(even)}C_{R(even)}$) part of the test signal. The **HD SDI BLACK** outputs will contain the Alpha channel ($AB_{(odd)}R_{(odd)}$) part of the test signal.

3.6.7.9. Enabling the Closed Captioning Signal

This menu item is only available on units fitted with the 7751TG2-HD.

OUTPUT
HD TEST GEN
HTG Captioning
HTG caption off
HTG caption tst
HTG caption blk
HTG caption b&t

The *HTG Captioning* menu is used to enable the 608/708 closed captioning data.

When the menu item is set to HTG caption off, no caption embedding takes place.

When the menu item is set to the *HTG caption tst*, the **HD SDI TG OUT** outputs will contain the closed caption data.

When the menu item is set to the *HTG caption blk*, the **HD SDI BLACK** outputs will contain the closed caption data.

When the menu item is set to the *HTG caption b&t*, the **HD SDI TG OUT** outputs and the **HD SDI BLACK** outputs will contain the closed caption data.

3.6.8. Selecting the HD SDI Video Test Generator Signal (HTG Option only)

OUTPUT
HD TEST SIGNALS

This menu item allows you to select the test signal on the HD SDI test signal generator output.

Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to select the test signal. Table 3-6 shows the test signals that are available. Most of the test signals are industry standard signals. Sections 3.6.8.1 to 3.6.8.3 describe the test signals that are unique to the 5600MSC. The name of the current test signal is shown on the front panel display.



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that changing the HD Test Generator test signals will affect the Analog Test Generator output immediately. You do not have to press the **SELECT** button to accept the new values.



Some test signals are not available on certain video formats.

Test Signal Name	Test Signal Name
Y Multipulse	Valid Ramp
Multipulse	Clean Aperture with Graticule
100% Y MB: 20, 22, 24, 26, 28, 30	Circle with Centre Cross
100% Y MB: 10, 12, 14, 16, 18, 20	Clean Aperture with Centre
100% Y MB: 1, 2, 4, 6, 8, 10 MHz	Clean Aperture
60% Y MB: 20, 22, 24, 26, 28, 30	Production Aperture
60% Y MB: 10, 12, 14, 16, 18, 20	12% White Window
60% Y MB: 1, 2, 4, 6, 8, 10	20% White Window
100% MB: 20, 22, 24, 26, 28, 30 MHz	50% White Window
100% MB: 10, 12, 14, 16, 18, 20 MHz	80% White Window
100% MB: 1, 2, 4, 6, 8, 10 MHz	100% White Window
60% MB: 20, 22, 24, 26, 28, 30 MHz	Split Field Bars
60% MB: 10, 12, 14, 16, 18, 20 MH	Full Field Pluge
60% MB: 1, 2, 4, 6, 8, 10 MHz	SMPTE Color Bars
60% Y Line Sweep 15 to 30 MHz	75% Color bars with pluge
60% Y Line Sweep to 30 MHz	100% Color bars with pluge
60% Line Sweep 15 to 30 MHz	Lab Bars, Moving Box
60% Line Sweep to 30 MHz	Lab Bars
Grey	75% bars, 100% white
Grey (all data bits active)	75% Color bars
SDI Checkfield	100% Color bars
Bouncing Box	White Field
10 Frame Sequence	Black
Five Frame Sequence	480P Composite Signal
Four Frame Sequence	480P Black/White Frames
Field ID	480P White Frame
Frame ID	480P Production Aperture
Bowtie	480P SMPTE Color Bars
5 Step Staircase	
Valid 5 Step	

Table 3-6: HD SDI Test Signal Selection

3.6.8.1. Clean Aperture with Graticule

This signal contains a number of key physical dimensions of the HDTV active picture area. It divides the 16x9 aspect ratio clean aperture area into an 8x6 graticule grid. The center 6x6 grid corresponds to a 4x3 aspect ratio rectangle that is concentric with the 16x9 clean aperture. The edges of the 4x3 area have different line patterns to help in identifying it. The clean aperture markers are placed so that the center of the lines is at the clean aperture. The production aperture markers are placed so that the outsides of the lines are at the production aperture (the extent of the total image). A center cross marker is also included to mark the middle of the image.

3.6.8.2. Production Aperture

Single horizontal lines and single pixel vertical borders around the active picture mark the production aperture. Single pixels and single horizontal lines are not legal for normal pictures but this test signal is designed to test equipment to make sure it is processing/passing the whole image area. If any side of the box is missing, then the device under test is not passing the whole production aperture.

3.6.8.3. The Grey Signals

These signals can be used as a 50% full field grey, and they are also designed to provide a best case and a worse case toggle rate on the test signal data bits. The regular *Grey* signal has both the luminance and the chrominance values set to 200hex, while the *Grey with all data bits active* signal has both the luminance and the chrominance bits alternating between 200hex and 1FFhex. The latter signal has every data bit toggling every video sample.

Most current digital logic designs use CMOS technology where the power consumed and the heat produced are proportional to the average toggle rate of all of the flip flops in the product. If a product performs a large amount of video processing (in proportion to all processing), and then there will be a power consumption difference between a “quiet” signal and a “very active” signal. The grey signals can be used as a best case and a worst case condition for checking such conditions.

3.6.9. Configuring the Output Global Phasing

The *Global Phasing* menu allows you to add a phase offset to the Sync 1 to 6, Analog and SDI Test generator, DARS and AES outputs. The *Global Phasing* menu items do not affect the HD Test generator output.

3.6.9.1. Enabling the Global Phase Offset

OUTPUT
GLOBAL PHASING
Global Phase En
Global phase off
Global phase on

This menu item sets whether the global phase offset will be applied to the Sync 1 to 6, Analog and SDI Test generator, DARS and AES outputs.

3.6.9.2. Setting the Global Phase Offset Value

There are three menu items that are used to set the value of the global phase offset.



The front panel display will show **WARNING LIVE CTL** for 0.6 seconds to indicate that adjusting the Global phase menu items will affect the phasing of the Sync 1 to 6, Analog and SDI Test Generator output, AES and DARS outputs immediately. You do not have to press the **SELECT** button to accept the new values. Use these controls with caution, as they will affect the overall timing of devices affected by the global phase offset.

OUTPUT
GLOBAL PHASING
Global Phase MS
G ph ms
mmuuunnn

This menu item is used to set the millisecond portion of the global phase offset. The *mm* digits will be blinking indicating that the millisecond portion of the global phase offset is being changed. The range of permitted values is 0 to 999.

OUTPUT
GLOBAL PHASING
Global Phase US
G ph us
mmuuunnn

This menu item is used to set the microsecond portion of the global phase offset. The *uuu* digits will be blinking indicating that the microsecond portion of the global phase offset is being changed. The range of permitted values is 0 to 999.

OUTPUT
GLOBAL PHASING
Global Phase NS
G ph ns
mmuuunnn

This menu item is used to set the nanosecond portion of the global phase offset. The *nnn* digits will be blinking indicating that the nanosecond portion of the global phase offset is being changed. The range of permitted values is 0 to 39.

3.6.10. Configuring whether NTSC Analog Video Outputs contain Setup Pedestal

OUTPUT
GLOBAL PEDESTAL
Global ped. off
Global ped. on

This menu item allows you to enable or disable pedestal on Sync 1 to 6, and Analog Test generator outputs.

3.6.11. Configuring the Balanced Analog Audio Output (STG Option only)

The Analog Audio outputs can have different sounds available on them. To configure the analog audio output, the user can combine up to ten different audio events. Each event can have a specific sound associated with it, and has a programmable duration. Events can be activated by themselves continuously or at regular intervals throughout the day or can be combined with other events in a user specified sequence, providing virtually unlimited flexibility. Each audio event has an identical set of menu items to configure it. For the sake of simplicity in the manual only the menus for Audio Event 1 will be described.



The **AUDIO EVENT** menus only affect the analog audio output of the 5600MSC. The AES and DARS outputs are configured using the **AES/DARS OUTPUT** menus.

3.6.11.1. Setting the Audio Level Sound Type

OUTPUT
AUDIO LEVEL
Aud Level xxx.x

This menu item sets the level of sound. It applies to all of the events.

The level ranges from -20dBu to +8dBu in 0.2dBu steps.

3.6.11.2. Setting the Time that an Audio Event will Occur

OUTPUT
AUDIO EVENT 1
A1 Start Time
00:00:00.0

This menu item sets the time that an audio event will occur. When you press the **SELECT** key, the current Audio 1 start time will be displayed in hh:mm:ss.s format with the hours digits blinking. If you want to exit the time entry mode press the **ESC** key. To enter a new Audio 1 Start Time follow the procedure outlined below.

1. Press any numeric key to enter a new value into the right digit of the blinking digit pair or press the **SELECT** key to advance to the next digit pair. Press another numeric key to shift the first digit to the left and enter a new value into the right digit of the blinking digit pair. Enter the value 99 if you want this event to occur every hour. The minutes digit pair will now be blinking
2. Repeat step 1 for the minutes. Enter the value 99 if you want this event to occur every minute of the hour entered. The seconds digit pair will now be blinking.
3. Repeat step 1 for the seconds. The tenths of seconds digit pair will now be blinking.
4. Press any numeric key to enter a new value into the blinking tenths of seconds digit pair or press the **SELECT** key to complete the time entry. Seconds has a range of 0.00 to 59.9. 99 cannot be entered.

When you are finished entering the tenths of seconds, the Audio 1 Start Time will be set, and the display will stop blinking. Press the **ESC** key to go back up one menu level.

For example to make the Audio Event occur each hour set the start time to 99:00:00:00. To make the Audio Event occur once per hour on the half hour set the start time to 99:30:00:00. To make the Audio event occur 5 seconds before each hour set the start time to 99:55:00:00.

3.6.11.3. Setting the Audio Event Sound Type

OUTPUT
AUDIO EVENT 1
A1 Sound Type
A1 sound mute
A1 sound tone
A1 sound beep
A1 sound bell
A1 sound klaxon

This menu item sets the type of sound will occur at the audio event start time. The frequency of the audio sound is set by using the *A1 Sound Freq* menu item. Mute is no sound output. Tone is a continuous tone. If tone is set, then Start Time and Duration are ignored. Beep is a pure tone that starts at start time and lasts for duration. Bell is a bell sound that starts at start time and lasts for duration. Klaxon is a square wave tone that starts at start time and lasts for duration

3.6.11.4. Setting the Audio Event Sound Frequency

OUTPUT
AUDIO EVENT 1
A1 Sound Freq
A1 freq 60 hz
A1 freq 100 hz
A1 freq 200 hz
A1 freq 250 hz
A1 freq 400 hz
A1 freq 500 hz
A1 freq 750 hz
A1 freq 1.0 khz
A1 freq 2.0 khz
A1 freq 3.0 khz
A1 freq 6.0 khz

This menu item sets the frequency of the sound that will occur at the audio event start time.

3.6.11.5. Setting the Audio Event Duration

OUTPUT
AUDIO EVENT 1
A1 Sound Durat'n
A1 dur 0.1 sec

This menu item sets the duration of the sound that will occur at the audio event start time. It is variable from 0.1 to 10.0 seconds

3.6.11.6. Testing the Audio Sound

OUTPUT
AUDIO EVENT 1
A1 Test Tone

This menu item allows the user to test the sound that will occur at the audio event start time. The front panel will show the tone type that was selected by the *A1 Sound Type* menu item. Press the **SELECT** button to test the sound. It is only valid if Sound Type is set to Beep, Bell or Klaxon.

3.6.11.7. Setting up Audio Event Sequences

The Ten audio events can be combined in any combination in order to create a sequence of tones that will occur at a regular time each day.

Example 1: Create a sequence to have a single 1 second duration 1 kHz beep once per hour at the half hour and a double 1 second beep once per hour at the hour.

1. Set the *Audio 1 Start Time* to 99:00:00:0. Set the *Audio 1 Sound Type* to *Beep*. Set the *Audio 1 Sound Freq* to 1.0 kHz. Set the *Audio 1 Duration* to 1 sec.
2. Set the *Audio 2 Start Time* to 99:30:00:0. Set the *Audio 2 Sound Type* to *Beep*. Set the *Audio 2 Sound Freq* to 1.0 kHz. Set the *Audio 2 Duration* to 1 sec.
3. Set the *Audio 3 Start Time* to 99:30:02:0. Set the *Audio 3 Sound Type* to *Beep*. Set the *Audio 3 Sound Freq* to 1.0 kHz. Set the *Audio 3 Duration* to 1 sec.

3.6.12. Configuring the DARS and AES Outputs (STG Option only)

3.6.12.1. Setting The Phase of the AES and DARS Outputs (STG Option only)

There are two registers that are used to set the phase of the AES and DARS outputs.



When adjusting the AES/DARS Output phase menu items, the phase of the AES and DARS outputs will be immediately changed. Use these controls with caution, as they will affect the overall timing of devices connected to the AES and DARS outputs.

OUTPUT

AES/DARS OUTPUT

AES Coarse Phase

AES course = 1

This menu item is used to set the phase of the AES and DARS outputs in coarse steps. This control affects both AES and DARS together.

OUTPUT

AES/DARS OUTPUT

AES Fine Phase

AES fine = 1

This menu item is used to set the phase of the AES and DARS outputs in fine steps. This control affects both AES and DARS together. This control is not valid if AES Lock Type is set to NTSC

3.6.12.2. Setting the AES Channel Frequency

There are two identical menus for each of the audio channels on the AES output. For the sake of simplicity only the menu item for channel 1 is described in the manual.

OUTPUT
AES/DARS OUTPUT
AES Ch 1 Freq
AES ch 1 Ident
AES ch 1 60 hz
AES ch 1 100 hz
AES ch 1 200 hz
AES ch 1 400 hz
AES ch 1 800 hz
AES ch 1 1.0 khz
AES ch 1 1.6 khz
AES ch 1 2.0 khz
AES ch 1 3.2 khz
AES ch 1 4.0 khz
AES ch 1 5.0 khz
AES ch 1 6.4 khz
AES ch 1 8.0 khz
AES ch 1 10 khz
AES ch 1 12 khz

The *AES Ch 1 Freq* menu item is used to select the frequency of the tone that will be embedded into audio channel 1 of the AES output.

Selecting one of these signals will set the frequency of the tone that is used for this channel.

3.6.12.3. Configuring the AES Audio Level

There are two identical menus for each of the audio channels in the AES output. For the sake of simplicity only the menu item for channel 1 is described in the manual.

OUTPUT
AES/DARS OUTPUT
AES Ch 1 Level
AES ch 1 mute
AES ch1 -28dBFS
AES ch1 -26dBFS
...
AES ch1 -2dBFS
AES ch1 0dBFS

The *AES Ch 1 Level* menu item is used to select the Audio level of audio channel 1 of the AES output.

The audio level is adjustable in 2dB steps from 0dBFS to -28dBFS

3.6.12.4. Configuring the AES/DARS Lock Type

OUTPUT
AES/DARS OUTPUT
AES Lock Type
AES lock PAL
AES lock NTSC

The *AES Lock Type* control is used to select how the AES/DARS output will be aligned to the video. When the dominant output video standard is NTSC-M or 1.001 HD rates we recommend setting this control to *AES lock NTSC*. When the dominant output video standard is PAL-B or 1.000 HD rates we recommend setting this control to *AES lock PAL*. In dual rate systems, where the frequency reference is GPS, all the video standards will be phase aligned to the GPS reference and consequently the AES/DARS frames will also be aligned to both NTSC-M and PAL-B videos syncs. See recommended practice AES11 for more information on the preferred relationship between DARS reference and video. See also Figure 3-2 to Figure 3-8.

When this control is set to *AES lock NTSC*, the output AES frames will maintain their phase relationship with respect to output NTSC-M syncs. Since it takes 5 NTSC-M frames for an integral number of AES/DARS frames, this relationship repeats only every 5th frame at the start of NTSC line 4. Any frequency reference input that is a valid source of NTSC-M output phase (e.g. NTSC-M or 1.001 HD rate genlock inputs or GPS) will cause a corresponding re-alignment of the AES/DARS outputs to the NTSC-M phase. Conversely, if the frequency reference input does not imply any particular NTSC-M output phase (e.g.: 10 MHz or PAL-B inputs), the AES/DARS output frequency will be synchronized with the input reference but their phase will remain unchanged. When GPS or NTSC-M video with a SMPTE 318M 10 field pulse is used as the reference input, the AES/DARS frames will be aligned to the 10 field input sequence. (See section 3.6.2.3.11 for a discussion of the 10 field sequence pulses.)

When this control is set to *AES lock PAL*, the output AES frames will maintain their phase relationship with respect to output PAL-B syncs. Since every PAL-B frame contains an integral number of AES/DARS frames, this relationship is defined for every frame at the start of PAL line 1. Any reference input that is a valid source of PAL-B output phase (e.g. PAL-B or 1.000 HD rate genlock inputs or GPS) will cause a corresponding re-alignment of the AES/DARS outputs to the PAL-B phase. Conversely, if the reference input does not imply any particular PAL-B output phase (e.g.: 10 MHz or NTSC-M inputs), the AES/DARS output frequency will be synchronized with the input reference but their phase will remain unchanged.

The relationship of AES/DARS to video is defined in AES11-1997 recommended practice.



Changing the state of *AES Lock Type* control will cause momentary disruption in AES/DARS output signal.

3.7. GENERAL CONFIGURATION ITEMS

The *GENERAL SETUP* menu is used to set up various items related to the overall operation of the 5600MSC. Table 3-7 shows the items available in the *GENERAL SETUP* menu. Sections 3.7.1 to 3.7.15 give detailed information about each of the sub menus.

<i>SERIAL PORT MODE</i>	Sets the whether the unit will broadcast its menu settings as a Master or receive its menu settings as a slave.
<i>SYNCRO EXCLUSION</i>	Sets the ATG, STG and HTD to be excluded from syncro operations.
<i>MODEM SETUP</i>	Sets the rules for modem operation
<i>GPO 1 FUNCTION</i>	Sets the function of General Purpose output 1.
<i>GPO 2 FUNCTION</i>	Sets the function of General Purpose output 2.
<i>GPI 1 FUNCTION</i>	Sets the function of General Purpose input 1.
<i>GPI 2 FUNCTION</i>	Sets the function of General Purpose input 2.
<i>FIRMWARE</i>	Displays the firmware version and upgrade firmware utility.
<i>ENG/USER MODE</i>	Sets the operating mode of the controls to Engineering or User
<i>PRESET SAVE/GET</i>	Saves and retrieves setups
<i>DST RULES</i>	Sets the rules for Daylight Savings Time
<i>IP RULES</i>	Sets the Internet Protocol Addresses
<i>NTP RULES</i>	Sets the rules for Network Time Protocol
<i>SET SYSTEM TIME</i>	Used to set the system time when there is no time reference.
<i>SET DATE yy/mm/dd</i>	Used to set the system date when there is no time/date reference
<i>SET USER BITS</i>	Used to set the user bits of the time code when the User Bit Mode is set to Manual Entry.
<i>USER BIT MODE</i>	Used to set the how the time code user bits will be set.

Table 3-7: Top Level of the General Setup Menu

3.7.1. Configuring The Serial Port Mode

GENERAL

SERIAL PORT MODE

Port normal
 Port synchro rx
 Port synchro tx
 Port synch time
 Port status dump
 Port status get

This menu item sets the mode of operation of the COM serial port.

When the *SERIAL PORT MODE* is set to *normal* the COM serial port is used for firmware upgrades only (see section 4.2).

When the *SERIAL PORT MODE* is set to *synchro tx* the COM serial port can be used to send configuration commands to another 5600MSC operating in the *synchro rx* mode. This application is used where there are two 5600MSC units tied together through a 5600ACO Auto changeover and you want to ensure that the menu settings of both units are always the same. See section 2.4 for information on connecting the two 5600MSC units together. There is normally a cable supplied with the 5600ACO changeover unit to interconnect the units.

When the *SERIAL PORT MODE* is set to *synchro rx* the COM serial port is used to receive configuration commands from another 5600MSC operating in the *synchro tx* mode. All menu parameter displays will be shown with the display brightness dimmed to indicate that the unit is operating as a slave of another 5600MSC units. You will be able to view the menu settings but not change most of them. You can also set the *TIME REF* to *Synchro time ref.* to reference the 5600MSC system time to the other 5600MSC that is connected and running in *synchro tx* mode. See section 3.5.2. A note here on GLOBAL PHASING. When the Frequency Reference is set to internal or 10MHz, the GLOBAL PHASING controls are ignored by the synchro, and may be set in the RX unit to a different value to the TX unit.

When the *SERIAL PORT MODE* is set to *sync time* the COM serial port is used to receive time information only from another 5600MSC operating in the *synchro tx* mode. Configuration parameters received from the other 5600MSC will be ignored. You will also have to set the *TIME REF* to *Synchro time ref.* to reference the 5600MSC system time to the other 5600MSC that is connected and running in *synchro tx* mode. See section 3.5.2.

When the *SERIAL PORT MODE* is set to *status dump* the current settings of all the controls are output on the COM serial port in human readable text and may be viewed by a standard terminal program such as HyperTerminal. There is also a set of hex strings which are computer readable. See section 4.2.2 for information on connecting the computer and setting up the terminal program. This can be stored for later retrieval.

When the *SERIAL PORT MODE* is set to *status get* 5600MSC is waiting for data to come in via the COM serial port. It expects the hex strings which were produced by a status dump. All other data is ignored. This can be used to recover settings that were output by a 5600MSC using the *status dump*. When the 5600MSC receives packets, it will pop up 1 second long messages indicating what type of information it has received. For instance, "GOT SYNC 1" or "GOT GENERAL".

3.7.2. Configuring what Items are Ignored in Syncro Rx Mode

GENERAL
SYNCRO
EXCLUSION
Exclude none
Exclude atg
Exclude stg
Exclude atg/stg
Exclude htg
Exclude atg/htg
Exclude stg/htg
Exc atg/stg/htg

This menu item sets items to be ignored in the syncro rx mode of operation of the COM serial port. When the *SERIAL PORT MODE* is set to *Syncro rx*, each of the test generators can be excluded from the syncro mode. This is for an application where the user wishes to have redundant outputs, but use the test generators as separate units. Then a test generator is excluded from *Syncro* control, it may be controlled from the front panel *OUTPUT* menus.

When set to *Exclude none*, all of the test generators are used in the syncro operations and may NOT be controlled from the front panel.

When set to *Exclude atg*, the analog test generator (ATG) does not get affected by syncro operations.

When set to *Exclude stg*, the SDI test generator (STG) does not get affected by syncro operations.

When set to *Exclude atg/stg*, the ATG and STG do not get affected by syncro operations.

When set to *Exclude htg*, the High definition test generator (HTG) does not get affected by syncro operations.

When set to *Exclude atg/htg*, the ATG and HTG do not get affected by syncro operations.

When the *SYNCRO EXCLUSION* is set to *Exclude stg/htg*, the STG and HTG do not get affected by syncro operations.

When the *SYNCRO EXCLUSION* is set to *Exc atg/stg/htg*, the ATG, STG and HTG do not get affected by syncro operations.

3.7.3. Configuring The Modem (Units fitted with the M Option)

The *MODEM SETUP* sub-menus of the *GENERAL* Setup menu are used to configure the operation of the internal modem in the 5600MSC. This modem is typically used to dial once per day to a standard time service or another 5600MSC fitted with the modem option in order to obtain its time reference. Alternately, if the 5600MSC is fitted with the GPS option, it can be set up as a master time source for other 5600MSCs to call in to.

3.7.3.1. Setting the Modem Operating Mode

GENERAL
MODEM SETUP
Modem Mode
Modem off
Auto answer
Auto dial
Auto dial/answer

This menu item sets the operational mode of the modem

When the *Modem Mode* is set to *modem off* the modem will not answer or dial automatically. It can still dial using Dial Now.

When the *Modem Mode* is set to *auto answer* the modem will answer incoming calls.

When the *Modem Mode* is set to *auto dial* the modem will dial out each day at the time set by the *Dial Time* menu item.

When the *Modem Mode* is set to *auto dial/answer* the modem will answer incoming calls and dial out each day at the time set by the *Dial Time* menu item.

3.7.3.2. Setting the Modem Standard

GENERAL
MODEM SETUP
Modem Standard
Modem NRC
Modem NIST

This menu item sets the standard of the modem communications

When the *Modem Standard* is set to *NRC*, it communicates using *NRC* standards. In this mode, it may act as a time source for other equipment using this standard.

When the *Modem Standard* is set to *NIST*, it communicates using *NIST* standards. In this mode it may only get time from other equipment, but cannot be used as a *NIST* time reference.

3.7.3.3. Setting the Modem Speaker Volume

GENERAL
MODEM SETUP
Modem Speaker
Modem spkr off
Modem spkr on

This menu item sets the volume of the modem speaker

When the *Modem Speaker* is set to *Modem spkr off* the Modem speaker is silent.

When the *Modem Speaker* is set to *Modem spkr on* the Modem speaker is on during a connection.

3.7.3.4. Setting the Modem Phone Number to Dial

GENERAL
MODEM SETUP
Phone number
000-000-000

This menu item sets the phone number of the time information provider to call. This number may be the number of a high-level time standards service such as the Canadian National Research Council (NRC) or another 5600MSC that is referenced to GPS time.

When you press the **SELECT** key the current phone number will be displayed. If you want to exit the phone number entry mode press the **ESC** key at any time.

Enter the phone number using the numeric keys. Remember to enter all the digits required to get an outside line. You can insert a 1 second pause (indicated by a "P") into the dialling string by pressing the up arrow (↑) key.

When you have entered the phone number press the **SELECT** key.

At the time of printing the following phone numbers are valid for these time standards services:

Canadian National Research Council +1 (613) 745-3900

3.7.3.5. Setting the Time that the Modem will Dial Out

GENERAL
MODEM SETUP
Dial time (UTC)
00:00:00 TIME

This menu item sets the time that the modem will dial out, when the *Modem Mode* menu item is set to *auto dial* or *auto dial/answer*.

When you press the **SELECT** key the current dial time will be displayed in hh:mm:ss format with the hours digits blinking. If you want to exit the time entry mode press the **ESC** key at any time.

Enter the dial time as universal coordinated time (UTC) using the following procedure.

1. Press any numeric key to enter a new value into the right digit of the blinking digit pair or press the **SELECT** key to advance to the next digit pair. Press another numeric key to shift the first digit to the left and enter a new value into the right digit of the blinking digit pair. The Minutes digit pair will now be blinking
2. Repeat step 1 for the minutes and seconds.
3. When you are finished entering the seconds, the menu will return to Dial time (UTC).

3.7.3.6. Dialling the Modem Immediately

GENERAL

MODEM SETUP

Dial now

This menu item forces the modem to dial out to a remote system to get the time immediately regardless of the setting of the *Modem Mode* menu item. It will not retry, regardless of the settings of Modem retries.

3.7.3.7. Cancelling a Call in Progress

GENERAL

MODEM SETUP

Cancel call

This menu item cancels a call currently in progress and forces the modem to hang up. If a retry is pending due to a previous failure, it is cancelled. This will also cancel any pending retries.

3.7.3.8. Setting the Number of Times the Modem will Retry a failed Call

GENERAL

MODEM SETUP

Modem Retries

Retries = xx

After a failed attempt to dial a remote system, the modem will attempt to reconnect once per minute. This menu item sets the number of retries before a calling sequence is cancelled. It only retries after the call in initiated by auto dial.

On the Front panel status display, the time until the next retry and the number of retries is shown.

3.7.4. Configuring The Function of the General Purpose Outputs

There are two menu items to set the function of the two general purposes outputs. See section 2.1.7 and 2.3 for information on connecting the general purpose outputs. For the sake of clarity in the manual only the menu items for General Purpose Output 1 are shown.

GENERAL**GPO 1 Function**

Gpo 1 not used
Gpo 1 no ref
Gpo 1 ltc short
Gpo 1 ps fail
Gpo 1 fan fail
Gpo 1 sys fault
Gpo 1 audio on

This menu item sets the mode of function of General Purpose Input 1.

When set to *Gpo 1 not used* the respective general purpose output will be disabled and will remain in the inactive (high) state.

When set to *Gpo 1 no ref* the respective general purpose output will be active (low) when there is no valid reference.

When set to *Gpo 1 ltc short* the respective general purpose output will be active (low) when there is short detected on the LTC 1 output. Note that this is only valid if the LTC 1 power is on.

When set to *Gpo 1 fan fail* the respective general purpose output will be active (low) when one of the fans has failed.

When set to *Gpo 1 ps fail* the respective general purpose output will be active (low) when one of the power supplies has failed.

When set to *Gpo 1 sys fault* the respective general purpose output will be active (low) when the Fault LED is On.

When set to *Gpo 1 audio on* the respective general purpose output will be active (low) when there is an audio output on the Audio sound generator.

3.7.5. Configuring The Function of the General Purpose Inputs

There are two menu items to set the function of the two general purposes inputs. See section 2.1.7 and 2.3 for information on connecting the general purpose inputs. For the sake of clarity in the manual only the menu items for General Purpose Input 1 are shown.

GENERAL**GPI 1 FUNCTION**

Gpi 1 not used
Gpi 1 sdi signal
Gpi 1 atg signal

This menu item sets the mode of function of General Purpose Input 1.

When set to *Gpi 1 not used* the respective general purpose input will not affect the operation of the 5600MSC.

When set to *Gpi 1 sdi signal*, a falling level on the respective general purpose input will cause the SDI test generator to toggle to the next test signal.

When set to *Gpi 1 atg signal*, a falling level on the respective general purpose input will cause the analog test generator to toggle to the next test signal.

3.7.6. Setting the Daylight Saving Time Rules

Daylight Saving Time (DST) or Summer Time as it is called in many countries, is a way of getting more daylight out of the summer days by advancing the clocks by one hour during the summer. Then, the sun will appear to rise one hour later in the morning when people are usually asleep anyway, at the benefit of one hour longer evenings when awake. The sunset and sunrise are one hour later than during normal time.

To make DST work, the clocks have to be adjusted one hour ahead when DST begins, and adjusted back one hour to standard time when DST ends. There are many countries observing DST, and many who do not.

During the months March/April to September/October, the countries in the Northern Hemisphere are having their summer and may observe DST, while the countries in the Southern Hemisphere are having winter. During the rest of the year (September/October to March/April) the countries in the Southern Hemisphere are having their summer and may observe DST, while the countries in the Northern Hemisphere are having winter.

Daylight Saving Time is difficult to predict, as many countries change the transition days/principles every year because of special happenings or conditions that have happened or will happen.

How does the transition to DST start?

Let's say that DST starts at 2:00 am local time and DST is one hour ahead of standard time:

DST start transition		
Local time HH:MM:SS	DST or normal?	Comments
01:59:58	normal	
01:59:59	normal	
03:00:00	DST	DST started, time advanced by one hour
03:00:01	DST	
03:00:02	DST	

Note that local time is never between 2:00:00 - 2:59:59. At the transition from standard time to DST, this hour is skipped and therefore this day has only 23 hours (instead of 24 hours).

How does the transition from DST end?

Let's say that DST ends at 2:00 am local time and DST is one hour ahead of standard time:

DST end transition		
Local time HH:MM:SS	DST or normal?	Comments
00:59:59	DST	
01:00:00	DST	
01:00:01	DST	
...3556 seconds from 01:00:02 to 01:59:57 daylight saving time not shown...		
01:59:58	DST	
01:59:59	DST	
01:00:00	Normal	Time is turned back to normal
01:00:01	Normal	
...3556 seconds from 01:00:02 to 01:59:57 standard time not shown...		
01:59:58	Normal	
01:59:59	Normal	
02:00:00	Normal	
02:00:01	Normal	

Note that local time between 1:00:00 and 1:59:59 actually is repeated twice this day, first during DST time, then clocks are turned back one hour to normal time, and the hour is repeated during standard time and therefore this day has 25 hours (instead of 24 hours). To avoid confusion when referring to time within this hour, it is important to tell whether it happened before of after the change back to normal time. For further information about daylight saving time in your area consult the web page <http://www.timeanddate.com/time/aboutdst.html>.

Because of the variation of daylight saving time rules throughout the world, the 5600MSC has several registers to allow the user to set the DST rules for their region. There is a set of DST registers for the LTC and each of the video outputs. For the sake of simplicity in the manual only the registers for the LTC DST will be described.

3.7.6.1. Setting The DST Date Entry Mode

GENERAL

DST RULES

DST Date Mode

day/week/month

day of month

This menu item allows the user to set the method of entering the DST information in the DST registers.

Select *day/week/month* to enter the DST information in the following format:
Day 1 of week 1 of month 4 (e.g. Sunday of first week of April)

Select *day of month* to enter the DST information in the following format:
Day 1 of month 4 (e.g. First day of April)

3.7.6.2. Setting the Beginning and End of Daylight Saving Time

The four *DST start* registers set the DST beginning time and the four *DST end* registers set the DST end time. For the sake of simplicity only the *DST start* registers will be described, although they both operate in the same way.

GENERAL
DST RULES
DST Start Hour
DST starts 0200

This menu item allows the user to set hour of the day when DST begins. Use the **SHAFT ENCODER** to change the start hour for DST.

GENERAL
DST RULES
DST Start Day
DST starts sun

When the *DST date mode* menu is set to *day/week/month* this menu item allows the user to set day of the week when DST begins. Use the **SHAFT ENCODER** to change the start day for DST.

When the *DST date mode* menu is set to *day of month* this menu item allows the user to set day of the month when DST begins.

GENERAL
DST RULES
DST Start Week
DST starts wk1

When the *DST date mode* menu is set to *day/week/month* this menu item allows the user to set week of the month when DST begins. Set the value to *last wk* when DST starts on the fourth or fifth week of the month depending on the year. Use the **SHAFT ENCODER** to change the start week for DST.

When the *DST date mode* menu is set to *day of month* this menu item is not used.

GENERAL
DST RULES
DST Start Month
DST starts Jan

This menu item allows the user to set month when DST begins. Use the **SHAFT ENCODER** to change the start month for DST.

3.7.6.3. Setting The DST Offset

GENERAL
DST RULES
DST Offset
DST offset 1 hour

This menu item allows the user to set amount of adjustment to be made when DST is active.

3.7.7. Firmware Utilities

The Firmware menu item allows you to view the firmware version that is installed in the 5600MSC and to upgrade the firmware when a new version is released.

3.7.7.1. Viewing the 5600MSC Firmware Version

GENERAL
Firmware
5600MSC Version
V1.6 build 16

This item is used to display the 5600MSC's firmware version. When you press the **SELECT** key, the display shows the software version which will be something like:

V1.6 build 16

3.7.7.2. Upgrading the 5600MSC Firmware

GENERAL
Firmware
Upgrade 5600MSC
Are You Sure?

This item is used to initiate a firmware upload of the 5600MSC main application firmware. When you press the **SELECT** key you are prompted to confirm that you really want to upgrade the firmware, as this process will completely erase the application firmware in the unit. After you have confirmed that you want to upgrade the firmware, the 5600MSC will reboot into its firmware upload mode. See section 4.2 for a complete description of the firmware upgrade procedure.



When upgrading the firmware in the 5600MSC, the unit will not output any of the signals on its sync or test signal output connectors.

3.7.7.3. Viewing the HD Test Generator Firmware Version

GENERAL
Firmware
7751-TG2 Version
V4.1 build 8

This item is used to display the 5600MSC's firmware version. When you press the **SELECT** key, the display shows the software version which will be something like:

There are two different versions of HD Test generator cards in the 5600MSC. The display prompt will indicate whether your unit has the 7750TG2-HD or 7751TG2-HD card installed.

V4.1 build 8

3.7.7.4. Upgrading the HD Test Generator Firmware

GENERAL

Firmware

Upgrade 7750-TG2

Upgrade 7751-TG2

Are You Sure?

This item is used to initiate a firmware upload of the HD Test Generator inside the 5600MSC. When you press the **SELECT** key you are prompted to confirm that you really want to upgrade the firmware, as this process will completely erase the Test generator firmware in the unit.

There are two different versions of HD Test generator cards in the 5600MSC. The display prompt will indicate whether your unit has the 7750TG2-HD or 7751TG2-HD card installed.

After you have confirmed that you want to upgrade the firmware, the 5600MSC will reboot into its firmware upload mode. See section 4.2 for a complete description of the firmware upgrade procedure, and information about the correct version of firmware you should load.



Note that you must upload the correct firmware for the version of card that is installed in your unit.



When upgrading the HD Test Generator firmware in the 5600MSC, the unit will not output any of the signals on its sync or test signal output connectors.

3.7.8. Configuring Engineering or User Operation Modes

This menu item is used to switch between Engineering mode and User mode. In User mode various menu items can be hidden to simplify the operation of the 5600MSC. In Engineering mode, all menu items are shown, and VistaLINK™ control is enabled to allow hiding various menus for User mode. See section 0 for information about hiding menus using VistaLINK™.

GENERAL

ENG/USER MODE

Set user mode

ARE YOU

SURE?

When the 5600MSC is in engineering mode the *ENG* will be flashing.

Press the **SELECT** key to change to user mode. The display will say "Set User Mode. ?". Press the **SELECT** key. There will be a prompt. "ARE YOU SURE?" Press the **SELECT** key to confirm that you want to change to user mode. The 5600MSC will return to the *ENG/USER MODE* menu item with the *USER* flashing. Press the **ESC** key twice to return to the *ENG/USER MODE* menu item. Once this is selected, a password will be required to return to USER MODE.

GENERAL
ENG/USER MODE
Enter Password

When the 5600MSC is in user mode the *USER* will be flashing.

Press the **SELECT** key to change to engineering mode. A password is required to change to engineering mode. Press the **SELECT** key again to enter the password using the numeric keys. Passwords can be from 1 to 16 digits. Press the **SELECT** key when you have finished entering the password. If you have entered the correct password the 5600MSC will return to the *ENG/USER MODE* menu item with the *ENG* flashing. If you enter an incorrect password you will return to the *ENG/USER MODE* menu item with the *USER* flashing.

3.7.9. Saving and Storing 5600MSC Presets

GENERAL
PRESET SAVE/GET
Save Preset 1
Save Preset 2
Save Preset 3
Get Preset 1
Get Preset 2
Get Preset 3
Get USA Factory
Get EUROPE Fact

This menu item is used to save and recall (get) the configuration of the 5600MSC to one of three user presets. In addition you can recall various factory preset configurations that closely match your desired application.

To save the entire configuration of the unit to the Preset 1 non-volatile memory location select *Save Preset 1*, and then press the **SELECT** key. There are two other user preset locations that can save alternate locations. The *Save Preset 2*, and *Save Preset 3* menu choices work the same way to save configurations to these preset locations.

To recall all the information from Preset 1, and use it to configure the unit, select *Get Preset 1* and then press the **SELECT** key. There will be 2 levels of prompt. "ARE YOU SURE?" and "VERY SURE?" This is because the current configuration will be replaced. Press the **SELECT** key to confirm each prompt. Pressing any other key will terminate the preset loading. The *Get Preset 2*, and *Get Preset 3* menu choices work the same way to recall configurations from the other two user presets.

The *Get USA Factory* and *Get EUROPE Fact* menu choices work the same way as *Get Preset 1*, but retrieve one of the factory settings.

Get USA Factory sets all the outputs to NTSC rates wherever possible.

Get EUROPE Fact sets all the outputs to PAL rates wherever possible.



Using any GET may change any of the settings of the 5600MSC. It may disrupt the timing of all the sync outputs, and the LTC and VITC timecodes and therefore must be used with caution.

3.7.10. Configuring the Internet Protocol Address

To set network addresses in the various IP or *NTP RULES* parameters, press the **SELECT** button when the desired parameter is shown on the front panel display (indicated by the letter on the left side of the display). The left group of digits (octet) will be flashing to indicate that they are in entry mode. Use the **↑** or **↓** buttons to change this octet to the desired value. Then press the **SELECT** button and the next octet will be flashing to indicate that they are in entry mode. Set the remaining octets in the same way. When you have entered the correct value for the last octet, press the **SELECT** button to set the parameter. The display will stop flashing to indicate that the parameter value has been set.

3.7.10.1. Setting up the Internet Protocol Address

GENERAL
IP RULES
IP Address
123.321.255.111

This item sets the unique Internet Protocol (IP) address of the 5600MSC within the network when the *IP address mode* is set to *Manual*. 192.168.1.XXX is an example of an IP address in a private (internal) network.

3.7.10.2. Setting up the Internet Protocol Address Mode

GENERAL
IP RULES
IP Address Mode
IP bootstrap
IP manual

This item is used to determine if the IP address of the 5600MSC will be determined from another server or will be set locally.

When *IP bootstrap* is selected, the IP address is retrieved from the server using BOOTP services.

When *IP manual* is selected, a static IP address is used. This address is the IP address set by the IP Address menu item

3.7.10.3. Setting up the Internet Protocol Local Mask

GENERAL
IP RULES
IP Net Mask
255.255.255.0

This menu item sets the “subnet mask” of the network. Specifically, this parameter outlines all the IP addresses that can communicate with the 5600MSC. This parameter is usually set to 255.255.255.0 for a private network. Normally you will not have to adjust this parameter from its default value.

3.7.10.4. Setting up the Internet Protocol Gateway Address

GENERAL
IP RULES
IP Gateway
123.123.255.111

This menu item identifies the IP address of the “gateway” (commonly referred to as the “firewall”). In a private network, this gateway could be identified as 192.168.1.YYY. Normally you will not have to adjust this parameter from its default value.

3.7.10.5. Setting up the Internet Protocol Gateway Enable.

GENERAL
IP RULES
IP Gateway En.
IP gateway on
IP gateway off

This item is used to enable gateway operation in the 5600MSC.

When set to *IP gateway on* if an IP request comes from a source outside of the local network, then it is returned to the gateway I.P. address.

When set to *IP gateway off* any IP requests from outside the local network are ignored

3.7.11. Configuring the Network Time Protocol Functions (Units fitted with the T Option)

The *NTP RULES* sub-menus of the *GENERAL* Setup menu are used to configure the 5600MSC for NTP. In most cases you will only have to plug in your Ethernet cable and configure the network IP address (*A*) to contain an unused IP address in the valid range. Entries are made in standard IP address format. Please consult your Network administrator for IP address allocations, netmask and gateway requirements.

The NTP (Network Time Protocol) message generated by the 5600MSC conforms to the RFC-1305 specification which dictates that the NTP server (the 5600MSC) shall indicate an unlocked condition when it has no reference. The 5600MSC must have its *TIME REF* menu item set to *GPS time ref*, with a GPS antenna connected to show a GPS locked condition. (The *STATUS* display message will say *Time GPS Locked*.) The 5600MSC may also have its *TIME REF* menu item set to *Modem time ref*, and have placed a successful call to synchronize the time within the past ten days to show a time locked condition. (The *STATUS* display message will say *Time Locked*.) Unless the 5600MSC has one of these two time locked conditions active, lower stratum clients will reject signals from it, according to NTP rules.



This means that the 5600MSC must be locked to GPS or via modem to a high order time reference in order to supply NTP.

3.7.11.1. Setting up the NTP restrictions.

Restrictions are a list of I.P. addresses that will be ignored if NTP requests come from them. They use the standard I.P. address/mask. There are 8 restrictions allowed, and they are additive. For the sake of simplicity in the manual only the menu items for restriction 1 will be shown.

3.7.11.1.1. Setting up the NTP Restriction I.P.

GENERAL
NTP RULES
Ntp restrict 1
Restrict 1 i.p.
123.123.255.111

This item is used to set the restricted Internet Protocol address for restriction 1. Restricted addresses are addresses that the 5600MSC will NOT respond to.

3.7.11.1.2. Setting up the NTP Restriction Mask.

GENERAL
NTP RULES
Ntp restrict 1
Restrict 1 mask
123.123.355.111

This item is used to set the restricted Internet Protocol mask for restriction 1. Restricted addresses are addresses that the 5600MSC will NOT respond to.

3.7.11.1.3. Setting up the NTP Restriction Enable.

GENERAL
NTP RULES
Ntp restrict 1
Restrict 1 en
Restr 1 permit
Restr 1 deny

This item is used to enable the restricted IP address set for restriction 1.

When set to *Restr 1 deny*, if an NTP request comes from a source inside of the NTP Restriction 1 IP and Restriction Mask, it will be ignored.

When set to *Restr 1 permit*, then if it passes other rules, the request is responded to.

3.7.12. Setting The System Time When There Is No Time Reference

GENERAL
Set System Time
00:00:00

When the FREQUENCY REF menu item is not set to *Gps freq ref* and the TIME REFERENCE menu item is set to *No time ref*, the user can set the system time using the following procedure. The system time should always be entered as universal coordinated time (UTC).

When you press the **SELECT** key the current system time will be displayed in hh:mm:ss format with the hours digits blinking. If you want to exit the time entry mode press the **ESC** key at any time.

1. Press any numeric key to enter a new value into the right digit of the blinking digit pair or press the **SELECT** key to advance to the next digit pair. Press another numeric key to shift the first digit to the left and enter a new value into the right digit of the blinking digit pair. The Minutes digit pair will now be blinking
2. Repeat step 1 for the minutes and seconds.
3. When you are finished entering the seconds, all the digits will stop blinking and the front panel display will show the word *Enter* at the right. Press the **SELECT** button to set the system time. The front panel display will show the message *System Time Set* for about 1 second.

3.7.13. Setting The System Date When There Is No Time Reference

GENERAL
Set System Date
00/00/00

When the FREQUENCY REF menu item is not set to *Gps freq ref* and the TIME REFERENCE menu item is set to *No time ref*, the user can set the system date using the following procedure. The system date should always be entered as the date corresponding to universal coordinated time (UTC).

1. Press the **GENERAL** key to enter the *GENERAL SETUP* menu. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to display the *Set System Date* menu item and press the **SELECT** key. The current system date will be displayed in yy/mm/dd format with the year digits blinking. If you want to exit the date entry mode press the **ESC** key at any time.
2. Press any numeric key to enter a new value into the right digit of the blinking digit pair or press the **SELECT** key to advance to the next digit pair. Press another numeric key to shift the first digit to the left and enter a new value into the right digit of the blinking digit pair. The month digit pair will now be blinking
3. Repeat step 2 for the month and day.
4. When you are finished entering the day, all the digits will stop blinking and the front panel display will show the word *Enter* at the right. Press the **SELECT** button to set the system date. The front panel display will show the message *System Date Set* for about 1 second.

3.7.14. Setting The User Bits in Manual User Bit Mode

GENERAL
Set User Bits
00000000 UB

When the *User Bit Mode* menu item is set to *Manual*, the user can set the User bits of the time code outputs using the following procedure. (see section 3.7.15)

1. Press the **GENERAL** key to enter the *GENERAL SETUP* menu. Use the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob to display the *Set User Bits* menu item and press the **SELECT** key. The current user bits will be displayed with the leftmost digit blinking. If you want to exit the user bit entry mode press the **ESC** key at any time. Note that in order to change the user bits, the USER BIT MODE must be set to *Manual entry*.
2. Press any numeric key to enter a new value into the blinking digit or turn the **SHAFT ENCODER** knob, and use the arrow keys (↑, ↓) to advance to the next digit. The range of each digit is 0 - 9 and a - f. The **SHAFT ENCODER** knob must be used for digits a - f.
3. Repeat step 2 for each digit.
4. When you are finished entering the user bits, press the **SELECT** button to set the user bits.

3.7.15. Setting The User Bits Mode

GENERAL

USER BIT MODE

Legacy date
Production date
Smppte bcd date
Smppte mjd date
Manual entry
Lat/Long

This menu item is used to set the contents of the user bits for the LTC and VITC generators. All the LTC and VITC generators will operate in the same user bit mode, although the actual user bits may vary from generator to generator depending on the mode chosen and the respective time zone being applied to the generator. Four of the user bit modes encode date information into the user bits in various modes. This date information will be the system date compensated for any time zone or daylight saving time adjustments being applied to a particular output.

Select *Legacy date* to output the date in a format compatible with Leitch master clock systems.

Select *Production date* to output the date in a format compatible with Time code smart slates used in film and television production. In this mode the date is encoded as yymmddrr, where rr is the nominal frame rate of the respective output (30 for 29.97 Hz outputs).

Select *SMPTE BCD date* to output the date in the SMPTE 309M standard BCD mode. In this mode the date is encoded as zzyymmdd, where zz is the time zone of the respective output.

Select *SMPTE MJD date* to output the date in the SMPTE 309M standard Modified Julian Date mode. In this mode the date is encoded as zzdddddd, where zz is the time zone of the respective output and ddddddd is the date expressed in its Modified Julian Date representation.

Select *Manual entry* to output the user bits that are entered using the *Set User Bits* menu item.

Select *Lat/Long* to embed location information in the user bits. This is only valid when a GPS clock is being used. Fields with even numbered frames contain longitude in the user bits, and fields with odd numbered frames contain latitude. Note that this gives the location of the antenna, and not the 5600MSC.

The format for latitude is wxxxxyzz where w is 1 for south, and 2 for north. xxx is degrees, yy is minutes, and zz is fractions of minutes.

The format for longitude is wxxxxyzz where w is 3 for west, and 4 for east. xxx is degrees, yy is minutes, and zz is fractions of minutes.

For example, at Evertz Microsystems factory, the data is:

20432049 and 30794623

which corresponds to 43 degrees, 20.49 minutes north and 79 degrees, 46.23 minutes west.

3.8. OPERATING WITH GLOBAL POSITIONING SYSTEM LOCK (G Option)

When the GPS option is installed, the 5600MSC can be both frequency and time locked to the Global Positioning system (GPS). The following section describes an overview of the GPS system and the operation of the 5600MSC when it is locking to the GPS satellites. See section 2.4 for information about installing the GPS antenna and connecting it to the 5600MSC.

3.8.1. The Global Positioning System Overview

The Global Positioning System (GPS) is a satellite based navigation system operated and maintained by the U.S. Department of Defense. When fully implemented, the GPS will consist of 24 satellites providing worldwide 24 hour, coverage. Originally conceived for military needs, the GPS has a broad array of civilian applications including timing, surveying, marine, land, aviation and vehicle navigation. GPS, the most accurate technology available for marine and land navigation is emerging as the technology of choice in timing applications including site and network synchronization.

As a satellite system, the GPS is immune from the limitations of land based systems previously available. By computing the distance to GPS satellites orbiting the earth, a GPS receiver can calculate an accurate position. This process is called satellite ranging. A two-dimensional position calculation requires three satellite ranges. A three-dimensional position calculation, including altitude requires four satellite ranges. GPS receivers can also provide precise time, speed, and course measurements.

3.8.2. GPS Lock Operation

Once the GPS has been locked and in steady state condition for longer than 20 minutes the 5600MSC's frequency reference is locked to within 100ns of the GPS system time reference.

If the GPS head is disconnected, the frequency reference within the 5600MSC may drift very slowly over time. (The figures provided below are assuming the unit is kept switched on and is maintained in the same operating environment). The maximum frequency drift of the 5600MSC's frequency reference is less 0.04 Hz at subcarrier frequency after a day of the GPS receiver being disconnected. The drift will be less than 0.3 Hz if the GPS receiver was disconnected or obscured from the sky for 1 year.

Upon reconnecting the GPS antenna there will be a very smooth transition of the 5600MSC's frequency reference back to the GPS frequency. This transition is very smooth and gradual with no non-linear jumps. The re-lock will take less than 40 minutes after an unspecified period of time (i.e. 1 year or more) of the GPS receiver being disconnected or obscured from the sky. If the GPS head is removed for 5 min and then returned, the unit will take nominally less than 5 minutes to return fully lock to GPS receiver. If the GPS receiver is removed for 15 min and then returned, the unit will take nominally less than 20 minutes to return fully locked to the GPS receiver.

CHAPTER 4: TECHNICAL DESCRIPTION

TABLE OF CONTENTS

4. TECHNICAL DESCRIPTION	4-1
4.1. SPECIFICATIONS	4-1
4.1.1. Analog Sync Outputs:	4-1
4.1.2. 10MHz Input and Output:	4-1
4.1.3. LTC Outputs:	4-1
4.1.4. Genlock Input	4-2
4.1.5. Communications and Control:	4-2
4.1.6. GPS Receiver (G option installed)	4-2
4.1.7. DARS & AES Test Generator Outputs (STG option installed)	4-3
4.1.8. Analog Composite Video Test Signal Generator (STG option installed)	4-3
4.1.9. Analog Audio Tones Generator (STG option installed)	4-3
4.1.10. SDI Test Generator Outputs (STG option installed)	4-4
4.1.11. HDTV Test Generator Outputs (HTG option installed)	4-4
4.1.12. Word Clock Output (WC option installed)	4-4
4.1.13. Electrical	4-5
4.1.14. Physical	4-5
4.2. UPGRADING THE FIRMWARE	4-5
4.2.1. Overview	4-5
4.2.2. Terminal Program Setup.	4-5
4.2.3. Initiating Firmware Upgrade Mode Via The Front Panel	4-6
4.2.4. Initiating Firmware Upgrade Mode From The Terminal Program	4-6
4.2.5. Uploading the new firmware	4-7
4.2.6. Completing the Upgrade	4-8
4.3. SERVICING INSTRUCTIONS	4-8
4.3.1. Changing The Fuses	4-8
4.3.2. Replacing The Battery	4-9
4.3.2.1. Safety Guidelines and Precautions concerning the Use of 3V Lithium Batteries	4-9
4.3.2.2. Procedure for Replacing the Battery	4-9

This page left intentionally blank

4. TECHNICAL DESCRIPTION

4.1. SPECIFICATIONS

4.1.1. Analog Sync Outputs:

Standards:	SMPTE 170M (NTSC-M), ITU-R BT.470-6 (PAL-B) SMPTE 274M (1080i/60, 1080i/50, 1080p/30, 1080p/30sF, 1080p/25, 1080p/25sF, 1080p/24, 1080p/24 and the 1/1.001 divisor versions where applicable) SMPTE 296M (720/60, 720p/59.94) 1 Hz and 6 Hz pulse (and the 1/1.001 divisor versions)
Connector:	BNC per IEC 60169-8 Amendment 2
Number of Outputs:	6 (2 banks of 3) configured as: 6 colour black (black & burst) - selectable with VITC On/Off or 6 HD tri-level sync or 3 colour black (black & burst) and 3 HD tri-level sync All outputs independently timeable
DC Offset:	0V \pm 0.1V
Return Loss:	>40dB to 5MHz
SNR:	>75dB

4.1.2. 10MHz Input and Output:

Input:	0.5Vp-p, 75 Ohm (Relay Bypass Protected)
Output:	1Vp-p (75 Ohm terminated)
Connector:	BNC per IEC 60169-8 Amendment 2
Signal Type:	Sine wave, harmonics < 40dB typical
Long Term Oscillator Stability	
Free Running:	0.01ppm
External Ref:	5 or 10 MHz external reference autodetect (max locking range \pm 0.1ppm GPS reference with +G option)

4.1.3. LTC Outputs:

Standard:	SMPTE 12M
Frame Rate:	nominal 24, 25, and 30 (drop frame and non drop frame)
Number of outputs:	2
Connectors:	3 pin male XLR type, Female DB9
Signal Level:	
XLR - Power Off:	Adjustable, 0.5V to 4.5V p-p
XLR - Power On:	Adjustable, 0.5V to 4.5V p-p with 11.5VDC nominal offset to drive downstream 1200 series slave clocks.
Female DB9:	Adjustable, 0.5V to 4.5V p-p
Output Impedance:	66 ohm balanced (unpowered)
Rise Time:	40 +/- 10 μ sec
Jitter:	< 2 μ sec

4.1.4. Genlock Input

Type: autodetects standard
 SMPTE 170M (NTSC-M), ITU-R BT.470-6 (PAL-B) Colour Black 1 V p-p
 Composite Bi-level sync (525i/59.94 or 625i/50) 300 mV
 HD Tri-level Sync (same HD standards as sync outputs)

Connector: BNC per IEC 60169-8 Amendment 2

Signal Level: Max: 2 V p-p video
 Min: Sync level 150 mV

Frequency Lock Range: ± 50 ppm from nominal

Termination: High impedance – external termination required

Return Loss: >25dB to 10MHz (with external 75 ohm termination)

4.1.5. Communications and Control:

Serial Port:

Connector: Female DB-9

Level: RS232

Baud Rate: 57.6 Kbaud

Format: 8 data bits, no parity, 2 stop bits

Modem: (M option installed)

Connector: RJ-11 telephone jack

Baud Rate: 300 baud Bell 103 compatible

Ethernet: (NTP port with T option installed)

Network Type: Fast Ethernet 100 Base-TX IEEE 802.3u standard for 100 Mbps baseband CSMA/CD local area network
 Ethernet 10 Base-T IEEE 802.3 standard for 10 Mbps baseband CSMA/CD local area network

Connector: RJ-45

NTP Standard: RFC-1305 compliant, broadcast and server mode support.
 Must be referenced to GPS or via modem

4.1.6. GPS Receiver (G option installed)

Temperature: -40°C to +70°C

Humidity: 95% R.H. Condensing at 60°C

Dimensions: 5.8" D x 3.9" H (147mm x 100mm)

Cable Options: Standard 50'
 Optional 100' (order WA-T76)
 Optional 400' (order WA-T11)

4.1.7. DARS & AES Test Generator Outputs (STG option installed)**Standard:****Unbalanced:** SMPTE 276M Single ended AES (24 bits)**Balanced:** AES3-1992 (24 bits)**Number of Outputs:****DARS:** 1 unbalanced, 1 balanced**AES Test Gen:** 1 unbalanced, 1 balanced**Connector:****Unbalanced:** BNC per IEC 60169-8 Amendment 2**Balanced:** Removable Terminal Strip**Sampling Rate:** 48 kHz**Impedance:****Unbalanced:** 75 Ohms unbalanced**Balanced:** 110 Ohms balanced**Signal Level:****Unbalanced:** 1 V p-p into 75 ohms**Balanced:** 4V p-p unterminated**Return Loss:** >25dB to 10MHz (with external 75 termination)**AES Tones:** Menu selectable**4.1.8. Analog Composite Video Test Signal Generator (STG option installed)****Standard:** SMPTE 170M (NTSC-M), ITU-R BT.470-6 (PAL-B)**Number of Outputs:** 1**Connector:** BNC per IEC 60169-8 Amendment 2**Signal Level:** 1V p-p nominal**DC Offset:** 0V \pm 0.1V**Output Impedance:** 75 Ohms**Return Loss:** >35dB to 10MHz (with external 75 termination)**SNR:** > 75dB**4.1.9. Analog Audio Tones Generator (STG option installed)****Number of Outputs:** 1 Left and right channel pair**Type:** Balanced analog audio**Connector:** 6 pins on 12 pin removable terminal strip**Output Impedance:** 66 Ohms balanced**Signal Level:** -20 to +2 dBu into 10 Kohm load**Audio Tones:** Menu selectable – same as AES tones

4.1.10. SDI Test Generator Outputs (STG option installed)

Standard: SMPTE 259M-C (270 Mb/s)
Number of Outputs: 2 outputs of selected test signal
 2 outputs of black video
Embedded Audio: Up to 4 groups as specified in SMPTE 272M
Connectors: BNC per IEC 60169-8 Amendment 2
Signal Level: 800mV nominal
DC Offset: 0V +/-0.5V
Rise and Fall Time: 900ps nominal
Overshoot: < 10% of amplitude
Return Loss: > 15 dB up to 540 Mb/s
Wide Band Jitter: < 0.2 UI
Genlock: Provided internally by 5600MSC

4.1.11. HDTV Test Generator Outputs (HTG option installed)

Standards: SMPTE 292M 4:2:2, YCbCr
 SMPTE 372M dual link 4:4:4 GBRA
 Same standards as HD sync outputs
Number of Outputs:
 4:2:2 2 outputs of selected test signal
 2 outputs of black video
 4:4:4 2 dual link outputs of selected test signal
Embedded Audio: Up to 4 tones in one audio group as specified in SMPTE 299M. Selectable tone frequencies (from 60 Hz to 10 kHz) and audio group. Audio can be embedded on test signal or black or both outputs. Audio Level is set to -20 dB Full Scale.
Connector: BNC per IEC 60169-8 Amendment 2
Signal Level: 800mV nominal
DC Offset: 0V +/-0.5V
Rise and Fall Time: 200ps nominal
Overshoot: < 10% of amplitude
Wide Band Jitter: < 0.20 UI
Genlock Input: HD Tri-level Sync or NTSC or PAL Color Black 1 V p-p
 (provided from one of the Sync outputs)

4.1.12. Word Clock Output (WC option installed)

Number of Outputs: 1
Connectors: BNC per IEC 60169-8 Amendment 2
Signal Level: 5Vpp square wave (0-5V) $\pm 0.5V$
Impedance: 296 ohms
Min. Load: 300 ohms for 2.5Vpp square wave (0-2.5V)

4.1.13. Electrical

Voltage:	Autoranging 100 - 240 Volts AC, 50/60 Hz
Configuration:	Optional redundant supply available with 2PS option
Power:	90 watts max (with all options installed and LTC 1 Power turned on)
Fuse Rating:	250 V, 1 amp, time delay
Safety:	ETL Listed, complies with EU safety directives
EMI/RFI:	Complies with FCC Part 15 Class A regulations Complies with EU EMC directive

4.1.14. Physical

Dimensions:	19" W x 1.75" H x 18.75" D. (483mm W x 45mm H x 477mm D)
Weight:	8 lbs. (3.5Kg)

4.2. UPGRADING THE FIRMWARE

4.2.1. Overview

The firmware in the 5600MSC and the internal HD SDI Test generator is contained on two separate FLASH EPROMs. From time to time firmware updates will be provided to add additional features to the unit.

You will need the following equipment in order to update the Firmware

- PC with available communications port. The communication speed is 57600 baud, therefore a 486 PC or better with a 16550 UART based communications port is recommended.
- "Straight-thru" serial extension cable (DB9 female to DB9 male) or (DB25 female to DB9 male).
- Terminal program that is capable of Xmodem file transfer protocol. (such as HyperTerminal)
- New firmware supplied by Evertz.

4.2.2. Terminal Program Setup.

1. Connect the serial cable to the COM DB9 connector on the rear panel
2. Connect the 9 pin connector on the end of the serial update cable to the PCs' RS-232 communications port
3. Start the terminal program.
4. Configure the port settings of the terminal program as follows:

Baud	57600
Parity	no
Data bits	8
Stop bits	2
Flow Control	None

5. Power up the 5600MSC unit.

4.2.3. Initiating Firmware Upgrade Mode Via The Front Panel

This is the recommended method of updating the software in the 5600MSC Master Clock/SPG. It is activated through the *GENERAL* Setup menu system. If you cannot invoke the upload mode via the front panel as outlined in step 6 then follow the steps in section 4.2.4.

6. You can invoke the Firmware upgrade mode using the front panel Setup Menu. (See section 3.2 for information on how to operate the front panel menus.) Press the **GENERAL** key to enter the *GENERAL* Setup menu. Scroll to the *FIRMWARE* menu item using the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob and then press **SELECT**. If you want to upgrade the main operating firmware in the 5600MSC scroll to the *Upgrade 5600MSC* menu item using the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob and then press **SELECT**. If you want to upgrade the operating firmware in the HD Test generator in the 5600MSC scroll to the *Upgrade HD-TG2* menu item using the arrow keys (↑, ↓) or turn the **SHAFT ENCODER** knob and then press **SELECT**.

The front panel will show the message `ARE YOU SURE?` for 0.6 seconds. To proceed, press the **SELECT** key. The front panel will show the message `VERY SURE?` for 0.6 seconds. This warning lets the user know that taking the next step will place the unit in programming mode and could erase the software already present in the FLASH device. To proceed, press the **SELECT** key. The front panel will show the message `UPGRADING IN 5 SEC.` This warning indicates that the unit will be placed in programming mode in the time shown. Press the **ESC** key if you want to abort the programming operation. When the timer expires the unit will be placed in programming mode and its serial port is opened to communicate with the terminal software program. The front panel display shows `UPGRADE MSC NOW` or `UPGRADE TG2 NOW` depending on whether you are upgrading the main application firmware of the test generator firmware. Proceed to section 4.2.5 for instructions on uploading the main application firmware using the terminal program. Proceed to step 11 of section 4.2.4 for instructions on uploading the test generator firmware using the terminal program.

4.2.4. Initiating Firmware Upgrade Mode From The Terminal Program

You may send commands to the 5600MSC Boot monitor in order to upgrade the 5600MSC application firmware. The High definition Test generator can not be upgraded using the boot monitor method. To initiate firmware uploading from a terminal program follow procedure described in steps 7 to 12.

7. Power up the 5600MSC Master Clock/SPG. After the unit powers up, a banner with the boot code version information should appear in the terminal window. The cursor to the right of the word "BOOT>" should be spinning.

For example:

```
EVERTZ MFC5407 MONITOR 2.1.3
COPYRIGHT 1997, 1998, 1999, 2000, 2001 EVERTZ MICROSYSTEMS LTD.
COLD BOOT |
```


8. The following is a list of possible reasons for failed communications:

- Defective Serial Upgrade cable.
- Wrong communications port selected in the terminal program.
- Improper port settings in the terminal program. (Refer to step 4 for settings). Note that HyperTerminal will not change port settings while connected. Click on HyperTerminal's "Disconnect" Button then click the "Reconnect" button to activate changes to the port settings.

9. While the cursor is spinning press the <CTRL> and <X> keys, this should stop the cursor from spinning. The spinning prompt will only remain for about 5 seconds. You must press <CTRL-X> during this 5 second delay. If the unit continues to boot-up, simply cycle the power and repeat this step.

10. Hit the <ENTER> key on your computer once.

11. Type the word "upgrade", without quotes, and hit the <ENTER> key once.

12. The boot code will ask for confirmation. Type "y", without quotes.

4.2.5. Uploading the new firmware

13. You should now see a prompt asking you to upload the file.

14. Upload the "*.bin" file supplied using the X-Modem transfer protocol of your terminal program. If you do not start the upload within 10 minutes the unit's Boot code will time out. You can restart the upgrade process by power cycling the unit.

If you are upgrading the main 5600MSC application firmware the bin file will have a name something like

5600MSC.bin

There are two different versions of HD test generator cards that may be installed in the 5600MSC. The front panel will show the version that is installed. Make sure that you upload the correct version for your unit.

If you are upgrading the 7750TG2-HD Test generator application firmware the bin file will have a name something like

7750TG2-HD.bin

If you are upgrading the 7751TG2-HD Test generator application firmware the bin file will have a name something like

7751TG2-HD.bin

15. The boot code will indicate whether the operation was successful upon completion of the upload.

For Example:

UPLOAD OKAY MFC5407 WARM BOOT>

16. The following is a list of possible reasons for a failed upload:

- If you get the message "transfer cancelled by remote" you must restart the terminal program and load the bin file, then remove and install the module again.
- The supplied "*.bin" file is corrupt.
- Wrong file specified to be uploaded.
- Wrong file transfer protocol used – make sure you specify Xmodem, not Xmodem 1K.
- The PCs' RS-232 communications port can't handle a port speed of 57600.
- Noise induced into the Serial Upgrade cable.

4.2.6. Completing the Upgrade

17. Power cycle the unit. The unit should now reboot.

18. You can now close the terminal program and disconnect the RS-232 serial cable from the PC.

4.3. SERVICING INSTRUCTIONS



CAUTION – These servicing instructions are for use by qualified service personnel only. To reduce risk of electric shock do not perform any servicing instructions in this section of the manual unless you are qualified to do so.



CAUTION – If the unit is fitted with dual power supplies, make sure that power is removed from both supplies before performing any work on the unit.

4.3.1. Changing The Fuses



Check that the line fuse is rated for the correct value marked on the rear panel. Never replace with a fuse of greater value.

The fuse holder is located inside the power entry module. To change the fuses, pull out the fuse holder from the power entry module using a small screwdriver. The fuse holder contains two fuses, one for the line and one for the neutral side of the mains connection. Pull out the blown fuse and place a fuse of the correct value in its place. Use time delay 5 x 20 mm fuses rated for 250 Volts with a current rating of 1 amp. Carefully reinsert the fuse holder into the power entry module.

4.3.2. Replacing The Battery

The 5600MSC is fitted with a 3V 20mm diameter Lithium battery type CR2032. This battery is used to power the clock while power is removed from the unit. If the unit is not keeping time properly when it is powered down, the battery should be replaced according to the procedure outlined in section 4.3.2.1.



Before attempting to change the battery remove power from the 5600MSC



CAUTION

**Danger of explosion if battery is incorrectly replaced
Replace only with the same or equivalent type**

4.3.2.1. Safety Guidelines and Precautions concerning the Use of 3V Lithium Batteries

Please observe the following warnings strictly. If misused, the batteries may explode or leak, causing injury or damage to the equipment.

- The batteries must be inserted into the equipment with the correct polarity (+ and -).
- Do not attempt to revive used batteries by heating, charging or other means.
- Do not dispose of batteries in fire. Do not dismantle batteries.
- Do not short circuit batteries.
- Do not expose batteries to high temperatures, moisture or direct sunlight.
- Do not place batteries on a conductive surface (anti-static work mat, packaging bag or form trays) as it can cause the battery to short.

4.3.2.2. Procedure for Replacing the Battery

- Remove the top cover of the unit.
- Carefully lift out the old battery.
- Insert the new battery with the + side facing up. Make sure it is firmly inserted into the socket.
- Replace the top cover of the unit and apply power.
- If you unit is referenced to an external time source such as GPS, Modem Time or incoming VITC you will have to allow a few minutes for the system Time in the 5600MSC to acquire the correct time. You may want to force an update of the modem time using the methods described in section 3.7.3.6. If the unit is running with no time reference you can set the system time and date using the methods described in section 3.7.12 and 3.7.13.

This page left intentionally blank

CHAPTER 5: VISTALINK® CONTROL

TABLE OF CONTENTS

5. VISTALINK® CONTROL	5-1
5.1. CONFIGURING WHAT MENUS WILL BE SEEN IN USER MODE USING <i>VistaLINK</i>®	5-1
5.1.1. Connecting the 5600MSC to <i>VistaLINK</i> ®	5-1
5.1.2. Installing <i>VistaLINK</i> ®	5-1
5.1.3. Using <i>VistaLINK</i> ®	5-2
 Figures	
Figure 5-1: <i>VistaLINK</i> ® Configuration – Input Menu Pruning	5-2
Figure 5-2: <i>VistaLINK</i> ® Configuration – Output Menu Pruning	5-3
Figure 5-3: <i>VistaLINK</i> ® Configuration – General Menu Pruning	5-4

This page left intentionally blank

5. VistaLINK® Control

5.1. CONFIGURING WHAT MENUS WILL BE SEEN IN USER MODE USING VistaLINK®

VistaLINK® is Evertz's remote monitoring and control capability over an Ethernet network using Simple Network Management Protocol (SNMP). SNMP is a standard computer network protocol that enables different devices sharing the same network to communicate with each other. VistaLINK® is used to configure what menu items will be shown when the 5600MSC is set to user mode. This allows the operation of the 5600MSC to be simplified to just a few menu items required for operational control and prevents users from changing critical parameters that may disturb the operation of the sync and time code system.

There are 3 components of SNMP:

1. An SNMP manager also known as a Network Management System (NMS) is a computer running special software that communicates with the devices in the network. Evertz VistaLINK®-C Configuration Utility graphical user interface (GUI), third party or custom manager software may be used to monitor and control Evertz VistaLINK® enabled products.
2. Managed devices (such as 5600MSC), each with a unique address (OID), communicate with the NMS through an SNMP Agent. The 5600MSC communicates directly with the manager using its internal the mini-Agent.
3. A virtual database known as the Management Information Base (MIB) lists all the variables being controlled and which both the Manager and Agent understand. Please contact Evertz for further information about obtaining a copy of the MIB for interfacing to a third party Manager/NMS.

5.1.1. Connecting the 5600MSC to VistaLINK®

Follow the instructions in section 2.1.4 to connect the 5600MSC to the Ethernet network. Once you have established a physical connection you will need to set up the IP addresses of the 5600MSC using the *IP Rules* menu items on the *GENERAL* menu.

5.1.2. Installing VistaLINK®

In order to control the 5600MSC, you will need at least version 10.1.42 of the VistaLINK® configuration tool. If you received the VistaLINK® Toolkit CD-ROM with the 5600MSC, insert it into the PC's CD-ROM drive. In a few seconds a screen will appear with a menu guiding you through the VistaLINK® installation. You want to press the button to install the VistaLINK™-C Configuration tool.

If you have an older version of VistaLINK®, or you are upgrading firmware in an existing 5600MSC and do not have VistaLINK® contact the Evertz customer support department to receive your free copy of the VistaLINK®-C Configuration utility.

If you are installing VistaLINK®-C version 10.1.42 you will also need to download the JAR file from Downloads section of the Evertz web site (www.evertz.com). You will need to put it into the *lib\products* folder of the VLPro install directory. If you installed the software in the default location put the JAR file in the *C:\Program Files\Evertz\VistaLinkPro\lib\products* folder.

5.1.3. Using VistaLINK[®]

The 5600MSC should be auto-discovered by VistaLINK[®] PRO and appear under the *Hardware* section of the VistaLINK[®] PRO Navigation Tree named with its given IP Address. If the 5600MSC is not auto-detected (because it is on another subnet) it can be manually added by right clicking the *Hardware* node and selecting *Add/Update frame*.

Right click the discovered 5600MSC to open the *Configuration View* screen. The screen is broken into three tabs, one for each of the 5600MSC menus. To view the other screens, click on the appropriate tab of the configuration screen. Figure 5-1 to Figure 5-3 show each of the configuration screens. To hide items on one of the menus, set the dropdown beside the menu item name to *hidden*. To make the menu item visible, set the dropdown to *visible*. On the Sync output menus set the dropdown to *phasing only* if you want to hide all the menu items except the phasing controls.

On the *GENERAL* tab you will see a text box for you to enter a numeric password. This password will be used when you are switching from *User* mode to *Engineering* mode. You can also choose where you want to place the 5600MSC into User Mode when you send the configuration or not.

Once you have finished configuring the menu tree you can save the configuration in VistaLINK[®]. You can also send it to the 5600MSC by pressing the *Apply* button on the VistaLINK[®] toolbar.



You cannot send the configuration to a 5600MSC that is operating in *User* mode. You must first set it to *Eng* mode using the *Eng/User Mode* menu item on the *GENERAL* menu.

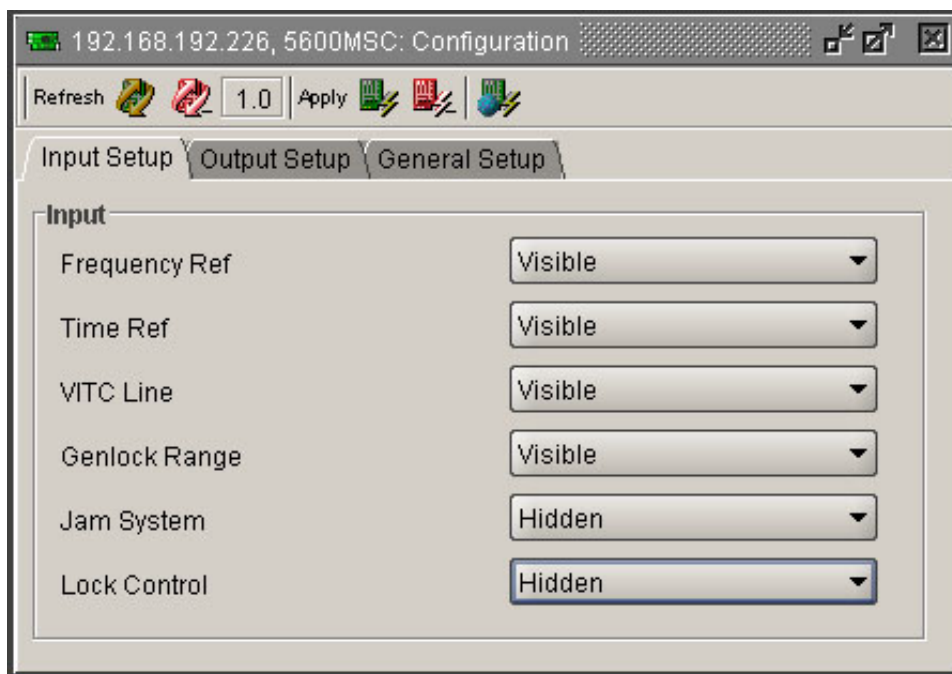


Figure 5-1: VistaLINK[®] Configuration – Input Menu Pruning

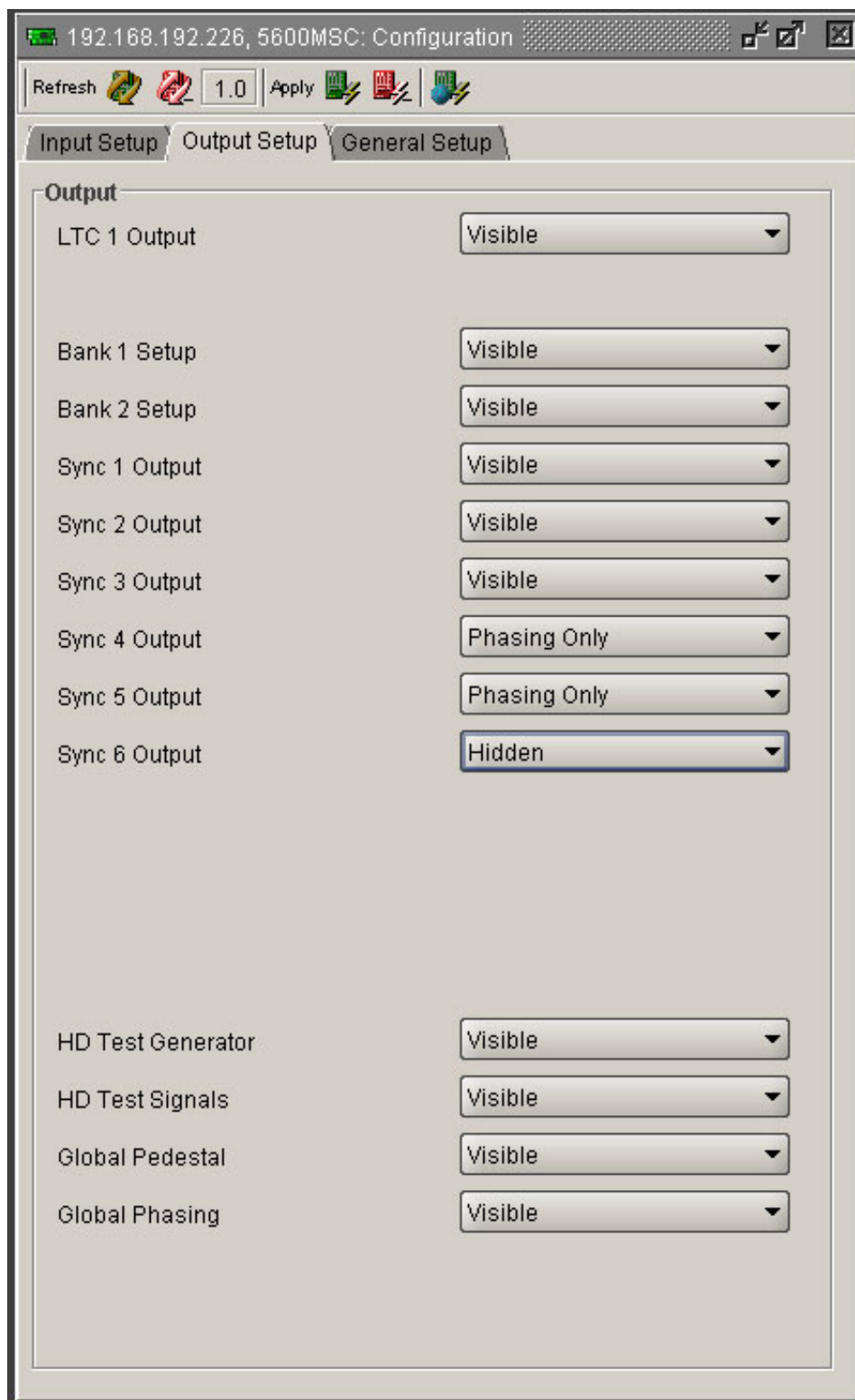


Figure 5-2: VistaLINK® Configuration – Output Menu Pruning

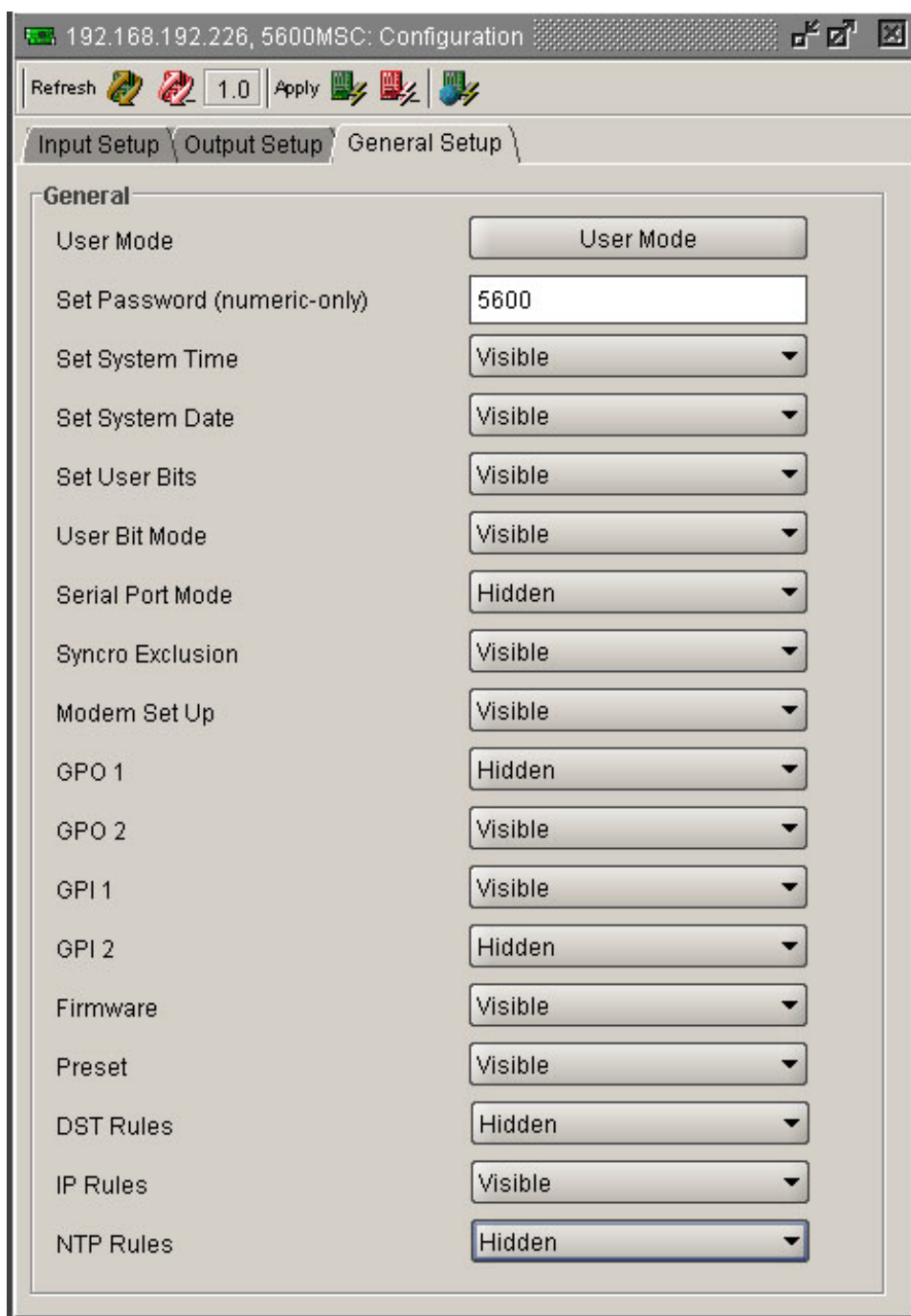


Figure 5-3: VistaLINK[®] Configuration – General Menu Pruning

This page left intentionally blank