5601MSC
Master SPG/Master Clock System

The 5601MSC Master Sync and Clock Generator is a broadcast quality, master sync pulse generator (SPG) and a master clock. It provides all of the synchronizing signals needed in a 21st century TV station or post production facility 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 5601MSC with better than 1.0x10–8 (or 0.01ppm) frequency reference. The free running drift of this 10MHz reference will be less than 0.1Hz (which amounts to less than one 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 5601MSC 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 section of the 5601MSC may be referenced to high stability time and frequency standards present in the Global Position System (GPS) by adding the GPS option (+GP). The 5601MSC may also be referenced to high stability time and frequency standards present in the Global Navigation Satellite System (GLONASS) by adding the GPS/GLONASS option (+GPSG).

The SPG section of the 5601MSC provides six timeable reference outputs. These six BNC outputs may be configured to provide independently timed color black (black burst) outputs or independently timed HDTV tri–level sync outputs. Each color black output can optionally carry vertical interval time code (VITC) on a user specified set of lines. Additionally, each output can provide 10MHz, 5MHz, PAL Subcarrier, NTSC Subcarrier, 1 PPS, 1/1.001 PPS, 6/1.001 PPS, PAL color frame pulse and 48kHz wordclock.

When referenced to the optional GPS receiver, the start of the NTSC four field sequences, or the PAL 8 field sequence, will coincide with a specific point in the GPS code. In this way, by referencing all the 5601MSCs 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 locked! GPS heads may be remoted from the unit with standard 50 ft. cables included or optional 100 ft. & 400 ft. weatherproof cables. For remote GPS head requirements of greater than 400 ft. or fiber optic isolation, GPS Data Fiber Transmitters & Receivers are also available (7707GPS–DT, 7707GPS–DR).

On the 5601MSC, the master clock section provides two longitudinal timecode (LTC) or optional IRIG outputs on XLR connectors and a 15–pin D connector. The time code may be set from the front panel or referenced to a number of different sources.

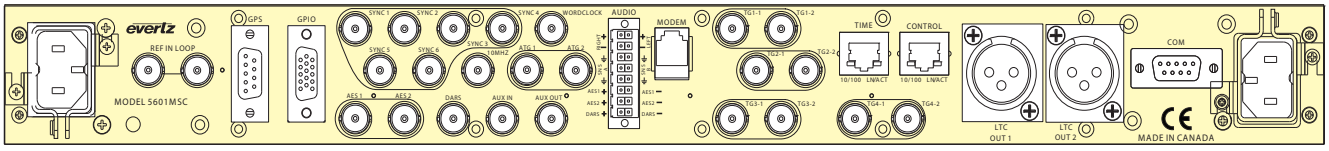
Having two LTC outputs provides the ability to drive 24 and 30 Fps, or drop–frame and non–drop frame timecode simultaneously. Time may be externally referenced to GPS or via modem to a high–level time source or extracted from VITC on the reference input. Time derived from such sources can be offset from UTC to a specific time zone as required. Time may be externally referenced to GPS, modem, or VITC or GLONASS, LTC, IRIG or SNTP. The 5601MSC can provide RFC–1305 compliant NTP via Ethernet, and operates in broadcast and server mode. The 5601MSC can act as a PTP/IEEE–1588 server on its time port. GPS, NTP, PTP and Modem access are all options. The 5601MSC includes a battery backed–up real time clock to maintain its time while power is not applied to the unit.

On the 5601MSC, a wordclock output is a standard feature. It provides a 48 kHz wordclock or may be configured as an additional sync output. Also, the 10MHz output provides 10MHz or 5MHz, or may be configured as an additional sync output.

There are four test signal generator options available. The SDTG option provides two composite analog video test generators, two AES and one DARS outputs (both balanced and unbalanced), and two balanced analog audio tone channels. The SDTG option also provides four standard definition SDI test signal generators. The HDTG option includes all features of the SDTG option and adds support for HD formats. The 3GTG option includes all features of the HDTG option and adds support for dual–link and 3G formats. Each test generator has two outputs and a large suite of test signals available. When the 3GTG option is ordered, 3D test signals are also available. In the 4K/UHDTV mode the four test generators are combined into one quad–link test generator.

The 5601MSC offers an optional redundant power supply. The redundant power supplies and fans are hot–swappable. Fan replacement kits are available for field servicing.

Automatic Changeover
Two 5601MSC units in combination with an Automatic Change Over (model 5601ACO2) provide an extra degree of reliability. Again, the 5601ACO2 provides relay changeover for the two LTC outputs, the six sync pulse outputs, the 10MHz reference output, wordclock and the GPI/O interface. The model 5601ACO2 also provides changeover for all the optional test generator signals.



5601MSC Rear Panel

The Complete Solution Provider

Features & Benefits

- Six independently timeable programmable reference outputs
- Bi–level or Tri–level outputs selectable
- Two independent LTC Time Code outputs (optional IRIG–B)
- LTC Input (optional IRIG–B)
- Reference loop input for video and 10MHz/5MHz references
- GPS option for frequency and time reference (GLONASS option)
- SNTP option for time reference
- 3.58/4.43/5MHz frequency reference output
- 10MHz frequency reference output
- Wordclock output
- Output frequency stability better than 1.0x10–8 (or 0.01ppm)
- Optional modem for time reference dial–up
- 2x GPS–based units will be in time and phase even when remotely separated by miles
- Optional test generators available are (refer to ordering options):
  - Composite Video
  - AES/DARS
  - Analog Audio Tones
  - SD SDI
  - HD SDI
  - 3Gb/s
- Time burn–in on all test signal generators
- SMPTE ST 12–2 (RP 188) on HD and 3G test signal generators
- Optional Network Time Protocol (NTP) server support (NTP requires a time reference such as GPS/GLONASS, modem, VITC, LTC or SNTP. GPS/GLONASS is the recommended reference)
- Optional PTP/IEEE–1588 master support
- Dual 6 line x 16 character Alpha–numeric display, with 10 pushbuttons
- Rack mountable
- Optional redundant hot–swappable power supply
- Automatic changeover units available for dual redundant systems applications
- Compatible with dual GPS data fiber receivers and transmitters
- 2x factory presets and 3x user presets available
- VITC reader on reference input for time reference
- Ten Field Pulse is available on NTSC sync outputs
- VistaLINK® control for device configuration and status monitoring
- All active components are front panel extractable & serviceable
- Fans are hot–swappable and field serviceable

Summary

5601MSC Signal Inputs / Outputs

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5601MSC Specifications

Analog Sync Outputs:

Output Standards:	
Black Burst:	SMPTE ST 170 (NTSC–M), ITU–R BT.1700–1 (PAL–B)
Bi–Level:	Slo–Pal 625i/48, 625i/47.95, 480p/59.94
HD Tri–Level:	SMPTE ST 274 (1080p/23.98, 1080p/24, 1080i/50, 1080i/59.94, 1080i/60, 1080p/23.98sF, 1080p/24sF, 1080p/25, 1080p/29.97, 1080p/30, 1080p/50, 1080p/59.94, 1080p/60) SMPTE ST 296 (720p/59.94, 720p/60, 720p/50, 720p/30, 720p/24)
Pulse Signals:	PAL color frame, 1Hz pulse, IRIG DATUM 1/1.001Hz pulse, 6/1.001Hz pulse
CW Signals:	5MHz, 10MHz, NTSC–M Subcarrier, PAL–B Subcarrier
Wordclock:	48kHz Wordclock
Connector:	6 BNC per IEC 61169–8 Annex A
Number of Outputs:	6
DC Offset:	0V ±0.05V
Return Loss:	> 40dB up to 10MHz
SNR:	> 75dB rms

10MHz Output:

Output Levels:	1.0V p–p, 2.0V p–p, in 75Ω, selectable
Connector:	BNC per IEC 61169–8 Annex A
Output Type:	10MHz sine wave (default), all other analog sync standards (see above) selectable
SNR:	>70dB rms
SFDR:	>50 dBc

Wordclock Output:

Output Type:	48kHz Wordclock (default), all other analog sync standards (see above) selectable
Connector:	BNC per IEC 61169–8 Annex A
Risetime:	< 25ns
Levels:	5V CMOS (1kΩ) or ±1V (75Ω)

LTC Outputs:

Standard:	SMPTE ST 12–2 or IRIG–B
Frame Rate:	24, 25, 30 and 29.97 (drop frame and non–drop frame)
Number of outputs:	2 balanced
Connectors:	3–pin male XLR type, Female DB–15
Level:	
Un–powered:	Adjustable, 1.0V to 8.0V p–p, balanced
Powered:	2V p–p with 11V DC offset to drive downstream 1200 series slave clocks on LTC1 only
Output Impedance:	44Ω balanced (un–powered)
Rise Time:	40 ±10µs
Jitter:	< 2µs

IRIG Input/Outputs (with +IRIG option installed):

Standard:	IRIG 200–04 B122, B123, B126, B127
Number of outputs:	2, shared with LTC, may be both LTC, 1 LTC–1 IRIG, both IRIG
Connectors:	3–pin male XLR type, Female DB–15
Level:	1.0–8.0 p–p, balanced
Output Impedance:	44Ω balanced

LTC Input:

Standard:	SMPTE ST12–2 or IRIG–B
Number of Inputs:	1 balanced
Connector:	Female DB–15
Input impedance:	>30kΩ balanced
Sensitivity:	0.25V p–p min

Communications and Control:

Serial Port:	
Connector:	Female DB–9
Level:	RS–232
Baud Rate:	115200 baud
Format:	8 data bits, no parity, 2 stop bits

GPS/GLONASS Receiver (with "+GP" or "+GPSG" option installed):

Temperature:	–40°C to +70°C
Humidity:	95% R.H. Condensing at 60°C
Dimensions:	3.74" D x 2.85" H (100mm x 72mm)

Modem (with "+M" option installed):

Connector:	RJ–11 telephone jack
Baud Rate:	300/1200 baud Bell 103 compatible

Ethernet:

Network Type:	Fast Ethernet 100 Base–TX IEEE 802.3u standard for 100Mb/s baseband CSMA/CD local area network Ethernet 10 Base–T IEEE 802.3 standard for 10Mb/s baseband CSMA/CD local area network
Connector:	RJ–45
Function:	VistaLINK® control NTP port with +T option installed

NTP Port (+T option installed):

Standard:	NTP V4 compliant, broadcast and server mode support Time must be referenced to GPS, LTC, VITC or have been synchronized via modem within the last 10 days (as per RFC1305)
SNTP Input:	NTP V4 compliant

PTP/IEEE–1588 (+PTP option installed):

	PTP version 2 support on Time Ethernet port (Master mode only)

DARS & AES Test Generator Outputs (with +SDTG, HDTG or 3GTG installed):

Standard:	
Unbalanced:	SMPTE ST 276–1 single ended AES (24–bits) (1V p–p into 75Ω)
Balanced:	AES3 (24–bits) (4V p–p 110Ω terminated)
Number of Outputs:	
DARS:	1 unbalanced, 1 balanced
AES Test Gen:	2 unbalanced, 2 balanced
Connector:	
Unbalanced:	BNC per IEC 61169–8 Annex A
Balanced:	Removable Terminal Strip
Sampling Rate:	48kHz
Impedance:	
Unbalanced:	75Ω unbalanced
Balanced:	110Ω balanced
AES Tones:	Menu selectable

Genlock Input (Video/10MHz selectable):

Type:	Autodetects standard SMPTE ST 170 (NTSC–M), ITU–R BT.1700–1 (PAL–B), Color Black 1V p–p with optional VITC and 10–field pulse HD Tri–level Sync (same HD standards as sync outputs)
Number of Inputs:	2 Loop thru High impedance, isolated, differential external termination required
Connector:	BNC per IEC 61169–8 Annex A
Return Loss:	>40dB to 10MHz (with external 75Ω termination)
Input Level Range:	
Video:	–3.5dB (double–terminated) to +6dB un–terminated)
10MHz:	0.3V p–p to 4.0V
Frequency Lock Range:	
Wide mode:	±15ppm min
Narrow mode:	±0.1ppm min

Analog Composite Video Test Signal Generator (with +SDTG, HDTG or 3GTG installed):

Standard:	SMPTE ST 170 (NTSC–M) ITU–R BT.1700–1 (PAL–B)
Number of Outputs:	2
Connector:	BNC per IEC 61169–8 Annex A
Signal Level:	1V p–p nominal
DC Offset:	0V ±0.05V
Output Impedance:	75Ω
Return Loss:	>40dB to 6MHz
Frequency response:	± –0.1dB to 5.5MHz
SNR:	> 75dB rms

Analog Audio Tone Generator (with +SDTG, HDTG or 3GTG installed):

Number of Outputs:	2
Type:	Balanced analog audio
Connector:	6 pins on 16–pin removable terminal strips
Output Impedance:	66Ω
Signal Level:	–30 to +10dBu into 10kΩ load
DC Offset:	< 10mV
Noise floor:	< –90dBu, unweighted
THD+N:	< –100dB with 1kHz @ +10dBu into 10kΩ load

SDI Test Generators:

Standards:	With SDTG option, SMPTE ST 259–C (270Mb/s) With HDTG option, SMPTE ST 259–C (270Mb/s), SMPTE ST 292–1 4:2:2 With 3GTG option, SMPTE ST 259–C (270Mb/s), SMPTE ST 292–1 4:2:2, SMPTE ST 372 dual link, and SMPTE ST 424 For SMPTE ST 2048–2 and SMPTE ST 2036–1 2160 line formats, Quad link SMPTE ST 292–1 4:2:2, Quad link SMPTE ST 424 4:2:2, SMPTE ST 425–3 Dual link 3Gb/s, SMPTE ST 425–5 Quad link 3Gb/s
Number of Generators:	4 (2 outputs per)
Embedded Audio:	Up to 4 audio groups as specified in SMPTE ST 299–1 or SMPTE ST 272 Selectable tone frequencies (from 20Hz to 12kHz) and audio group
Connector:	BNC per IEC 61169–8 Annex A
Signal Level:	800mV nominal drive (1600mV drive for 5601AC02)
DC Offset:	0V ±0.5V
Rise and Fall Time:	100ps HD/3G, 600ps SD
Overshoot:	< 10% of amplitude
Jitter:	< 0.2 UI
Return Loss:	> 15dB to 1.5GHz > 10dB to 3GHz

General Purpose Inputs and Output:

Number of Inputs:	2
Number of Outputs:	2 (function menu selectable)
Output Type:	Opto–isolated, active closure to GND, 20kΩ pull–ups to +5V
Input Type:	Opto–isolated, senses closure to GND, pull–ups to +5V
Connector:	4 pins plus 2 ground pins on DB–15 female

Physical:

Dimensions:	19" W x 1.75" H x 11.5" D (483mm W x 45mm H x 292mm D)
Weight:	8lbs (3.5kg)

Electrical:

Voltage:	Auto–ranging 100 to 240V AC, 50/60Hz
Configuration:	Optional redundant supply available
Power:	90W max (all options installed)
Safety:	TüV Listed Complies with EU safety directives
EMI/RFI:	Complies with FCC Part 15 Class A Complies with EU EMC Directive

The Complete Solution Provider

5601MSC Ordering Information

5601MSC	Master SPG/Master Clock System including: 6 bi–level/tri–level sync outputs 5/10 MHz output, 48kHz word clock output, 2 LTC outputs Loop thru genlock/5/10MHz input, LTC input, 1 power supply
5601ACO2	2RU Automatic Change Over System *(see individual brochure)*

Ordering Options:

+2PS	Redundant power supply
+M	Modem option
+GP	GPS option (includes GPS receiver and 50' weatherproof cable)
+GPSG	GLONASS/GPS option (includes GLONASS/GPS receiver and 50' weatherproof cable)
+T	Network Time Protocol Server, SNTP client
+SDTG	4x dual output SD SDI test generators, 2x NTSC/PAL test signal generator outputs, 1x stereo analog audio tone generator, 1x DARS generator (balanced and unbalanced), 2x AES generator (balanced and unbalanced)
+HDTG	4x dual output configurable SD/HD SDI test/black generators, 2x NTSC/PAL test signal generator outputs, 1x stereo analog audio tone generator, 1x DARS generator (balanced and unbalanced), 2x AES generators (balanced and unbalanced), includes SD SDI test generators
+3GTG	4x dual output configurable SD/HD/3G SDI test generators, 2x NTSC/PAL test signal generator outputs, 1x stereo analog audio tone generator, 1x DARS generator (balanced and unbalanced), 2x AES generator (balanced and unbalanced), includes SD SDI and HD SDI test generators
+IRIG	LTC inputs and outputs are IRIG compatible
+4K	1x UHD SDI test generator in 2SI or Square Division format — when enabled, uses all 4 SDI test generator output ports, when disabled, 4 dual output configurable SD/HD/3G SDI test generators are available; 2 NTSC/PAL test signal generator outputs, 1x stereo analog tone generator, 1x DARS generator (balanced and unbalanced), 2x AES generators (balanced and unbalanced), includes SD SDI, HD SDI and 3G SDI test generators
+PTP	PTP Master on Time Ethernet port (includes +T option)

Accessories:	*For other weatherproof cable lengths, contact factory.*
WA–T76	Optional 100' weatherproof cable for GPS receiver
WA–T11	Optional 400' weatherproof cable for GPS receiver

For remote GPS head requirements greater than 400' cables or fiber optic isolation order:

7707GPS–DT	Dual GPS Data Fiber Transmitter
7707GPS–DR	Dual GPS Data Fiber Receiver
WA–T77	Optional 100' cable for 7707GPS–DR to 5601MSC