

Model 5600MSC Master Clock/SPG

Instruction Manual

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IMPORTANT SAFETY INSTRUCTIONS

	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.
	The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (Servicing) instructions in the literature accompanying the product.

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- Do not defeat the safety purpose of the polarized or grounding type plug. A polarized plug has two blades, one blade being wider than the 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 (ie. 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).

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WARNING

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WARNING

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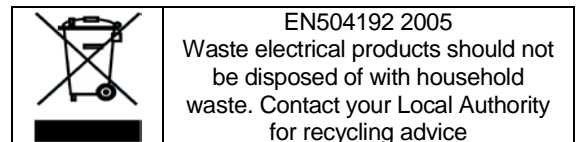
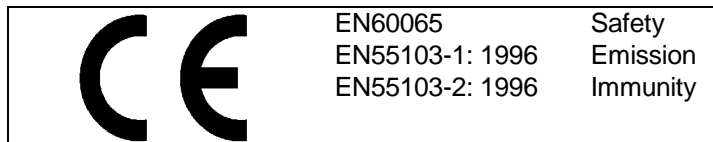
NOTE

This equipment with the CE marking complies with both the EMC Directive (2004/108/EC) and the Low Voltage Directive (2006/95/EC) 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

Evertz Microsystems Ltd		This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:
 For Commercial Use		
Tested to comply with FCC Standards		This device may cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

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>
1.0	Major revision updated to new menu structure of firmware version 1.2 build 6	Aug 2003
1.1	Added info on connecting two units together in Synchro mode, Added specs for Genlock input – note non-terminating	Sep 2003
1.2	Added info on NTP, Added 1 Hz, 6 Hz and PAL Colour frame sync signals	Jan 2004
1.3	Added info Modem Option – new menus added firmware version 1.3 build 6	Feb 2004
1.4	Added new menus and status displays for firmware version 1.3 build 14	May 2004
1.5	Updated to features of firmware version 1.5	Oct 2005
1.6	Updated to features of firmware version 1.6	Apr 2006
1.6.1	Fix typos, add info about changing battery, add Support for tri-level sync genlock	Aug 2006
1.6.2	Added support for Word Clock output	Oct 2006
1.6.3	Fixed “ESC” description and Cross-references	May 2007
1.6.4.	Updated to features of firmware Version 2.0 build 20 – VistaLINK® control added	Jun 2007
1.6.5.	Added lip sync notes to 3.6.5.4.6. and 3.6.12.2. Removed “5/10 MHz Ref NA”	Jul 2007
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2.0.2	Updated list of Sync Pulses supported	Nov 2008
2.0.3	Minor cross-reference change in section 2.1.5. General clean up	Mar 2009
2.0.4	Updated Word Clock output specifications section	April 2009
2.0.5	Updated fuse safety information	Dec 2009
2.0.6	Added password information to section 3.7.7.2	Feb 2010
2.0.7	Updated electrical safety specification	April 2010
2.0.8	Updated General Purpose Output Menu	June 2010
2.0.9	Added support for SNTP Time Reference,	June 2011
2.1	Removed NTP Spoof – Updated for Firmware version 2.4 build 15,	Jan 2013
2.1.1	Minor updates throughout	Oct 2013

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CHAPTER 1: OVERVIEW

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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 Positioning 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 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 timecode 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. All versions of the 5600MSC have an Ethernet port for remote SNMP control and optionally NTP services.

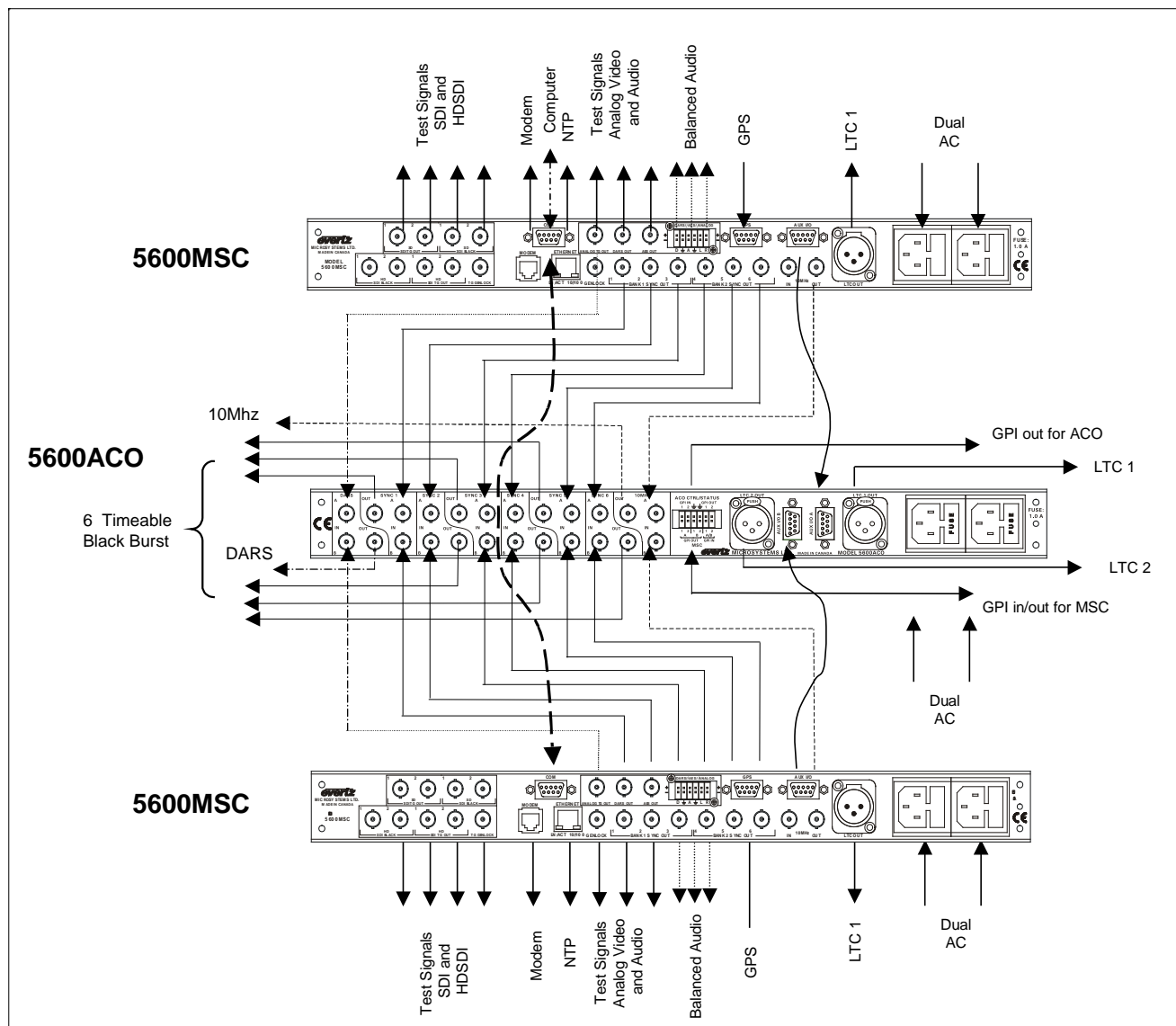


Figure 1-1: Redundant Master Clock/SPG with Auto Changeover System Diagram

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 fail. The 5600ACO2 unit can be programmed as to which outputs 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 (NTP) server support
- Optional 48 KHz audio word clock output. Word clock may also be generated from DARS with a 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
- Remote SNMP monitoring and control using VistaLINK[®] Pro
- Optioncal LTC input (instead of secondary LTC output)

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 sub-carrier 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.
- AES3:** Informal name for a digital audio standard established by the Audio Engineering Society. This audio standard is in four parts formally known as AES3-1-2009, AES3-2-2009, AES3-3-2009, and AES3-4-2009.
- 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 ST 125, 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 ST 259 and CCIR 656.
- BIT STREAM:** A continuous series of bits transmitted on a line.
- BNC:** Acronym for 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 IEC 61169-8 Annex A.
- 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-R BT.601).

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

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 ITU-R BT.601. ITU-R BT.656 and SMPTE ST 125 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 ITU-R BT.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 ST 244. 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 ST 244. 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 standard, but often has only the preamble active. This signal is used for synchronization in digital audio studio applications. The recommended practice AES11 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 ST 12-1 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 ITU-R BT.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 ST 272 (standard definition) or SMPTE ST 299-1 (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 BT.470: An international standard for the PAL composite analog television system. This document has not been replaced by ITU-R BT.1700-1.

ITU-R BT.601: An international standard for component digital television from which was derived SMPTE ST 125 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-R BT.656:** 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 ST 125 (parallel 525 line systems) and SMPTE ST 259 (serial 525 line systems). This document was formerly known as CCIR-656.
- ITU-R BT.1700-1:** An international standard for composite analog television systems. This document includes standards for the 525 line NTSC, 625 line PAL, 525 line PAL (also known informally as PAL-M) and 625 line SECAM. For 525 line NTSC this recommendation refers to SMPTE ST 170 as the defining standard.
- LTC:** Linear Time Code or Longitudinal Time Code. This time and address control signal standardized by SMPTE ST 12-1 (formerly known as 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.
- 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 ST 259.
- SMPTE (Society of Motion Picture and Television Engineers):** A professional organization that recommends standards for the film and television industries.

- SMPTE 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.
- SMPTE RP 188:** See SMPTE 12-2
- SMPTE ST 12-1:** The SMPTE standard for the Time and Address Control signal in widespread use in the professional video and audio industries. SMPTE ST 12-1 defines the specifications for both Linear Time Code (LTC) and Vertical Interval Time Code (VITC). This standard was previously called SMPTE 12M.
- SMPTE ST 12-2:** The SMPTE standard for transmitting Time code in the ancillary data space of serial digital television signals. This standard was previously called SMPTE RP 188.
- SMPTE ST 125:** 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 ST 170:** The SMPTE standard for the NTSC Composite Analog Television signals.
- SMPTE ST 259:** 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 ST 272:** The SMPTE standard for the embedding up to 4 groups of audio into Standard Definition television signals.
- SMPTE ST 276:** The SMPTE standard for transmission of AES digital audio over coaxial cable.
- SMPTE ST 274:** The SMPTE standard for HDTV 1920 x 1080 line scanning and analog and parallel interfaces for multiple frame rates.
- SMPTE ST 291-1:** The SMPTE standard for formatting of ancillary data onto serial digital interfaces.
- SMPTE ST 292-1:** The SMPTE standard for the 1.5 Gb/s nominal serial digital interface for High Definition television signals. (often referred to as HD SDI)
- SMPTE ST 296:** The SMPTE standard for HDTV 1280 x 720 line progressive images - scanning and analog and parallel interfaces.
- SMPTE ST 299-1:** The SMPTE standard for the embedding up to 4 groups of audio into 1.5 Gb/s and 3 Gb/s High Definition television signals.
- SMPTE ST 299-2:** The SMPTE standard for the embedding an additional 4 groups of audio into 3 Gb/s High Definition television signals defined in SMPTE 425-1 Level A
- SMPTE ST 309:** The SMPTE standard for the encoding Date and Time Zone information into SMPTE ST 12-1 Time code signals.

SMPTE ST 424: The SMPTE standard for the physical layer for the 3.0 Gb/s nominal serial digital interface. (often referred to as 3G SDI)

SMPTE ST 425-1: The SMPTE standard for mapping 4:4:4 or higher frame rate 4:2:2 High Definition television signals onto a 3.0 Gb/s nominal serial digital interface. (often referred to as 3G SDI)

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 ST 12-1 is encoded on one or more lines in the vertical interval of standard definition television signals.

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CHAPTER 2: INSTALLATION

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2. INSTALLATION

2.1. REAR PANEL

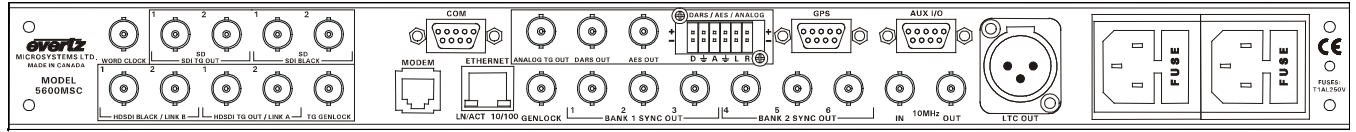


Figure 2-1: 5600MSC Rear Panel

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 an input of a 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 5600MSC. 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.



When locked to input video and the genlock range is set to wide, the 10MHz output is forced into bypass (will not detect any input applied, and output=input)

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 when genlocking to the video reference. See section 3.5.1 and 3.5.6. 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 is 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®-Pro Configuration software 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 5 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 3.7.11 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.

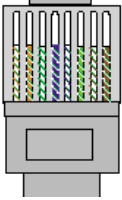
	Pin #	Signal	EIA/TIA 568A	AT&T 258A or EIA/TIA 568B	10BaseT or 100BaseT
	1	Transmit +	White/Green	White/Orange	X
	2	Transmit –	Green	Orange	X
	3	Receive +	White/Orange	White/Green	X
	4	N/A	Blue	Blue	Not used (required)
	5	N/A	White/Blue	White/Blue	Not used (required)
	6	Receive –	Orange	Green	X
	7	N/A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



Many versions of the 5600MSC have the labeling for 10/100 and LN/ACT reversed on the rear panel.

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 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 2-5.

2.1.6. Serial Port and Modem Connections

COM: A 9 pin female 'D' connector for connection to the RS-232 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 information on configuring the port for various applications. See section 2.4 for information on connecting two 5600MSC units in 'synchro mode'.

Pin #	Name	Description
1		
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 port. See section 2.5 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. Section 3.7.3 in the *General* menu descriptions provides 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 provides two GPI inputs and outputs and two LTC outputs (or one LTC output and one LTC input with the LTC option). This connector is typically used to interconnect the 5600MSC to the auto-changeover 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 ST 170 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 in the *OUTPUT* Setup menu selects the test signal available on the **ANALOG TG OUT** connector. (See section 3.6.4.)

AES OUT: This BNC connector has an unbalanced AES audio output compatible with the AES3-4 and SMPTE ST 276 standards. A balanced version of this signal is available on the **DARS/AES/ANALOG** 12 pin terminal strip. The *AES/DARS OUT* sub-menu in the *OUTPUT* Setup menu is used to configure the AES audio outputs. (See section 3.6.12.)

DARS OUT: This BNC connector has an unbalanced Digital Audio Reference signal (DARS) compatible with the AES3-4 and SMPTE ST 276 standards. A balanced version of this signal is available on the **DARS/AES/ANALOG** 12 pin terminal strip. The *AES/DARS OUTPUT* sub-menu in 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 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 in the *OUTPUT* Setup menu are used to configure the analog audio outputs. (See section 3.6.11) 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 in the *OUTPUT* Setup menu are 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 ST 259-C standard. The *SDI TEST SIGNALS* sub-menu in the *OUTPUT* Setup menu selects the test signal available on the **SD SDI TG OUT** connectors. (See section 3.6.6)

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

2.1.10. HD SDI Test Generator Connections (HTG Option)

The *HD TEST GEN* group of sub-menus in the *OUTPUT* Setup menu are 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 using a short cable.

HD SDI TG OUT: This pair of BNC connectors has serial component video outputs compatible with the SMPTE ST 292-1 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 in 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 ST 292-1 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 contain 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. The *AES/DARS/WC OUT* sub-menu in the *OUTPUT* Setup menu is used to configure the phase of the word clock output. (See section 3.6.12.4)

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 sense 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 combine 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.

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 GPIs can be used to change test patterns on the SDI and Analog Test Generators (STG option only). These functions are set using the GPI 1 and GPI 2 function menu items in the GENERAL setup menu (See section 3.7.5)

The outputs are internally pulled up to +5 volts DC. When a GPO activates, the GPO pin is pulled to ground. Care must be taken to limit the sink current to less than 50mA or damage to the GPO will result. 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 and Figure 2-3 shows the circuitry for each of the I/O pins.

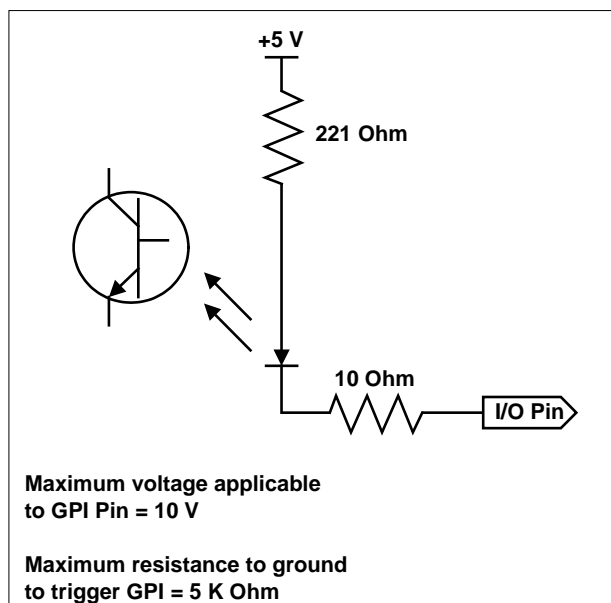


Figure 2-2: Typical GPI Circuitry

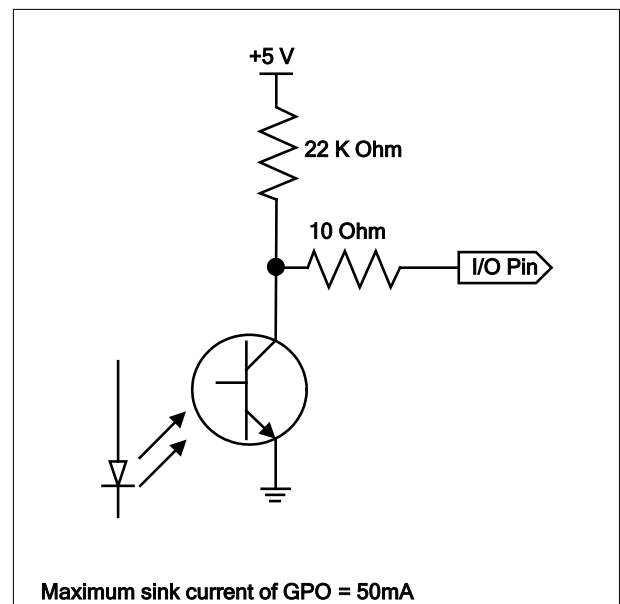


Figure 2-3: Typical GPO Circuitry

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 2-8. The synchro cable is essentially a null modem cable with male DB9 ends instead of female ends. 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. The menu settings on the Master B unit shown in Table 2-7 can be viewed but cannot be changed. Some of these menu items can be excluded from Synchro mode by using the *SYNCHRO EXCLUSION* menu item on the *GENERAL* menu. The menu items that are Synchronized 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.

LTC 1 OUTPUT	ANALOG TEST GEN (excludable)
LTC 2 OUTPUT	ANALOG TEST SIGS (excludable)
BANK 1 SETUP	SDI TEST GEN (excludable)
BANK 2 SETUP	SDI TEST SIGNALS (excludable)
SYNC 1 OUTPUT	HD TEST GEN (excludable)
SYNC 2 OUTPUT	HD TEST SIGNALS (excludable)
SYNC 3 OUTPUT	GLOBAL PHASING (See section 3.7.1)
SYNC 4 OUTPUT	GLOBAL PEDESTAL
SYNC 5 OUTPUT	AUDIO EVENT 1 to AUDIO EVENT 10
SYNC 6 OUTPUT	AES/DARS/WC

Table 2-7: Menu Items Synchronized in Synchro Mode

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 2-8: 5600MSC-1-0-30 Synchro Cable

2.5. GPS RECEIVER INSTALLATION (GP OPTION)

The 5600MSC unit (with the +GP option fitted) is designed to work with the Trimble Accutime 2000 Smart Antenna that can be located up to 1000 feet from the 5600MSC unit. 5600MSC units built after January 1, 2007 will also work with Trimble Accutime Gold antenna. 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.



5600MSC units built before January 1, 2007 will not reliably power up newer Trimble Accutime Gold antennas. These units must be operated with the larger Accutime 2000 antennas or returned to the factory for modifications. Units shipped after January 1, 2007 support both antenna types.

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.



When mounting two or more smart antennas they must be spaced at least 3 feet (1 meter) apart to prevent interference.

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 2-4.

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

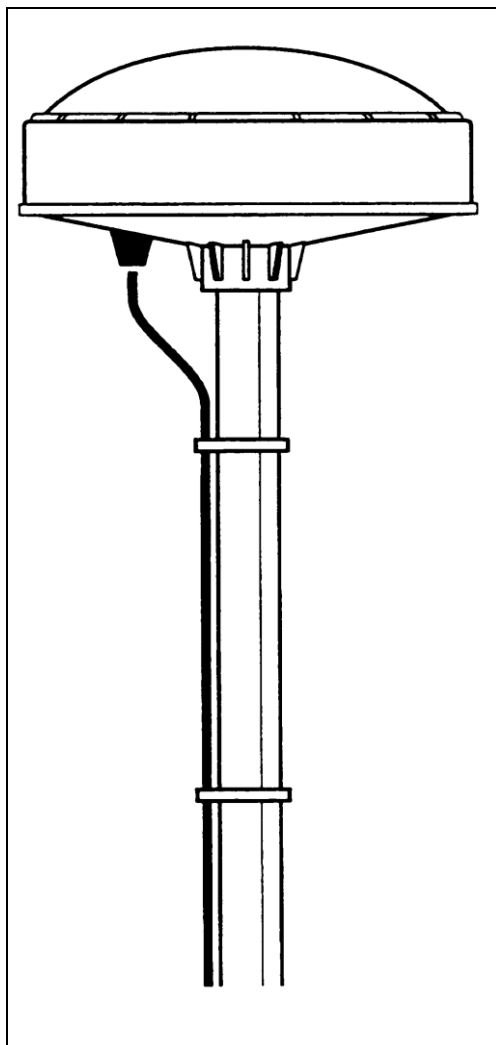


Figure 2-4: Pole Mounting the Smart Antenna

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 sub-miniature 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 2-5. If you require a longer cable, a 100 foot (Evertz part WA-T76), 200 foot cable (Evertz part WA-T10), 400 foot cable (Evertz part WA-T11), 800 foot cable (Evertz part WA-08) or 1200 foot cable (Evertz part WA-T12) 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 2-6.

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 -
	-----	Drain Wire	Shield

Figure 2-5: 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 2-6: 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 2-6.

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 to operate with the GPS Smart antenna see section 3.5.1 of this manual

CHAPTER 3: OPERATION

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3. HOW TO OPERATE THE MASTER CLOCK/SPG

The model 5600MSC Master Clock/SPG combines the latest LSI technology with sophisticated embedded micro-controller 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

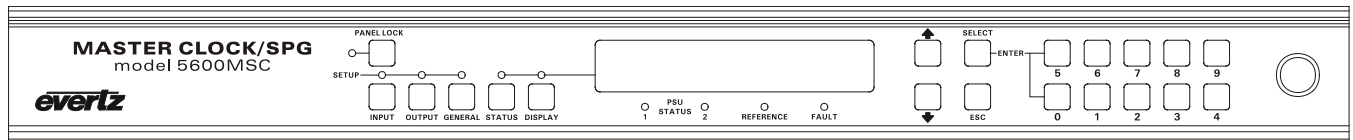


Figure 3-1: Model 5600MSC Front Panel Layout

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

The pushbuttons are 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.

Note that if both \uparrow , \downarrow keys are pressed at any time, a line of help text will scroll across the display. While this is scrolling, pressing any key will return to the previous menu item.

3.1.1. The Setup Menu Pushbutton Group

The Setup pushbutton group consists of the **INPUT**, **OUTPUT**, **GENERAL**, **SELECT**, **ESC**, \uparrow , \downarrow 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**, \uparrow , \downarrow and **SHAFT ENCODER** knob are used to navigate the menu.

INPUT: Enters the *INPUT SETUP* menu that is used to set up various items related to the input references to the 5600MSC. (See section 3.5)

OUTPUT: Enters the *OUTPUT SETUP* 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 *GENERAL SETUP* 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 *Setup* menus the **SELECT** key is used to move to the next lower sub-menu level 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 higher sub-menu level.

↑, ↓, 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)



Pressing the ↑ and ↓ buttons simultaneously will activate a scrolling help message that will explain the currently selected item in detail.

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 Function

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 a menu item 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, the time reference selected is invalid or 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 Green 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 not a valid connection.



Many versions of the 5600MSC have the labeling for 10/100 and LN/ACT reversed on the rear panel.

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:

These displays can be used to verify that any time zone offsets and daylight saving time settings are being applied correctly.

SYS	12:34:56.00	System time derived from time reference
DATE	22 Jan 2003	System date derived from time reference
L1	12:34:56:00	Primary LTC Generator Output Time information
L2	12:34:56:00	Secondary LTC Generator Output Time information
V i	12:34:56:00	VITC Input Time information from genlock input
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 sync output is High definition, then it will not have time information. For example

S6 no vitc in hd

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

L o	12:34:56:00	LTC Generator Output Time information
L i	12:34:56:00	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. If the item is not currently relevant, then the display will be dim. An example of this is when the Frequency reference is Video, the 5/10MHz status will be dim. If the item is causing the FAULT LED to be on, then it will be extra bright. Some of the common *Status* messages are:



If the fault LED is on, scroll through the status displays to find the status items that are extra bright to discover why the 5600MSC is in the fault condition.

3.3.1. GPS Status Messages

GPS disconnected	The GPS antenna is not connected or is not functioning
GPS No Sat Found	The GPS receiver could not find a valid satellite.
GPS Searching	The GPS receiver has no almanac. This will be retrieved automatically when the signal is received from the satellites.
GPS Poor Signal	The satellite signal to the GPS receiver is poor.
GPS Only 3 Sats	The GPS receiver has only found 3 satellites and it has not completed a survey of its position. 4 Satellites is the minimum requirement to survey the position. After the survey is complete, the GPS can function on as little as 1 satellite.
GPS 3 Good Sats	The GPS receiver has completed a survey and is functioning normally with 3 satellites.
GPS 0 Good Sats	Contact with all satellites has been lost. The accuracy of the GPS reference cannot be guaranteed in this state.
GPS OK Sig OK	The GPS antenna is connected – the signal strength is good
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.
VITC IN Not OK	No VITC detected on selected line of genlock input.
VITC IN OK	VITC is detected.

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 change in the phase of the video reference).
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	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 3.5.7.
Needs Time Jam	This flashing display indicates that the <i>Lock Contrl Time</i> menu item is set to <i>User time jam</i> and there is a disagreement between the incoming time reference and the internal time reference. In order for the 5600MSC to lock to its time reference input it must perform a jam that will affect the complete system time of the 5600MSC. In order to perform the Time Jam, press the INPUT button to access the <i>Force Time Jam Menu</i> item. When a system jam is needed, any LEDs that are On will be flashing.
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.
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.
GPS Freq Ref	The 5600MSC currently has GPS selected as its frequency reference.
10 MHz Freq Ref	The 5600MSC currently has 5/10MHz selected as its frequency reference.
Video Freq Ref w	The 5600MSC currently has video selected as its frequency reference and its lock range is wide.
Video Freq Ref n	The 5600MSC currently has video selected as its frequency reference and its lock range is narrow.
Internal Frq Ref	The 5600MSC currently has no input selected as its frequency reference and is free running.

3.3.4. Modem Status Messages

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.
Modem on hook	Modem is offline, ready to dial
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.	
Dialing modem	The modem is dialing out.
No dial tone	There is no dial tone when the modem tries to dial out.
Wait for answer	Waiting for the remote system to answer.
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 BAD DATA	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.
50 Sec to redial	The modem is waiting to retry a failed call.

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. Network 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.

In bootstrap mode these addresses will read 0.0.0.0. until the addresses are successfully acquired from a bootp server.

3.3.6. SNMP Messages

SNMP on	SNMP is enabled, and remote control of this unit is possible.
SNMP status only	SNMP is enabled for monitoring only. No remote control of this unit is possible.
SNMP disabled	SNMP is not enabled. Any SNMP messages received will be ignored.

3.3.7. MENU Status Messages

All menus shown	All menus are shown on the menu system.
Menus restricted	Some of the menus may not be available to the user. The unavailable menus are hidden and can be made visible again via the Engineering/User menu with a password.

3.3.8. LTC 1 Output Power Status Messages

LTC Power Off	The LTC 1 Output power is turned off.
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.

3.3.9. 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.

3.3.10. GPI Input Status Messages

GPIx input xxxx	Shows the state of GPI 1 or GPI 2 input (high or low).
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3.3.11. 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.

3.3.12. Synchro Status Messages

Syncro not RX	The synchro mode is not RX or synchro time.
Syncro link OK	The synchro mode is RX or synchro time, and receiving data ok.
Syncro no link	The synchro mode is RX or synchro time, and not receiving data.

3.3.13. Option Messages

Opt 2PS STG WC M	Opt is followed by items indicating the installed options. The following is a list of the options:	
Opt HTG LTC GP T		
		2PS Redundant power supply
		M Modem
		GP GPS
		T Network Time Protocol Server

STG	<ul style="list-style-type: none"> • NTSC/PAL test signal generator • Audio Tone generator (analog) • DARS generator (balanced & unbalanced) • AES generator (balanced & unbalanced) • SD SDI Test Generator with 2 SD SDI test signals and 2 SD SDI black
HTG	HD SDI Test Generator with 2 HD SDI test signals & 2 HD SDI black
WC	48 KHz Word Clock Output
LTC	LTC Input

3.3.14. Ethernet Status Messages

Ethernet link ok	The Ethernet port is detecting a link signal.
No ethernet link	The Ethernet port is not detecting a link signal.

3.3.15. Flashing LEDs

Leds are flashing	When a system jam is needed, any LEDs that are on, will be flashing. See section 3.5.7.
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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 the 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.



Pressing the ↑ and ↓ keys simultaneously, accesses a scrolling help display.

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 *Syncro Mode*)



When the *Serial Port Mode* menu item in the *GENERAL Setup* menu is set to *Syncro Rx* mode, the parameter values displayed will be dimmed, indicating that they cannot 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 3.5.8 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 the genlock input.
<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 or time. This affects the timing of all outputs and should be used cautiously. It is also used to reset the phase detector.
<i>LOCK CONTROL</i>	Configures whether the 5600MSC will lock to its frequency reference gradually or suddenly.

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

3.5.1. Configuring the Frequency Reference

INPUT
FREQUENCY REF
GPS freq ref
10 MHz freq ref
Video freq ref
Internal frq ref

The *FREQUENCY REF* menu item is used to select the type of frequency reference to be used by 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 the different possible 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 *AES Lock Type* menu item on the *AES/DARS OUT* branch of the *OUTPUT* menu tree. (See section 3.6.12.5.)

When set to *GPS freq ref* the master oscillator will be locked to frequency information being acquired from the GPS receiver.

When set to *10 MHz freq ref* the master oscillator will be locked to an incoming 10 MHz or 5 MHz reference connected to the **10 MHz** input connector.

When set to *Video freq ref* 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 *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. (See section 3.5.6)

When set to *Internal freq ref* the master oscillator will be free running. The accuracy of the internal master oscillator is 0.01ppm which corresponds to a time drift of about 0.31 seconds per year.

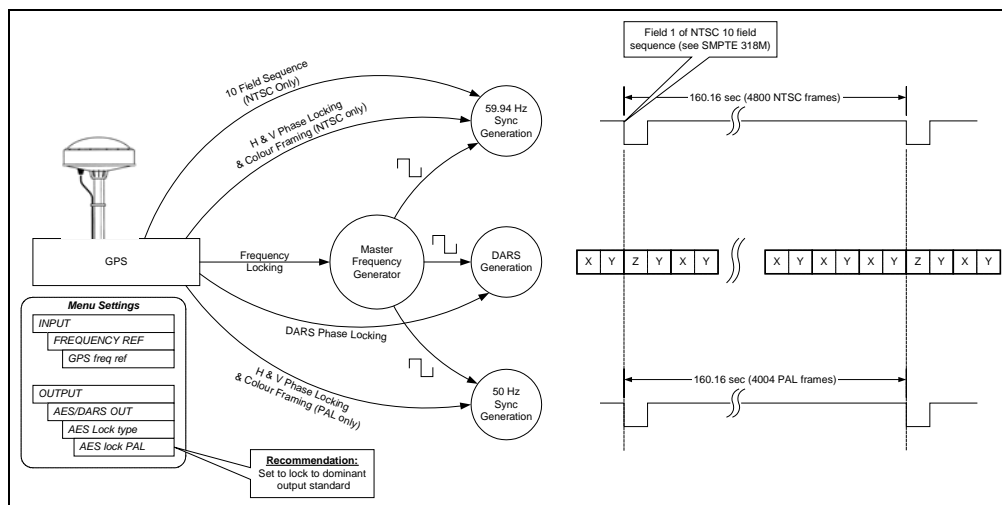


Figure 3-2: Sync Generation - GPS Frequency Reference

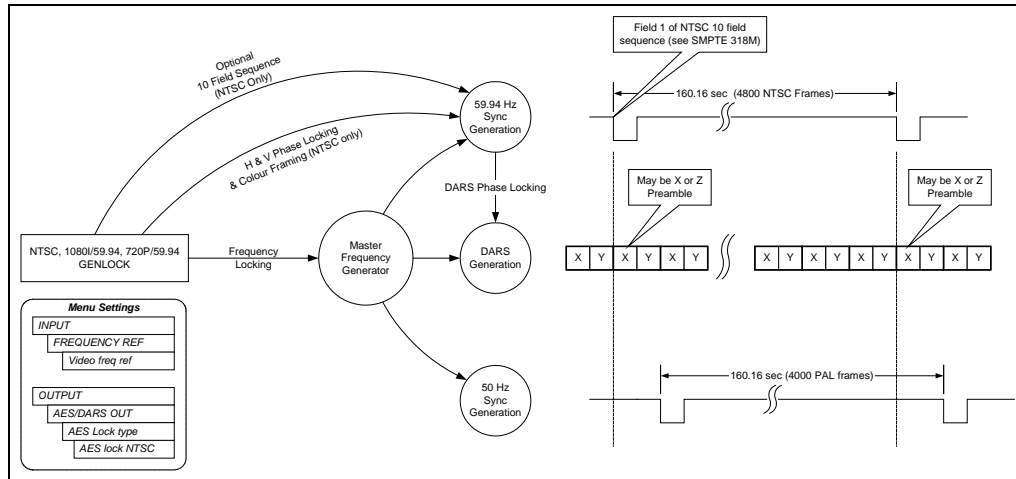


Figure 3-3: Sync Generation – NTSC or 59.95 Hz Video Reference

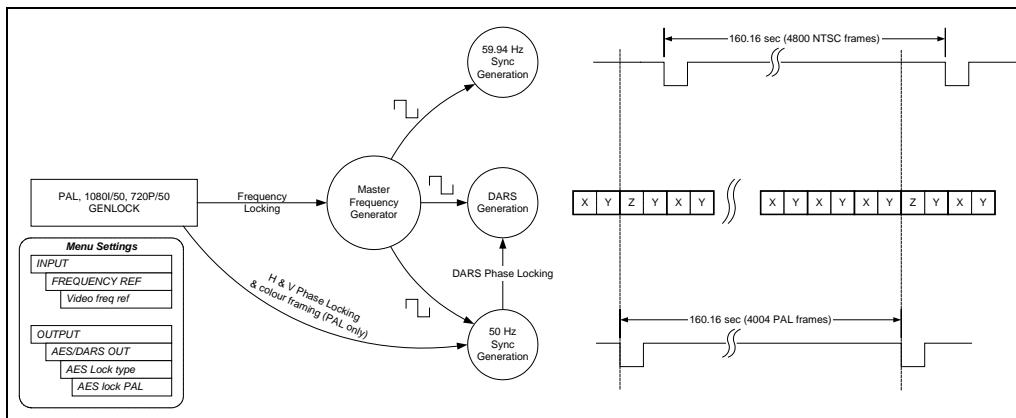


Figure 3-4: Sync Generation – PAL or 50 Hz Video Reference

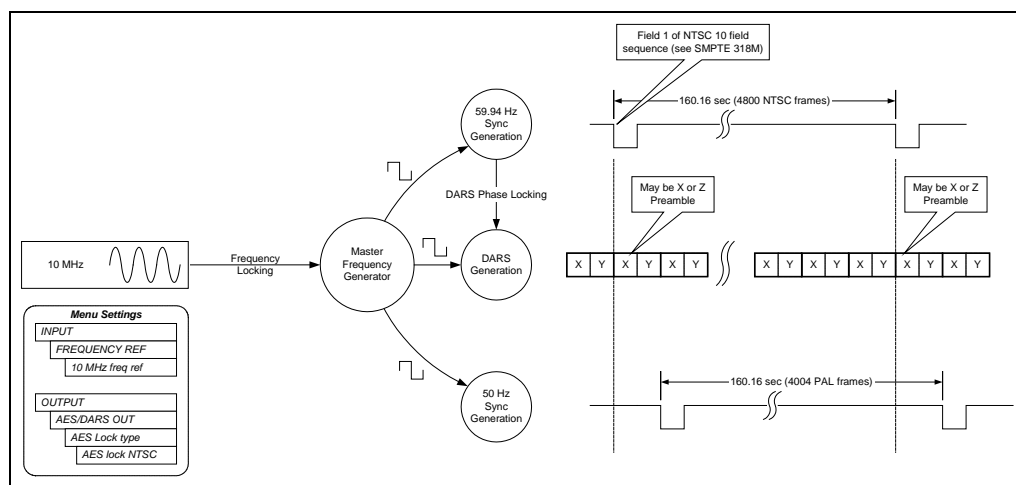


Figure 3-5: Sync Generation – 10 MHz Reference – NTSC outputs

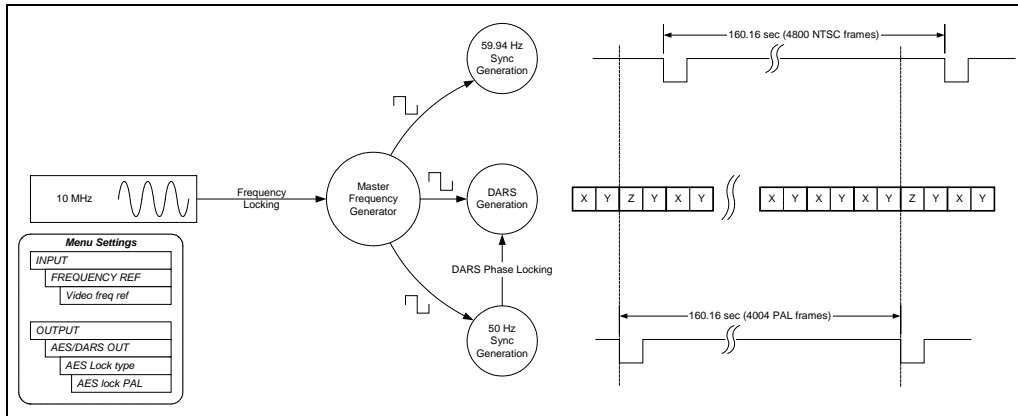


Figure 3-6: Sync Generation – 10 MHz Reference – PAL outputs

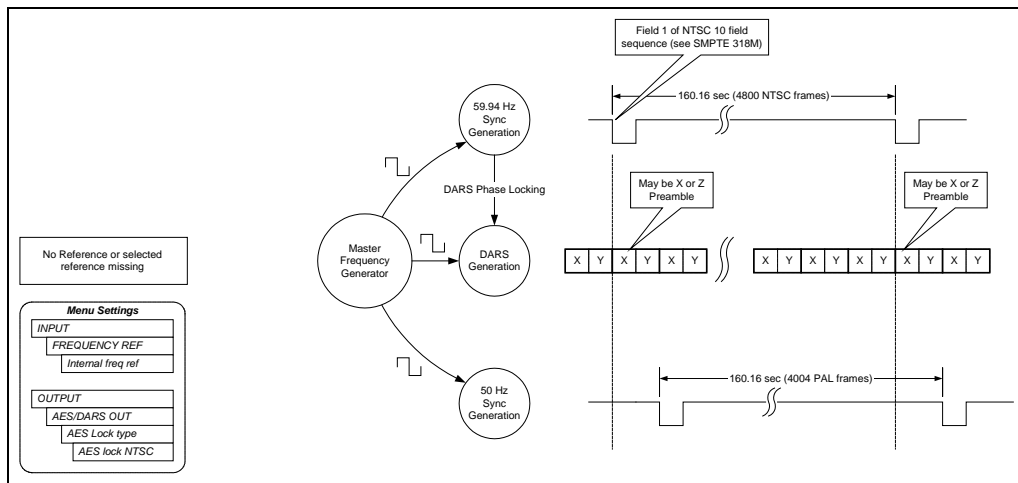


Figure 3-7: Sync Generation – No Reference – NTSC outputs

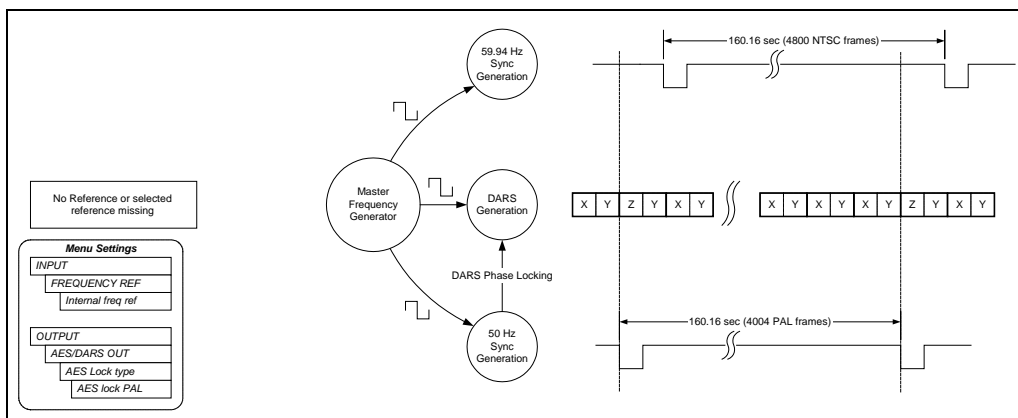


Figure 3-8: Sync Generation – No Reference – PAL outputs

3.5.2. Configuring the Time Reference

INPUT
TIME REF
Select Time Ref
GPS time ref
Modem ref
Synchro time ref
No time ref
LTC time ref
VITC time ref
SNTP time ref

The *Select Time Ref* menu item is used to select the type of time reference to be used by the 5600MSC.

When set to *GPS time ref* the 5600MSC system time is referenced to time information being acquired from the GPS receiver. (GP 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 anything else. 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 *LTC time ref* the 5600MSC system time will be referenced to time information being read at the LTC input port. The frame reate of the incoming LTC is auto-detected (+LTC option only).

When set to *VITC time ref* the 5600MSC system time will be referenced to time information being read from VITC on the video genlock. The incoming VITC frame rate is auto-detected.

When set to *SNTP* (Simple Network Time Protocol) the 5600MSC system time will be referenced to time information being received from one or more NTP servers. The NTP server with the 'best' time information will be used. The address(es) of the NTP sesrver(s) it will use must be set using the *Select Time IP* menu items. See section 3.5.4.



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

3.5.3. Configuring the Time Reference Date Format

INPUT
TIME REF
Select Date Mode
Date std auto
Legacy date
Production date
Smppte309bcd date
Smppte309mjd date
No date decode

The *Select Date Mode* menu item is used to select the type of date format when the time reference is LTC or VITC.

When set to *Date std auto*, the 5600MSC will try to find the best date format. Use caution with this as some random data, including all 0s will look like valid Legacy date format.

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

Select *Production date*, to decode 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 decode the date in the SMPTE ST 309 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 decode the date in the SMPTE ST 309 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 *No date decode* to ignore any date information in the LTC or VITC.

3.5.4. Configuring the Time Reference IP

There are eight identical pairs of controls to set the IP address and allow the 5600 to interrogate up to 8 NTP servers. For the sake of simplicity only the controls for Server 1 will be shown.

INPUT
TIME REF
Select Time IP
Server 1 IP
192.168.1.1

This control sets the IP address for Server 1 to get SNTP time from. It should be set to the IP address of the NTP server you wish to interrogate. This setting is only used when the *Select Time Ref* menu is set to *SNTP time ref*.

INPUT
TIME REF
Select Time IP
Server 1 mode
Server 1 Disabled
Server 1 Enabled

This control determines if the 5600 will use the NTP server configured as server 1. Server 1 is disabled by default and must be configured correctly before its associated NTP server will be interrogated.



When the 5600MSC is using SNTP as a time reference, it will interrogate each of the servers 8 times, and average the results. It will then pick the best one based on stratum number, NTP distance to server, and NTP dissipation numbers. The accuracy of this is determined by the accuracy of the servers, and the delay consistency of the network that the data is traveling. For detailed information on NTP, see www.ntp.org

3.5.5. 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 VITC time ref. See section 3.5.2.

3.5.6. 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 re-phase until it achieves a locked condition. (See section 3.5.8.)

Set this menu item 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 cannot change this menu item.



When locked to input video and the genlock range is set to wide, the 10MHz output is forced into bypass (will not detect any input applied, and output=input)

3.5.7. Synchronizing the System Master Oscillator to the Frequency Reference Immediately

INPUT

JAM SYSTEM NOW

System Force Jam
Force Time 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*)

It is also used to accept a new time if the Lock Control Time has been set to *User time jam*, and the 5600MSC has decided that the time reference input is in disagreement with its internal time. To synchronize the system time to the time reference immediately, press **SELECT** when Force Time Jam is shown on the display. The front panel will display TIME JAMMED momentarily after the system time has been updated. If the Time Ref is set to *SNTP time ref*, then this control will force the 5600MSC to interrogate the servers in its Time IP list and update time.

To synchronize all of 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 so 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.

3.5.8. Configuring the Lock Speed

INPUT
LOCK CONTROL
Lock Control Ref
Abrupt lock
Slow lock

The *Lock Control Ref* menu item is used to select whether the 5600MSC will abruptly lock to its frequency reference or slowly re-phase 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 it's internal oscillator to bring it into lock with the frequency reference selected. This setting may cause disturbances to the sync and AES 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 re-phase. 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 re-phase 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 3.5.7.)

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 cannot change this menu item.

3.5.9. Configuring the Time Lock Control

INPUT
LOCK CONTROL
Lock Contrl Time
User time jam
Daily time jam
Always time jam

The *Lock Control Time* menu item is used to select whether the 5600MSC will automatically jam to its time reference when it sees the incoming reference time is in disagreement with the internal time, or wait for user permission to jam.

When set to *Always time jam* the 5600MSC will jam its internal time reference to the incoming time reference whenever these two references disagree for a prolonged period of time.

When set to *Daily time jam*, the 5600MSC will jam its internal time reference to the incoming time reference daily at the time set by *Time Jam TOD* menu. If the *Time Ref* is set to *SNTP Time*, then the 5600MSC will interrogate the servers in its Time IP list and update time. Otherwise, the 5600MSC will jam time if needed for the next 90 seconds.

When set to *User time jam* the 5600MSC will request operator permission to perform a *Time Jam* that will be required in order for the 5600MSC to relock to the reference if the internal time jam disagrees with the internal time reference. (See section 3.3.3)

3.5.10. Configuring the Time Lock Jam Time Of Day

INPUT
LOCK CONTROL
Time Jam TOD
In Jam at 00:00

The *Lock Control Time Jam Time Of Day* menu item is used to select when the 5600MSC will automatically jam to its time reference. It is only valid if the Lock Contrl Time is set to *Daily time jam*. If the Time Ref is set to *SNTP Time ref*, then it will interrogate the servers in its Time IP list and update time. Otherwise, the 5600MSC will jam time if needed for the next 90 seconds.

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

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.

<i>LTC 1 OUTPUT</i>	Configures the Primary LTC output.
<i>LTC 2 OUTPUT</i>	Configures the Secondary LTC output.
<i>BANK 1 SETUP</i>	Configures the Frequency source for the Bank 1 Outputs (Sync 1, 2, & 3)
<i>BANK 2 SETUP</i>	Configures the Frequency source for the Bank 2 Outputs (Sync 4, 5, & 6)
<i>SYNC 1 OUTPUT</i>	Configures the Sync 1 Output
<i>SYNC 2 OUTPUT</i>	Configures the Sync 2 Output
<i>SYNC 3 OUTPUT</i>	Configures the Sync 3 Output
<i>SYNC 4 OUTPUT</i>	Configures the Sync 4 Output
<i>SYNC 5 OUTPUT</i>	Configures the Sync 5 Output
<i>SYNC 6 OUTPUT</i>	Configures the Sync 6 Output
<i>ANALOG TEST GEN</i>	Configures the Analog Video Test Generator output
<i>ANALOG TEST SIGS</i>	Selects the test signal on the Analog Video Test Generator output
<i>SDI TEST GEN</i>	Configures the standard definition SDI Test Generator output
<i>SDI TEST SIGNALS</i>	Selects the test signal on the SDI Test Generator output
<i>HD TEST GEN</i>	Configures the HD SDI Test Generator output
<i>HD TEST SIGNALS</i>	Selects the test signal on the HD SDI Test Generator output
<i>GLOBAL PHASING</i>	Configures the output phase of all signals, where valid
<i>GLOBAL PEDESTAL</i>	Configures pedestal on all signals, where valid
<i>AUDIO LEVEL</i>	Sets audio level for analog audio outputs
<i>AUDIO EVENT 1</i>	Configures the sound associated with Audio Event 1
<i>AUDIO EVENT 2</i>	Configures the sound associated with Audio Event 2
<i>AUDIO EVENT 3</i>	Configures the sound associated with Audio Event 3
<i>AUDIO EVENT 4</i>	Configures the sound associated with Audio Event 4
<i>AUDIO EVENT 5</i>	Configures the sound associated with Audio Event 5
<i>AUDIO EVENT 6</i>	Configures the sound associated with Audio Event 6
<i>AUDIO EVENT 7</i>	Configures the sound associated with Audio Event 7
<i>AUDIO EVENT 8</i>	Configures the sound associated with Audio Event 8
<i>AUDIO EVENT 9</i>	Configures the sound associated with Audio Event 9
<i>AUDIO EVENT 10</i>	Configures the sound associated with Audio Event 10
<i>AES/DARS OUTPUT</i>	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 ST 12-1 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 3.3.8 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.



For 5600MSC units equipped with the dual power supply option, note that only power supply #1 will power the LTC 1 output when LTC 1 Power is on. Power supply #1 must be plugged in at all times when LTC 1 power is on.

3.6.1.2. Setting the LTC Output Rate

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 frames 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 and 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.



When the time reference is set to *VITC Time Ref* or *LTC Time Ref*, and the rate is the same as the reference. Time will be jammed directly from the time reference source rather than from the system time.

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 the 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 the colour frame bit is set on the LTC 1 output.

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

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

3.6.1.11. Setting the LTC Output Level

OUTPUT
LTC 1 OUTPUT
LTC 1 Level
L1 level = 30.5%

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. See section 2.1.5.

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 and 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** to 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 that 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 into 75 Ω termination. Users may have to increase the amplitude of these pulses by using an Evertz analog DA (model 7700ADA or 500ADA) 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 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*.

For 1080p/30sF use the 1080i/60 format

For 1080p/25sF use the 1080i/50 format

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*.

For 1080p/29.97sF use the 1080i/59.94 format

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.

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*.

OUTPUT**SYNC 1 OUTPUT****Sync 1 VITC Ln 2**

S1 vitc ln 2= 16

The default line values for NTSC-M are lines 14 and 16.

The default line values for PAL-B are lines 17 and 17 (same line).

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

This menu item allows the user to control whether the 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 ST 12-1 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. This 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 this 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

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 *vitc cf off*, colour frame compensation will not be applied to the Sync 1 output's VITC time information.

When set to *vitc cf on* 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 ST 12-1 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 and the 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 item (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.



When the Time Reference is set to VITC or LTC, and the VITC time output rate is the same as the time reference, the VITC output will be jammed directly from the time reference rather than from system time.

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 in 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 a SMPTE ST 318 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 onto line 15 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* standard. The menu item will show the message *S1 not NTSC* when the *Sync Standard* is not set to *NTSC-M*.

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.

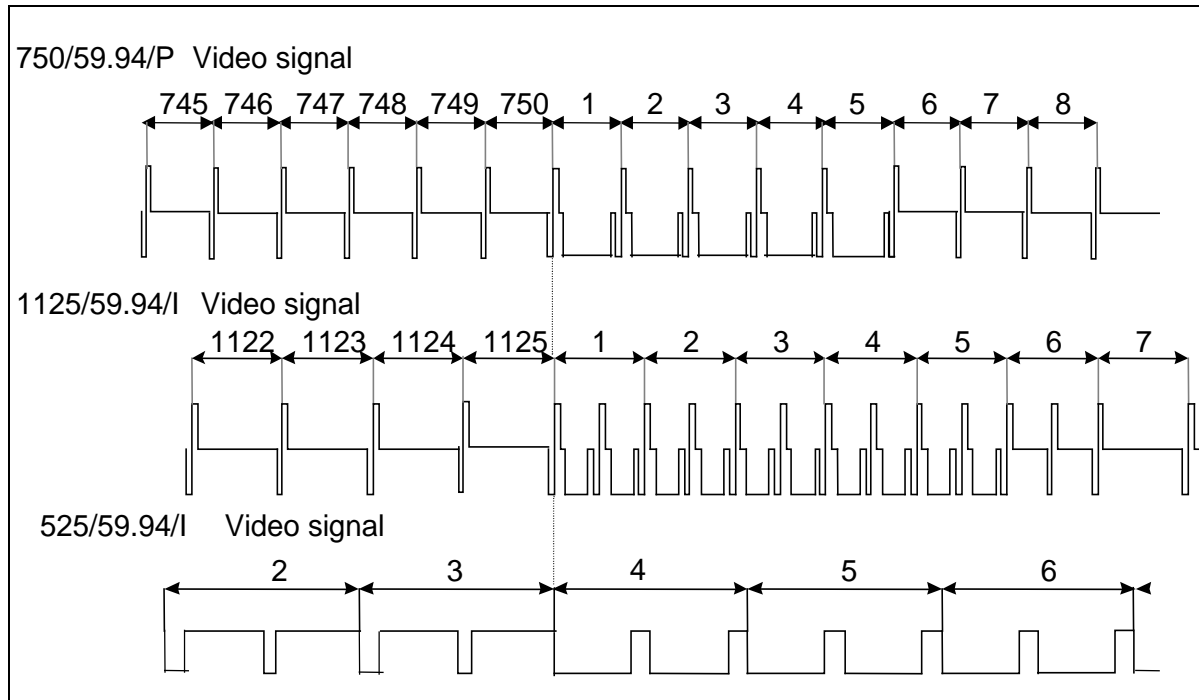


Figure 3-9: Video Sync Phase Alignment in 59.94 Hz Field Rate Systems

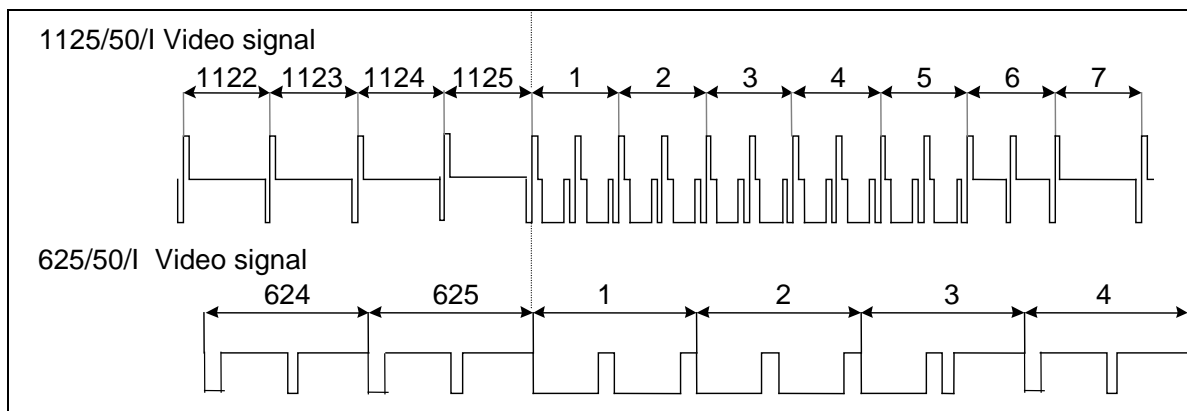


Figure 3-10: Video Sync Phase Alignment in 50 Hz Field Rate Systems



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 vert ph = 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 hor ph = 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 single 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 hor ph = 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 output can be adjusted independent of the analog colour black, and SDI and HD SDI test signal outputs. There are four menu items 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 front panel of the 5600MSC.

To edit the message, turn the **SHAFT ENCODER** knob to change the blinking character. Press the arrow keys (↑, ↓) to move 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 set the size of the font used for the Analog Video Test Generator On Screen Message Display.

3.6.3.4. Enabling the Analog Test Generator Moving Line

OUTPUT

ANALOGTEST 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	Convergence Pattern
75% Color bars	FCC Multiburst
100% Color bars	FCC Composite
Composite Signal	Chroma Freq. Response
2T Pulse and Bar	NTC 7 Combination
4 Level Ped, Pluge	NTC 7 Composite
2 Level Ped, Pluge	Multipulse
SinX/X Pulse	60% Ext Multiburst
20% White Window	60% Multiburst
50% White Window	2.5 MHz Bowtie
80% White Window	5 Step
100% White Window	Y Ramp
Y Multipulse	Valid ramp
Shallow Y Ramp	Pathological
Shallow Ramp	Field ID (B=1, W=2)
Modulated Ramp	White
10 Y Step	Grey
10 Step	Black

Table 3-3: 525 Line Test Signal Selection

Test Signal Name	Test Signal Name
75% Color bars	Limited ramp
100% Color bars	5 Step
4 Level Ped, Pluge	Y Only 10 Step
2 Level Ped, Pluge	10 Step
Composite Signal	60% Y Sweep
Pathological	60% Sweep
Convergence Pattern	100% Y Sweep
2T 4T 20T Pulse and Bar	100% Sweep
CCIR 331	SinX/X Pulse
CCIR 330	60% Multiburst
CCIR 18	2.5 MHz Bowtie
CCIR 17	Field ID (B=1, W=2)
Y Ramp	White
Shallow Y Ramp	Grey
Shallow Ramp	Black
Modulated Ramp	

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 525i/59.94
STG 625i/50

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 two menu items 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 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 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 ST 272 provides for embedding four groups of 4 channels of audio into SMPTE ST 259 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 levels of the audio.

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

There are four identical menus for each of the 4 groups. For the sake of simplicity only the menu item for group 1 is described in the manual. These menu items control the embedded audio groups on the test outputs only and do not affect the black outputs.

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 group 1 with all four channels of audio. Selecting *off* will not embed this group.

3.6.5.4.2. Enabling the SDI Embedded Audio Groups in the Black Outputs



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 four identical menus for each of the 4 groups. For the sake of simplicity only the menu item for group 1 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 group 1 with four channels of silent audio. Selecting *off* will not embed this group.

3.6.5.4.3. Setting the SDI Embedded Audio Channel Frequency

There are 16 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 16 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 an 18 ms duration burst of 1 KHz tone once every 400 ms.

Select *Ident tone* to use a continuous 1 KHz tone that decreases in level for 20 ms once every 4 seconds.



This menu item also sets the ident type for the AES outputs.

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 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 all embedded audio. The *STG lip sync* mode overrides *STG Audio Ident* and is output on the SDI and AES outputs. This black SDI outputs are not affected.



Enabling lip sync here puts the lip sync signal on the 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 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/29.97sF
HTG 1080p/25
HTG 1080p/25sF
HTG 1080p/24
HTG 1080p/24sF
HTG 1080p/23.98
HTG 1080p/23.98sF
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 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 independently of the analog colour black and analog, and SDI test signal outputs. There are two menu items 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 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.

3.6.7.4.2. 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.



The message text will briefly change to all stars ("*****") while these controls are being modified to help show the message position more clearly.

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 the On 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 sixteen channels within four groups. The following sections describe how to enable the embedded audio groups, and select the tone frequencies.

OUTPUT
HD TEST GEN
HTG Audio Group
HTG Aud mute
HTG Aud 0dBFS

This control sets the audio level for all 16 channels of embedded audio. The range is -28dBFS to 0dBFS as well as 'mute' for silence.

3.6.7.5.1. Setting the Embedded Audio Group

There are four identical menus for each of the audio groups used 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

The *HTG Aud Group 1* menu item is used to enable audio group 1 embedded audio on the HD SDI Test generator output.

Note:

Group 1 consists of channels 1-4
 Group 2 consists of channels 5-8
 Group 3 consists of channels 9-12
 Group 4 consists of channels 13-16

3.6.7.5.2. Setting the Embedded Audio Group (Units fitted with 7750TG2-HD)

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.

3.6.7.5.3. Setting the Embedded Audio Frequency

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 *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 group 1.

Selecting one of these signals will generate a tone of the selected frequency and embed it into this channel.

The Audio tones will be embedded on the Test output, black output, or both outputs. The embedded audio can also be turned off. This is controlled by the HTG Audio Output menu item.

3.6.7.5.4. Enabling the Embedded Audio (Units fitted with 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*.

3.6.7.5.5. Enabling the Embedded Audio (Units fitted with 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 audio 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:frq 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 4:2:2 or 4:4:4 mode.

When the menu item is set to *HTG mode 4:2:2*, 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 *HTG mode 4:4:4*, 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.



The HD Test Generator Output Mode cannot be set to 4:2:2 mode unless the colour space is YcbCr (See section 3.6.7.8).

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 *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 *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

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 *HTG caption tst*, the **HD SDI TG OUT** outputs will contain the closed caption data.

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

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



The closed caption test messages are generated on 708 services 1, 2, 3 and 4. There are also 608 caption signals generated inside the 708 caption data packet on all caption (CC1 – CC4), Text (T1 – T4) and XDS channels.

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 HD Test Generator output immediately. You do not have to press the **SELECT** button to accept the new pattern.



Some test signals are not available in certain video formats.

Test Signal Name	Test Signal Name
Y Multipulse	5 Step Staircase
Multipulse	Valid 5 Step
100% Y MB: 20, 22, 24, 26, 28, 30	Valid Ramp
100% Y MB: 10, 12, 14, 16, 18, 20	Clean Aperture with Graticule
100% Y MB: 1, 2, 4, 6, 8, 10 MHz	Circle with Centre Cross
60% Y MB: 20, 22, 24, 26, 28, 30	Clean Aperture with Centre
60% Y MB: 10, 12, 14, 16, 18, 20	Clean Aperture
60% Y MB: 1, 2, 4, 6, 8, 10	Production Aperture
100% MB: 20, 22, 24, 26, 28, 30 MHz	12% White Window
100% MB: 10, 12, 14, 16, 18, 20 MHz	20% White Window
100% MB: 1, 2, 4, 6, 8, 10 MHz	50% White Window
60% MB: 20, 22, 24, 26, 28, 30 MHz	80% White Window
60% MB: 10, 12, 14, 16, 18, 20 MH	100% White Window
60% MB: 1, 2, 4, 6, 8, 10 MHz	Full Field Pluge
60% Y Line Sweep 15 to 30 MHz	Split Field Bars
60% Y Line Sweep to 30 MHz	SMPTE Color Bars
60% Line Sweep 15 to 30 MHz	75% Color bars with pluge
60% Line Sweep to 30 MHz	100% Color bars with pluge
Grey	Lab Bars, Moving Box
Grey (all data bits active)	Lab Bars
SDI Checkfield	RP219 Colourbars 1
Bouncing Box	4x3 Colourbars
10 Frame Sequence	75% bars, 100% white
½ sec, 30 Fps ID	75% Color bars
1 sec and 5 sec, 30 Fps ID	100% Color bars
1 sec and 5 sec, 25 Fps ID	White Field
1 sec and 5 sec, 24 Fps ID	Black
24 Fps 4 frame sequence	480P Composite Signal
Five Frame Sequence	480P Black/White Frames
Four Frame Sequence	480P White Frame
Field ID (W=1, B=2)	480P Production Aperture
Frame ID	480P SMPTE Colour Bars
Bowtie	

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 worse 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 Syncs 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. This is to prevent a double phase offset as the HD Test generator is usually referenced to one of the sync outputs.

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 Syncs 1 to 6, Analog and SDI Test Generator, 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 connected to these outputs.

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 39.

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 999.

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. Will only affect NTSC outputs.

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

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 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 Analog Audio Level

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. 99 cannot be entered. The tenths of seconds digit will now be blinking.
4. Press any numeric key to enter a new value into the blinking tenths of a second digit or press the **SELECT** key to complete the time entry.

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 99:00:00.0. To make the Audio Event occur once per hour on the half hour set the start time to 99:30:00.0. To make the Audio event occur 5 seconds before each hour set the start time to 99:59:55.00.



Only one audio event can be active at a time. For example, if an audio event becomes active while another one is currently playing, the second (latter) event will take precedence.

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 that 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 selected, then the Start Time and Duration are ignored. Beep is a pure tone that starts at the start time and lasts for the duration. Bell is a bell sound that starts at the start time and lasts for the duration. Klaxon is a square wave tone that starts at the start time and lasts for the 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 during the audio event.

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 99:30:00.0. 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 99:00:00.0. 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 99:00:02.0. 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) and the Word Clock Outputs (WC Option only)

The heading AES/DARS OUTPUT will change to AES/DARS/WC OUT if the STG Option and the WC option are present. If just the WC option is present, then the heading will change to WORDCLOCK OUTPUT, and only WC lock type and Word Clock Phase will be available.

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

There are two menu items 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 coarse = 1

This menu item is used to set the phase of the AES and DARS outputs in coarse steps. The range is 0 to 191. Each step is 1 AES frame or 20.8 μ s. This control affects both AES and DARS together. This control is not valid if AES Lock Type is set to NTSC.

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. The range is 0 to 127. Each step is $\frac{1}{2}$ a data bit or 163 ns. This control affects both AES and DARS together.

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.

Selecting Ident will generate a pulse as chosen by the Ident Type menu item in the SDI Test Gen menu. (See section 3.6.5.4.5)



Enabling lip sync in the SDI Test Gen menu puts the lip sync signal on the AES outputs and overrides this control.

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 Word Clock Phase

OUTPUT
AES/DARS OUTPUT
Word Clock Phase
WC phase = 0

The *Word Clock Phase* menu item is used to adjust the phase of the Word Clock output with respect to the AES/DARS outputs.

The Word Clock Phase is adjustable in 128 steps from 0 to 127. Each step represents 1/128 of the word clock phase, or 1/2 of a DARS bit cell (163 ns).

3.6.12.5. Configuring the AES/DARS Lock Type

OUTPUT

AES/DARS OUTPUT

AES Lock Type

WC Lock Type

AES/WC 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 ST 318 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.

If the STG option is not present, the heading will be *WC Lock Type*. If both the STG option and the WC option are present, the heading will be *AES/WC Lock Type*.



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 function of the COM port DB9 connector on the back of the unit.
<i>SYNCRO EXCLUSION</i>	Sets whether the ATG, STG and HTG are to be excluded from syncro operations.
<i>MODEM SETUP</i>	Configures the modem parameters (+M option only).
<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 functions.
<i>ENG/USER MODE</i>	Engineering menu for SNMP and menu hiding controls (password protected).
<i>DST RULES</i>	Sets the rules for Daylight Savings Time.
<i>PRESET SAVE/GET</i>	Saves and retrieves setups.
<i>IP RULES</i>	Sets the Internet Protocol Addresses and SNMP trap destinations.
<i>NTP RULES</i>	Sets the rules for Network Time Protocol (+T option only).
<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 select what the time code user bits will contain.

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

When the *SERIAL PORT MODE* is set to *synchro tx* the COM 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 port is used to receive configuration commands from another 5600MSC operating in the *synchro tx* mode. All affected menu parameter displays will be shown with the display brightness dimmed to indicate that the unit is operating as a slave of another 5600MSC unit. 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 syncro, 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 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 immediately output on the COM 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*, the 5600MSC is will wait for data to come in via the COM 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".



Sending a configuration file to the COM port may change any or all of the settings in the 5600MSC.

3.7.2. Configuring which 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 allows some 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 keep the test generators as separate units. When 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 included 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-menu of the *GENERAL* Setup menu is 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 to 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 into.

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 be dialled manually using the *Dial Now* menu item.

When the Modem Mode is set to *auto answer* the modem will answer incoming calls to provide a time reference (NRS mode only).

When the Modem Mode is set to *auto dial* the modem will dial out once 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* (National Research Council), 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* (National Institute of Standards and Technology), 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 is used to enable or disable the modem speaker.

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

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

3.7.3.4. Setting the Modem Phone Number to Dial

GENERAL
MODEM SETUP
Phone number
16137453900

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 dialing 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
NIST Colorado	+1 (303) 494-4774
NIST Hawaii	+1 (808) 335-4721

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.

Note the dial time is system time (normally UTC) which may not be local 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).



The modem will not dial out unless the Time Ref is set to modem.

3.7.3.6. Dialing 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 if the call has been initiated by auto dial.

On the Front panel status display, the time until the next retry is shown. See section 3.3.4.

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 simplicity 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 time fault
Gpo 1 gps fault
Gpo 1 audio on
Gpo 1 hrdw fault
Gpo 1 noref slow

This menu item sets the 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 frequency reference.

When set to *Gpo 1 ltc short* the respective general purpose output will be active (low) when the LTC 1 output is overloaded. 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 or both of the fans have 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 time fault* the respective general purpose output will be active (low) when the *Time Unlocked Fault* is active.

When set to *Gpo 1 gps fault* the respective general purpose output will be active (low) when the GPS status is showing a fault.

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. For example, this can be used to activate an audio amplifier.

When set to *Gpo hrdw fault* the respective general purpose output will be active (low) if the 5600MSC senses any internal hardware failures.

When set to *Gpo 1 noref slow* the respective general purpose output will be active (low) when there is no valid frequency reference, but a 40 second filter is applied to suppress momentary activation due to momentary losses of input reference.

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 simplicity 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 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. 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.

3.7.6.1. Viewing the 5600MSC Firmware Version

GENERAL
Firmware
5600MSC Version
V2.0 build 20

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 look similar to following:

V2.0 build 20

3.7.6.2. Upgrading the 5600MSC Firmware

GENERAL
Firmware
Upgrade 5600MSC
Are You Sure?

This item is used to initiate a firmware upgrade 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.

3.7.6.3. Viewing the HD Test Generator Firmware Version

GENERAL
Firmware
7751-TG2 Version
V4.2 build 103

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 look similar to the following:

V4.2 build 103



When the unit boots up, this display may indicate the version as 0.0 build 0 for about a minute until communications to the HD Test Generator have been fully established.

3.7.6.4. Upgrading the HD Test Generator Firmware

GENERAL
Firmware
Upgrade 7751-TG2
Are You Sure?

This item is used to initiate a firmware upgrade 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 HDTest generator 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, and information about the correct version of firmware you should load.



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.

3.7.7. Configuring SNMP and Menu Hiding

3.7.7.1. Setting User Mode

This menu item is used to switch between *Engineering* mode and *User* mode. In *User* mode the only menu available under this heading is *Enter Password*. In *Engineering* mode, all menu items under this heading are shown.

GENERAL
ENG/USER MODE
Set user mode
ARE YOU SURE?

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

Press the **SELECT** key to change to user mode. There will 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* text flashing.

3.7.7.2. Setting Engineering Mode

GENERAL

ENG/USER MODE

Enter Password

When the 5600MSC is in user mode the *USER* text 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 9 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. Note that this will automatically revert to USER MODE after 5 minutes.

Once the ENG part of the menu is flashing, you can enter the engineering menu by pressing SELECT.

The default password for the 5600MSC is **5 6 0 0**

3.7.7.3. Changing the Password

GENERAL

ENG/USER MODE

Change Password

This menu item will only be available when the 5600MSC is in ENG MODE.

Press the **SELECT** key to enter a new password using the numeric keys. Passwords can be from 1 to 9 digits. Press the **SELECT** key when you have finished entering the password. Take note of this password as it will be required to re-enter ENG MODE. In the event that a password is lost, contact the factory for assistance in password recovery.

3.7.7.4. Setting SNMP Mode

GENERAL

ENG/USER MODE

Vistalink Enable

snmp on

snmp off

snmp traps only

This menu item will only be available when the 5600MSC is in ENG MODE.

Select *snmp on* to enable full control and monitoring via SNMP. Remote control of this unit is possible in this mode.

Select *snmp off* to disable all SNMP functionality. Remote control or monitoring of this unit is not possible in this mode. All received SNMP messages will be ignored and no SNMP messages will be sent.

Select *snmp traps only* to allow reading of controls via SNMP, while not allowing setting of controls via SNMP. Traps will be sent if enabled.

3.7.7.5. Setting the Read Only Community String

GENERAL

ENG/USER MODE

Set Comm str Rd

public

This menu item will only be available when the 5600MSC is in ENG MODE.

The *Set Comm str Rd* menu item is used to edit the Read only community string used by SNMP. This string acts as a password for SNMP read access control.

Any SNMP read request must contain this string or the 5600MSC will reject it. If this string is changed, the SNMP agent must be configured to have the same string or it will not be able to read parameters from the 5600MSC. VistaLINK[®] expects the read community string to be "public" by default. It is not normally required to change this. There is a maximum of 15 characters for this string.

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

3.7.7.6. Setting the Write Community String

GENERAL

ENG/USER MODE

Set Comm str Wr

private

This menu item will only be available when the 5600MSC is in ENG MODE.

The *Set Comm str Wr* menu item is used to edit the Write communications string used by SNMP. This string acts like a password for the SNMP write access control.

Any SNMP write request must contain this string or the 5600MSC will reject it. If this string is changed, the SNMP agent must be configured to have the same string or it will not be able to change parameters in the 5600MSC. VistaLINK[®] expects the write community string to be "private" by default. It is not normally required to change this string. There is a maximum of 15 characters for this string.

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.



For information on changing the read/write community strings in VistaLINK[®] contact Evertz customer service department at 1-905-335-7570 or service@evertz.com.

3.7.7.7. Setting Global Menu Hiding

GENERAL
ENG/USER MODE
Menu Hiding En
global hides off
global hides on

This menu item will only be available when the 5600MSC is in ENG MODE.

Select *global hides off* to show all menus.

Select *global hides on* to hide any menus that are set to *hide* in the *Select Menu Hides* menu item.

3.7.7.8. Setting Individual Menu Hiding

This menu will be repeated for all of the menu items under the *INPUT*, *OUTPUT*, and *GENERAL* menus with the exception of *ENG/USER MODE*, which cannot be hidden. The menu items *SYNC*, *ATG*, *STG*, and *HTG* have an extra selection available, which is *phase*. When this is selected, the menu items which affect phasing of that menu item will remain visible, while all other menu items disappear. For example under *sync*: *Col'r Frm*, *V Phase*, *H Phase*, and *Fine Phase* will remain visible while *Standard*, *VITC*, *VITC Ln 1*, *VITC Ln 2* etc. will be hidden.

The menus that can be hidden are, *SET TIME*, *SET DATE*, *USER BITS*, *BIT MODE*, *SER PORT*, *SYNC EXCL*, *MODEM*, *GPO 1*, *GPO 2*, *GPI 1*, *GPI 2*, *FIRMWARE*, *PRESETS*, *DST*, *IP*, *NTP*, *FREQ REF*, *TIME REF*, *VITC LINE*, *GL RANGE*, *JAM NOW*, *LOCK CTL*, *LTC1 OUT*, *LTC2*, *BANK 1*, *BANK2*, *SYNC 1*, *SYNC 2*, *SYNC 3*, *SYNC 4*, *SYNC 5*, *SYNC 6*, *ATG*, *ATG SIG*, *STG*, *STG SIG*, *HTG*, *HTG SIG*, *GLOBAL PED*, *GLOBAL PH*, *ANL AUDIO*, and *DARS/AES*. Some of these may not be shown if the appropriate option is not installed. There are 42 identical menus for each of the menu hides. For the sake of simplicity, only the menu item for *SET TIME* hiding is described in the manual.

GENERAL
ENG/USER MODE
Select Menu Hides
Item SET TIME
show SET TIME
hide SET TIME

This menu item will only be available when the 5600MSC is in ENG MODE.

Select *show* to make the *SET TIME* menu item visible.

Select *hide* to make the *SET TIME* menu item hidden if *global hides on* is selected.

3.7.8. 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 of 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 or 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 menu items to allow the user to set the DST rules for their region. These rules affect all outputs for which DST is enabled.

3.7.8.1. Setting the DST Date Entry Mode

GENERAL
DST RULES
DST Date Mode
DST day/wk/month
DST 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)

3.7.8.2. Setting the Beginning and End of Daylight Saving Time

The four *DST start* menu items set the DST beginning time and the four *DST end* menu items set the DST end time. For the sake of simplicity only the *DST start* menu items 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 the hour of the day when DST begins. Use the **SHAFT ENCODER** to change the start hour for DST in 24 hour time.

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 the 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 the 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, and will display "Not in Week Mode".

GENERAL
DST RULES
DST Start Month
DST starts Jan

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

3.7.8.3. Setting the DST Offset

GENERAL
DST RULES
DST Offset
DST offset 1 hr
DST offset 2 hrs
DST offset 0 hrs

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

Setting the DST offset to 0hrs effectively disables daylight saving time.

3.7.9. Saving and Recalling 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/from 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 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 options 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 options work the same way to recall configurations from the other two user presets.

The *Get USA Factory* and *Get EUROPE Fact* menu options 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 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
192.168.8.56

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. This IP address is ignored when the IP address mode is set to bootstrap.

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. To see if the 5600MSC has successfully obtained an IP address, view the Network Messages in the STATUS menu. (See section 3.3.5)

When *IP manual* is selected, a static IP address is used. This address is the IP address set by the IP Address menu item, and subnet mask set by the IP Net Mask menu item.

3.7.10.3. Setting up the Internet Protocol Subnet 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 directly communicate with the 5600MSC without having to go through a gateway or router. 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. This parameter is obtained automatically from a bootp server in bootstrap mode.

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. This tells the 5600MSC where to send data that is destined for an IP address outside the range defined by the subnet mask. This parameter is ignored in bootstrap mode and the gateway address is obtained from a bootp server instead.

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 IP address.

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

3.7.10.6. Setting up the Trap Destinations

GENERAL
IP RULES
IP Trap Add 1
192.168.1.1

There are four identical controls to set four different IP addresses to send each trap to. These should normally be set to the IP address of the VistaLINK[®] Pro Server(s).

GENERAL
IP RULES
IP Trap Enable 1
Trap Enable 1 on
Trap Enable 1 off

There are four identical controls to enable/disable sending traps to each of the trap destination IP addresses. They are all disabled by default and must be configured correctly before traps will be sent out.

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.

3.7.11.1. Setting up the NTP TEST MODE

In order to facilitate setting up NTP on computer networks, the 5600MSC may be “spoofed” to indicate it is locked to a time reference when none is available.

GENERAL
NTP RULES
NTP normal
NTP spoofed

This item is used to force the status in the NTP packets to clear the “unsynchronized” flag. When set, it will count down from 1 hour, at which time it will stop spoofing. Pressing **SELECT** again will also exit the spoofing mode.

This spoofing mode is only available when the TIME REF is set to none.

3.7.11.2. Setting up the NTP Restrictions

Restrictions are a list of IP addresses that will be ignored if NTP requests come from them. They use the standard IP 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.

3.7.11.2.1. Setting up the NTP Restriction IP

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.

A restriction mask of 255.255.255.255 indicates that any IP address that matches the restrict 1 IP address exactly will be denied.

3.7.11.2.2. 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.

3.7.11.2.3. 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 range set for restriction 1.

When set to *Restr 1 permit*, the restricted IP range is not applied. If the request passes other rules, the request is responded to.

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

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

GENERAL
Set System Time
00:00:00 TIME

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 return to the Set System Time menu.

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

GENERAL
Set System Date
00/00/00 DATE

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 return to the Set System Date menu.

3.7.14. Setting the User Bits in Manual User Bit Mode

GENERAL
Set User Bits
00000000 User BT

When the *User Bit Mode* menu item is set to *Manual*, the operator 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 formats. 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 ST 309 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 ST 309 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 (GP 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 described 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 then 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 sub-carrier frequency after a day of the GPS receiver being disconnected. The drift will be less then 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 then 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 minutes and then returned, the unit will take nominally less then 5 minutes to return fully lock to GPS receiver. If the GPS receiver is removed for 15 minutes and then returned, the unit will take nominally less then 20 minutes to return fully locked to the GPS receiver.

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CHAPTER 4: TECHNICAL DESCRIPTION

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4. TECHNICAL DESCRIPTION

4.1. SPECIFICATIONS

4.1.1. Analog Sync Outputs

Standards:	SMPTE ST 170 (NTSC-M), ITU-R BT.1700-1 (PAL-B) SMPTE ST 274 (1080i/60, 1080i/50, 1080p/30sF, 1080p/25, 1080p/25sF, 1080p/24, 1080p/24sF and the 1/1.001 divisor versions where applicable) SMPTE ST 296 (720/60, 720p/59.94, 720p/50, 720p/24) 'Slow PAL' (625i/48 and the 1/1.001 divisor version) Pulses: 1 Hz, 1/1.001 Hz, 6/1.001 Hz, PAL Colour Frame
Connector:	BNC per IEC 61169-8 Annex A
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 10mV
Return Loss:	>40dB to 5MHz
SNR:	>75dB

4.1.2. 10MHz Input and Output

Input:	0.5Vp-p, 75 Ohm (Bypass Relay Protected)
Output:	1Vp-p (75 Ohm terminated)
Connector:	BNC per IEC 61169-8 Annex A
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 +GP option

4.1.3. LTC Outputs

Standard:	SMPTE ST 12-1
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:	Fixed, 2Vp-p on negative pin, positive pin has 11.5VDC nominal to drive downstream 1200 series slave clocks.
Female DB9:	Adjustable, 0.5V to 4.5V p-p
Output Impedance:	66 ohm balanced (un-powered)
Rise Time:	40 +/- 10 μ sec
Jitter:	< 2 μ sec

4.1.4. Genlock Input

Type: Autodetects standard
SMPTE ST 170 (NTSC-M), ITU-R BT.1700-1 (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 61169-8 Annex A

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: >25 dB 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:

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 (GP 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 200' (order WA-T10)
Optional 400' (order WA-T11)
Optional 800' (order WA-T08)
Optional 1200' (order WA-T12)

4.1.7. DARS & AES Test Generator Outputs (STG option installed)**Standard:**

Unbalanced: SMPTE ST 276, AES3-4-2009 Single ended AES (24 bits)
Balanced: AES3-4-2009 (24 bits)

Number of Outputs:

DARS: 1 unbalanced, 1 balanced
AES Test Gen: 1 unbalanced, 1 balanced

Connector:

Unbalanced: BNC per IEC 61169-8 Annex A
Balanced: Removable Terminal Strip

Sampling Rate:

48 kHz

Impedance:

Unbalanced: 75 Ohms unbalanced
Balanced: 110 Ohms balanced

Signal Level:

Unbalanced: 1 V p-p ± 100 mV into 75 ohms
Balanced: 6V p-p into 110 Ω

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 ST 170 (NTSC-M), ITU-R BT.1700-1 (PAL-B)

Number of Outputs:

1

Connector:

BNC per IEC 61169-8 Annex A

Signal Level:

1V p-p nominal

DC Offset:

0V ± 10 mV

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 +8 dBu into 10 K ohm load

Audio Tones:

Menu selectable – events

4.1.10. SDI Test Generator Outputs (STG option installed)

Standard:	SMPTE ST 259-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 ST 272
Connectors:	BNC per IEC 61169-8 Annex A
Signal Level:	800mV $\pm 10\%$
DC Offset:	0V $\pm 0.5V$
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 ST 292-1 4:2:2, YCbCr SMPTE ST 372 dual link 4:4:4 YPbPr 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 16 tones in four audio groups as specified in SMPTE ST 299-1. Selectable tone frequencies (from 60 Hz to 10 kHz) and audio groups. Audio can be embedded on test signal or black or both outputs. Audio Level range is controllable from mute(silence), -28dBFS to 0dBFS.
Connector:	BNC per IEC 60169-8 Amendment 2
Signal Level:	800mV nominal
DC Offset:	0V $\pm 0.5V$
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 Colour 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 61169-8 Annex A
Signal Level:	5Vpp square wave (0-5V) $\pm 0.5V$
Impedance:	75 ohms
Min. Load:	75 ohms for 2.5Vpp square wave (0-2.5V)

4.1.13. Electrical

Voltage:	Auto-ranging 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:	TÜV 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 3.1 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 by turning 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 7751-TG2* menu item 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 cannot 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 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 similar to:
5600MSC.bin

If you are upgrading the 7751TG2-HD Test generator application firmware the bin file will have a name similar to:

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 resend the file. Try closing all other programs that may be running on the PC and make sure the bin file is on a local hard drive and not being sent from a network drive or floppy disk.
- 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.

Skip to section 4.2.6. step 25 to complete upgrading the 5600MSC, only proceed to section 4.2.5.1 if you wish to update in-service redundant systems.

4.2.5.1. Updating In-Service Redundant Systems

17. Send the .BIN file to the 5600MSC. Ensure that the protocol is XModem. Once initiated a window will appear displaying the file transfer progress.
18. Once the update is complete, you must type in *boot* or power cycle the 5600MSC to return to operational mode. It will then need to be synchronized with the live 5600MSC. If GPS is being used as the frequency and time reference, wait until 100% lock is obtained. Compare each output from the updated 5600MSC to the live 5600MSC to verify correct phasing. If video has been used as the frequency reference, follow the steps as outlined above paying particular attention to the DARS output (if equipped). Independent phase adjustment may need to be executed to have this match the live 5600MSC. Once this has been confirmed, proceed to Step # 20. If a different reference is used, proceed to the next step.
19. In order to bring phasing into alignment with the live 5600MSC, the global phasing adjustment is used. This adjustment is found in the *OUTPUT* menu. Scroll to the *GLOBAL PHASING* menu item using the arrow keys (↑,↓) or turn the **SHAFT ENCODER** knob and then press **SELECT**. Use the arrow keys (↑,↓) or turn the **SHAFT ENCODER** knob until *Global Phase En* is displayed and then press **SELECT**. To enable Global Phasing, use the arrow keys (↑,↓) or turn the **SHAFT ENCODER** knob until on is shown and press **SELECT**. Depending on how much adjustment is required to align the outputs, select NS, MS or US (Nano, Milli, or Micro second).



GLOBAL PHASING is a LIVE control. All adjustments will affect the outputs immediately.

20. Once Global Phasing is completed, check and verify the outputs with respect to the Live 5600MSC. **Be sure to confirm all signals!**
21. Using the 5600ACO, switch the test signals from the Live 5600MSC to the backup 5600MSC that was updated.
22. Repeat Step 1 to 8 for additional units.

4.2.5.1.1. Returning System to Normal Operation

23. Switch the 5600ACO back to the primary 5600MSC and return it to AUTO mode.

24. Synchro mode may be reinstated.

4.2.6. Completing the Upgrade

25. Power cycle the unit. The unit should now reboot.

26. 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

CAUTION: For continued protection against the risk of fire, replace only with the same type and rating of fuse.

ATTENTION: Pour éviter les risques d'incendie, remplacer le fusible avec un fusible de même calibre.

The fuse holder is located inside the power entry module. To change the fuses, disconnect the line cord from the power entry module and 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 slo blo (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.

Prior to testing, Evertz personnel have taken and stored pictures of the final install.

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 your 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.

CHAPTER 5: VISTALINK® CONTROL

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5. VISTALINK[®] CONTROL

5.1. VistaLINK[®] OVERVIEW

VistaLINK[®] is Evertz's remote monitoring and configuration platform which operates 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[®] provides centralized alarm management, which monitors, reports, and logs all incoming alarm events and dispatches alerts to all the VLPro Clients connected to the server. Device configuration through VistaLINK[®] PRO can be performed on an individual or multi-unit basis using simple copy and paste routines, which reduces the time to configure each unit separately. Finally, VistaLINK[®] enables the user to configure devices in the network from a central station and receive feedback that the configuration has been carried out.

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, 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.



SNMP communication is disabled by default in the 5600MSC. You must first enable SNMP in the password-protected engineering menu. See section 3.7.7.2 and 3.7.7.4. In order to receive traps; the 5600MSC must be configured to send traps to the proper IP address. See section 3.7.10.6.

5.1.2. Installing VistaLINK[®]

In order to control the 5600MSC, you will need at least v version 10.4 build 483 which has the jar file built into 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. Press the install 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.

Periodic updates to *VistaLINK*[®] for the 5600MSC may occur in order to enhance or add features. These updates come in the form of a .JAR file. *VistaLINK*[®] version 10.4 b483 includes version 74 of the .JAR file for the 5600MSC. If the .JAR file needs to be updated, the updates will be available to download from the Downloads section of the Evertz web site (<http://www.evertz.com/downloads>).



Note that the free configuration-only version of VistaLINK[®] (VistaLINK[®]-C) does not support traps. The server/client version is needed to receive and log traps.

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 Agent...*

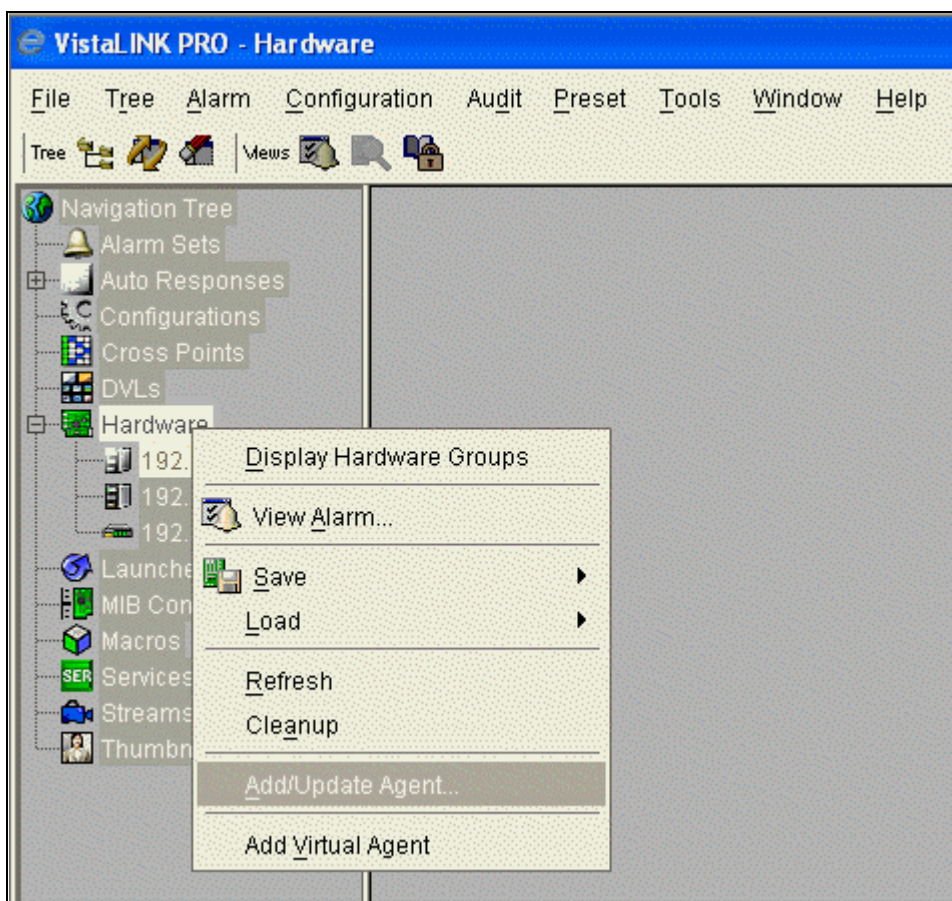
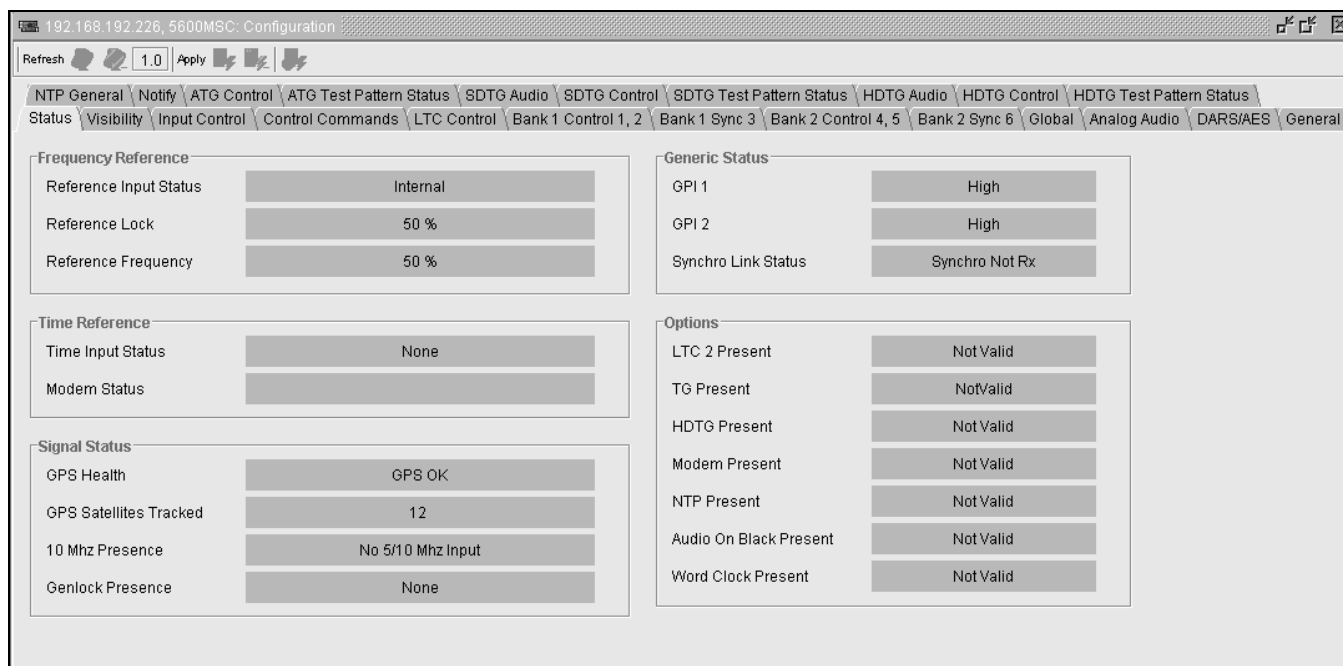


Figure 5-1: *VistaLINK*[®] – Manually Adding an Agent



Engineering-only settings can be changed via **VistaLINK®** without requiring a password. The password for engineering mode can also be changed.

The **VistaLINK®** screens are modeled after the structure of the operational menus. When using **VistaLINK®** you should see the following **VistaLINK®** 5600MSC Configuration screens.



Frequency Reference	
Reference Input Status	Internal
Reference Lock	50 %
Reference Frequency	50 %

Time Reference	
Time Input Status	None
Modem Status	





Signal Status	
GPS Health	GPS OK
GPS Satellites Tracked	12
10 Mhz Presence	No 5/10 Mhz Input
Genlock Presence	None

Generic Status	
GPI 1	High
GPI 2	High
Synchro Link Status	Synchro Not Rx

Options	
LTC 2 Present	Not Valid
TG Present	Not Valid
HDTG Present	Not Valid
Modem Present	Not Valid
NTP Present	Not Valid
Audio On Black Present	Not Valid
Word Clock Present	Not Valid

Figure 5-2: VistaLINK® Configuration – Status Tab

192.168.192.226, 5600MSC: Configuration

Refresh  1.0 Apply   

[NTP General](#) | [Notify](#) | [ATG Control](#) | [ATG Test Pattern Status](#) | [SDTG Audio](#) | [SDTG Control](#) | [SDTG Test Pattern Status](#) | [HDTG Audio](#) | [HDTG Control](#) | [HDTG Test Pattern Status](#) | [Status](#) | [Visibility](#) | [Input Control](#) | [Control Commands](#) | [LTC Control](#) | [Bank 1 Control 1, 2](#) | [Bank 1 Sync 3](#) | [Bank 2 Control 4, 5](#) | [Bank 2 Sync 6](#) | [Global](#) | [Analog Audio](#) | [DARS/AES](#) | [General](#)

Menu Hiding

Menu Hiding Enable All Menus Visible

General

Set System Time	Visible
Set System Date	Visible
Set User Bits	Visible
User Bit Mode	Visible
Serial Port Mode	Visible
Syncro Exclusion	Visible
Modem Setup	Visible
GPO1 Function	Visible
GPO2 Function	Visible
GPI1 Function	Visible
GPI2 Function	Visible
Firmware	Visible
DST Rules	Visible
Preset Save/Get	Visible
IP Rules	Visible
NTP Rules	Visible

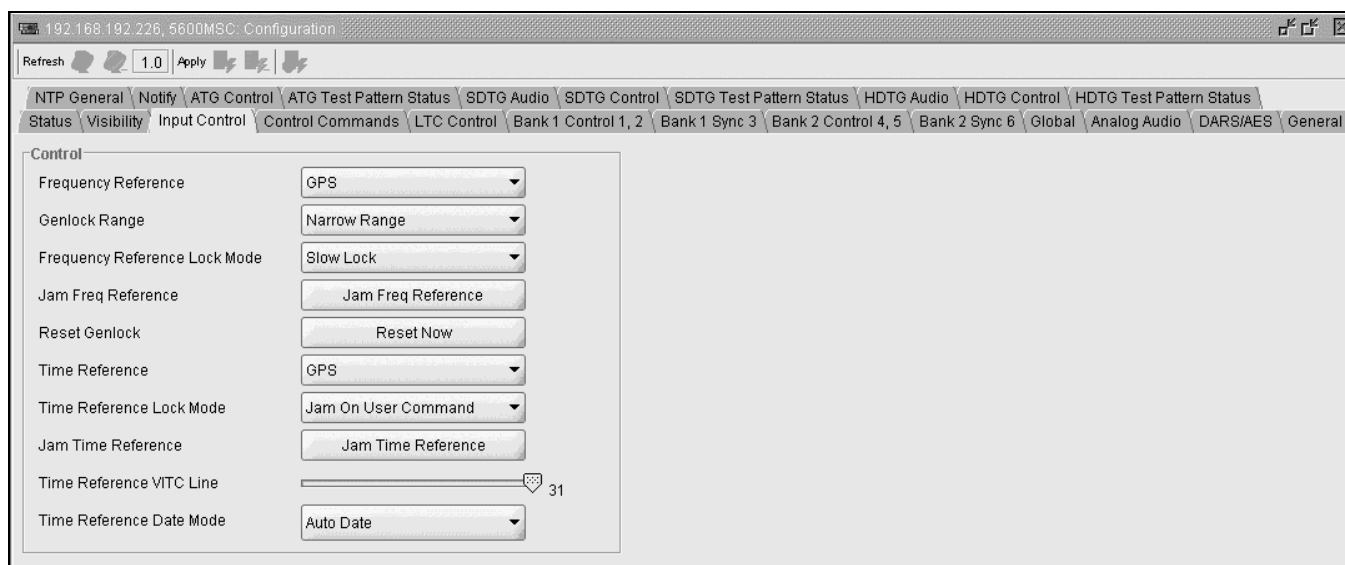
Input

Input VITC Line	Visible
Frequency Reference	Visible
Genlock Range	Visible
Lock Control	Visible
System Jam	Visible
Time Reference	Visible

Output

Bank 1 Setup	Visible
Bank 2 Setup	Visible
Sync 1 Output	Visible
Sync 2 Output	Visible
Sync 3 Output	Visible
Sync 4 Output	Visible
Sync 5 Output	Visible
Sync 6 Output	Visible
Analog Test Generator	Visible
Analog Test Signals	Visible
SDI Test Generator	Visible
SDI Test Signals	Visible
HD Test Generator	Visible
HD Test Signals	Visible
LTC 1 Output	Visible
LTC 2 Output	Visible
Global Pedestal	Visible
Global Phasing	Visible
Analog Audio	Visible
AES Audio	Visible

Figure 5-3: *vistaLINK*® Configuration – Visibility Tab



192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status | Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

Control

Frequency Reference: GPS

Genlock Range: Narrow Range

Frequency Reference Lock Mode: Slow Lock

Jam Freq Reference: Jam Freq Reference

Reset Genlock: Reset Now

Time Reference: GPS

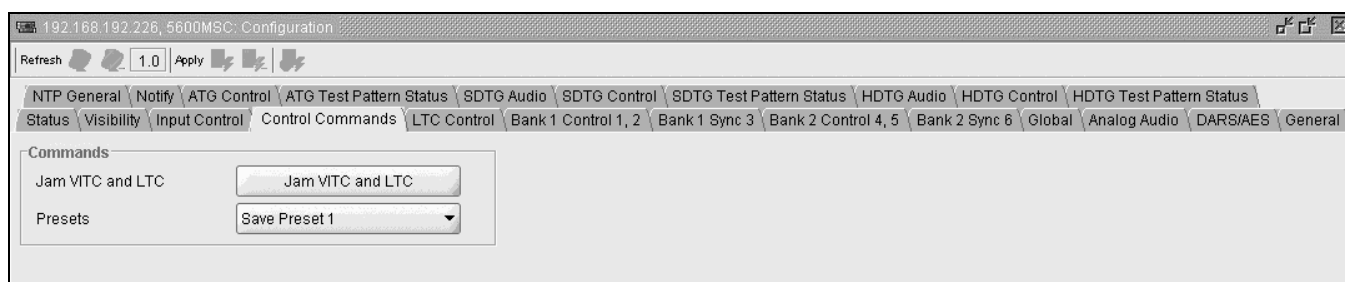
Time Reference Lock Mode: Jam On User Command

Jam Time Reference: Jam Time Reference

Time Reference VITC Line: 31

Time Reference Date Mode: Auto Date

Figure 5-4: VistaLINK® Configuration - Input Control Tab



192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status | Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

Commands

Jam VITC and LTC: Jam VITC and LTC

Presets: Save Preset 1

Figure 5-5: VistaLINK® Configuration – Control Commands Tab



192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status | Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

LTC 1

Rate: 30 fps

Jam Time (hh:mm):

Jam Now: Jam Now

Offset: 50 frames

Time Zone: -12:00

DST Enable: Off

Level: 19.5 %

Parity: Off

Colour Frame: Off

Power: Off

LTC 2

Rate: 30 fps

Jam Time (hh:mm):

Jam Now: Jam Now

Offset: 50 frames

Time Zone: -12:00

DST Enable: Off

Level: 19.5 %

Parity: Off

Colour Frame: Off

Figure 5-6: VistaLINK® Configuration – LTC Control Tab

192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General Notify ATG Control ATG Test Pattern Status SDTG Audio SDTG Control SDTG Test Pattern Status HDTG Audio HDTG Control HDTG Test Pattern Status
 Status Visibility Input Control Control Commands LTC Control Bank 1 Control 1, 2 Bank 1 Sync 3 Bank 2 Control 4, 5 Bank 2 Sync 6 Global Analog Audio DARS/AES General

Bank 1
 Bank1 Standard Definition

Sync 1 Control

Video Standard PAL

Vertical Phase 50

Horizontal Phase 50

Fine Phase 19.53 %

VITC Enable Off

VITC Line 1 31

VITC Line 2 31

Drop Frame Off

Colour Frame Off

Jam Time (hh:mm)

Jam Now Jam Now

Offset 50

Time Zone -1200

DST Enable Off

Ten Field Pulse Off

Colour Phase 4

Sync 2 Control

Video Standard PAL

Vertical Phase 50

Horizontal Phase 50

Fine Phase 19.53 %

VITC Enable Off

VITC Line 1 31

VITC Line 2 31

Drop Frame Off

Colour Frame Off

Jam Time (hh:mm)

Jam Now Jam Now

Offset 50

Time Zone -1200

DST Enable Off

Ten Field Pulse Off

Colour Phase 4

Figure 5-7: VistaLINK® Configuration – Bank 1 Control 1, 2 Tab

192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General Notify ATG Control ATG Test Pattern Status SDTG Audio SDTG Control SDTG Test Pattern Status HDTG Audio HDTG Control HDTG Test Pattern Status

Status Visibility Input Control Control Commands LTC Control Bank 1 Control 1, 2 Bank 1 Sync 3 Bank 2 Control 4, 5 Bank 2 Sync 6 Global Analog Audio DARS/AES General

Bank 1

Bank1 Standard Definition

Sync 3 Control

Video Standard PAL

Vertical Phase 50

Horizontal Phase 50

Fine Phase 19.53 %

VITC Enable Off

VITC Line 1 31

VITC Line 2 31

Drop Frame Off

Colour Frame Off

Jam Time (hh:mm)

Jam Now Jam Now

Offset 50

Time Zone -1200

DST Enable Off

Ten Field Pulse Off

Colour Phase 4

Figure 5-8: VistaLINK® Configuration – Bank 1 Sync 3 Tab

192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

[NTP General](#) | [Notify](#) | [ATG Control](#) | [ATG Test Pattern Status](#) | [SDTG Audio](#) | [SDTG Control](#) | [SDTG Test Pattern Status](#) | [HDTG Audio](#) | [HDTG Control](#) | [HDTG Test Pattern Status](#) | [Status](#) | [Visibility](#) | [Input Control](#) | [Control Commands](#) | [LTC Control](#) | [Bank 1 Control 1, 2](#) | [Bank 1 Sync 3](#) | [Bank 2 Control 4, 5](#) | [Bank 2 Sync 6](#) | [Global](#) | [Analog Audio](#) | [DARS/AES](#) | [General](#)

Bank 2

Bank2 Standard Definition

Sync 4 Control

Video Standard PAL

Vertical Phase 50

Horizontal Phase 50

Fine Phase 19.53 %

VITC Enable Off

VITC Line 1 31

VITC Line 2 31

Drop Frame Off

Colour Frame Off

Jam Time (hh:mm)

Jam Now Jam Now

Offset 50

Time Zone -1200

DST Enable Off

Ten Field Pulse Off

Colour Phase 4

Sync 5 Control

Video Standard PAL

Vertical Phase 50

Horizontal Phase 50

Fine Phase 19.53 %

VITC Enable Off

VITC Line 1 31

VITC Line 2 31

Drop Frame Off

Colour Frame Off

Jam Time (hh:mm)

Jam Now Jam Now

Offset 50

Time Zone -1200

DST Enable Off

Ten Field Pulse Off

Colour Phase 4

Figure 5-9: VistaLINK® Configuration – Bank 2 Control 4, 5 Tab

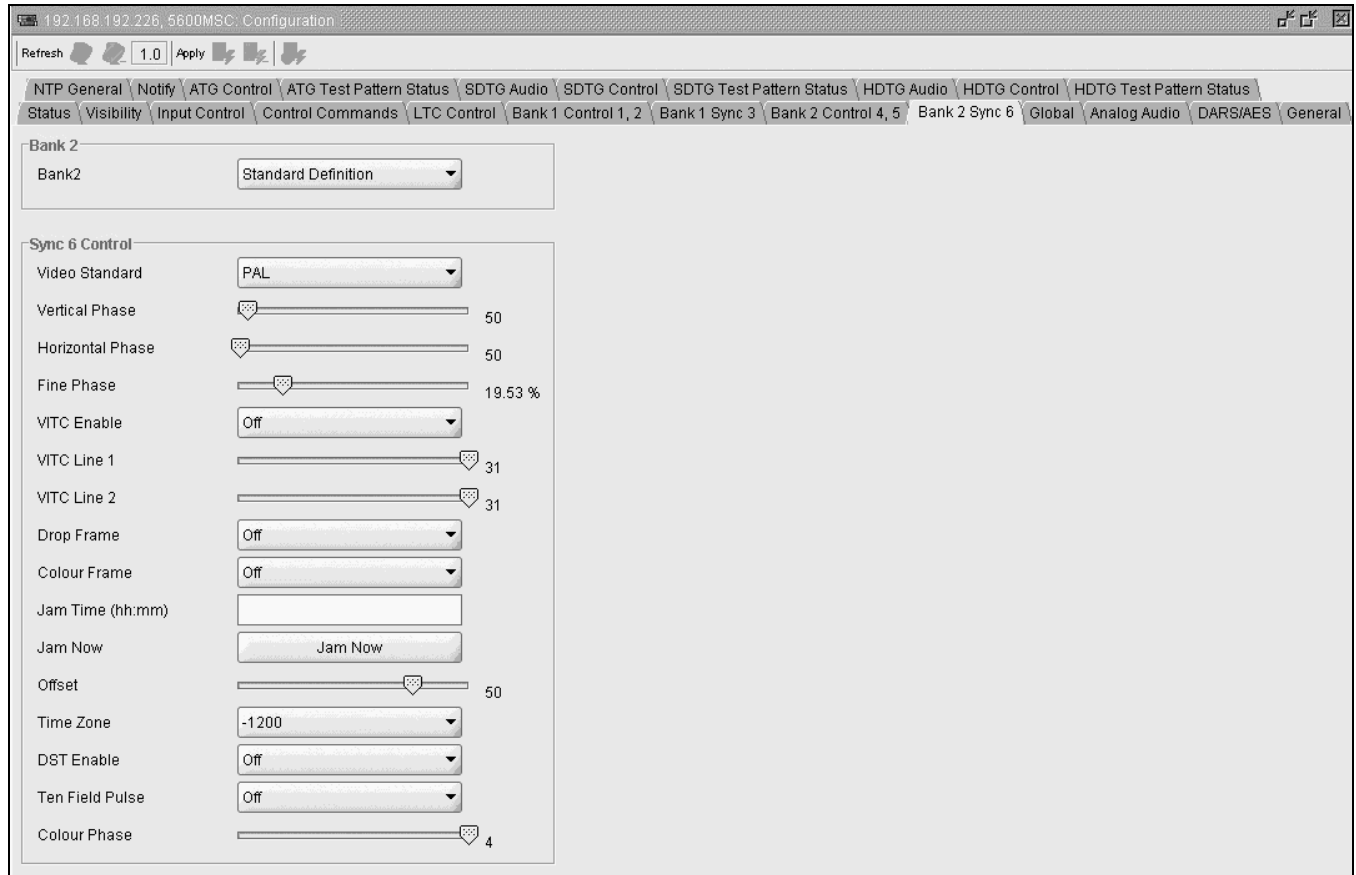


Figure 5-10: VistaLINK® Configuration – Bank 2 Sync 6 Tab

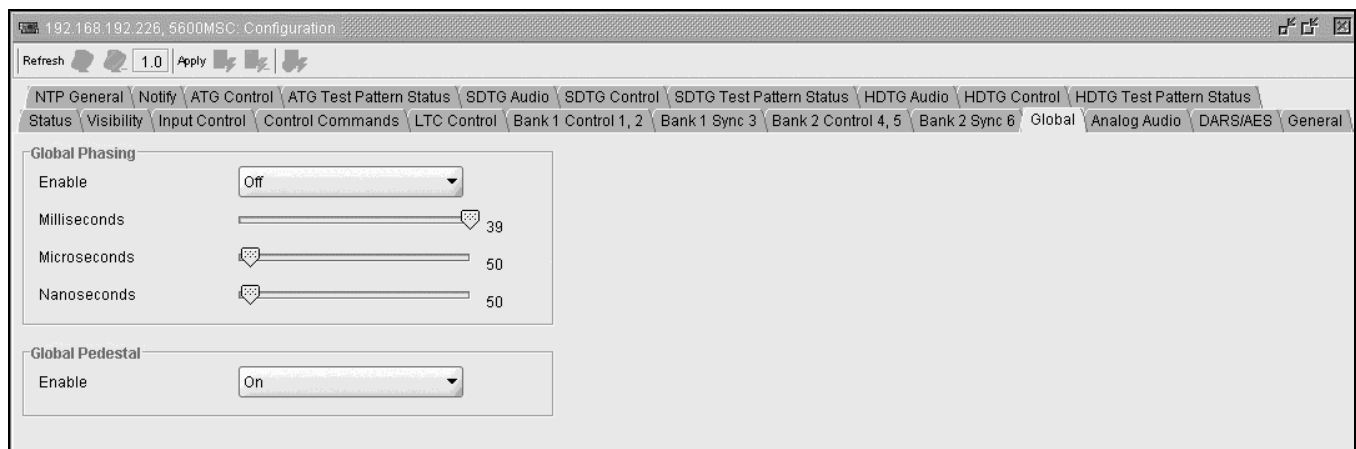


Figure 5-11: VistaLINK® Configuration – Global Tab

192.168.192.226, 5600MSC: Configuration

Refresh 1.0

[NTP General](#) | [Notify](#) | [ATG Control](#) | [ATG Test Pattern Status](#) | [SDTG Audio](#) | [SDTG Control](#) | [SDTG Test Pattern Status](#) | [HDTG Audio](#) | [HDTG Control](#) | [HDTG Test Pattern Status](#)
[Status](#) | [Visibility](#) | [Input Control](#) | [Control Commands](#) | [LTC Control](#) | [Bank 1 Control 1, 2](#) | [Bank 1 Sync 3](#) | [Bank 2 Control 4, 5](#) | [Bank 2 Sync 6](#) | [Global](#) | [Analog Audio](#) | [DARS/AES](#) | [General](#)

Level

Analog Audio Level 8.0 dB

Sound Type

Event	Sound Type
Event 1	Mute
Event 2	Mute
Event 3	Mute
Event 4	Mute
Event 5	Mute
Event 6	Mute
Event 7	Mute
Event 8	Mute
Event 9	Mute
Event 10	Mute

Frequency

Event	Frequency
Event 1	60 Hz
Event 2	60 Hz
Event 3	60 Hz
Event 4	60 Hz
Event 5	60 Hz
Event 6	60 Hz
Event 7	60 Hz
Event 8	60 Hz
Event 9	60 Hz
Event 10	60 Hz

Duration

Event	Duration
Event 1	5.0 s
Event 2	5.0 s
Event 3	5.0 s
Event 4	5.0 s
Event 5	5.0 s
Event 6	5.0 s
Event 7	5.0 s
Event 8	5.0 s
Event 9	5.0 s
Event 10	5.0 s

Start Time (hh:mm:ss.d)

The range of hh (hour) is 00 - 23 or 99, with 99 means event happens every hour.
 The range of mm (minute) is 00 - 59 or 99, with 99 means event happens every minute.
 The range of ss (second) is 00 - 59.
 The range of d (tenth of a second) is 0 - 9.

Event	Start Time
Event 1	
Event 2	
Event 3	
Event 4	
Event 5	
Event 6	
Event 7	
Event 8	
Event 9	
Event 10	

Figure 5-12: *vistaLINK*® Configuration – Analog Audio Tab

192.168.192.226, 5600MSC: Configuration

Refresh 1.0

[NTP General](#) | [Notify](#) | [ATG Control](#) | [ATG Test Pattern Status](#) | [SDTG Audio](#) | [SDTG Control](#) | [SDTG Test Pattern Status](#) | [HDTG Audio](#) | [HDTG Control](#) | [HDTG Test Pattern Status](#)
[Status](#) | [Visibility](#) | [Input Control](#) | [Control Commands](#) | [LTC Control](#) | [Bank 1 Control 1, 2](#) | [Bank 1 Sync 3](#) | [Bank 2 Control 4, 5](#) | [Bank 2 Sync 6](#) | [Global](#) | [Analog Audio](#) | [DARS/AES](#) | [General](#)

Control

Fine Phase 50

Coarse Phase 50

Ch1 Frequency Ident

Ch2 Frequency Ident

Ch1 Level Mute

Ch2 Level Mute

Lock PAL

Word Clock Phase 50

Figure 5-13: *vistaLINK*® Configuration – DARS/AES Tab

192.168.192.226, 5600MSC Configuration

Refresh 1.0 Apply

[NTP General](#)
[Notify](#)
[ATG Control](#)
[ATG Test Pattern Status](#)
[SDTG Audio](#)
[SDTG Control](#)
[SDTG Test Pattern Status](#)
[HDTG Audio](#)
[HDTG Control](#)
[HDTG Test Pattern Status](#)
[Status](#)
[Visibility](#)
[Input Control](#)
[Control Commands](#)
[LTC Control](#)
[Bank 1 Control 1, 2](#)
[Bank 1 Sync 3](#)
[Bank 2 Control 4, 5](#)
[Bank 2 Sync 6](#)
[Global](#)
[Analog Audio](#)
[DARS/AES](#)
[General](#)

DST

Mode: Day of Week of Month

Start Hour: 00 00 hrs

Start Day: 0

Start Week: First Week

Start Month: January

End Hour: 00 00 hrs

End Day: 0

End Week: First Week

End Month: January

Offset: No DST

Control

Set Time (hh:mm:ss)

Set Date (yy:mm:dd)

User Bits (hex)

User Bit Mode: Legacy Date

Serial Port Mode: Normal

Syncro Exclude: Exclude None

GPO 1: Not Used

GPO 2: Not Used

GPI 1: Not Used

GPI 2: Not Used

Set Password

Modem

Mode: Off

Standard: NRC

Volume: Off

Phone Number (only numerals or 'p')

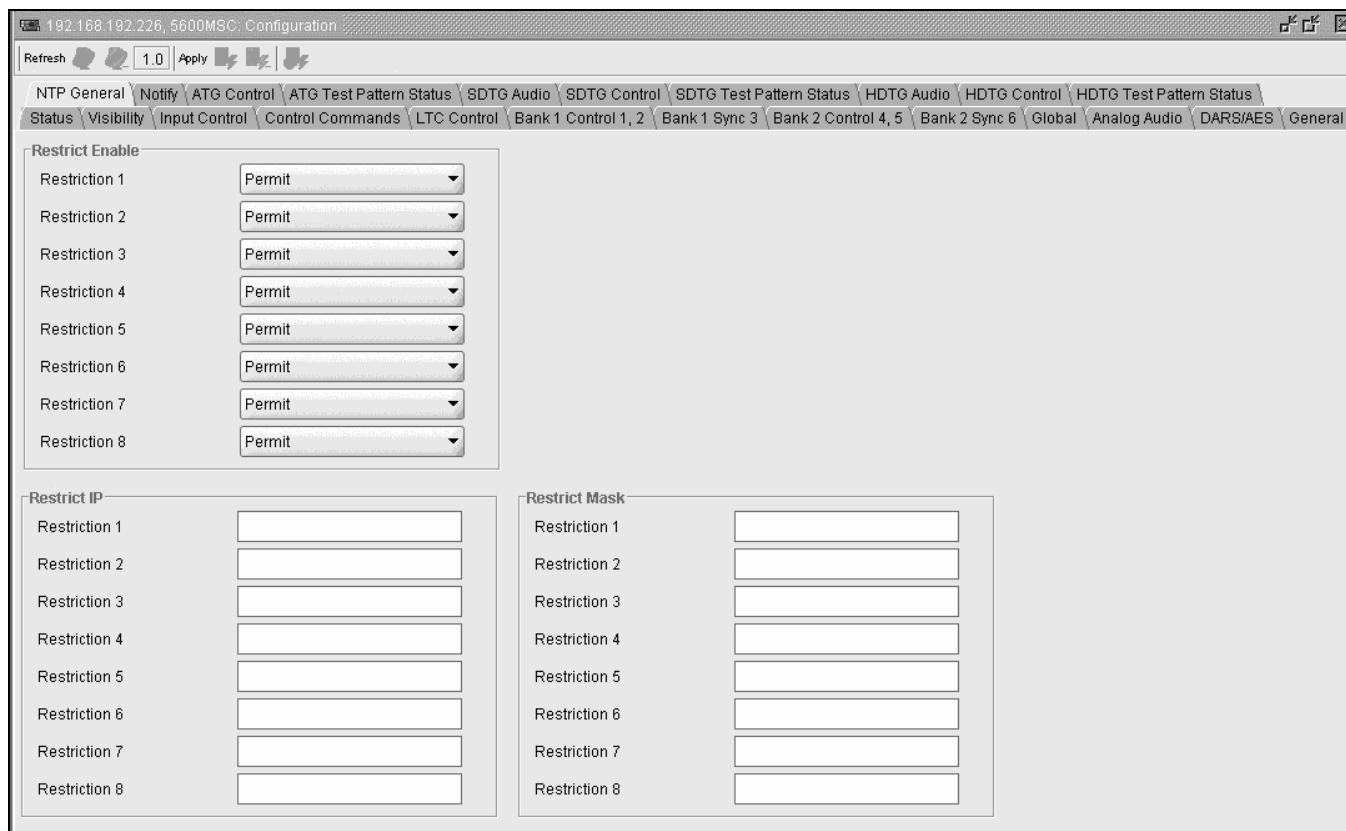
Dial Time (hh:mm:ss)

Retries: 50

Dial Now

Cancel Call

Figure 5-14: VistaLINK® Configuration – General Tab



192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status

Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

Restrict Enable

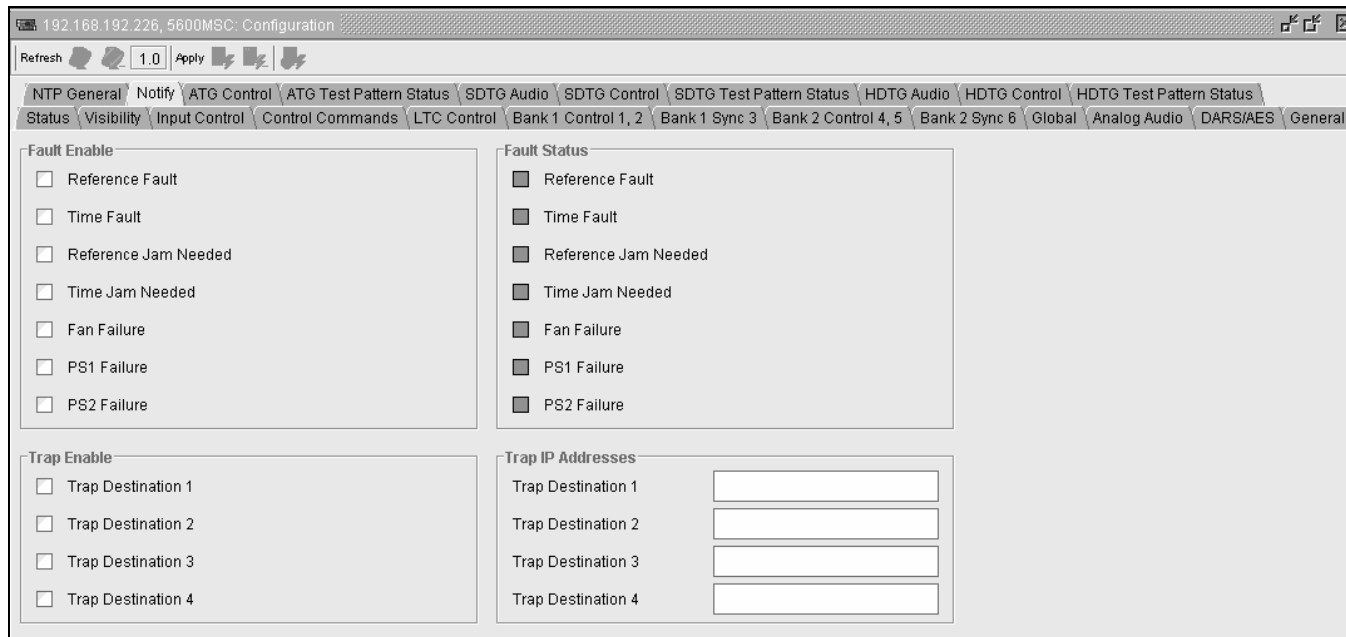
Restriction 1	Permit
Restriction 2	Permit
Restriction 3	Permit
Restriction 4	Permit
Restriction 5	Permit
Restriction 6	Permit
Restriction 7	Permit
Restriction 8	Permit

Restrict IP

Restriction 1	
Restriction 2	
Restriction 3	
Restriction 4	
Restriction 5	
Restriction 6	
Restriction 7	
Restriction 8	

Restrict Mask

Restriction 1	
Restriction 2	
Restriction 3	
Restriction 4	
Restriction 5	
Restriction 6	
Restriction 7	
Restriction 8	

Figure 5-15: *VistaLINK*® Configuration – NTP General Tab


192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status

Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

Fault Enable

- ☐ Reference Fault
- ☐ Time Fault
- ☐ Reference Jam Needed
- ☐ Time Jam Needed
- ☐ Fan Failure
- ☐ PS1 Failure
- ☐ PS2 Failure

Fault Status

- ☒ Reference Fault
- ☒ Time Fault
- ☒ Reference Jam Needed
- ☒ Time Jam Needed
- ☒ Fan Failure
- ☒ PS1 Failure
- ☒ PS2 Failure

Trap Enable

- ☐ Trap Destination 1
- ☐ Trap Destination 2
- ☐ Trap Destination 3
- ☐ Trap Destination 4

Trap IP Addresses

Trap Destination 1	
Trap Destination 2	
Trap Destination 3	
Trap Destination 4	

Figure 5-16: *VistaLINK*® Configuration – Notify Tab

192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTG General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status

Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

Control

Video Standard: PAL

Colour Phase: 4

Vertical Phase: 50

Horizontal Phase: 50

Fine Phase: 19.53 %

Moving Line: Off

Message Control

Enable: Off

Text:

Font: Small

Horizontal Position: 20

Vertical Position: 24

Figure 5-17: VistaLINK® Configuration – ATG Control

192.168.192.226, 5600MSC: Configuration

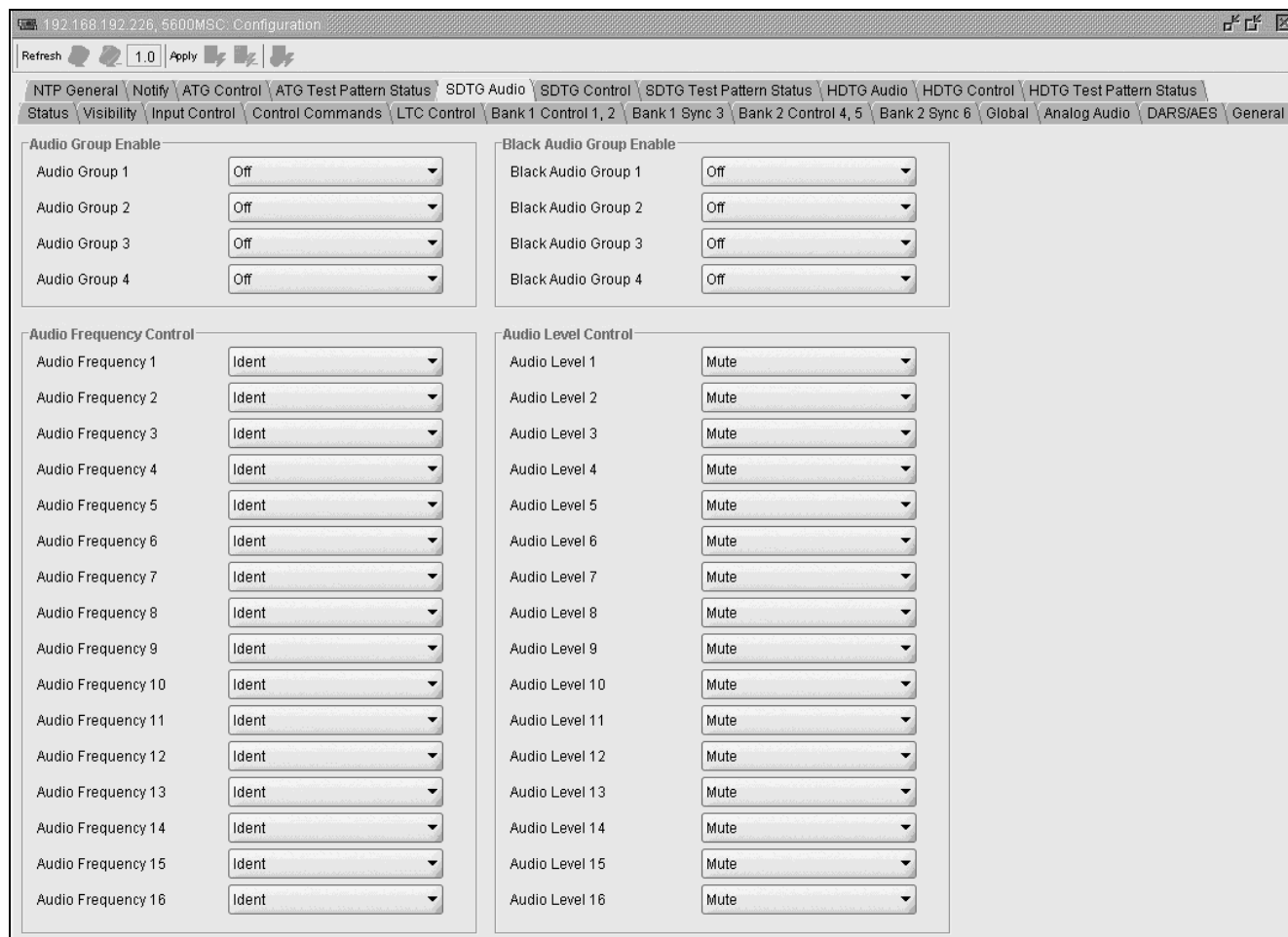
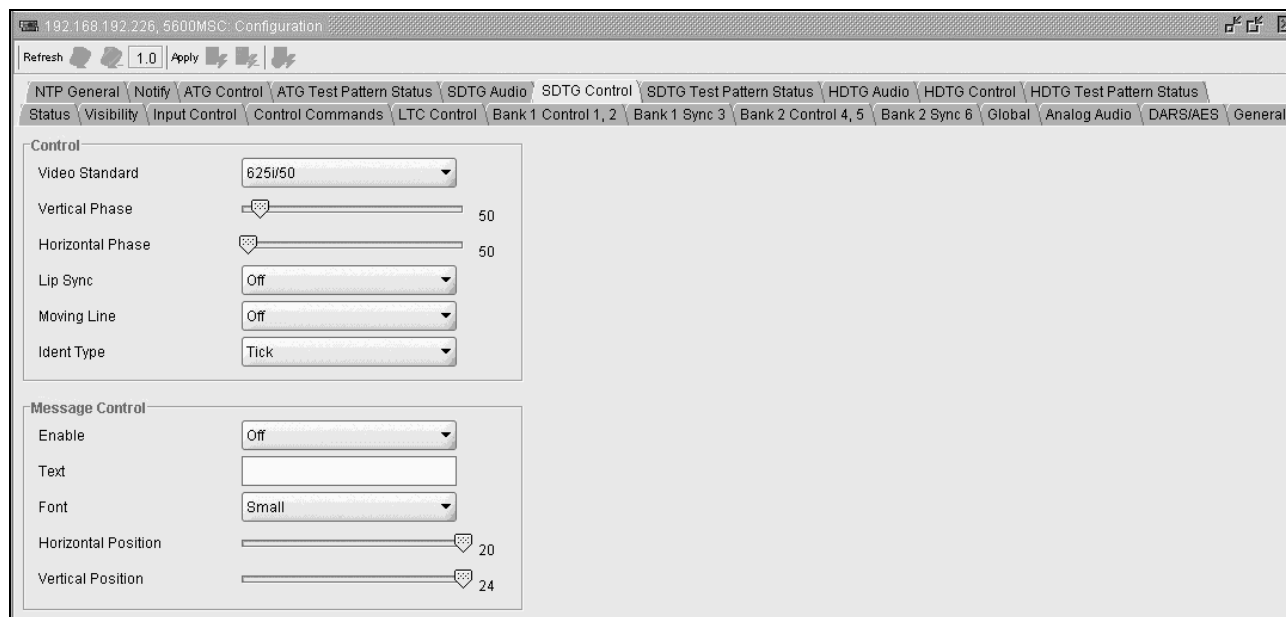
Refresh 1.0 Apply

NTG General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status

Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

Pattern Name	Pattern Name	Pattern Name
100% Color Bar	75% Color Bars	SMPTE Color Bars
Black	Grey	White
FIELD (B=1, w=2)	Checkfield	Valid Ramp
Y Ramp	5 Step	2.5 MHz Bowtie
60% Multiburst	60% Ext MB	Multipulse
NTC7 Composite	NTC7 Combination	Chroma Freq. Resp.
FCC Composite	FCC Multiburst	Convergence Pattern
10 Step	10 Y Step	Modulated Ramp
Shallow Ramp	Shallow Y Ramp	Y Multipulse
100% White Window	80% White Window	50% White Window
20% White Window	SinX/X	2T Pulse & Bar
2 Level Ped, Pluge	4 Level Ped, Pluge	Composite Signal

Figure 5-18: VistaLINK® Configuration – ATG Test Pattern Status Tab

Figure 5-19: *VistaLINK*® Configuration – SDTG Audio TabFigure 5-20: *VistaLINK*® Configuration – SDTG Control Tab

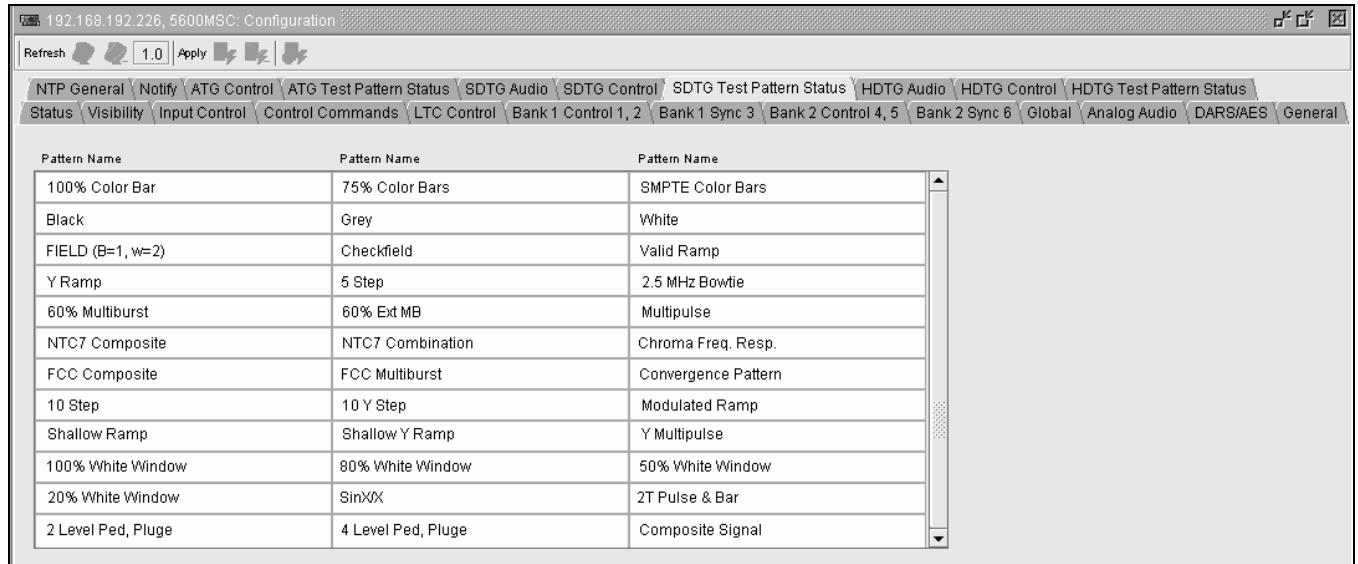


Figure 5-21: VistaLINK® Configuration – SDTG Test Pattern Status Tab

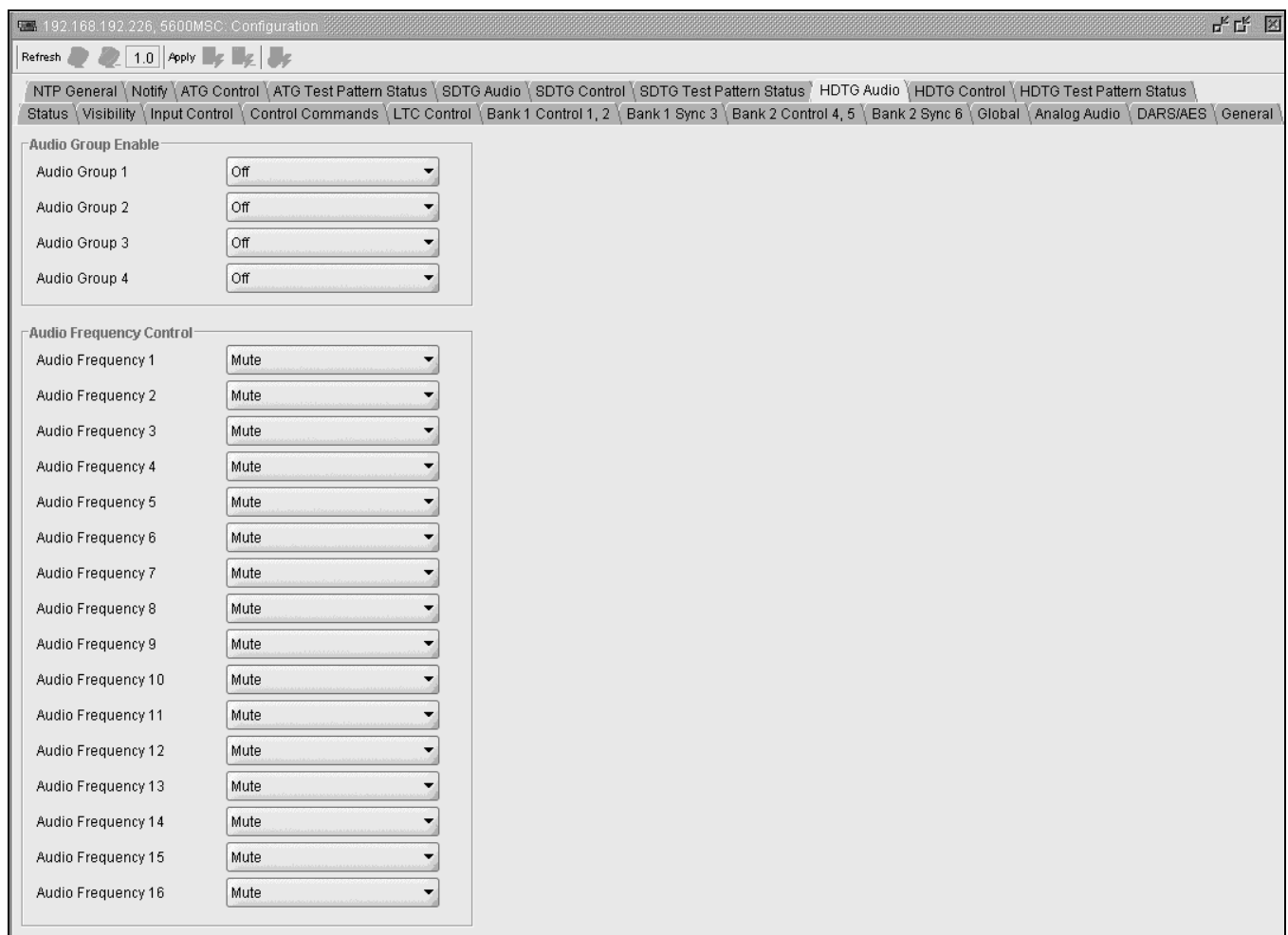
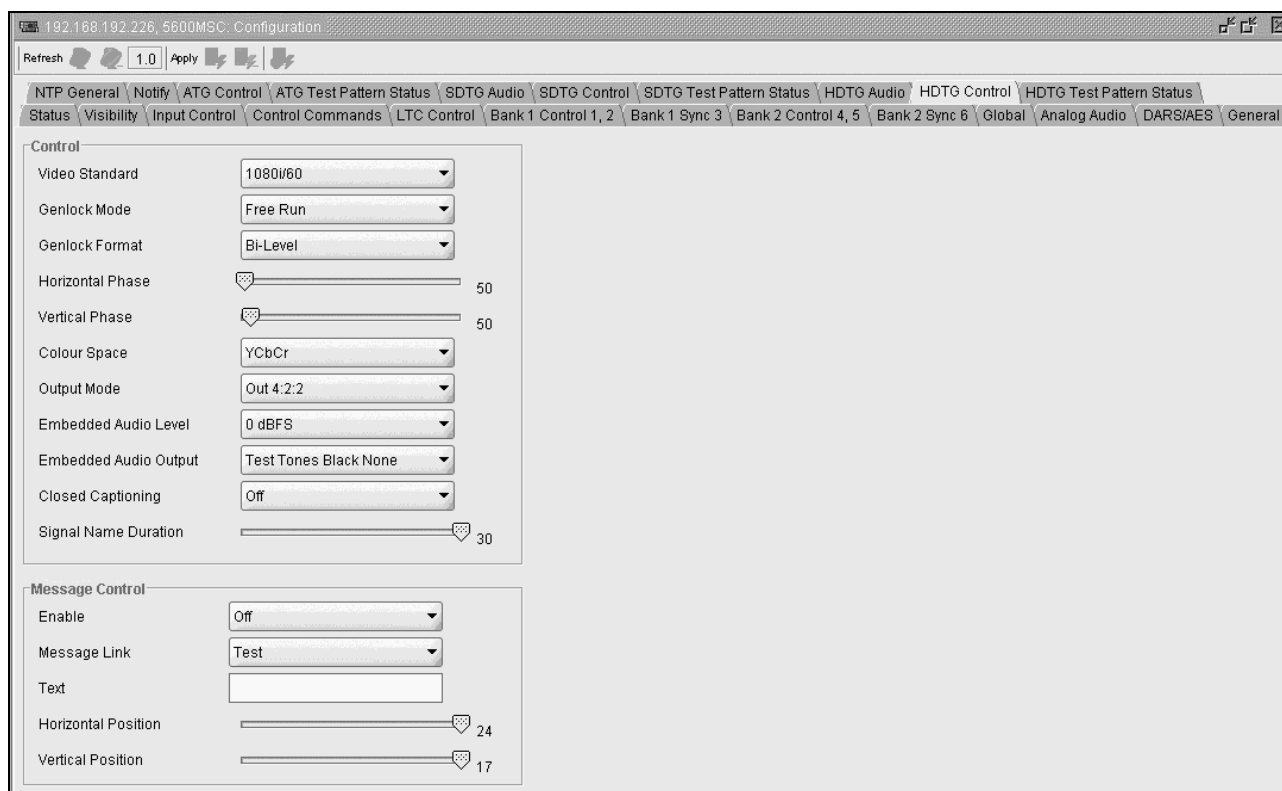


Figure 5-22: VistaLINK® Configuration – HDTG Audio Tab



192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status
 Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

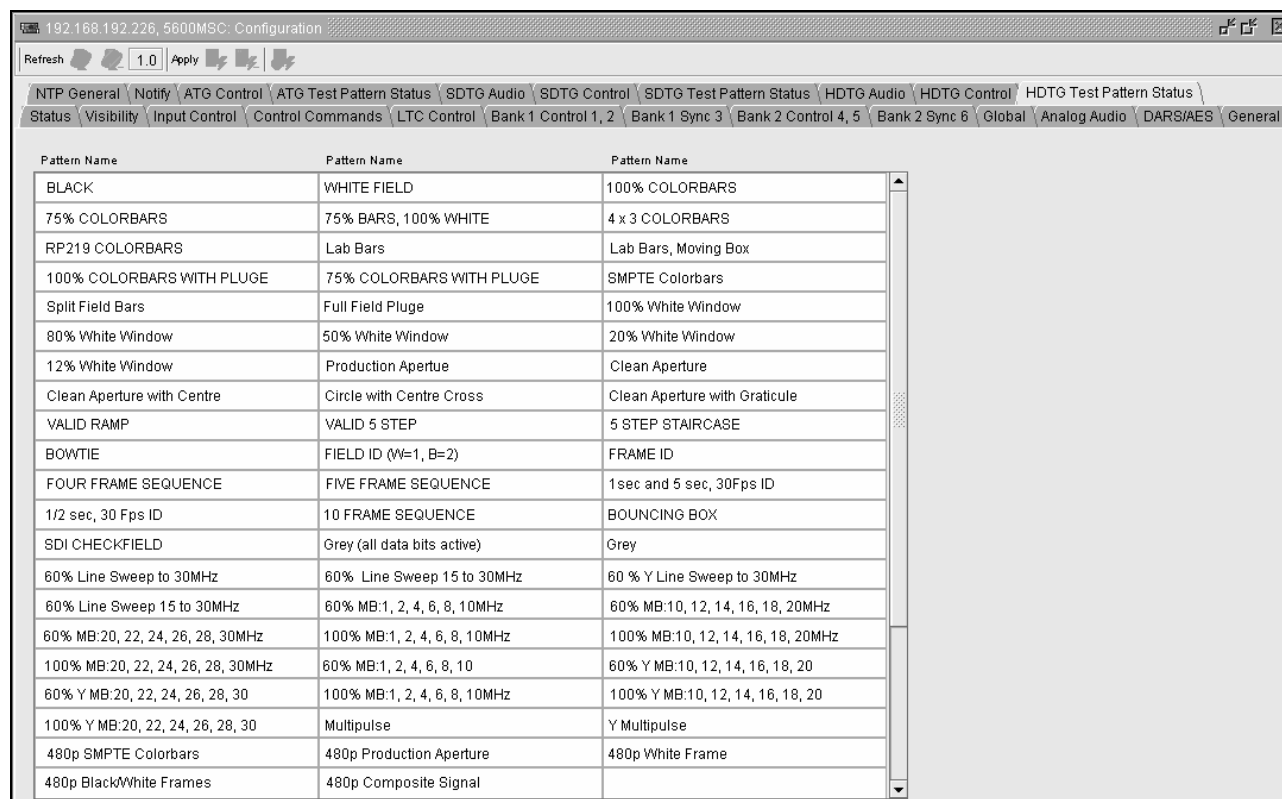
Control

Video Standard: 1080i/60
 Genlock Mode: Free Run
 Genlock Format: Bi-Level
 Horizontal Phase: 50
 Vertical Phase: 50
 Colour Space: YCbCr
 Output Mode: Out 4:2:2
 Embedded Audio Level: 0 dBFS
 Embedded Audio Output: Test Tones Black None
 Closed Captioning: Off
 Signal Name Duration: 30

Message Control

Enable: Off
 Message Link: Test
 Text:
 Horizontal Position: 24
 Vertical Position: 17

Figure 5-23: VistaLINK® Configuration – HDTG Control Tab



192.168.192.226, 5600MSC: Configuration

Refresh 1.0 Apply

NTP General | Notify | ATG Control | ATG Test Pattern Status | SDTG Audio | SDTG Control | SDTG Test Pattern Status | HDTG Audio | HDTG Control | HDTG Test Pattern Status
 Status | Visibility | Input Control | Control Commands | LTC Control | Bank 1 Control 1, 2 | Bank 1 Sync 3 | Bank 2 Control 4, 5 | Bank 2 Sync 6 | Global | Analog Audio | DARS/AES | General

Pattern Name	Pattern Name	Pattern Name
BLACK	WHITE FIELD	100% COLORBARS
75% COLORBARS	75% BARS, 100% WHITE	4 x 3 COLORBARS
RP219 COLORBARS	Lab Bars	Lab Bars, Moving Box
100% COLORBARS WITH PLUGE	75% COLORBARS WITH PLUGE	SMPTE Colorbars
Split Field Bars	Full Field Pluge	100% White Window
80% White Window	50% White Window	20% White Window
12% White Window	Production Aperture	Clean Aperture
Clean Aperture with Centre	Circle with Centre Cross	Clean Aperture with Graticule
VALID RAMP	VALID 5 STEP	5 STEP STAIRCASE
BOWTIE	FIELD ID (W=1, B=2)	FRAME ID
FOUR FRAME SEQUENCE	FIVE FRAME SEQUENCE	1sec and 5 sec, 30Fps ID
1/2 sec, 30 Fps ID	10 FRAME SEQUENCE	BOUNCING BOX
SDI CHECKFIELD	Grey (all data bits active)	Grey
60% Line Sweep to 30MHz	60% Line Sweep 15 to 30MHz	60 % Y Line Sweep to 30MHz
60% Line Sweep 15 to 30MHz	60% MB:1, 2, 4, 6, 8, 10MHz	60% MB:10, 12, 14, 16, 18, 20MHz
60% MB:20, 22, 24, 26, 28, 30MHz	100% MB:1, 2, 4, 6, 8, 10MHz	100% MB:10, 12, 14, 16, 18, 20MHz
100% MB:20, 22, 24, 26, 28, 30MHz	60% MB:1, 2, 4, 6, 8, 10	60% Y MB:10, 12, 14, 16, 18, 20
60% Y MB:20, 22, 24, 26, 28, 30	100% MB:1, 2, 4, 6, 8, 10MHz	100% Y MB:10, 12, 14, 16, 18, 20
100% Y MB:20, 22, 24, 26, 28, 30	Multipulse	Y Multipulse
480p SMPTE Colorbars	480p Production Aperture	480p White Frame
480p Black/White Frames	480p Composite Signal	

Figure 5-24: VistaLINK® Configuration – HDTG Test Pattern Status