HANDBOOK

AVN-GMC

IEEE1588 PTP Grandmaster Clock with GPS Receiver

Manufacturers of audio & video products for radio & TV broadcasters

SONIFEX

This handbook is for use with the following product:
IEEE1588 PTP Grandmaster Clock with GPS Receiver
AW10735A, Stock Code: 30-294

Revision 1.02, January 2016

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Made in the UK by SONIFEX

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Register Online for an Extended 2 Year Warranty

As standard, Sonifex products are supplied with a 1 year back to base warranty.

If you register the product online, you can increase your product warranty to 2 years and we can also keep you informed of any product design improvements or modifications.

To register your product, please go online to www.sonifex.co.uk/register

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Product Warranty - 2 Year

As standard, Sonifex products are supplied with a 1 year back to base warranty. In order to register the date of purchase and so that we can keep you informed of any product design improvements or modifications, it is important to complete the warranty registration online. Additionally, if you register the product on the Sonifex website within 30 days of purchase, you can increase your product warranty to 2 years. Go to the Sonifex website at: http://www.sonifex.co.uk/technical/register/index.asp to apply for your 2 year warranty.

Note: For your own records the product serial number is recorded on the CE certification page of this handbook.

Sonifex Warranty & Liability Terms & Conditions

1. Definitions

'the Company' means Sonifex Ltd and where relevant includes companies within the same group of companies as Sonifex Limited.

'the Goods' means the goods or any part thereof supplied by the Company and where relevant includes: work carried out by the Company on items supplied by the Purchaser; services supplied by the Company; and software supplied by the Company.

'the Purchaser' means the person or organisation who buys or has agreed to buy the Goods.

'the Price' means the Price of the Goods and any other charges incurred by the Company in the supply of the Goods.

'the Warranty Term' is the length of the product warranty which is usually 12 months from the date of despatch; except when the product has been registered at the Sonifex website when the Warranty Term is 24 months from the date of despatch.

'the Contract' means the quotation, these Conditions of Sale and any other document incorporated in a contract between the Company and the Purchaser.

This is the entire Contract between the parties relating to the subject matter hereof and may not be changed or terminated except in writing in accordance with the provisions of this Contract. A reference to the consent, acknowledgement, authority or agreement of the Company means in writing and only by a director of the Company.

2. Warranty

(a) The Company agrees to repair or (at its discretion) replace Goods which are found to be defective (fair wear and tear excepted) and which are returned to the Company within the Warranty Term provided that each of the following are satisfied:

(i) notification of any defect is given to the Company immediately upon its becoming apparent to the Purchaser;

(ii) the Goods have only been operated under normal operating conditions and have only been subject to normal use (and in particular the Goods must have been correctly connected and must not have been subject to high voltage or to ionising radiation and must not have been used contrary to the Company's technical recommendations);

(iii) the Goods are returned to the Company's premises at the Purchaser's expense;

(iv) any Goods or parts of Goods replaced shall become the property of the Company;

(v) no work whatsoever (other than normal and proper maintenance) has been carried out to the Goods or any part of the Goods without the Company's prior written consent;

(vi) the defect has not arisen from a design made, furnished or specified by the Purchaser;

(vii) the Goods have been assembled or incorporated into other goods only in accordance with any instructions issued by the Company;

(viii) the defect has not arisen from a design modified by the Purchaser;

(ix) the defect has not arisen from an item manufactured by a person other than the Company. In respect of any item manufactured by a person other than the Company, the Purchaser shall only be entitled to the benefit of any warranty or guarantee provided by such manufacturer to the Company.

(b) In respect of computer software supplied by the Company the Company does not warrant that the use of the software will be uninterrupted or error free.

(c) The Company accepts liability:

(i) for death or personal injury to the extent that it results from the negligence of the Company, its employees (whilst in the course of their employment) or its agents (in the course of the agency);

(ii) for any breach by the Company of any statutory undertaking as to title, quiet possession and freedom from encumbrance.

(d) Subject to conditions (a) and (c) from the time of despatch of the Goods from the Company's premises the Purchaser shall be responsible for any defect in the Goods or loss, damage, nuisance or interference whatsoever consequential economic or otherwise or wastage of material resulting from or caused by or to the Goods. In particular the Company shall not be liable for any loss of profits or other economic losses. The Company accordingly excludes all liability for the same.

(e) At the request and expense of the Purchaser the Company will test the Goods to ascertain performance levels and provide a report of the results of that test. The report will be accurate at the time of the test, to the best of the belief and knowledge of the Company, and the Company accepts no liability in respect of its accuracy beyond that set out in Condition (a).

(f) Subject to Condition (e) no representation, condition, warranty or other term, express or implied (by statute or otherwise) is given by the Company that the Goods are of any particular quality or standard or will enable the Purchaser to attain any particular performance or result, or will be suitable for any particular purpose or use under specific conditions or will provide any particular capacity, notwithstanding that the requirement for such performance, result or capacity or that such particular purpose or conditions may have been known (or ought to have been known) to the Company, its employees or agents.

(g) (i) To the extent that the Company is held legally liable to the Purchaser for any single breach of contract, tort, representation or other act or default, the Company's liability for the same shall not exceed the price of the Goods.

(ii) The restriction of liability in Condition (g)(i) shall not apply to any liability accepted by the Seller in Condition (c).

(h) Where the Goods are sold under a consumer transaction (as defined by the Consumer Transactions (Restrictions on Statements) Order 1976) the statutory rights of the Purchaser are not affected by these Conditions of Sale.

Unpacking Your Product

Each product is shipped in protective packaging and should be inspected for damage before use. If there is any transit damage take pictures of the product packaging and notify the carrier immediately with all the relevant details of the shipment. Packing materials should be kept for inspection and also for if the product needs to be returned.

The product is shipped with the following equipment so please check to ensure that you have all of the items below. If anything is missing, please contact the supplier of your equipment immediately.

Item	Quantity
Product Unit	1
IEC Mains lead fitted with moulded mains plug	2
Handbook and warranty card	1

If you require a different power lead, please let us know when ordering the product.

Repairs & Returns

Please contact Sonifex or your supplier if you have any problems with your Sonifex product. Email technical.support@sonifex.co.uk for the repair/ upgrade/returns procedure, or for support & questions regarding the product operation.

CE Declaration of Conformity and Approval Information

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This document certifies that the Sonifex product that you have purchased is compliant with CE specifications. If you would like further information on compliance of all Sonifex products, please check the website at the address above where full information is available.

Sonifex Limited hereby certify that the following product with serial number shown has been designed and manufactured in accordance with the following specifications :

Product: _____

_____

Serial No: _____

EMC:	EN 55103-1: 1997 Electromagnetic Compatibility. Limits of disturbance for audio apparatus for professional use For use in environments 1 to 4.
	EN 55103-2: 1997 Electromagnetic Compatibility. Limits of disturbance for audio apparatus for professional use For use in environments 1 to 4.
Safety:	EN 60950: 1992 Safety of Information Technology Equipment Including Electrical Business Equipment.
Hybrid Approvals:	BS6301, BS7002, BS415, CTR21, R&TTE directive (1999/5/EC)

The Reference Technical Justification File for this product is available at Sonifex Ltd.

Authorised By:

Name: Chris Stills

Position: Technical Director

Date of Issue: 01 January 2016

Signature: 

Safety & Installation of Mains Operated Equipment

There are no user serviceable parts inside the equipment. If you should ever need to look inside the unit, always disconnect the mains supply before removing the equipment covers. The cover is connected to earth by means of the fixing screws. It is essential to maintain this earth/ground connection to ensure a safe operating environment and provide electromagnetic shielding.

Voltage Setting Checks

Ensure that the machine operating voltage is correct for your mains power supply by checking the box in which your product was supplied. The voltage is shown on the box label. The available voltage settings are 115V, or 230V. Please note that all products are either switchable between 115V and 230V, or have a universal power supply.

Fuse Rating

The product is supplied with a single fuse in the live conducting path of the mains power input. For reasons of safety it is important that the correct rating and type of fuse is used. Incorrectly rated fuses could present a possible fire hazard, under equipment fault conditions. The active fuse is fitted on the outside rear panel of the unit.

Power Cable & Connection

Two IEC power leads are supplied with the product which have a moulded plug attached – this is a legal requirement The mains lead is automatically configured for the country that the product is being sent to, from one of :

Territory	Voltage	IEC Lead Type	Image
UK & Middle East	230V	UK 3 pin to IEC lead	
Europe	230V	European Schuko round 2 pin to IEC lead	
USA, Canada and South America	115V	3 flat pin to IEC lead	
Australia & New Zealand	230V	Australasian 3 flat pin to IEC lead	

Connect the equipment in accordance with the connection details and before applying power to the unit, check that the machine has the correct operating voltage for your mains power supply.

Important Note: If there is an earth/ground terminal on the rear panel of the product then it must be earthed/grounded.

WEEE Directive

The Waste Electrical and Electronic Equipment (WEEE) Directive was agreed on 13 February 2003, along with the related Directive 2002/95/EC on Restrictions of the use of certain Hazardous Substances in electrical and electronic equipment (RoHS). The Waste Electrical and Electronic Equipment Directive (WEEE) aims to minimise the impacts of electrical and electronic equipment on the environment during their life times and when they become waste. All products manufactured by Sonifex Ltd have the WEEE directive label placed on the case. Sonifex Ltd will be happy to give you information about local organisations that can reprocess the product when it reaches its "end of use", or alternatively all products that have reached "end of use" can be returned to Sonifex and will be reprocessed correctly free of charge.

RoHS Directive

RoHS COMPLIANT

The RoHS directive limits the use of certain hazardous substances currently used in EEE manufacture, including lead, mercury, cadmium, hexavalent chromium, and halide-containing compounds PBB (polybrominated biphenyl) and PBDE (polybrominated diphenyl ether). Elimination of these substances will result in more environmentally friendly recycling of electronic equipment.

Sonifex Ltd practices lead-free (LF) manufacturing processes and does not use any of the hazardous substances identified in the European Union's Restriction of Hazardous Substances (RoHS) directive. The manufacturing processes include the assembly of purchased components from various sources. Product is offered as RoHS compliant, or LF, only after sufficient evidence is received from the component manufacturers that their components are RoHS compliant. Sonifex Ltd relies solely on the distributor, or manufacturer, of the components for identification of RoHS compliance. Thus whilst every effort is made to ensure compliance, Sonifex Ltd makes no warranty, or certification, or declaration of compliance concerning said components.

Atmosphere

The units should be installed in an area that is not subject to excessive temperature variation (<0°C, >50°C), moisture, dust or vibration.

1. AVN-GMC IEEE1588 PTP Grandmaster Clock with GPS Receiver

Introduction

Fig 1-1: The AVN-GMC front Panel

The AVN-GMCS is a PTPv2 grandmaster clock for use with AoIP applications. IEEE1588-2008 PTPv2 (precision time protocol) is used to synchronise all the nodes within a network. To achieve this one of the nodes must become the master clock and distribute time packets to the others. The AVN-GMCS is designed to perform this role simply and accurately, enabling sub micro second synchronisation between all nodes.

The AVN-GMCS supports the Default Profile and in normal operaton, the unit has PTPv2 time stamping resolution to 8nsec. The AVN-GMCS uses a combination of a GPS receiver, a PLL (phase lock loop) and a specialist on-board clock device to create the precise, low jitter clock signals required to drive the physical transceiver's time stamping circuitry, also providing holdover if the GPS signal is lost.

The specialist on board clock , which is used to sustain the PTP clock if the GPS signal is lost, is available in three different types:
TCXO, OXCO and **CSAC** (Chip Scale Atomic Clock, Caesium), which vary in both price and accuracy:

AVN-GMCS – TCXO Temperature Compensated Oscillator accurate to 1 part per million (worst case 1 sec gain/loss every 11.5 days). *

AVN-GMCOS – OCXO Oven Controlled Oscillator accurate to 0.01 parts per million (worst case 1 sec gain/loss every 3.1 years). *

AVN-GMCCS – SAC Quantum Atomic Clock accurate to 0.00050 parts per million (worst case 1 sec gain/loss every 63 years). *

An external sync clock input can act as an alternative reference source to GPS. Clock outputs, driven from the physical transceiver, can be used to provide media clocks for external equipment local to the AVN-GMC when it is in both 'master' and 'slave' states. The clock outputs are available as a single AES-3id output and two outputs which can be selected as either word clock or variable PPS. The wordclock can operate at 32, 44.1, 48, 96, 176.4 and 192kHz. When set as a variable PPS output, the unit can act as a clock master to distribute a reference frequency to test and measurement equipment.

The unit shows UTC as standard, but can be set to show 'local time' on the front panel, by adding a time offset. Daylight saving time changes can be accommodated by entering Spring Forward and Fall Back dates.

The built-in webserver, or front panel OLED display, can be used to configure the unit. Front panel LEDs show the synchronisation status, GPS lock and the status of the AC and DC power supply inputs.

The brightness of the OLED display and LED indicators can be adjusted for low or high lighting conditions

4 general purpose outputs indicate critical states for the unit using a 9 way D-type connector mounted on the rear panel. Pull down when active pins are supplied for reference source, GPS lock status, AC power present and DC power present.

** This figure represents the holdover accuracy should the GPS signal be lost - this is an approximation based on 1st year stability figures.*

The unit has a front panel power button and dual power connectors - an IEC mains input and a 12V DC input, which allows the AVN-GMCS to be used for both studio and mobile installations. Moreover this allows for a secondary power source to reduce the effect of power down events. In any case, the unit monitors the status of both power sources and displays this on the front panel.

The unit can be put into a low-power sleep mode when not in use, with an instant start when power is re-applied. In power off situations, a super capacitor is used to keep the GPS receiver powered in a low power mode for more than 20 hours, enabling the receiver to regain lock immediately rather than having to 'cold' start.

Front Panel Display & Indicators

Front Panel Indicators

Fig 1-2: Front Panel Indicators

Ethernet - An indication of network link status. This LED is green when an Ethernet link is established or red when the link is down.

GPS - If the unit is using GPS as its primary synchronisation source, this LED is illuminated green.

Sync In - If the unit is using the external input as the primary synchronisation source, this LED is illuminated green.

Lock - **Green** - This indicates that the GPS receiver has a 3D (high quality) lock and is ready to provide time data.

Yellow - The GPS receiver has a 2D (low quality) lock.

Red - The GPS receiver has no lock.

Master - **Green** - This means that the PTP state of the unit is set to Master.

Yellow - This shows that the unit is in another PTP state other than Master or Slave.

Red - This means that the PTP state of the unit is set to Slave.

AC PSU - The colour of this LED shows the state of the AC power input:

Green - This means that AC power is plugged in and is providing the correct voltage level after AC/DC conversion, within the range 11.75V to 12.25V.

Yellow - This means that AC power is plugged in, but the AC/DC converted level is in a warning state, within the ranges of either 11.5V to 11.75V or 12.25V to 12.5V.

Red - This means that AC power is plugged in, but the AC/DC converted level is out of specification (less than 11.5V or more than 12.5V)

Off - This means that AC power is low enough to be considered as not present.

DC PSU - This is similar to the AC Power LED with different voltage limits:

Green: This means that DC power is plugged in and is providing the correct voltage level within the range 11.5V to 12.5V.

Yellow: This means that DC power is plugged in but the voltage level is in a warning state within the ranges of either 10.8V to 11.5V or 12.5V to 13.2V.

Red - This means that DC power is plugged in, but the voltage level is out of specification (less than 10.8V or more than 13.2V).

Off - This means that DC power is low enough to be considered as not present.

Display & Spinwheel

Fig 1-3: Display & Spinwheel

The front panel contains an OLED monochrome display which is normally used to indicate the time and date as well as the information about the GPS lock quality. The display is used with the spinwheel and directional buttons to navigate, select and edit parameters & settings via the menu structure.

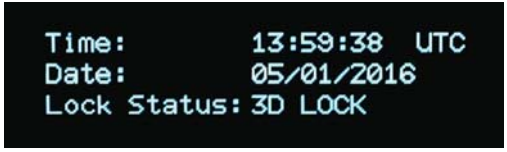


Fig 1-4: Default Screen Display

The **Time** field is displayed in hh:mm:ss, 24 hour format. Next to the time, the time base is displayed. This can be either UTC, GPS or LOCAL, where:

UTC - the time displayed is the UTC time.

GPS - the time displayed is GPS time including leap seconds.

LOCAL - the time displayed is UTC plus an offset which is set via the webserver.

The **Date** field defaults to dd/mm/yy format. Other formats will be made available in future firmware versions.

The **Lock Status** field describes the quality of the lock to the GPS signal where:

2D - 3 satellites have been locked and a GPS signal is possible

3D - more than 3 satellites have been locked. This is superior to 2D lock.

Power Button

This puts the unit in and out of standby mode.

Standby Mode - Power button is red

Normal Powered Mode - Power button is green

On applying power to the AC mains or DC power inputs, the button is illuminated red, meaning that it is in standby mode. In standby mode, all operation is halted. A momentary press of the power button restarts the unit into normal power mode.

To put the unit into standby mode, press and hold the button for two seconds, then release it. The current mode is remembered through a power cycle and the standby mode can also be disabled through the webserver.

GPS Operation

A note regarding GPS operation is that if no GPS signal can be received, then no time and date is displayed on the front of the unit. If this is the case, then you can force a date and time into the unit using the webserver interface. See the 'Force Time' and 'Time Settings' webpages for more information.

Rear Panel Connectors

Fig 1-5: AVN-GMC Rear Panel

Sync Input
This is a 50Ω input used to connect an external synchronisation source to drive the internal PTP clock. Connect a wordclock to this input and from the menu select Device Settings> Reference Input> External Sync Input to enable it and select the sample rate. This allows the distribution of an existing station wordclock through the network. Supported sample rates are 32, 44.1, 48, 88.2, 96, 176.4 and 192kHz.

WC (Wordclock) Output
This is a 50Ω TTL level wordclock output which is synchronised to the onboard PTP clock. The rate is selectable from the front panel menu (Device Settings> Wordclock) or the webserver. Selectable sample rates are 32, 44.1, 48, 88.2, 96, 176.4, and 192kHz.

AES-3id Output
This is a 75Ω AES-3id digital audio signal, with muted audio, that is synchronised to the onboard PTP clock. The rate is selectable from the front panel menu (Device Settings> AES-3id) or the webserver. Selectable sample rates are 32, 44.1, 48, 88.2, 96, 176.4, and 192 kHz.

Variable PPS (Pulse Per Second) Output
This 50Ω output is synchronised to the onboard PTP clock and the rate is selectable through the front panel menu (Device Settings> Variable PPS) and webserver. Selectable rates are 1Hz, 10, 100, 1kHz, 10k, 100k & 1MHz.

Note: From release of the AVN-GMC in March 2016 and onwards, the two Wordclock and Variable PPS Outputs can both provide either Wordclock or Variable PPS Outputs.

GPS Antenna
An SMA socket is used for connection to an active or passive GPS antenna.

GPI/O Remote Input/Output Connector
A 9 way D-type female connector contains 4 open-collector outputs and 4 active low inputs. The 4 outputs provide alarms/indicators for:

Pin #	Type	Function	Action
1	Output	GPS or External Sync	Open when GPS selected
2	Output	Lock indication	Open when 2D or 3D locked
3	Output	AC Power status	Open when AC present
4	Output	DC Power status	Open when DC present
5	Ground	Ground reference	
6	Input	Not used	
7	Input	Not used	
8	Input	Not used	
9	Input	Not used	

Ethernet

This is a standard 100BASE-T CAT5 Ethernet RJ45 connector to connect the unit to the network. The connector has two LEDs that indicate data throughput and link status. The unit can be controlled remotely over the Ethernet connection using the built-in webserver.

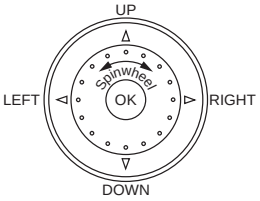
12V DC Power Input

This 12V power input provides a secondary power source on a KPJX-45 plug. It accepts voltages in the range of 10.3V - 13.2V and must be able to source 500mA. Both mains and DC power sources can be connected at the same time, so the DC input can act as an alternative redundant power supply.

IEC Mains Input

Power is applied via a standard three-pin IEC male socket. Mains voltages between 85V and264V AC and frequencies between 47 and 63Hz are accepted without adjustment. The Mains input is protected by a 1A, 5 x 20mm 250V rated fuse. The Earth pin MUST be connected to ensure safety.

Front Panel Menu Navigation



The menu is entered by holding the center button (the ‘OK’ button) of the rotational and directional spinwheel.

Use the four UP, DOWN, LEFT and RIGHT directional buttons at the outer edge of spinwheel to move within the menu.

Once entered a number of pages can be chosen by moving the highlight using the directional buttons, or by rotating the spinwheel (Clockwise = DOWN, Anti Clockwise = UP).

Select a Page - Use the OK button, or the RIGHT button

Exit a Page - Use the BACK menu item or the LEFT button.

Exit the Menu Structure - Use the CLOSE menu item, usually at the bottom.

Each dialog page contains a number of options in one of the following control formats:

String Entry/Edit - Move the cursor highlight to the character that you want to edit/alter. Use the spinwheel to cycle through the available characters. A push of the centre OK button changes the character to its default value which is 'A'. To move to the next character press the RIGHT button.

To end the entry, press the DOWN button and then LEFT/RIGHT directional buttons to highlight the 'OK' screen box to confirm or the 'CANCEL' box to ignore the new string and return to the previous one. Press the OK button to action your choice. Please note, the first and last characters cannot be a '-'.

IP Address Edit - Move the highlight to one of the 4 IP numbers using the directional LEFT/RIGHT buttons. These are 3 digit strings which will cycle from 000 to 255 (and back around), using the spinwheel. Once you have entered the 4 numbers, use the DOWN button to move to either the 'OK' or 'CANCEL' screen options and press the OK button.

Number Edit - Use the spinwheel to change the number. The number range is set according to which option has been selected. Once you have finished, move to either the 'OK' or 'CANCEL' screen options and press the OK button.

Scale Edit - Use the spinwheel to change the position of the scale bar. Once you have finished, move to either the ‘OK’ or ‘CANCEL’ screen options and press the OK button.

Select List Option - Move the cursor highlight to the desired list item and press the OK button to select it. A tick appears next to the selected option.

These parameters are also accessible from the unit’s webpages by connecting the unit to a PC (or similar device) and entering the IP address in a browser’s address bar, similar to the following: “http//:aaa.bbb.ccc.ddd“ where aaa.bbb.ccc.ddd is the IP address of the AVN-GMC unit.

AVN-GMC Menu Tree

AVN-GMC Menu Tree

Main Menu
- Device Information -> Info about the device, Serial Number, Firmware Versions, Network Info & Voltages
- Network Settings
  - IP Address -> Dialog to set Static IP address of system
  - Subnet Mask -> Dialog to set Subnet Mask of system
  - Gateway -> Dialog to set Gateway address of system
  - Network Mode -> List selection from Static IP Mode, or Auto IP or DHCP with failover to Static IP Address or to Auto-IP
- PTP Profile
  - Active Profile -> List selection from Default or Media Profile

    Default Profile
    - Delay Mechanism -> List selection from E2E or P2P mechanisms
    - Announce Interval -> List selection from Interval of 1 to 32 seconds
    - Announce Timeout -> Dialog to set Timeout from 2 to 10 announce intervals
    - Sync Interval -> List selection from Interval of $^{1}/_{2}$ to 2 seconds
    - Del Req Interval -> List selection from Interval of 1 to 32 seconds
    - Priority 1 -> Dialog to Set Priority 1 level between 0 to 255
    - Priority 2 -> Dialog to Set Priority 2 level between 0 to 255
    - Domain -> List selection from Domain of 0 to 3
    - DCSP -> List selection from DSCP method from 22 available
  - Media Profile
    - Delay Mechanism -> List selection from E2E or P2P mechanisms
    - Announce Interval -> List selection from Interval of 1 to 32 seconds
    - Announce Timeout -> Dialog to set Timeout from 2 to 10 announce intervals
    - Sync Interval -> List selection from Interval of $^{1}/_{16}$ to 2 seconds
    - Del Req Interval -> List selection from Interval of $^{1}/_{8}$ to 32 seconds
    - Priority 1 -> Dialog to Set Priority 1 level between 0 to 255
    - Priority 2 -> Dialog to Set Priority 2 level between 0 to 255
    - Domain -> List selection from Domain of 0 to 3
    - DCSP -> List selection from DSCP method from 22 available
- Device Settings
  - Device ID -> Dialog to enter Unit name for user identification
  - Reference Input -> Select the time reference Source between GPS and External Sync Input
  - Word Clock -> Select the rate of the External Wordclock output from 32 to 192kHz
  - Variable PPS -> Select the rate of the Variable PPS output from 32 to 192kHz
  - Cable Delay -> Select a GPS cable delay according to cable type and length between 0 and 1000ns
- Display Settings
  - LED Brightness ->Set the brightness of the indicator LEDs and the SONIFEX logo
  - Screen Contrast -> Set the level of screen contrast to suit different viewing angles and ambient lighting conditions
- Time Settings
  - Time Base -> Select the Time displayed between UTC, GPS, or Local time
  - Local Offset -> Set the local time offset from UTC

Fig 1-6: AVN-GMC Menu Tree (V1.0)

2. Webserver & Unit Discovery

The AVN-GMC uses the Zeroconf networking methodology to allow the unit to be a “plug and play” device. Just simply connect it to the network and use it. The unit is assigned an IP address using a DHCP server, or a self-assigned address using AutoIP when one isn’t available.

Once the unit has been connected to the network it will try to obtain an IP address from a DHCP server on the network, if none is found then the unit will use Auto-IP to assign itself an IP address.

If you’re using the AVN-GMC for the first time, it is configured with a static IP address of 192.168.0.92 so is accessible by network connecting it to a PC (or similar device) and entering the following IP address in a browser’s address bar:

http//:192.168.0.92

The Mozilla Firefox and Google Chrome browsers are preferred.

Bonjour Network Discovery

The AVN-GMC will use Bonjour discovery in a later firmware version - please check the Sonifex website for firmware updates.

Using a Bonjour discovery application or browser plug-in, the unit can be discovered and connected to with relative ease. Bonjour is available as standard on MAC OS and as plug-in for Internet Explorer for the Bonjour for windows download. You can also use the discovery application provided by Sonifex and available from the download page.

Webpage Parameter Details - Device Information

Fig 2-1: AVN-GMC Device Information Screen

This page contains important information about the unit including code version numbers, current IP information, MAC address, serial number, and AC/DC input voltage levels.

Network Settings

Accessible by selecting Config > Network Settings on the web page.

Fig 2-2: AVN-GMC Network Settings Screen

Set up the network access to the unit:

- **Static IP** - IP Address used to identify the unit on a network and to access its webpage when in static address mode.
  Default: 192.168.000.092
- **Static Subnet** - The subnet that the unit can be identified over.
  Default: 255.255.255.000
- **Static Gateway** - The IP of the gateway for this particular subnet.
  Default: 000.000.000.000
- **Address Mode** - This is the Address mode used by the unit. Options are:
  Static
  AutoIP
  DHCP/S (use DHCP and failover to Static) and
  DHCP/A (use DHCP and failover to AutoIP).
  Default: Static.

PTP Profile

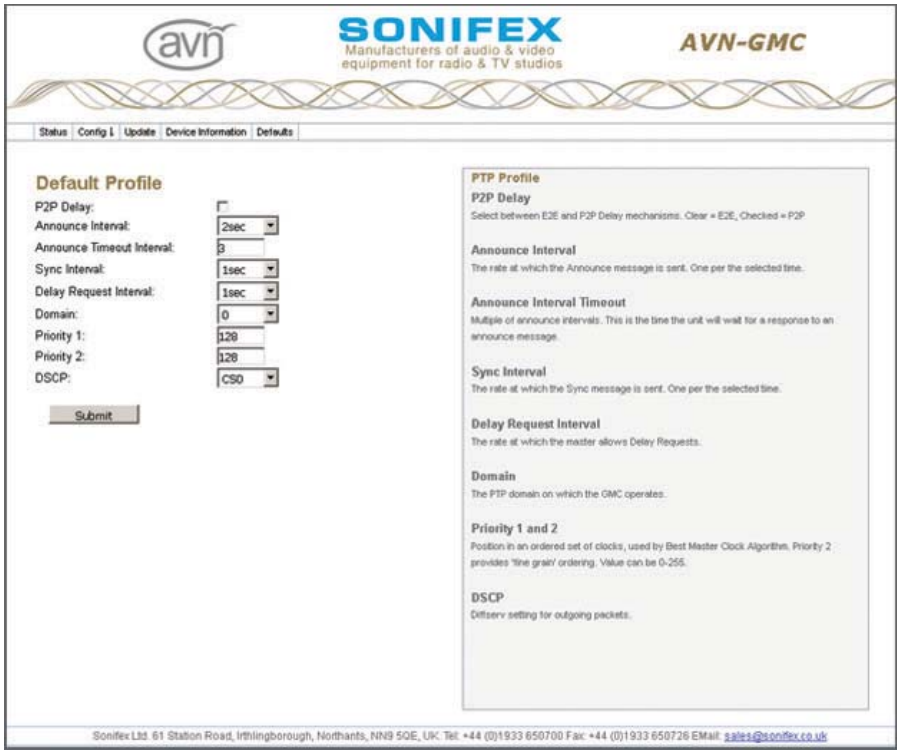


Fig 2-3: AVN-GMC PTP Profile Screen

Select a profile using Config > Profiles. There are several options available to edit.

- Delay Mechanism - Either P2P or E2E
- Announce Interval - To set interval from 1 to 32 seconds (Default: 2)
- Announce Timeout - To set timeout from 2 to 10 announce intervals (Default: 3)
- Sync Interval - To set the sync interval from $^{1}/_{16}$ to 2 seconds (Default: 1)
- Del Req Interval - STo set the Del Req interval from $^{1}/_{8}$ to 32 seconds (Default: 1)
- Priority 1 - To set priority between 0 and 255 (Default: 128)
- Priority 2 - To set priority between 0 and 255 (Default: 128)
- These priority levels are used to manage networks with more than 1 x GMC:
- Domain - From 0 to 3 (Default: 0)
- DSCP - From entry List (Default: CS0)

Device Settings

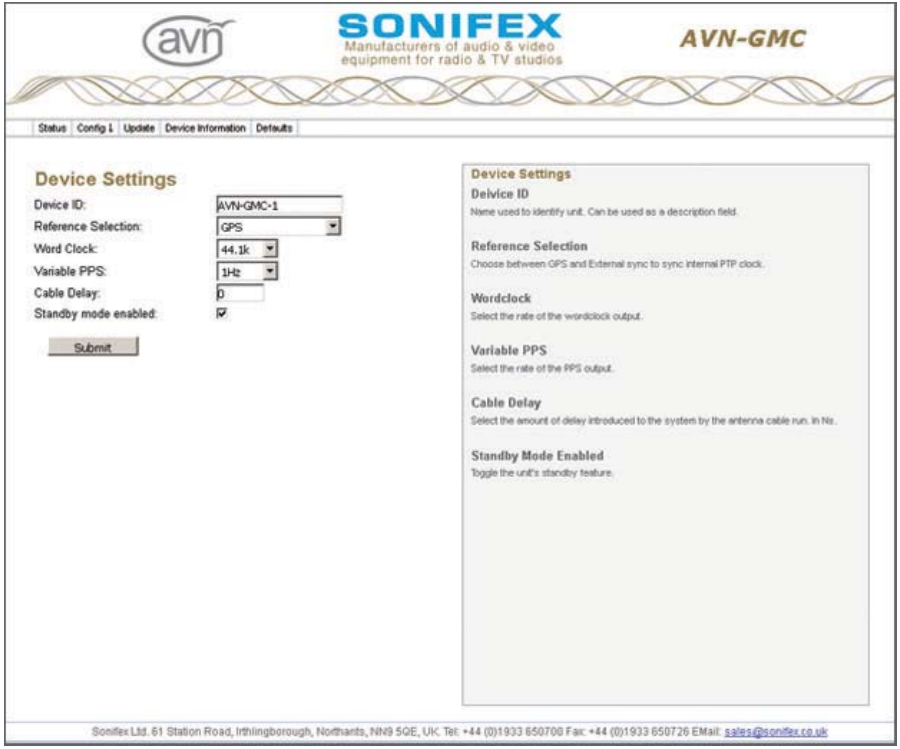


Fig 2-4: AVN-GMC Device Settings Screen

Contains configuration options of the outputs and the unit in general.

- Device ID - The name of unit for ID purposes. Default - AVN-GMC-1
- Reference Input - Select the primary synchronisation source. Options are:
  GPS
  External Input.
  Default: GPS
- Wordclock - Select the framerate and bit rate of the wordclock and AES3ID output. Options - 32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz & 192kHz.
- Variable PPS - Select the rate of the variable PPS output. Options - 1Hz, 10Hz, 100Hz, 1kHz, 10kHZ, 100kHz & 1MHz.
- Cable Delay - Experimental option. Certain antenna setups can cause a small delay in the accuracy of the GPS time. This option allows adjustment for this error. Range is 0 - 1000nS. Default - 0.
- Enable the Standby Mode. If disabled, the front panel power button will be disabled.

Display Settings

Fig 2-5: AVN-GMC Display Settings Screen

Change the appearance of the front panel OLED.

- Screen contrast - Controls the contrast of the OLED display. Range - 1-64.
  Default: 20
- LED brightness - Controls the brightness of the Indicator LEDs and the illuminated 'SONIFEX' logo on the front page. Range - 0-6.
  Default: 1

Time Settings

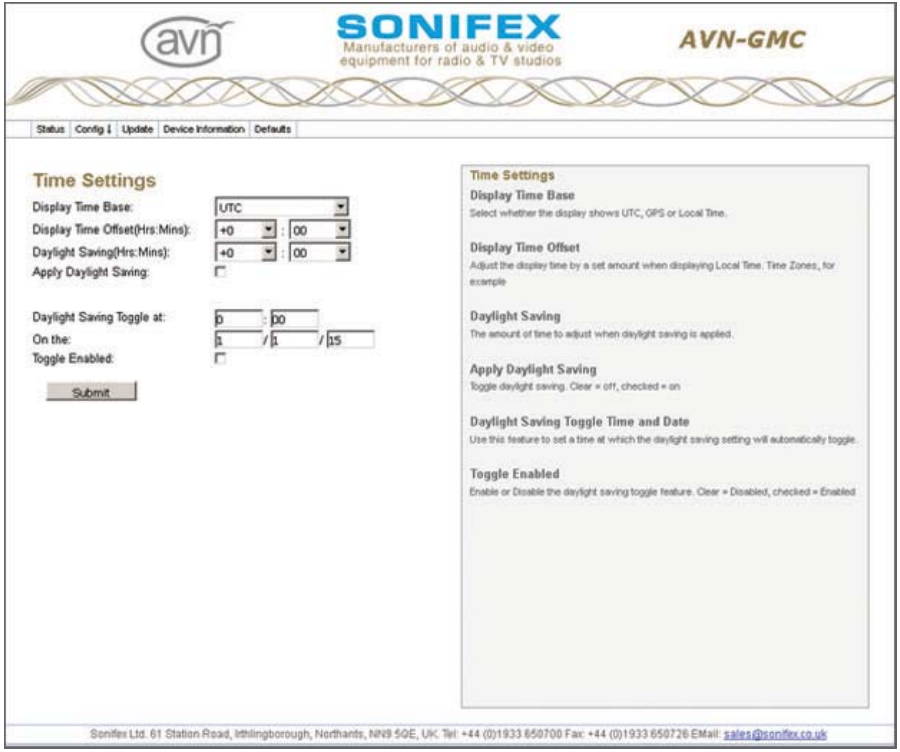


Fig 2-6: AVN-GMC Time Settings Screen

All the options pertaining to the time display

- Time Base – Select from UTC, GPS or Local Time (default: UTC)
- Time Offset - To set a +- offset from the received UTC (default 0)

The webpage has a more sophisticated offset method allowing you to specify an offset and a changeover date and step to/from daylight saving time.

Other Webpages - Status

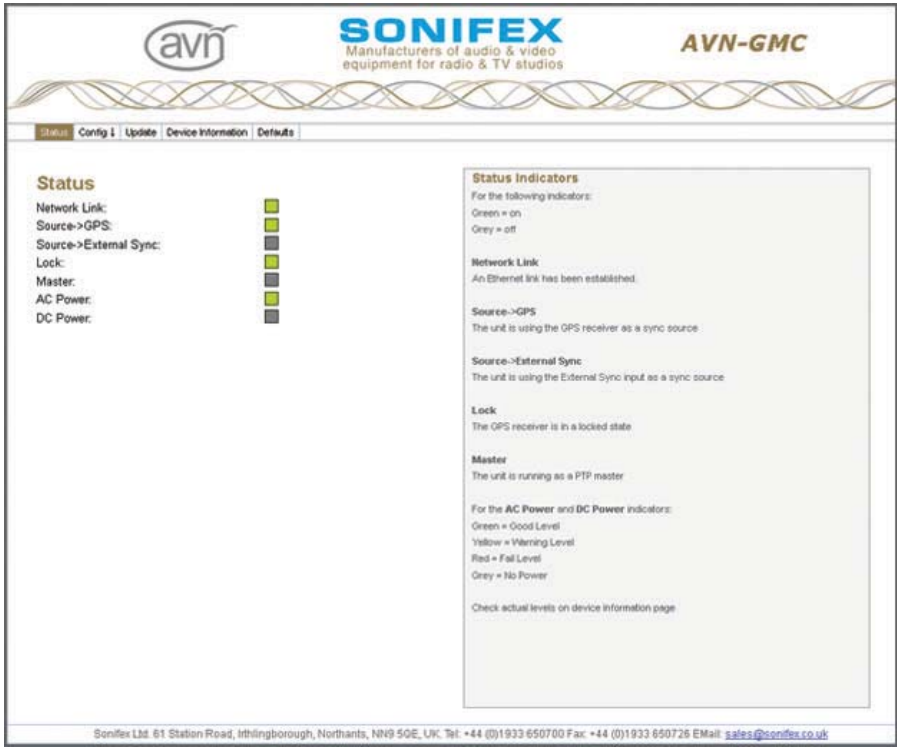


Fig 2-7: AVN-GMC Status Screen

This page shows the status of the AVN-GMC and reflects the information shown on the LED indicators on the left hand side of the front panel.

Password Protection

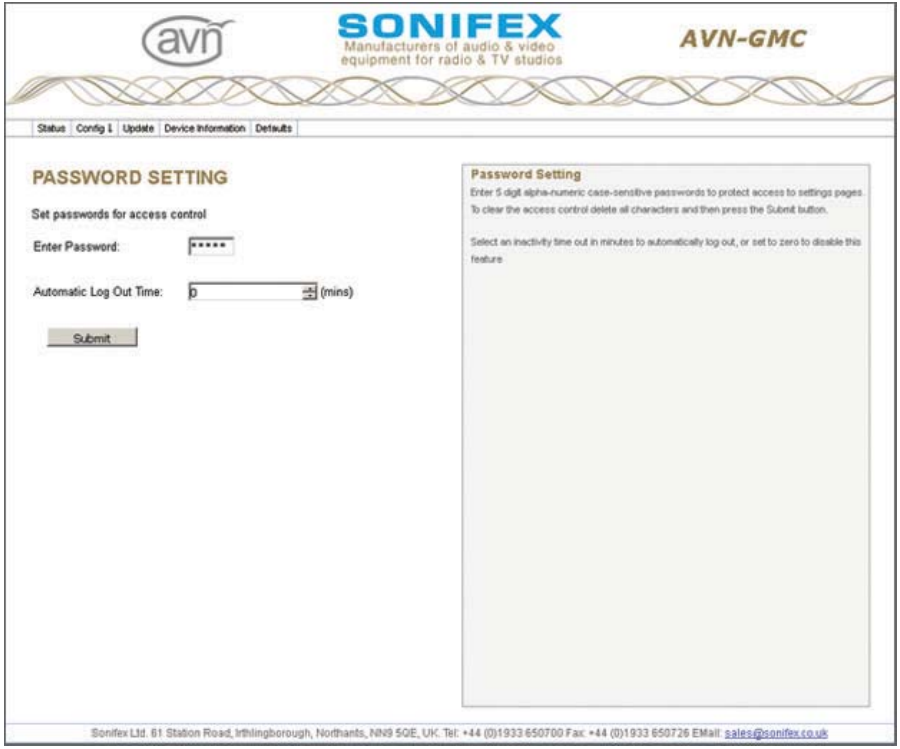


Fig 2-8: AVN-GMC Password Protection Screen

The unit can be set to prevent accidental or malicious changes to parameters by setting a password. The web pages will only show Status, Device Information and a Log-In page until the correct password has been entered.

Update Firmware

Fig 2-9: AVN-GMC Update Screen

This page allows you to update the firmware running on the unit. New versions of firmware can be found on the appropriate product page on the Sonifex website.

Force Time

Fig 2-10: AVN-GMC Force Time Screen

This page allows you to preset the unit to a specific time and is required where the unit has no GPS signal available, or you are using an external wordclock for clock generation.

Defaults

Fig 2-11: AVN-GMC Defaults Screen

Use this option to return the unit to a factory default state. The secondary dialog double checks this operation with the user

3. Grandmaster Clocks, AVN, Ravenna & AES67

Sonifex joined the Ravenna group in 2012 and the AVN product range is the result of our R&D in the area of audio over IP. If a Sonifex product starts with the letters 'AVN', then it's part of the family of products which can send autio to eahc other over an IP network (AoIP).

RAVENNA (of which AES67 is a subset) allows for the distribution of audio across a network. For this to be possible, each of the nodes needs to be time synchronised with one another. Ravenna uses PTP (Precision Time Protocol, as defined by IEEE1588-2008v2) time stamping to achieve this, which both distributes the network time and also works out the latency involved in the delivery and adjusts the time at each node accordingly. Unit configuration is achieved easily either with the front panel controls or the webserver, including the setup of the PTP profile. A Grandmaster Clock (GMC) is a source of all the networks' time and should be synchronised to GPS.

AVN and other manufacturers Ravenna products will use the time distributed by the GMC to create internal audio clocks that are all highly synchronous to one another, so that audio derived from one unit will playout at precisely the same rate when sent to another.

AES67 is a standard released by the Audio Engineering Society to enable interoperability of Audio over IP devices from different manufacturers and there is a specific subset of Ravenna that will implement the methods and protocols as required.

4 Technical Specification For AVN-GMC

Timing Specification	
Profile Support:	Default profile
Timing Protocol:	PTPv2, IEEE1588-2008
Timing Accuracy:	PTP time stamping resolution 8ns
Holdover Drift: TCXO: OCXO: CSAC: These figures are over 24 hours at constant temperature	 <90ms <900µs <45µs
GPS Performance:	50 channel GPS receiver
GPS Frequency:	1575.42MHz, L1 band

Clock Specification	
Word Clock Sync Impedance:	50Ω
Word Clock Output Input Impedance:	<50Ω
AES-3id Output Impedance:	<75Ω
Antenna Impedance:	50Ω

Connections	
Clocking Input:	BNC female TTL
Clocking Outputs:	BNC female AES-3id @ 32, 44.1, 48, 96, 176.4 & 192kHz. BNC female Wordclock Out (32kHz to 192kHz) TTL BNC female Variable PPS Out (1Hz to 1MHz) TTL
GPS Input:	SMA socket
GPIO:	9 way D-Type female
Ethernet Port:	RJ45 socket, 100BASE-T

Mains AC Input:	Universal filtered IEC socket, continuously rated 85-264 VAC @47-63Hz, max 10W
DC Input: Maximum Operating Range (DC):	1 x 12V, KPJX-45 socket, positive pins 1 and 3 10.3V to 13.2V DC, 500mA

Equipment Type	
AVN-GMCS:	Grandmaster clock for PTP systems, GPS, IP, TCXO, 1ppm, rackmount
AVN-GMCOS:	Grandmaster clock for PTP systems, GPS, IP, OCXO, 0.01ppm, rackmount
AVN-GMCCS:	Grandmaster clock for PTP systems, GPS, IP, CSAC, 0.0005ppm rackmount

Physical Specification	
Dimensions: (Raw)	4.4cm (H) x 48.3cm (W) x 17.8cm (D) (1U) 1.8” (H) x 19” (W) x 7” (D) (1U)
Dimensions (Boxed):	6.8cm (H) x 58.8cm (W) x 27cm (D) 2.7” (H) x 23” (W) x 10.6” (D)
Weight:	Nett: 1.5kg Gross: 2.2kg Nett: 3.2lbs Gross: 4.8lbs

Accessories	
AVN-DC150:	150W DC power supply with KPJX-45 plug

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