

7600REF

REFERENCE GENERATORS



Instruction Manual
Software Version 5.0

KEMA Quality

CERTIFICATE

Certificate Number: 510040.001

The Quality System of:

Grass Valley USA, LLC and its Grass Valley Affiliates

Headquarters:

**400 Providence Mine Road
Nevada City, CA 95945
United States**

**15655 SW Greystone Ct.
Beaverton, OR 97006
United States**

**Brunnenweg 9
D-64331 Weiterstadt
Germany**

**Kapittelweg 10
4827 HG Breda
The Netherlands**

**2300 So. Decker Lake Blvd.
Salt Lake City, UT 84119
United States**

Including its implementation, meets the requirements of the standard:

ISO 9001:2008

Scope:

The design, manufacture and support of video and audio hardware and software products and related systems.

This Certificate is valid until: June 14, 2012
This Certificate is valid as of: December 23, 2010
Certified for the first time: June 14, 2000



H. Pierre Sallé
President
KEMA-Registered Quality

The method of operation for quality certification is defined in the KEMA General Terms And Conditions For Quality And Environmental Management Systems Certifications. Integral publication of this certificate is allowed.

KEMA-Registered Quality, Inc.
4377 County Line Road
Chalfont, PA 18914
Ph: (215)997-4519
Fax: (215)997-3809
CRT 001 042108

Accredited By:
ANAB



a  **DEKRA** company



7600REF

REFERENCE GENERATORS

Instruction Manual
Software Version 5.0.0

Contacting Grass Valley

International Support Centers	France 24 x 7	+800 8080 2020 or +33 1 48 25 20 20	United States/Canada 24 x 7	+1 800 547 8949 or +1 530 478 4148
Local Support Centers (available during normal business hours)	Asia	Hong Kong, Taiwan, Korea, Macau: +852 2531 3058 Indian Subcontinent: +91 22 24933476 Southeast Asia/Malaysia: +603 7492 3303 Southeast Asia/Singapore: +65 6379 1313 China: +861 0660 159 450 Japan: +81 3 5484 6868		
		Australia and New Zealand: +61 1300 721 495	Central/South America: +55 11 5509 3443	
		Middle East: +971 4 299 64 40 Near East and Africa: +800 8080 2020 or +33 1 48 25 20 20		
	Europe	Belarus, Russia, Tadzikistan, Ukraine, Uzbekistan: +7 095 2580924 225 Switzerland: +41 1 487 80 02 S. Europe/Italy-Roma: +39 06 87 20 35 28 -Milan: +39 02 48 41 46 58 S. Europe/Spain: +34 91 512 03 50 Benelux/Belgium: +32 (0) 2 334 90 30 Benelux/Netherlands: +31 (0) 35 62 38 42 1 N. Europe: +45 45 96 88 70 Germany, Austria, Eastern Europe: +49 6150 104 444 UK, Ireland, Israel: +44 118 923 0499		

Copyright © Grass Valley USA, LLC. All rights reserved.

This product may be covered by one or more U.S. and foreign patents.

Grass Valley Web Site

The www.grassvalley.com web site offers the following:

Online User Documentation — Current versions of product catalogs, brochures, data sheets, ordering guides, planning guides, manuals, and release notes in .pdf format can be downloaded.

FAQ Database — Solutions to problems and troubleshooting efforts can be found by searching our Frequently Asked Questions (FAQ) database.

Software Downloads — Download software updates, drivers, and patches.



END-OF-LIFE PRODUCT RECYCLING NOTICE

Grass Valley's innovation and excellence in product design also extends to the programs we've established to manage the recycling of our products. Grass Valley has developed a comprehensive end-of-life product take back program for recycle or disposal of end-of-life products. Our program meets the requirements of the European Union's WEEE Directive, the United States Environmental Protection Agency, and U.S. state and local agencies.

Grass Valley's end-of-life product take back program assures proper disposal by use of Best Available Technology. This program accepts any Grass Valley branded equipment. Upon request, a Certificate of Recycling or a Certificate of Destruction, depending on the ultimate disposition of the product, can be sent to the requester.

Grass Valley will be responsible for all costs associated with recycling and disposal, including freight. However, you are responsible for the removal of the equipment from your facility and packing the equipment to make it ready for pickup.



For further information on the Grass Valley product take back system please contact Grass Valley at + 800 80 80 20 20 or +33 1 48 25 20 20 from most other countries. In the U.S. and Canada please call 800-547-8949, and ask to be connected to the EH&S Department. Additional information concerning the program can be found at: www.grassvalley.com/about/environmental-policy

001187401

Contents

Preface	9
About This Manual.....	9
Safety Terms and Symbols.....	11
Terms in This Manual.....	11
Terms on the Product.....	11
Symbols on the Product.....	12
Warnings.....	12
Cautions.....	13
Certifications and Compliances.....	23
FCC Emission Control.....	23
Canadian EMC Notice of Compliance.....	23
EN55022 Class A Warning.....	23
Canadian Certified Power Cords.....	24
Canadian Certified AC Adapter.....	24
FCC Emission Limits.....	24
Certifications:.....	25
Recommended ESD Guidelines.....	27
Sources of ESD and Risks.....	28
Grounding Requirements for Personnel.....	29
7600REF Reference Generators	31
Product Overview.....	31
7600REF Models.....	32
7600HD-REF Reference Signal Generator.....	32
7600MHD-REF Master HD Reference Signal Generator.....	32
Installation.....	33
Unpacking.....	33
Module/Software Installation.....	33
Rack Mounting.....	33
Rear Panel Connections.....	34
Grounding Lug.....	34
Ethernet Port.....	34
Tri-Level Sync Reference.....	34
SD/HD-SDI Test Outputs.....	35
Analogue Audio/Remotes.....	35
Analogue BB Reference/Test.....	38
10/27/WC Output.....	38
Genlock Loop Input.....	38
5/10 Ref In.....	38
GPS BNCs (7600MHD-REF Model).....	38
AES 1/AES 2 Outputs.....	39
Timecode.....	40
AC Mains Connection and Fusing.....	41
Power Supply Replacement.....	41

Operation.	42
Front Panel Control Description.	42
Basic Operation.	43
Selecting a Function	43
Changing Values	44
Leaving the Selected Function.	44
Menu Timeout	45
Front Panel Lock	45
Configuration and Setup.	46
Front Panel Configuration.	46
GV 7600REF Web Browser Interface Configuration	46
Front Panel Configuration	47
Top Level Menu	47
Digital Video Menus.	47
Analogue Video Menus	47
Audio Menus	48
Lock Mode Menus.	48
Setup Menus	48
Status Menus	49
Options Menus	49
Digital Video Menus – Top Level.	50
VITC Within SDI Video Waveform	50
Digital Video – Video Standard	52
Digital Video – Test Patterns	53
Digital Video – Pattern Submenu	55
Digital Video – Timing	58
Digital Video – VITC (7600MHD-REF Model)	58
Digital Video – AES Configuration	61
Analogue Video Menus – Top Level	63
VITC in Analogue Waveforms	63
Analogue Video – All Black and Burst	65
Analogue Video – YUV	66
Analogue Video – Comp/BnB/BnB	67
Analogue Video – RGB.	68
Analogue Video – YC/BnB	69
Available Analogue Test Patterns	70
Analogue Video – VITC (7600MHD-REF Model)	71
Audio Menus – Top Level	74
Lock Mode Menus – Top Level	76
Genlock – Mode.	77
Genlock Loss	77
Genlock – Field Lock	78
Genlock – Input Standard	78
Setup Menus – Top Level	79
Setup – Timecode (7600MHD-REF only).	80
Setup – LTC Menu (7600MHD-REF Model).	83
Setup – GPIO Control.	85
Setup: More	86
Setup: More – NTP (7600MHD-REF Model).	88
Setup: More – Comms	89
Status Menu – Top Level	91
Options Menus –Top Level	93
Option Slot 1: GPS (7600MHD-REF Model)	94
GPS Antenna Requirements	95

GPS Menu Structure	99
Option 3: HD Tri-Level Sync	102
SNMP Support	104
Common Configurations for the 7600REF.	105
GPS Locked SPG and Timecode Generator Configuration	105
GPS Locked NTP Server Configuration	105
Daylight Saving Time	106
VITC As a JAM Source	106
Using a TFTP Server	107
Generating the Log File (Digital Signature)	107
Specifications	108

GV 7600REF Web Browser Interface 115

Introduction	115
Accessing the Web Browser Interface	115
Configuring the 7600REF	117
SDI Channels 1-3 Configuration	117
SDI 1 >> Channel 1-3 >> Standard	117
SDI >> Channel 1-3 >> Settings	118
SDI >> Channel 1-3 >> Audio	119
SDI >> Channel 1-3 >> Timecode	120
SDI >> Channel 1-3 >> Ident	121
Analogue Video Configuration	122
AV >> BnB 1 >> Configure	122
AV >> BnB 1 - BnB 5 >> Standard	123
AV >> BnB 1 - BnB 5 >> Settings	123
AV >> BnB 1 - BnB 5 >> VITC	124
Audio Configuration	125
Audio >> AES 1/AES 2 >> AES	125
Audio >> Analogue >> Settings	126
Lock Configuration	127
Lock >> Settings and Timing	127
Setup	128
Setup >> GPIO >> GPIO 1/GPIO 2	128
Setup >> Timecode >> Specific Frequency or All Frequencies	129
Setup >> LTC 1/LTC 2 >> LTC	131
Setup >> Misc	132
Status	133
Admin Configuration	134
Admin >> Config	135
Admin >> Login/IP	136
Option 1 (GPS) Configuration	137
Option 3 (TLS) Configuration	138
Option 3 (TLS) >> Channel 1-4 >> Standard	138
Option 3 (TLS) >> Channel 1-4 >> Timing	138

Index 139

Preface

About This Manual

This manual covers the complete details of the various 7600REF Reference Generator models, including installation, setup, operation, and specifications.

In addition to this manual, a *7600REF Installation and Safety Manual* is included with every frame to ensure that the required regulatory and safety information for this product is available when the frame is received.

All documentation relating to this product and other Grass Valley Modular products can be found on-line in PDF format at this URL:

www.grassvalley.com/docs/modular

Safety Summary

Read and follow the important safety information below, noting especially those instructions related to risk of fire, electric shock or injury to persons. Additional specific warnings not listed here may be found throughout the manual.

WARNING Any instructions in this manual that require opening the equipment cover or enclosure are for use by qualified service personnel only. To reduce the risk of electric shock, do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Safety Terms and Symbols

Terms in This Manual

Safety-related statements may appear in this manual in the following form:

WARNING Warning statements identify conditions or practices that may result in personal injury or loss of life.

CAUTION Caution statements identify conditions or practices that may result in damage to equipment or other property, or which may cause equipment crucial to your business environment to become temporarily non-operational.

Terms on the Product

The following terms may appear on the product:

DANGER — A personal injury hazard is immediately accessible as you read the marking.

WARNING — A personal injury hazard exists but is not immediately accessible as you read the marking.

CAUTION — A hazard to property, product, and other equipment is present.

Symbols on the Product

The following symbols may appear on the product:



Indicates that dangerous high voltage is present within the equipment enclosure that may be of sufficient magnitude to constitute a risk of electric shock.



Indicates that user, operator or service technician should refer to product manual(s) for important operating, maintenance, or service instructions.



This is a prompt to note fuse rating when replacing fuse(s). The fuse referenced in the text must be replaced with one having the ratings indicated.



Identifies a protective grounding terminal which must be connected to earth ground prior to making any other equipment connections.



Identifies an external protective grounding terminal which may be connected to earth ground as a supplement to an internal grounding terminal.



Indicates that static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Warnings

The following warning statements identify conditions or practices that can result in personal injury or loss of life:

Dangerous voltage or current may be present — Disconnect power and remove battery (if applicable) before removing protective panels, soldering, or replacing components.

Do not service alone — Do not internally service this product unless another person capable of rendering first aid and resuscitation is present.

Remove jewelry — Prior to servicing, remove jewelry such as rings, watches, and other metallic objects.

Avoid exposed circuitry — Do not touch exposed connections, components or circuitry when power is present.

Use proper power cord — Use only the power cord supplied or specified for this product.

Ground product — Connect the grounding conductor of the power cord to earth ground.

Operate only with covers and enclosure panels in place — Do not operate this product when covers or enclosure panels are removed.

Use correct fuse — Use only the fuse type and rating specified for this product.

Use only in dry environment — Do not operate in wet or damp conditions.

Use only in non-explosive environment — Do not operate this product in an explosive atmosphere.

High leakage current may be present — Earth connection of product is essential before connecting power.

Dual power supplies may be present — Be certain to plug each power supply cord into a separate branch circuit employing a separate service ground. Disconnect both power supply cords prior to servicing.

Double pole neutral fusing — Disconnect mains power prior to servicing.

Use proper lift points — Do not use door latches to lift or move equipment.

Avoid mechanical hazards — Allow all rotating devices to come to a stop before servicing.

Cautions

The following caution statements identify conditions or practices that can result in damage to equipment or other property:

Use correct power source — Do not operate this product from a power source that applies more than the voltage specified for the product.

Use correct voltage setting — If this product lacks auto-ranging power supplies, before applying power ensure that the each power supply is set to match the power source.

Provide proper ventilation — To prevent product overheating, provide equipment ventilation in accordance with installation instructions.

Use anti-static procedures — Static sensitive components are present which may be damaged by electrostatic discharge. Use anti-static procedures, equipment and surfaces during servicing.

Do not operate with suspected equipment failure — If you suspect product damage or equipment failure, have the equipment inspected by qualified service personnel.

Ensure mains disconnect — If mains switch is not provided, the power cord(s) of this equipment provide the means of disconnection. The socket outlet must be installed near the equipment and must be easily accessible. Verify that all mains power is disconnected before installing or removing power supplies and/or options.

Route cable properly — Route power cords and other cables so that they are not likely to be damaged. Properly support heavy cable bundles to avoid connector damage.

Use correct power supply cords — Power cords for this equipment, if provided, meet all North American electrical codes. Operation of this equipment at voltages exceeding 130 VAC requires power supply cords which comply with NEMA configurations. International power cords, if provided, have the approval of the country of use.

Use correct replacement battery — This product may contain batteries. To reduce the risk of explosion, check polarity and replace only with the same or equivalent type recommended by manufacturer. Dispose of used batteries according to the manufacturer's instructions.

Troubleshoot only to board level — Circuit boards in this product are densely populated with surface mount technology (SMT) components and application specific integrated circuits (ASICs). As a result, circuit board repair at the component level is very difficult in the field, if not impossible. For warranty compliance, do not troubleshoot systems beyond the board level.

Sicherheit – Überblick

Lesen und befolgen Sie die wichtigen Sicherheitsinformationen dieses Abschnitts. Beachten Sie insbesondere die Anweisungen bezüglich Brand-, Stromschlag- und Verletzungsgefahren. Weitere spezifische, hier nicht aufgeführte Warnungen finden Sie im gesamten Handbuch.

WARNUNG Alle Anweisungen in diesem Handbuch, die das Abnehmen der Geräteabdeckung oder des Gerätegehäuses erfordern, dürfen nur von qualifiziertem Servicepersonal ausgeführt werden. Um die Stromschlaggefahr zu verringern, führen Sie keine Wartungsarbeiten außer den in den Bedienungsanleitungen genannten Arbeiten aus, es sei denn, Sie besitzen die entsprechende Qualifikationen für diese Arbeiten.

Sicherheit – Begriffe und Symbole

In diesem Handbuch verwendete Begriffe

Sicherheitsrelevante Hinweise können in diesem Handbuch in der folgenden Form auftauchen:

WARNUNG Warnungen weisen auf Situationen oder Vorgehensweisen hin, die Verletzungs- oder Lebensgefahr bergen.

VORSICHT Vorsichtshinweise weisen auf Situationen oder Vorgehensweisen hin, die zu Schäden an Ausrüstungskomponenten oder anderen Gegenständen oder zum zeitweisen Ausfall wichtiger Komponenten in der Arbeitsumgebung führen können.

Hinweise am Produkt

Die folgenden Hinweise können sich am Produkt befinden:

GEFAHR — Wenn Sie diesen Begriff lesen, besteht ein unmittelbares Verletzungsrisiko.

WARNUNG — Wenn Sie diesen Begriff lesen, besteht ein mittelbares Verletzungsrisiko.

VORSICHT — Es besteht ein Risiko für Objekte in der Umgebung, den Mixer selbst oder andere Ausrüstungskomponenten.

Symbole am Produkt

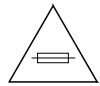
Die folgenden Symbole können sich am Produkt befinden:



Weist auf eine gefährliche Hochspannung im Gerätegehäuse hin, die stark genug sein kann, um eine Stromschlaggefahr darzustellen.



Weist darauf hin, dass der Benutzer, Bediener oder Servicetechniker wichtige Bedienungs-, Wartungs- oder Serviceanweisungen in den Produkthandbüchern lesen sollte.



Dies ist eine Aufforderung, beim Wechsel von Sicherungen auf deren Nennwert zu achten. Die im Text angegebene Sicherung muss durch eine Sicherung ersetzt werden, die die angegebenen Nennwerte besitzt.



Weist auf eine Schutzerdungsklemme hin, die mit dem Erdungskontakt verbunden werden muss, bevor weitere Ausrüstungskomponenten angeschlossen werden.



Weist auf eine externe Schutzerdungsklemme hin, die als Ergänzung zu einem internen Erdungskontakt an die Erde angeschlossen werden kann.



Weist darauf hin, dass es statisch empfindliche Komponenten gibt, die durch eine elektrostatische Entladung beschädigt werden können. Verwenden Sie antistatische Prozeduren, Ausrüstung und Oberflächen während der Wartung.

Warnungen

Die folgenden Warnungen weisen auf Bedingungen oder Vorgehensweisen hin, die Verletzungs- oder Lebensgefahr bergen:

Gefährliche Spannungen oder Ströme — Schalten Sie den Strom ab, und entfernen Sie ggf. die Batterie, bevor sie Schutzabdeckungen abnehmen, löten oder Komponenten austauschen.

Servicearbeiten nicht alleine ausführen — Führen Sie interne Servicearbeiten nur aus, wenn eine weitere Person anwesend ist, die erste Hilfe leisten und Wiederbelebungsmaßnahmen einleiten kann.

Schmuck abnehmen — Legen Sie vor Servicearbeiten Schmuck wie Ringe, Uhren und andere metallische Objekte ab.

Keine offen liegenden Leiter berühren — Berühren Sie bei eingeschalteter Stromzufuhr keine offen liegenden Leitungen, Komponenten oder Schaltungen.

Richtiges Netzkabel verwenden — Verwenden Sie nur das mitgelieferte Netzkabel oder ein Netzkabel, das den Spezifikationen für dieses Produkt entspricht.

Gerät erden — Schließen Sie den Erdleiter des Netzkabels an den Erdungskontakt an.

Gerät nur mit angebrachten Abdeckungen und Gehäuseseiten betreiben — Schalten Sie dieses Gerät nicht ein, wenn die Abdeckungen oder Gehäuseseiten entfernt wurden.

Richtige Sicherung verwenden — Verwenden Sie nur Sicherungen, deren Typ und Nennwert den Spezifikationen für dieses Produkt entsprechen.

Gerät nur in trockener Umgebung verwenden — Betreiben Sie das Gerät nicht in nassen oder feuchten Umgebungen.

Gerät nur verwenden, wenn keine Explosionsgefahr besteht — Verwenden Sie dieses Produkt nur in Umgebungen, in denen keinerlei Explosionsgefahr besteht.

Hohe Kriechströme — Das Gerät muss vor dem Einschalten unbedingt geerdet werden.

Doppelte Spannungsversorgung kann vorhanden sein — Schließen Sie die beiden Anschlußkabel an getrennte Stromkreise an. Vor Servicearbeiten sind beide Anschlußkabel vom Netz zu trennen.

Zweipolige, neutrale Sicherung — Schalten Sie den Netzstrom ab, bevor Sie mit den Servicearbeiten beginnen.

Fassen Sie das Gerät beim Transport richtig an — Halten Sie das Gerät beim Transport nicht an Türen oder anderen beweglichen Teilen fest.

Gefahr durch mechanische Teile — Warten Sie, bis der Lüfter vollständig zum Halt gekommen ist, bevor Sie mit den Servicearbeiten beginnen.

Vorsicht

Die folgenden Vorsichtshinweise weisen auf Bedingungen oder Vorgehensweisen hin, die zu Schäden an Ausrüstungskomponenten oder anderen Gegenständen führen können:

Gerät nicht öffnen — Durch das unbefugte Öffnen wird die Garantie ungültig.

Richtige Spannungsquelle verwenden — Betreiben Sie das Gerät nicht an einer Spannungsquelle, die eine höhere Spannung liefert als in den Spezifikationen für dieses Produkt angegeben.

Gerät ausreichend belüften — Um eine Überhitzung des Geräts zu vermeiden, müssen die Ausrüstungskomponenten entsprechend den Installationsan-

weisungen belüftet werden. Legen Sie kein Papier unter das Gerät. Es könnte die Belüftung behindern. Platzieren Sie das Gerät auf einer ebenen Oberfläche.

Antistatische Vorkehrungen treffen — Es gibt statisch empfindliche Komponenten, die durch eine elektrostatische Entladung beschädigt werden können. Verwenden Sie antistatische Prozeduren, Ausrüstung und Oberflächen während der Wartung.

CF-Karte nicht mit einem PC verwenden — Die CF-Karte ist speziell formatiert. Die auf der CF-Karte gespeicherte Software könnte gelöscht werden.

Gerät nicht bei eventuellem Ausrüstungsfehler betreiben — Wenn Sie einen Produktschaden oder Ausrüstungsfehler vermuten, lassen Sie die Komponente von einem qualifizierten Servicetechniker untersuchen.

Kabel richtig verlegen — Verlegen Sie Netzkabel und andere Kabel so, dass Sie nicht beschädigt werden. Stützen Sie schwere Kabelbündel ordnungsgemäß ab, damit die Anschlüsse nicht beschädigt werden.

Richtige Netzkabel verwenden — Wenn Netzkabel mitgeliefert wurden, erfüllen diese alle nationalen elektrischen Normen. Der Betrieb dieses Geräts mit Spannungen über 130 V AC erfordert Netzkabel, die NEMA-Konfigurationen entsprechen. Wenn internationale Netzkabel mitgeliefert wurden, sind diese für das Verwendungsland zugelassen.

Richtige Ersatzbatterie verwenden — Dieses Gerät enthält eine Batterie. Um die Explosionsgefahr zu verringern, prüfen Sie die Polarität und tauschen die Batterie nur gegen eine Batterie desselben Typs oder eines gleichwertigen, vom Hersteller empfohlenen Typs aus. Entsorgen Sie gebrauchte Batterien entsprechend den Anweisungen des Batterieherstellers.

Das Gerät enthält keine Teile, die vom Benutzer gewartet werden können. Wenden Sie sich bei Problemen bitte an den nächsten Händler.

Consignes de sécurité

Il est recommandé de lire, de bien comprendre et surtout de respecter les informations relatives à la sécurité qui sont exposées ci-après, notamment les consignes destinées à prévenir les risques d'incendie, les décharges électriques et les blessures aux personnes. Les avertissements complémentaires, qui ne sont pas nécessairement repris ci-dessous, mais présents dans toutes les sections du manuel, sont également à prendre en considération.

AVERTISSEMENT Toutes les instructions présentes dans ce manuel qui concernent l'ouverture des capots ou des logements de cet équipement sont destinées exclusivement à des membres qualifiés du personnel de maintenance. Afin de diminuer les risques de décharges électriques, ne procédez à aucune intervention d'entretien autre que celles contenues dans le manuel de l'utilisateur, à moins que vous ne soyez habilité pour le faire.

Consignes et symboles de sécurité

Termes utilisés dans ce manuel

Les consignes de sécurité présentées dans ce manuel peuvent apparaître sous les formes suivantes:

AVERTISSEMENT Les avertissements signalent des conditions ou des pratiques susceptibles d'occasionner des blessures graves, voire même fatales.

ATTENTION Les mises en garde signalent des conditions ou des pratiques susceptibles d'occasionner un endommagement à l'équipement ou aux installations, ou de rendre l'équipement temporairement non opérationnel, ce qui peut porter préjudice à vos activités.

Signalétique apposée sur le produit

La signalétique suivante peut être apposée sur le produit:

DANGER — risque de danger imminent pour l'utilisateur.

AVERTISSEMENT — Risque de danger non imminent pour l'utilisateur.

MISE EN GARDE — Risque d'endommagement du produit, des installations ou des autres équipements.

Symboles apposés sur le produit

Les symboles suivants peut être apposés sur le produit:



Signale la présence d'une tension élevée et dangereuse dans le boîtier de l'équipement ; cette tension peut être suffisante pour constituer un risque de décharge électrique.



Signale que l'utilisateur, l'opérateur ou le technicien de maintenance doit faire référence au(x) manuel(s) pour prendre connaissance des instructions d'utilisation, de maintenance ou d'entretien.



Il s'agit d'une invite à prendre note du calibre du fusible lors du remplacement de ce dernier. Le fusible auquel il est fait référence dans le texte doit être remplacé par un fusible du même calibre.



Identifie une borne de protection de mise à la masse qui doit être raccordée correctement avant de procéder au raccordement des autres équipements.



Identifie une borne de protection de mise à la masse qui peut être connectée en tant que borne de mise à la masse supplémentaire.



Signale la présence de composants sensibles à l'électricité statique et qui sont susceptibles d'être endommagés par une décharge électrostatique. Utilisez des procédures, des équipements et des surfaces antistatiques durant les interventions d'entretien.

Avertissements

Les avertissements suivants signalent des conditions ou des pratiques susceptibles d'occasionner des blessures graves, voire même fatales:

Présence possible de tensions ou de courants dangereux — Mettez hors tension, débranchez et retirez la pile (le cas échéant) avant de déposer les couvercles de protection, de défaire une soudure ou de remplacer des composants.

Ne procédez pas seul à une intervention d'entretien — Ne réalisez pas une intervention d'entretien interne sur ce produit si une personne n'est pas présente pour fournir les premiers soins en cas d'accident.

Retirez tous vos bijoux — Avant de procéder à une intervention d'entretien, retirez tous vos bijoux, notamment les bagues, la montre ou tout autre objet métallique.

Évitez tout contact avec les circuits exposés — Évitez tout contact avec les connexions, les composants ou les circuits exposés s'ils sont sous tension.

Utilisez le cordon d'alimentation approprié — Utilisez exclusivement le cordon d'alimentation fourni avec ce produit ou spécifié pour ce produit.

Raccordez le produit à la masse — Raccordez le conducteur de masse du cordon d'alimentation à la borne de masse de la prise secteur.

Utilisez le produit lorsque les couvercles et les capots sont en place — N'utilisez pas ce produit si les couvercles et les capots sont déposés.

Utilisez le bon fusible — Utilisez exclusivement un fusible du type et du calibre spécifiés pour ce produit.

Utilisez ce produit exclusivement dans un environnement sec — N'utilisez pas ce produit dans un environnement humide.

Utilisez ce produit exclusivement dans un environnement non explosible — N'utilisez pas ce produit dans un environnement dont l'atmosphère est explosible.

Présence possible de courants de fuite — Un raccordement à la masse est indispensable avant la mise sous tension.

Deux alimentations peuvent être présentes dans l'équipement — Assurez vous que chaque cordon d'alimentation est raccordé à des circuits de terre séparés. Débranchez les deux cordons d'alimentation avant toute intervention.

Fusion neutre bipolaire — Débranchez l'alimentation principale avant de procéder à une intervention d'entretien.

Utilisez les points de levage appropriés — Ne pas utiliser les verrous de la porte pour lever ou déplacer l'équipement.

Évitez les dangers mécaniques — Laissez le ventilateur s'arrêter avant de procéder à une intervention d'entretien.

Mises en garde

Les mises en garde suivantes signalent les conditions et les pratiques susceptibles d'occasionner des dommages à l'équipement et aux installations:

N'ouvrez pas l'appareil — Toute ouverture prohibée de l'appareil aura pour effet d'annuler la garantie.

Utilisez la source d'alimentation adéquate — Ne branchez pas ce produit à une source d'alimentation qui utilise une tension supérieure à la tension nominale spécifiée pour ce produit.

Assurez une ventilation adéquate — Pour éviter toute surchauffe du produit, assurez une ventilation de l'équipement conformément aux instructions d'installation. Ne déposez aucun document sous l'appareil — ils peuvent gêner la ventilation. Placez l'appareil sur une surface plane.

Utilisez des procédures antistatiques - Les composants sensibles à l'électricité statique présents dans l'équipement sont susceptibles d'être endommagés par une décharge électrostatique. Utilisez des procédures, des équipements et des surfaces antistatiques durant les interventions d'entretien.

N'utilisez pas la carte CF avec un PC — La carte CF a été spécialement formatée. Le logiciel enregistré sur la carte CF risque d'être effacé.

N'utilisez pas l'équipement si un dysfonctionnement est suspecté — Si vous suspectez un dysfonctionnement du produit, faites inspecter celui-ci par un membre qualifié du personnel d'entretien.

Acheminez les câbles correctement — Acheminez les câbles d'alimentation et les autres câbles de manière à ce qu'ils ne risquent pas d'être endommagés. Supportez correctement les enroulements de câbles afin de ne pas endommager les connecteurs.

Utilisez les cordons d'alimentation adéquats — Les cordons d'alimentation de cet équipement, s'ils sont fournis, satisfont aux exigences de toutes les réglementations régionales. L'utilisation de cet équipement à des tensions dépassant les 130 V en c.a. requiert des cordons d'alimentation qui satisfont aux exigences des configurations NEMA. Les cordons internationaux, s'ils sont fournis, ont reçu l'approbation du pays dans lequel l'équipement est utilisé.

Utilisez une pile de remplacement adéquate — Ce produit renferme une pile. Pour réduire le risque d'explosion, vérifiez la polarité et ne remplacez la pile que par une pile du même type, recommandée par le fabricant. Mettez les piles usagées au rebut conformément aux instructions du fabricant des piles.

Cette unité ne contient aucune partie qui peut faire l'objet d'un entretien par l'utilisateur. Si un problème survient, veuillez contacter votre distributeur local.

Regulatory Notices

Certifications and Compliances

FCC Emission Control

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. Changes or modifications not expressly approved by Grass Valley can affect emission compliance and could void the user's authority to operate this equipment.

Canadian EMC Notice of Compliance

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

EN55022 Class A Warning

In a domestic environment, products that comply with Class A may cause radio interference in which case the user may be required to take adequate measures.

Canadian Certified Power Cords

Canadian approval includes the products and power cords appropriate for use in the North America power network. All other power cords supplied are approved for the country of use.

Canadian Certified AC Adapter

Canadian approval includes the AC adapters appropriate for use in the North America power network. All other AC adapters supplied are approved for the country of use.

FCC Emission Limits

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesirable operation. This device has been tested and found to comply with FCC Part 15 Class B limits for a digital device when tested with a representative laser-based fiber optical system that complies with ANSI X3T11 Fiber Channel Standard.

Certifications:

For specific 7600REF certifications, refer to [Table 16 on page 108](#).

Category	Standard	Designed/tested for compliance with:
Safety	ANSI / UL60950	"Standard for Safety of Information Technology Equipment - Safety - Part 1: General Requirements", (ANSI/UL 60950-1, First Edition, Dated April 1, 2003, with revision through and including November 26, 2003.)
	IEC 60950	"Standard for Safety for Information Technology Equipment - Safety - Part 1: General Requirements", (IEC 60950-1, First Edition, 2001, Corrigendum 1:10-2002)
	CAN/CSA C22.2, No. 60950	"Standard for Safety of Information Technology Equipment - Safety - Part 1: General Requirements", (CAN/CSA-C22.2 No. 60950-1-03, First Edition Dated April 1, 2003, with revisions through and including November 26, 2003)
	EN60950	Safety of Information Technology Equipment, including Electrical Business Equipment.
	2006/95/EC	Low Voltage Directive
EMI	EMC Directive 2004/108/EC via EN 55103-1 and 2	Audio, Video and Entertainment Lighting Control for the European Community.
	EN 55103-1 standards	Electromagnetic compatibility. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 1 Emissions, Environment E1/E2 EN 55022: Class A Radiated and Conducted Emissions EN 61000-3-2: Power Line Harmonic Emissions, Radiated Magnetic Field Emissions, Peak Inrush Current
	EN55103-2 standards	Electromagnetic compatibility--Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use. Part 2 Immunity, Environment E1/E2 EN 50082-1: Immunity EN 61000-4-2: Electrostatic Discharge "ESD" Immunity EN 61000-4-3: Radiated RF Electromagnetic Field Immunity EN 61000-4-4: Electrical Fast Transient/Burst "EFT" Immunity EN 61000-4-5: Surge Immunity EN 61000-4-6: Conducted RF Immunity EN 61000-4-11: Voltage Dips, Short Interruptions and Voltage Variations Annex A - Radiated Magnetic Field Immunity Note: This only applies to assemblies sensitive to magnetic fields
	US FCC Class A Canada FCC Industry Canada	CISPR Pub. 22 (1985)
	Australia & New Zealand:	AS/NZS CISPR 22

Category	Standard	Designed/tested for compliance with:
Safety	UL1419	Professional Video and Audio Equipment

ESD Protection

Electronics today are more susceptible to electrostatic discharge (ESD) damage than older equipment. Damage to equipment can occur by ESD fields that are smaller than you can feel. Implementing the information in this section will help you protect the investment that you have made in purchasing Grass Valley equipment. This section contains Grass Valley's recommended ESD guidelines that should be followed when handling electrostatic discharge sensitive (ESDS) items. These minimal recommendations are based on the information in the [Sources of ESD and Risks](#) area. The information in [Grounding Requirements for Personnel on page 29](#) is provided to assist you in selecting an appropriate grounding method.

Recommended ESD Guidelines

Follow these guidelines when handling Grass Valley equipment:

- Only trained personnel that are connected to a grounding system should handle ESDS items.
- Do not open any protective bag, box, or special shipping packaging until you have been grounded.

Note When a Personal Grounding strap is unavailable, as an absolute minimum, touch a metal object that is touching the floor (for example, a table, frame, or rack) to discharge any static energy before touching an ESDS item.

- Open the anti-static packaging by slitting any existing adhesive tapes. Do not tear the tapes off.
- Remove the ESDS item by holding it by its edges or by a metal panel.
- Do not touch the components of an ESDS item unless it is absolutely necessary to configure or repair the item.
- Keep the ESDS work area clear of all nonessential items such as coffee cups, pens, wrappers and personal items as these items can discharge static. If you need to set an ESDS item down, place it on an anti-static mat or on the anti-static packaging.

Sources of ESD and Risks

The following information identifies possible sources of electrostatic discharge and can be used to help establish an ESD policy.

Personnel

One of the largest sources of static is personnel. The static can be released from a person's clothing and shoes.

Environment

The environment includes the humidity and floors in a work area. The humidity level must be controlled and should not be allowed to fluctuate over a broad range. Relative humidity (RH) is a major part in determining the level of static that is being generated. For example, at 10% - 20% RH a person walking across a carpeted floor can develop 35kV; yet when the relative humidity is increased to 70% - 80%, the person can only generate 1.5kV.

Static is generated as personnel move (or as equipment is moved) across a floor's surface. Carpeted and waxed vinyl floors contribute to static build up.

Work Surfaces

Painted or vinyl-covered tables, chairs, conveyor belts, racks, carts, anodized surfaces, plexiglass covers, and shelving are all static generators.

Equipment

Any equipment commonly found in an ESD work area, such as solder guns, heat guns, blowers, etc., should be grounded.

Materials

Plastic work holders, foam, plastic tote boxes, pens, packaging containers and other items commonly found at workstations can generate static electricity.

Grounding Requirements for Personnel

The information in this section is provided to assist you in selecting a grounding method. This information is taken from ANSI/ESD S20.20-2007 (Revision of ANSI/ESD S20.20-1999).

Table 1. Product Qualification

Personnel Grounding Technical Requirement	Test Method	Required Limits
Wrist Strap System*	ANSI/ESD S1.1 (Section 5.11)	$< 3.5 \times 10^7$ ohm
Flooring / Footwear System – Method 1	ANSI/ESD STM97.1	$< 3.5 \times 10^7$ ohm
Flooring / Footwear System – Method 2 (both required)	ANSI/ESD STM97.1	$< 10^9$ ohm
	ANSI/ESD STM97.2	< 100 V

Product qualification is normally conducted during the initial selection of ESD control products and materials. Any of the following methods can be used: product specification review, independent laboratory evaluation, or internal laboratory evaluation.

Table 2. Compliance Verification

Personnel Grounding Technical Requirement	Test Method	Required Limits
Wrist Strap System*	ESD TR53 Wrist Strap Section	$< 3.5 \times 10^7$ ohm
Flooring / Footwear System – Method 1	ESD TR53 Flooring Section and ESD TR53 Footwear Section	$< 3.5 \times 10^7$ ohm
Flooring / Footwear System – Method 2 (both required)	ESD TR53 Flooring Section and ESD TR53 Footwear Section	$< 1.0 \times 10^9$ ohm

* For situations where an ESD garment is used as part of the wrist strap grounding path, the total system resistance, including the person, garment, and grounding cord, must be less than 3.5×10^7 ohm.

7600REF Reference Generators

Product Overview

The 7600REF family of synchronizing pulse generators are some of the most flexible SPG units available on the market today. They are suitable for any digital or mixed format environment where a high quality digital SPG is required. This manual covers the installation and operation of all models along with full technical specifications. Refer to [7600REF Models on page 32](#) for specific functionality available for each of the model types.

Each 7600REF model has the following basic functionality:

- Five independently timed analogue outputs that can be configured as black/burst or analogue video test signal outputs
- Three SD/HD-SDI video outputs with four channels of embedded AES audio and EDH

Note All SDI and analogue black/burst outputs offer full timing control and are individually selectable for 525/625 standard operation.

- Two AES-3 silence outputs
- 10 MHz/27 MHz/Word Clock output
- 5/10 MHz Reference input
- Dual power supplies that auto-sense line rates with separate mains connections for power backup in the case of one power supply failure
- Looping Genlock input
- ANALOGUE AUDIO/REMOTES connector that provides:
 - A serial communication port,
 - Analogue audio output test tones,
 - Power fail output status, and
 - Fan failure status, and GPI input output control connections.
- A browser-based configuration tool is provided, offering:
 - Online editing of 7600REF configuration, and
 - Ability to copy, backup, and restore configuration
- SNMP support

7600REF Models

Functionality specific to the currently available 7600REF models is described below.

All models include a browser-based configuration tool and SNMP support.

7600HD-REF Reference Signal Generator

This model features the following functionality:

- SD-SDI and analogue video test signal patterns,
- HD-SDI video test patterns,
- Analogue and AES audio test tones (including GLITS),
- Full-field test patterns. and
- A one slot HD Tri-level sync module provides 4 tri-level sync outputs, each output individually configured from the front panel.

7600MHD-REF Master HD Reference Signal Generator

This model expands the 7600HD-REF to include the following:

- A one slot GPS receiver module with a GPS antenna input and a GPS 1 PPS output allows for locking to a high stability time and oscillator reference,
- Two LTC timecode outputs available on the LTC D-25 connector and the addition of VITC timecode to the Analogue and SDI test signals, and
- Network Time Protocol (NTP) with both Client and Server modes. NTP is intended for synchronizing time to a global reference.

Installation

Follow the instructions below to unpack, install, and cable the 7600REF frame.

Unpacking

Carefully unpack the unit from its packing box and check for signs of damage. Check the contents of the box against the packing list and your original order to ensure that you have received the correct parts.

In the event the unit has been damaged or does not match your order, contact the Grass Valley Sales office listed on [Contacting Grass Valley on page 4](#).

Module/Software Installation

All hardware modules are installed at the factory and shipped inside the unit. Module functionality included in the model configuration depends on the model type (see [7600REF Models on page 32](#)). Any software functionality included with the model is already installed and enabled.

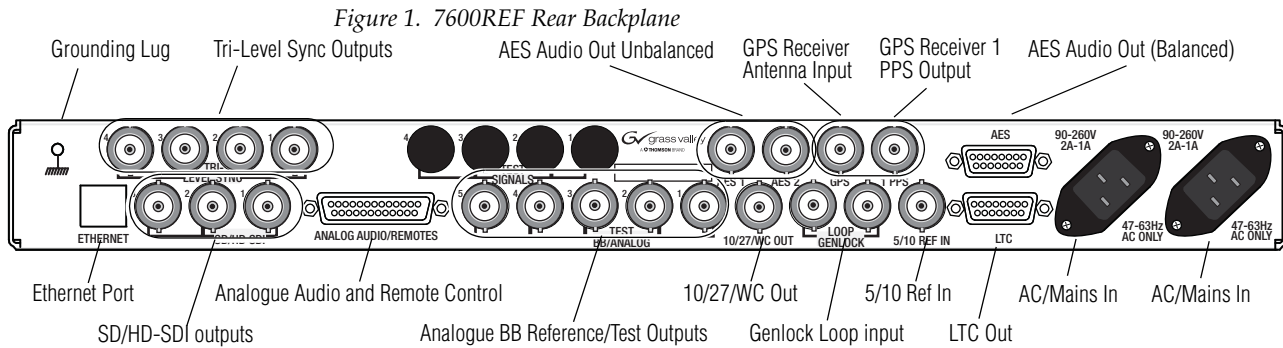
Rack Mounting

The 1 RU rack frame has integral rack mounting ears on the frame front cover for direct mounting into a standard 19 inch rack. Carefully place the unit in your rack and firmly attach it to the rack using four standard rack screws (not provided).

CAUTION This unit has air intakes on one side of the unit and fan-assisted exhaust vents on the other side of the unit. Ensure that these have an unobstructed air flow, otherwise the unit will overheat. Pay particular attention to ensure that any rack wiring or cable trays do not obstruct the vent. 60 mm (2.36 in.) of clear space should be allowed between the vents and any potential obstruction.

Rear Panel Connections

The rear connectors for the 7600REF frame are shown in [Figure 1](#). Presence of hardware and software functionality depends on the model you have purchased (see [7600REF Models on page 32](#)). Cabling instructions for each of the connectors are explained in detail in this section.



Grounding Lug

The unit is provided with a single 4 mm (0.16 in.) ground lug on the far left of the rear panel. Incoming mains ground from the IEC connector is internally bonded to both the chassis and technical 0V to meet safety requirements and performance specifications. The stud allows the addition of an ground strap, if required, for rack installations.

Ethernet Port

Each 7600REF model is equipped with a 10/100 base-T Ethernet port. The Ethernet port is provided for connection to the GV 7600REF web browser. This port may be configured for either dynamic (DHCP) address mode or static address mode.

Configuration is done in the Setup menu (see [Setup Menus – Top Level on page 79](#)) or, if using the GV 7600REF web browser interface, [Admin Configuration on page 134](#)). The 7600REF should be connected to the network in the same way as other networked devices (such as a computer or printer) with a 1:1 CAT 5 RJ-45 cable.

Tri-Level Sync Reference

The TRI-LEVEL SYNC REFERENCE BNCs will output four independently configured tri-level sync outputs. Setup is done in the Options menu ([Option 3: HD Tri-Level Sync on page 102](#) or, if using the GV 7600REF web browser interface, [Option 3 \(TLS\) Configuration on page 138](#)).

SD/HD-SDI Test Outputs

The outputs from the SD/HD-SDI TEST BNCs 1, 2, and 3, (depending on the model) provide three independently configured output channels. Each output test pattern has text positioning and an AFD (Active Format Description) control. The three outputs are configured in the Digital Video menu ([Digital Video Menus – Top Level on page 50](#)) or, if using the GV 7600REF web browser interface, [SDI Channels 1-3 Configuration on page 117](#)).

On the 7600MHD-REF model, these outputs also offer a combination of the following LTC (Longitudinal Timecode) features with LTC capability:

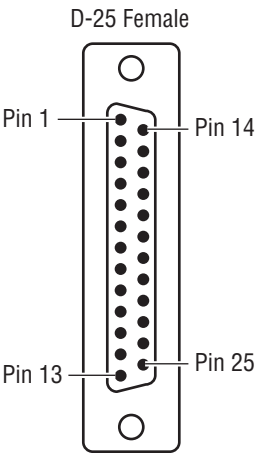
- Digital VITC (SMPTE S266) for standard definition signals only, and
- ATC (SMPTE RP188) for standard definition or high definition SD signals.

Analogue Audio/Remotes

The 25 pin Sub-D connector labeled ANALOGUE AUDIO/REMOTES provides a serial communication port, the analogue audio output tones, power fail output status, fan failure status, and the GPI connections.

Pinouts for the ANALOGUE AUDIO/REMOTES connector are given in [Table 3](#). Each of the connector functions is described in detail in this section.

Table 3. ANALOGUE AUDIO/REMOTES Connector Pinouts

ANALOGUE AUDIO/REMOTES	Pin	Function	Pin	Function
 <p>D-25 Female</p> <p>Pin 1</p> <p>Pin 14</p> <p>Pin 13</p> <p>Pin 25</p>	1	Fan OK -1 (Pair with pin 16. Closed if OK)	14	Power OK 1
	2	RS422 CTS – (minus)	15	Power OK 2
	3	RS422 RXD + (plus)	16	Fan OK - 2
	4	RS422 TXD + (plus)	17	GPI0 - Output 1
	5	RS422 RTS – (minus)	18	GPI0 - Input 2
	6	RS422 TXD – (minus)	19	GPI0 - Input 1
	7	GND	20	RS422 CTS + (plus)
	8	RS422 RXD – (minus)	21	GPI0 - Output 2
	9	GND	22	RS422 RTS + (plus)
	10	+ 12V DC / 0.3A	23	Analogue Audio Out 1 – (minus)
	11	Analogue Audio Out 1 + (plus)	24	Analogue Audio Out 2 – (minus)
	12	Analogue Audio Out 2 + (plus)	25	GND
	13	GND		

Fan Failure Output

This open collector output senses the current drawn by the cooling fans fitted to the enclosure. The detector indicates a failure if a fan is stuck and/or an open circuit is detected.

Analogue Audio Outputs

The two Analogue Audio output channels are configured as described in [Audio Menus – Top Level on page 74](#) or, if using the GV 7600REF web browser interface, [Audio >> Analogue >> Settings on page 126](#).

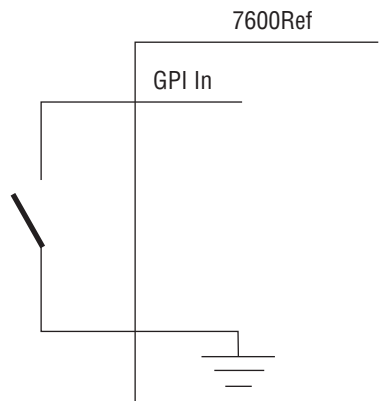
GPI Inputs 1 and 2

The General Purpose Interface (GPI) inputs 1 and 2 are configured in software using the menus described in [Setup – GPIO Control on page 85](#) or, if using the GV 7600REF web browser interface, [Setup >> GPIO >> GPIO 1/GPIO 2 on page 128](#), to provide any of the following functions:

- Force freerun mode
- Force Genlock mode
- Force external 10 MHz lock mode
- Step through SDI output 1 test patterns
- Step through SDI output 2 test patterns
- Step through SDI output 3 test patterns
- Step through setup memory locations

The single-ended GPI inputs are activated when connected to a ground connection on the 25 pin Sub-D connector as shown in [Figure 2](#). The two GPI inputs are pin 18 and pin 19 as listed in [Table 3 on page 35](#). The inputs can withstand +/- 20V and draw approximately 600uA when activated.

Figure 2. Connection to GPI Inputs



GPI Outputs 1 and 2

The General Purpose Interface (GPI) outputs 1 and 2 are configured in software using the menus described in [Setup – GPIO Control on page 85](#) or, if using the GV 7600REF web browser interface, [Setup >> GPIO >> GPIO 1/GPIO 2 on page 128](#), to provide any of the following functions:

- Loss of genlock input
- Loss of external 10 MHz reference
- Line lock error
- Field lock error
- Subcarrier lock error
- Illegal input ScH
- Diagnostic state alert
- Currently locked to external 5/10 MHz
- Currently locked to external genlock
- Currently internal/freerun mode

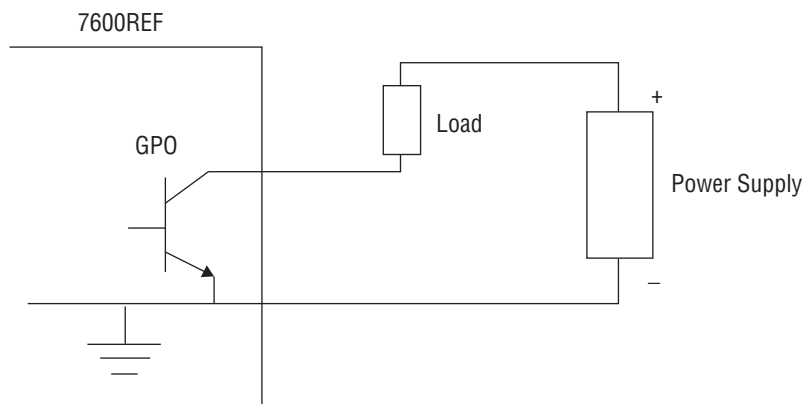
The GPI outputs are single-ended open collector outputs with a 30V/190 mA rating not to exceed 600 mW dissipation. The two GPI outputs are pin 17 and pin 21 as listed in [Table 3 on page 35](#).

Note It is intended that the GPO be activated when one or more of the above conditions is true (for example, loss of genlock input and/or line lock error).

To use an output, a load should be connected between the output and an external power supply, with the negative end of the power supply connected back to the ground pin on the 25 pin Sub-D connector.

As an alternate to an external power supply, a +12V, 300mA feed is available on pin 10 of the Sub-D connector.

Figure 3. Connection to GPI Outputs



Analogue BB Reference/Test

The five ANALOGUE BB REFERENCE/TEST BNCs provide independent black burst reference signals and/or video test signal outputs as configured in the Analogue Video menus (see [Analogue Video Menus – Top Level on page 63](#) or if using the GV 7600REF web browser interface, [Analogue Video Configuration on page 122](#)).

10/27/WC Output

The 10/27/WC BNC provides either a 10 MHz, 27 MHz, or Word Clock output. The output type is configured in the Setup/Clock Output menu ([Setup Menus – Top Level on page 79](#) or, if using the GV 7600REF web browser interface, [Setup >> Misc on page 132](#)).

Genlock Loop Input

The GENLOCK LOOP BNCs provide an external genlock reference input to the device. Genlock configuration is done in the Lock menu ([Lock Mode Menus – Top Level on page 76](#) or, if using the GV 7600REF web browser interface, [Lock >> Settings and Timing on page 127](#)).

5/10 Ref In

The 5/10 REF IN BNC accepts either a 5 MHz or 10 MHz reference input.

GPS BNCs (7600MHD-REF Model)

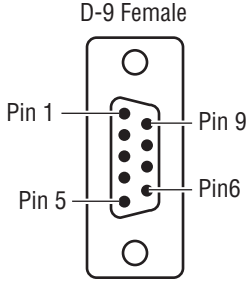
The BNCs for the GPS input and 1PPS output shown in [Figure 9 on page 58](#) are present with the 7600MHD-REF model. GPS installation is described in [GPS Antenna Requirements on page 95](#). GPS setup is described in [Option Slot 1: GPS \(7600MHD-REF Model\) on page 94](#) or, if using the GV 7600REF web browser interface, [Option 1 \(GPS\) Configuration on page 137](#).

AES 1/AES 2 Outputs

Balanced AES Audio Outputs

The AES 9 pin Sub-D female connector provides balanced AES audio 1 and AES 2 audio outputs. The pinouts and their functions for this connector are shown in [Table 4](#).

Table 4. AES Pin Sub-D Pinout

AES Audio Out	Pin	Function
 <p>D-9 Female</p> <p>Pin 1</p> <p>Pin 5</p> <p>Pin 6</p> <p>Pin 9</p>	1	AES 1 + (plus)
	2	AES 1 – (minus)
	3	Shield
	4	N/C
	5	0V GND
	6	Shield
	7	AES 2 + (plus)
	8	AES 2 – (minus)
	9	Shield

Unbalanced AES Audio Outputs

When the GPS module is present (7600MHD-REF models), BNCs for unbalanced AES Audio 1 and AES Audio 2 audio outputs are present next to the GPS connections.

Configuration of AES Audio Outputs

Configuration of AES balanced and unbalanced outputs, which track each other, is described in [Digital Video – AES Configuration on page 61](#) or, if using the GV 7600REF web browser interface, [Audio >> AES 1/AES 2 >> AES on page 125](#).

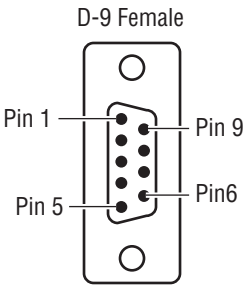
Timecode

LTC Output (7600MHD-REF Model)

The LTC (Longitudinal Timecode) 9 pin Sub-D female connector provides LTC 1 and LTC 2 outputs on the 7600MHD-REF model. The LTC pinouts and their functions for this connector are shown in [Table 5](#).

The LTC function provides two outputs of LTC. For configuration, see [Setup – LTC Menu \(7600MHD-REF Model\) on page 83](#) or, if using the GV 7600REF web browser interface, [Setup >> LTC 1/LTC 2 >> LTC on page 131](#).

Table 5. LTC Output Sub-D Pinout

LTC Out	Pin	Function
 <p>D-9 Female</p> <p>Pin 1</p> <p>Pin 5</p> <p>Pin 6</p> <p>Pin 9</p>	1	LTC 1 + (plus)
	2	LTC 1 – (minus)
	3	Shield
	4	N/C
	5	0V GND
	6	Shield
	7	LTC 2 + (plus)
	8	LTC 2 – (minus)
	9	Shield

Vertical Interval Timecode (VITC)

VITC can be superimposed on analogue waveforms. This is enabled or disabled in accordance with the current group arrangement of the analogue signal outputs. See [Analogue Video – VITC \(7600MHD-REF Model\) on page 71](#) or, if using the GV 7600REF web browser interface, [AV >> BnB 1 - BnB 5 >> VITC on page 124](#).

SDI outputs will offer a combination of Digital VITC (SMPTE S266) for standard definition signals only and ATC (SMPTE RP188) for standard definition or high definition SD signals. See [VITC Within SDI Video Waveform on page 50](#) or, if using the GV 7600REF web browser interface, [SDI >> Channel 1-3 >> Timecode on page 120](#).

AC Mains Connection and Fusing

CAUTION The power supply cord is used as the main power disconnection device. Ensure that the socket outlet is located/installed near the equipment and is easily accessible.

ATTENTION Le cordon d'alimentation est utilisé comme interrupteur général. La prise de courant doit être située ou installée à proximité de l'équipement et être facile d'accès.

Each 7600REF model is fitted with two independent AC mains power supplies. Each power supply has its own dedicated IEC mains plug on the rear of the unit.

The correct power cords for the line standard of the region the product has been shipped to are included in the shipping box. The power supplies used in this unit are a switch mode design and are auto-sensing to handle a wide input voltage range. See the Specifications in [Table 16 on page 108](#) for the voltage and frequency ranges.

Power Supply Replacement

If one of the power supplies fails, a replacement unit can be acquired from Customer Service and can be installed by the customer in the field.

To replace a 7600REF power supply:

CAUTION Make sure power to the unit is completely disconnected by removing both AC cords from both power supply connections on the rear of the unit.

1. Remove the top cover of the frame by removing the 13 screws holding the cover to the frame. Determine which power supply unit needs to be replaced.
2. Tilt the frame up and on the bottom of the frame remove the two screws holding the defective power supply unit to the frame chassis.
3. On the front of the power supply unit, remove the 2-pin connector labeled J1 coming from the AC Main assembly. Note the orientation of the connector when removing it.
4. On the rear of the power supply unit, remove the 4-pin rear connector labeled J2 from the power supply attached to the cable coming from the rear of the main circuit board. Note the orientation of the connector when removing it.
5. Lift the defective power supply out of the chassis.
6. Install the new unit by reversing the steps above noting cable connector orientation. These connectors are keyed so they cannot be installed improperly.

Operation

This section of the manual will cover using the front panel for configuration and adjustments.

When the unit is powered up by connecting one or both of the AC Mains connections, initialization messages will appear on the LCD display as the unit configures the internal hardware.

Once initialization is complete, the following message indicating a normal operational status will be displayed:

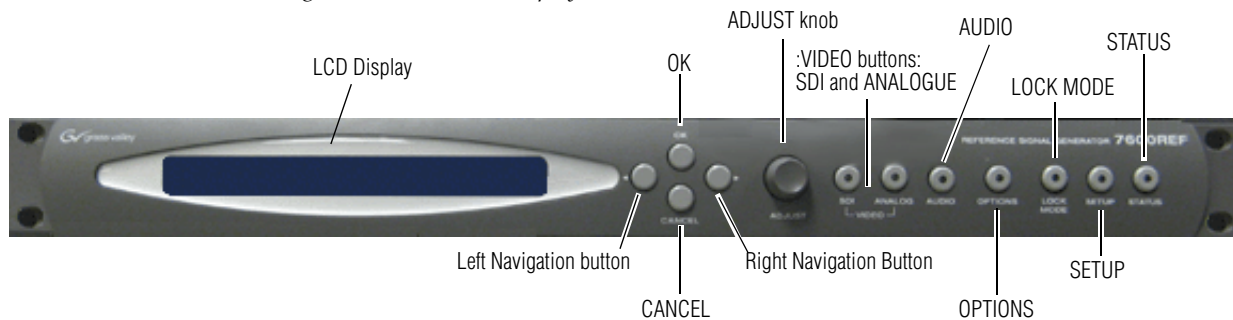
7600REF Main Menu

<Digital Video> Analogue Video Audio →

Front Panel Control Description

The front panel is shown in [Figure 4](#).

Figure 4. Front Panel Display



The front panel has the following main functional areas (see [Figure 4](#)):

- A Liquid Crystal Display (LCD) used to show information to guide the user through operating the various functions and to show status information.
- Front Panel Buttons including the following:
 - **Left** and **Right** navigation buttons for moving through the menus
 - **OK** and **CANCEL** buttons to initiate or exit the currently selected function
 - **ADJUST** knob for parameter adjustment and/or left/right menu navigation
 - Video **SDI** and **ANALOGUE** function buttons to access SDI or Analogue video menus
 - **AUDIO** function button to access menus for analogue and AES audio menus

- **OPTIONS** function button to access optional menus (options included depend on model type, see [7600REF Models on page 32](#)).
- **LOCK MODE** function button to access menus to set up genlock modes.
- **SETUP** function button for miscellaneous configuration options menus.
- **STATUS** button for accessing diagnostic and status information menus.

Basic Operation

There are a number of basic concepts that once understood will simplify the use of the unit as described below:

- Valid button pushes are indicated by a lamp lit inside a button. In most cases, buttons without a lamp will not be prohibited, allowing rapid changes between functions grouped on each button.
- Invalid button pushes will result in an informative message on the LCD.

Selecting a Function

To change any parameter, the appropriate function button must first be pushed. Once a function button is pushed, that button will remain illuminated and the others will turn off to provide a reminder of which function is active.

Pushing a function button that has sub-functions under it will cause the bottom row of the LCD to show the lower level functions. For example, pushing the **SDI** function button will bring you to the top of the SDI menu, **SDI: Select Channels**. Use either the **ADJUST** knob or the left or right arrow buttons to select the choices under this menu: **SDI 1**, **SDI 2**, or **SDI 3**.

To choose which of these sub-functions is required, the **Adjust** button or left-right keys may be used to step between the sub-functions. The current selection is marked with chevron symbols < >.

The top row of the LCD provides a fuller explanation of the function.

Once the required sub-function is selected, the **OK** button is used to choose it. Depending on the sub-function chosen, either a further set of sub-functions or the current value of that function is displayed. Where appropriate, the currently active option is indicated by square brackets (e.g. [ON]). If the active option is also selected, it is indicated by asterisks (e.g. *ON*).

Changing Values

To change the value of a function, the **ADJUST** knob or the **Left** or **Right** navigation buttons can be used.

In the case of numerical values, there are two functional modes:

- If the overall range of an adjustment is small the **ADJUST** knob always alters the value by the smallest amount possible.
- If a wider range of adjustment is required, a Delta value system is used. Use the **Right** navigation button to select the Delta value in brackets and adjust it to the desired resolution by turning the **ADJUST** knob, then press the **Left** navigation button to select the value then adjust it with the **ADJUST** knob.

An example of this would be setting the Line Offset for SDI 1. Scroll down from Digital Video to SDI 1. Select Video Standard then Timing and scroll to Line and press the **OK** button. The Line Offset menu will be present on the LCD. Note the Delta value on the right of the LCD indicated by a triangle Delta symbol = 1. You may change the Delta resolution value to 10 or 100 with the knob.

Use the **Left** navigation button to select the Pixel choice field and turn the knob to change the values to 1, 10, or 100. Note that when the Delta value is 1, the values change by steps of one pixel. With a Delta value of 10, the pixels change by steps of 10, 20, 30 etc.). Selecting a Delta value of 100 allows you to change the pixels by 100, 200, 300 etc. Change the Delta resolution if you need a finer offset setting.

As the parameter is changed, the new value will be shown on the LCD. For some functions, the unit responds by actually altering the value immediately. Otherwise the new value is applied when the **OK** button is pushed.

Leaving the Selected Function

Once the parameter has been set the unit can be returned to the normal operating mode or another function chosen by one of the following methods:

- Pressing the current (lit) function button will step up through the menu structure one level at a time. Thus another parameter related to that function button may be changed without having to start again at the top-level menu.
- The **OK** button allow you to descend the menu structure and the current function and the **CANCEL** key allows you to ascend the menu structure.
- At any time any other function key may be pressed causing the menu structure to be traversed sideways. For example, having set an **OUTPUT CONTROL** function, the **SETUP** key may be pushed without having to first step back up through the menus.

Menu Timeout

In addition, there is a built-in timeout mechanism that will automatically step back up through the menu structure until the top level is reached if a key is not pressed within a preset time period.

The option to configure this feature is located under the Setup >> More >> Display >> Menu Timeout menu. See [Setup: More](#) menu on [page 86](#).

Front Panel Lock

Front panel controls may be locked to prevent inadvertent changing of settings. To lock or unlock the controls, press the **Left** and **Right** navigation buttons simultaneously.

Configuration and Setup

The 7600REF frames can be configured and monitored from the front panel or using the GV 7600REF web browser interface.

Front Panel Configuration

The Front panel configuration section ([Front Panel Configuration on page 47](#)) covers in detail all of the front panel menus for configuration and setup for all 7600REF models. Frames come from the factory with options and option software already installed.

Menus and functionality will differ between 7600REF models due to available functionality. These differences will be pointed out in the text.

GV 7600REF Web Browser Interface Configuration

The current software (version 5.0) now provides a browser-based configuration and setup tool offering:

- Greatly simplified initial setup,
- Online editing of 7600REF configurations,
- Partial or incremental updates without causing disruption (where possible), and
- The ability to copy, backup and restore configuration data.

The web browser tool is compatible with Internet Explorer 8 (and later) plus Mozilla Firefox web browsers.

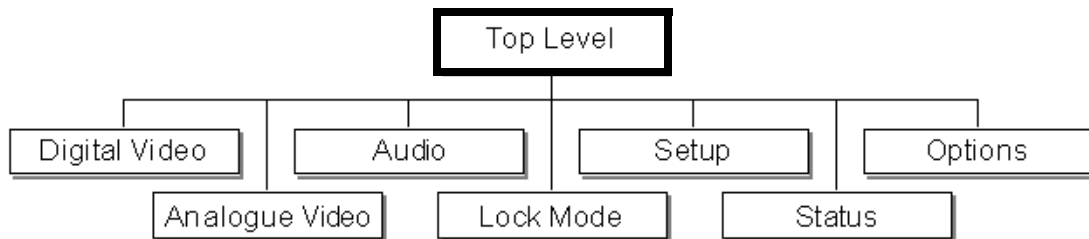
Refer to the Appendix, [GV 7600REF Web Browser Interface on page 115](#), for complete details on using the web browser interface to configure the 7600REF.

Front Panel Configuration

Top Level Menu

The top level menu has the menu branches shown in [Figure 5](#). You may access each top level menu directly by pressing the corresponding button ([Figure 4 on page 42](#)) or scroll through the menus using the arrow keys on the front panel of the frame to reach each menu.

Figure 5. Top Level Menu



The content and features of each top level choice are summarized below. A more detailed description of each top level choice is given later in this manual. Note that the Options branch (on the right side of [Figure 5](#)) is only displayed if specific options (GPS for example) are included in the model. For option functionality for each model type, refer to [7600REF Models on page 32](#).

Digital Video Menus

The Digital Video (SDI) menu provides full control of the configuration of the three SDI outputs. The video standard, timing and appearance of each output are controlled from this sequence of menus. In addition, the embedded AES audio is enabled and configured for each output. If high definition (HD) is present, additional choices will appear on the menu.

For 7600MHD-REF model, VITC submenus will be present due to the Timecode functionality present in this model. See [Digital Video Menus – Top Level on page 50](#).

Analogue Video Menus

The Analogue Video menus control the format of the five analogue video signals provided on the Analogue BB/Test BNCs on the rear of the frame. These are arranged as a group of three plus a second group of two outputs. This allows the group of three to be set as RGB or YUV in a single operation.

For 7600MHD-REF model, VITC submenus will be present due to the Timecode functionality present in this mode. See [Analogue Video Menus – Top Level on page 63](#).

Audio Menus

The Audio menus control both the non-embedded AES and analogue audio outputs. For all outputs, control of frequency and amplitude is available. In addition, for the AES outputs, the sample rate and source ident may also be set. See [Audio Menus – Top Level on page 74](#) or for the GV 7600REF web browser interface configuration, [Audio >> Analogue >> Settings on page 126](#).

Lock Mode Menus

The Lock Mode genlock menus sets the required format of the incoming video signal and defines the behavior of the 7600REF when the genlock signal is applied or removed. See [Lock Mode Menus – Top Level on page 76](#).

Setup Menus

The System Setup menu provides control of the basic configuration of the 7600REF and will be used primarily during the installation phase. Refer to [Setup Menus – Top Level on page 79](#) for details.

System setup includes:

- Configuration of the LTC function (7600MHD-REF model)
- Configuration of the Clock Output
- Comprehensive control of General Purpose Inputs and Outputs, including:
 - the input signal response mode
 - the action resulting from a GPI trigger
 - the event causing a GPO state change
- Check and control of the internal memory
- Setup of the real-time clock (RTC)
- Configuration of the Network Time Protocol (NTP) (7600MHD-REF)
- Functions under the COMMS menu, including:
 - configuration of the Ethernet port
 - configuration of the Serial port
- Functions under the DISPLAY menu, including:
 - enable and control timing of the menu timeout

- set the display contrast
- Configure the 7600REF as Slave, allowing settings to be received from a Master

Status Menus

The Status menu provides, in read-only mode, the current version of the software, hardware and firmware of the 7600REF. These three values will be required when speaking to Technical Support. It also reports a number of other status items.

In addition, a series of status error messages may be enabled for display on the LCD screen. The final option on this menu displays a summary of the current configuration status. See [Status Menu – Top Level on page 91](#) for details.

Options Menus

The Options menu ([Figure 6 on page 50](#)) is displayed if options are installed. The Option menu lists the type of module fitted in each of the three option slots. Options installed depend on the model type.

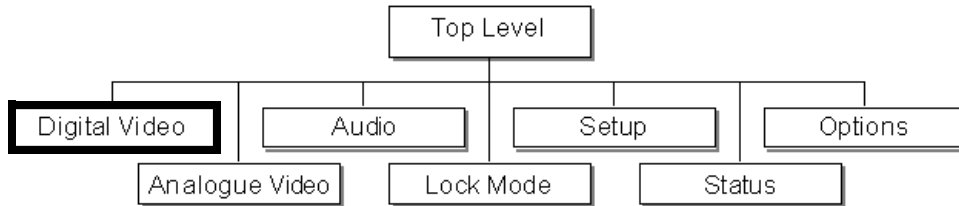
Options available include the following depending on the 7600 model type:

- Option 1: GPS (Global Positioning System) (7600MHD-REF only)
- Option 2: Not used in this application
- Option 3: TLS (Tri-Level Sync) (7600HD-REF and 7600MHD-REF)

Digital Video Menus – Top Level

The top level Digital Video menu is shown in [Figure 6](#).

Figure 6. Top Level Menu – Digital Video



Selecting the top level Digital Video menu will bring up the SDI 1, SDI 2, and SDI 3 menus shown in [Figure 7 on page 51](#).

The Digital Video menus provide full control of the configuration of each of the three SDI video outputs. The video standard, timing and appearance of each output are controlled from this sequence of menus.

In models with Timecode (VITC) and HD capability, the menu is extended to include further options, depending on the model.

The SDI 1-3 menus have the menu branches listed below and shown in [Figure 7 on page 51](#):

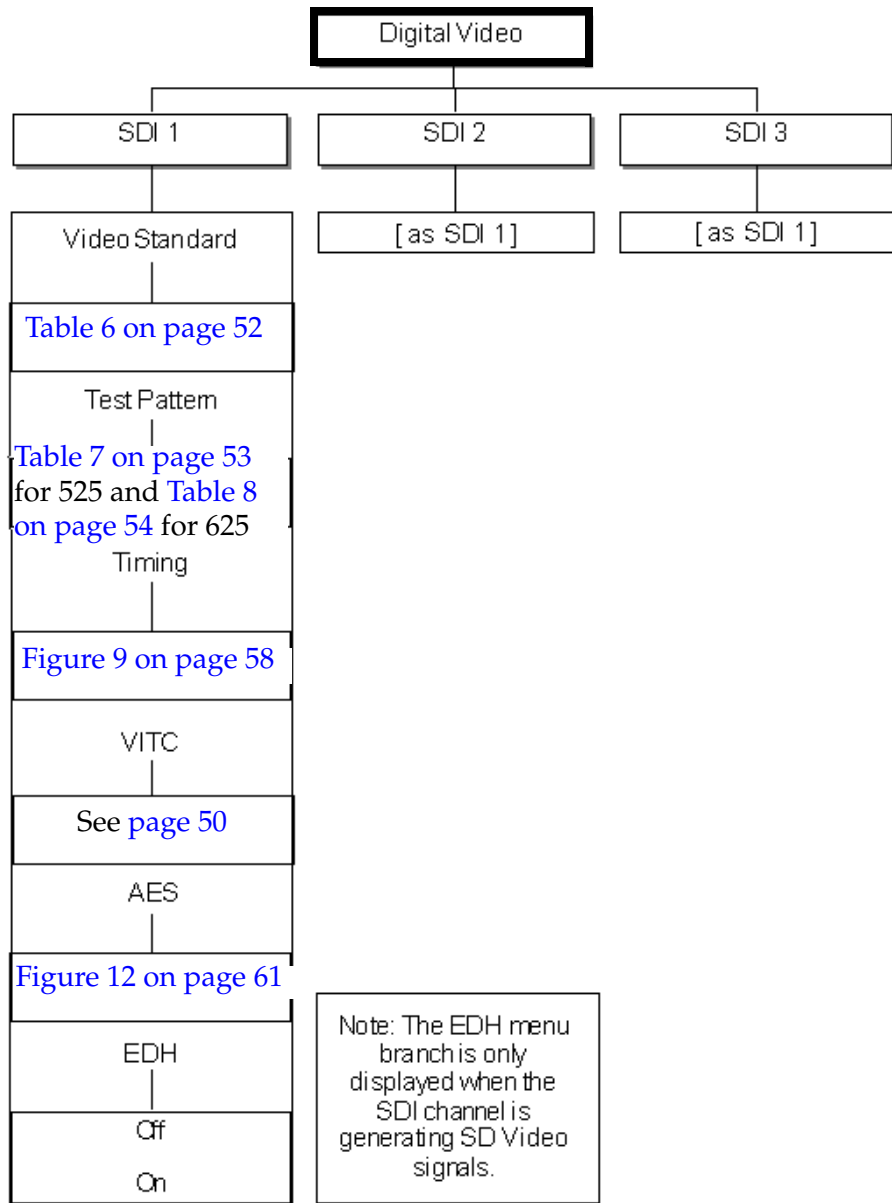
- Video Standard – see [Table 6 on page 52](#) for a listing of the current video standards available.
- Test Pattern – see [Digital Video – Test Patterns on page 53](#) and [Digital Video – Pattern Submenu on page 55](#).
- Timing – see [Digital Video – Timing on page 58](#).
- VITC – see [VITC Within SDI Video Waveform](#) below and [Digital Video – VITC \(7600MHD-REF Model\) on page 58](#).
- AES – see [Digital Video – AES Configuration on page 61](#).
- EDH – turn EDH insertion on or off.

VITC Within SDI Video Waveform

The 7600MHD-REF model will have the Timecode software option installed and will provide VITC (Vertical Interval Time Code) menus in appropriate Digital SDI 1-3 video menus.

VITC menus are described in this section unless they are the same as the LTC Timecode setup. For more information on LTC Timecode, refer to [Setup – LTC Menu \(7600MHD-REF Model\) on page 83](#).

Figure 7. Digital Video Menu



Digital Video – Video Standard

Selecting Video Standard will bring up the currently available digital video standards listed in [Table 6](#) based on the 7600REF model type. Scan types are identified by I (Interlaced) or P (Progressive). Select a video standard for each of the three SD/HD-SDI outputs from these choices.

Table 6. Current Digital Video Standards

Description	Lines/Frames	Frame Rate (Hz)	Scan	7600HD-REF 7600MHD-REF
525				Yes
625				Yes
1080i / 60	1080	60	I	Yes
1080i / 59.94	1080	59.94	I	Yes
1080i / 50	1080	50	I	Yes
1080p / 30	1080	30	P	Yes
1080p / 29.97	1080	29.97	P	Yes
1080p / 25	1080	25	P	Yes
1080p / 24	1080	24	P	Yes
1080p / 23.98	1080	23.98	P	Yes
720p / 60	720	60	P	Yes
720p / 59.94	720	59.94	P	Yes
720p / 50	720	50	P	Yes
720p / 30	720	30	P	Yes
720p / 29.97	720	29.97	P	Yes
720p / 25	720	25	P	Yes
720p / 24	720	24	P	Yes
720p / 23.98	720	23.98	P	Yes

Digital Video – Test Patterns

Selecting the Test Pattern menu choice, brings up the Test Pattern menu shown in [Figure 8 on page 55](#).

The Test Pattern menu offers the following selections:

- Patterns – available SD-SDI patterns are listed in [Table 7](#). Patterns for HD-SDI are listed in [Table 8 on page 54](#). The test pattern will appear immediately upon selection.
- Logos – not used in this application.
- Ident – up to 4 lines of text may be added to the selected test pattern for identification. Refer to [Using the Ident Menu on page 56](#).
- APL – allows the average picture level mode to be set to High, Low, or Bounce. See [APL Menu on page 56](#).
- Moving – turn a moving pattern on or off for detecting whether a signal is frozen by frame buffer.
- AFD – Refer to the [Active Format Description \(AFD\) Overview on page 57](#) for AFD information.

Table 7. Available SD-SDI Test Patterns

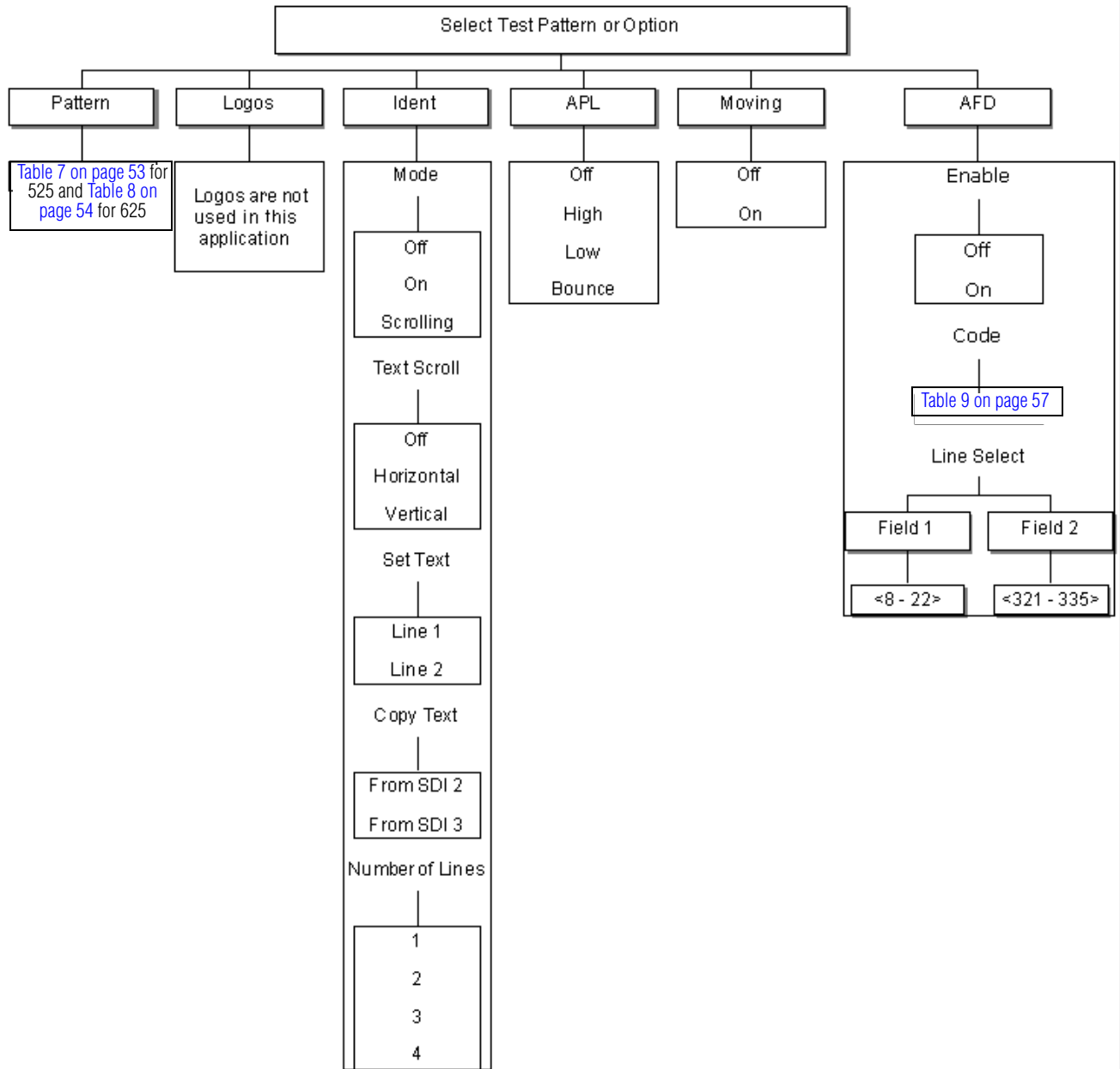
Pattern	525	625	Pattern	525	625
Full Field Black	x	x	Convergence Grille		x
75% White Field	x		17x14 Convergence Grille	x	
Full Field White	x	x	3T 2T Pulse & Bar	x	x
Full Field Yellow	x	x	5 Riser Luma Stair	x	x
Full Field Cyan	x	x	5 Riser Stair	x	x
Full Field Green	x	x	Valid 5 Riser Stair	x	x
Full Field Magenta	x	x	Luminance Ramp	x	x
Full Field Red	x	x	Limit Ramp	x	x
Full Field Blue	x	x	Valid Ramp	x	x
Digital Grey	x	x	Shallow Ramp	x	x
100% Colour Bars	x	x	PLUGE	x	x
100% Color Bars & Split	x	x	SPLUGE		x
75% Colour Bars	x		Multiburst	x	x
75% Colour Bars & Split	x		6.0 MHz Line Sweep	x	x
EBU Bars		x	25 Hz Lip Sync		x
EBU Bars & Split		x	Bowtie	x	x
100% VT Bars	x	x	Sin (x)/x	x	x
VT Bars & Split	x	x	30 Hz Lip Sync	x	
SMPTE Bars	x		Clean_Aperture_4_3	x	
Co-Siting Check	x	x	Clean_Aperture_16_9	x	
SDI Check Field	x	x	4:3 Test Card		x
SDI Green Check Field		x	16:9 Test Card		x
Linearity Grille		x	Clean_Aperture		x

Table 8. Available HD-SDI Test Patterns

Pattern	720	1080	Pattern	720	1080
Full Field Black	x	x	SDI Check Field	x	x
Full Field White	x	x	16x9 Grille	x	x
Full Field Yellow	x	x	10 Riser Stair	x	x
Full Field Cyan	x	x	Valid Ramp	x	x
Full Field Green	x	x	RP219 Option 1	x	x
Full Field Magenta	x	x	RP219 Option 2	x	x
Full Field Red	x	x	RP219 Option 3	x	x
Full Field Blue	x	x	RP219 Option 4	x	x
Digital Grey	x	x	Multiburst 100		x
100% Colour Bars	x	x	Multiburst	x	
100% Color Bars & Split	x	x	PLUGE	x	x
75% Colour Bars	x	x	Bowtie	x	x
75% Colour Bars & Split	x		Clean Aperture		x
SMPTE Bars	x	x	24 Hz Lip Sync	x	x
EBU Bars & Split		x	25 Hz Lip Sync	x	x
100% VT Bars		x	30 Hz Lip Sync	x	x
100% VT Bars & Split		x	50 Hz Lip Sync	x	
VT Colour Bars	x		60 Hz Lip Sync	x	
VT Colour Bars & Split	x				

Digital Video – Pattern Submenu

Figure 8. Digital Video –Select Test Patterns or Option Menu



Using the Ident Menu

Up to four lines of text may be set up on a selected test pattern using the Ident menu.

The Ident menu has the following controls:

- Mode – turn the text mode on and off or set to scroll across the screen.
- Text Scroll – set the text scroll off or to scroll horizontally or vertically.
- Set Text – select the line number to enter text into. Use the ADJUST knob to scroll through the alphabetic until you reach the first letter. Use the right arrow to move to the next letter, then select it with the ADJUST knob. Continue until you have the test you want then use the OK button to approve the text. Move to the next line of text with the right arrow button.
- Copy Text – if you are in the menu for SDI Pattern 1, you can copy the text from SDI Pattern 2 or 3.

APL Menu

The APL (Average Picture Level) menu provides the following four modes of APL:

- Off – turns APL off.
- High – selects a repeating pattern of 9 lines of white and 3 lines of the selected test signal.
- Low – selects a repeating pattern of 9 lines of black and 3 lines of the selected test signal
- Bounce – turns on APL Bounce where the signal will alternate between APL High and APL Low every 3 seconds.

Moving Menu

Use the Moving menu to turn a moving pattern on or off. This is used for detecting whether a signal has been freeze-framed via a frame buffer.

Active Format Description (AFD) Overview

Active Format Description (AFD) is a standard set of codes that can be sent in the video signal that carries information about their aspect ratio and active picture characteristics. It is used by television broadcasters to enable both 4:3 and 16:9 television sets to optimally present pictures transmitted in either format. It is also used by broadcasters to dynamically control how down conversion equipment formats widescreen 16:9 pictures for 4:3 displays.

AFD is available on 7600REF units loaded with firmware version 3.0.0.8 and later. The code can be enabled on main board outputs with version 10 (or later) hardware revision. Check the hardware revision from the Status > Options menu.

Three menu entries ([Figure 8 on page 55](#)) allow the AFD feature to be turned on or off, the insertion line to be selected (on Fields 1 & 2) and the AFD code to be set according to [Table 9](#).

Note The precise interpretation of the code may depends on the standards authority being studied. The code maybe represented as decimal or 4-bit binary.

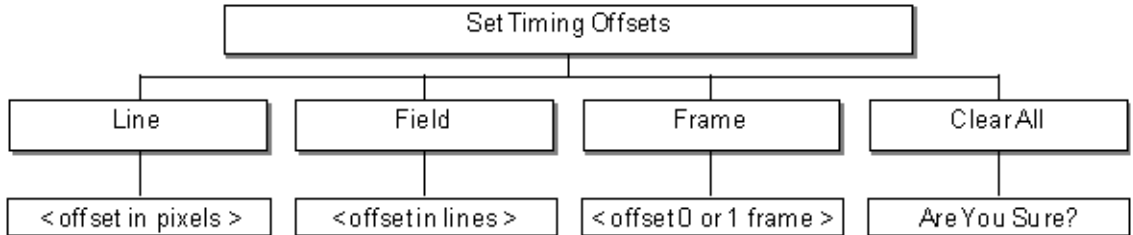
Table 9. AFD Table

Decimal	Binary	Summary
2	0010	16:9 top of frame
3	0011	14:9 top of frame
4	0100	16:9 vertically centered
8	1000	4:3 same as frame
9	1001	4:3 same as frame
10	1010	16:9 vertically centered
11	1011	14:9 vertically centered
13	1101	4:3: alternate 14:9 center
14	1110	16:9: alternate 14:9 center
15	1111	16:9: alternate 4:3 center

Digital Video – Timing

Select the Timing choice to bring up the Set Timing Offsets menu shown in [Figure 9](#). Set the Line, Field, and Frame offset for the SDI outputs.

Figure 9. Digital Video – Set Timing Offsets Menu



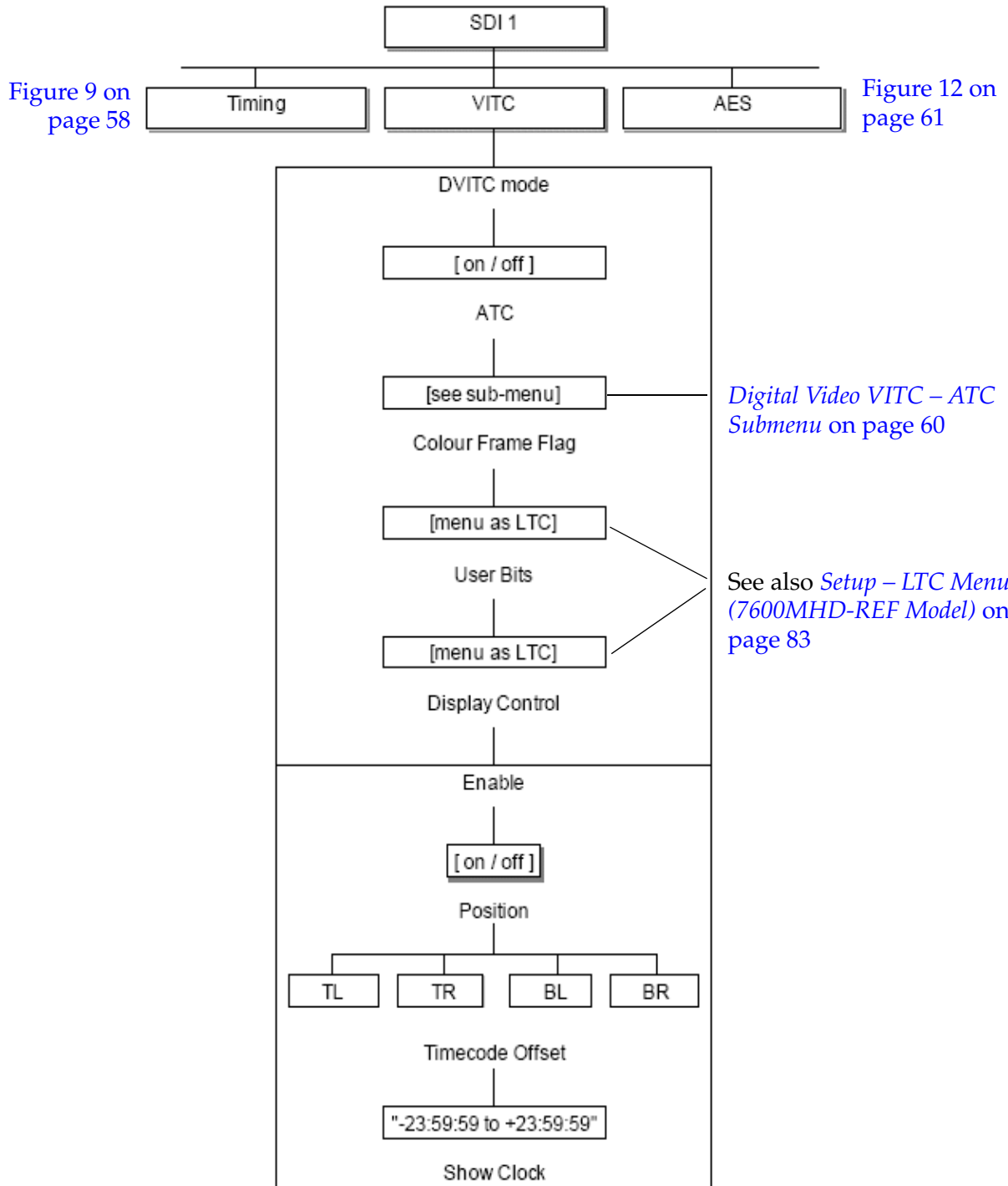
Digital Video – VITC (7600MHD-REF Model)

In 7600MHD-REF model, the Timecode software option is installed providing VITC menu branches in the Digital SDI 1-3 video menus where appropriate. The Digital Video – VITC menu is shown in [Figure 10 on page 59](#).

Setups for the DVITC menu include the following:

- DVITC mode – turn DVITC on or off.
- ATC – The ATC (Absolute Time Code) menu is explained in [Digital Video VITC – ATC Submenu on page 60](#) and shown in [Figure 11 on page 60](#).
- Color Frame Flag – this is a single bit within the data stream which indicates whether timecode is related to the video signal. This menu option allows the operator to turn this bit On or Off. This control is the same for LTC explained in [Setup – LTC Menu \(7600MHD-REF Model\) on page 83](#).
- User Bits – the primary function of the Flag Bits is to allow the operator to embed a date code within the data stream since timecode represents only embedded time. This conforms to SMPTE S309.
- Display Control
 - Enable – turn display on or off.
 - Position – set VITC position to TL, TR, BL, or BR.
 - Timecode Offset – an additional offset may be applied to any timecode output with a value between -23h: 59m: 59s and +23h: 59m: 59s. The default is 0h: 0m: 0s. This offset is applied immediately. Timecode outputs using the same oscillator frequency will remain in-step using the Timecode JAM settings applied in the Timecode JAM menu.

Figure 10. VITC within SDI Menu

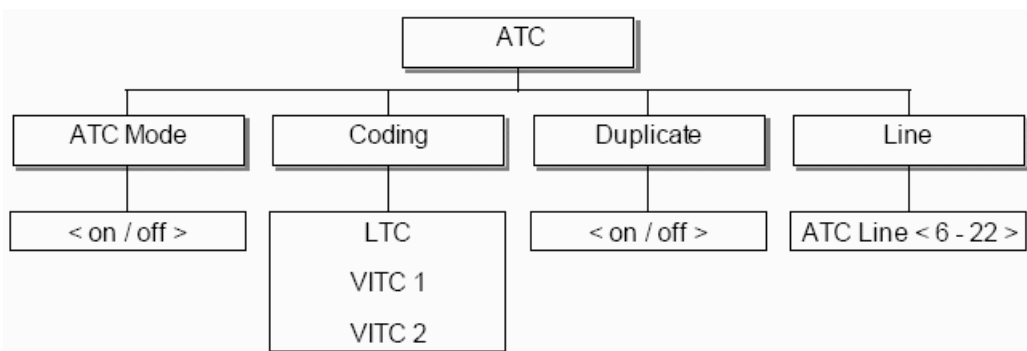


Digital Video VITC – ATC Submenu

The VITC ATC (Absolute Time Code) submenu (Figure 11) allows configuration of the following:

- ATC Mode – allows you to turn ATC mode on or off.
- Coding – indicates where the ATC data to be re-encoded as a VITC signal would appear on 1 or 2 lines in each field
- Duplicate – turn duplication on or off.
- Line – sets the line number where the ATC data to be re-encoded as a VITC signal will appear.

Figure 11. Digital Video VITC – ATC Menu

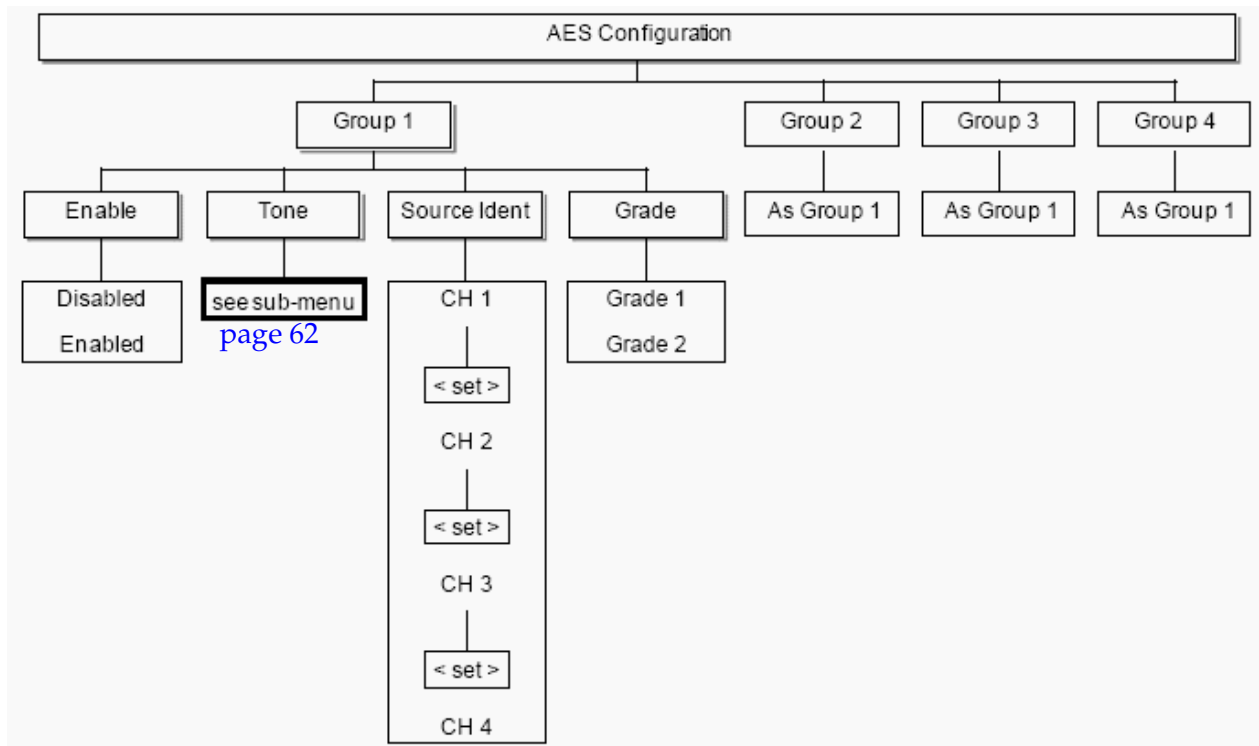


Digital Video – AES Configuration

Configure the AES 1 and 2 audio outputs with the AES menu shown in [Figure 12](#).

Note Setting the **Enable** mode to **Disabled** will remove **Tones** and **Source Ident** from the stream.

Figure 12. Digital Video – AES Configuration Menu



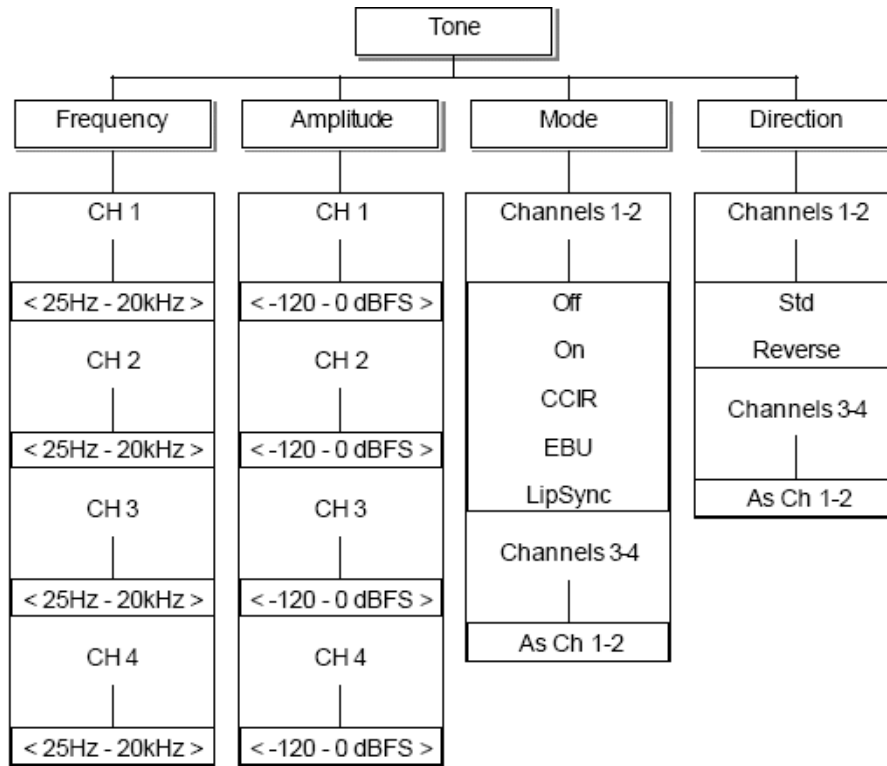
Four simultaneous AES groups are only available with firmware release 3.0.0.8 and later: prior to this, only one of the four groups may be enabled at once.

In those cases where four simultaneous AES groups are not supported, the menu structure shown above will change, such that the **Group** selection moves down the tree to sit alongside **Grade**.

Tone Submenu

The Tone submenu is present in each Group when the Enable setting is set to **Enabled**. Refer to the AES Configuration Tone sub-menu in [Figure 13](#).

Figure 13. AES Configuration – Tone Submenu



Setting Tone mode to **Off** mutes the signal but retains the AES data within the stream. Setting Tone Mode to **On** will provide continuous tone.

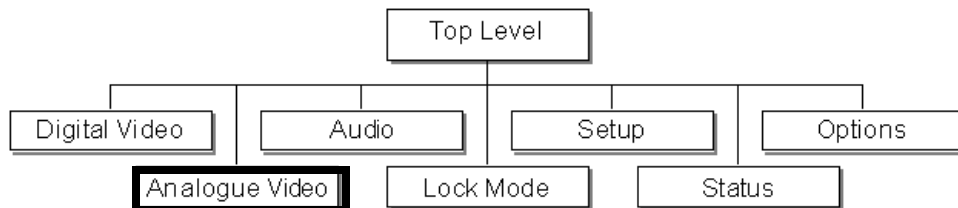
If the AES Group is disabled in the previous menu ([Figure 12 on page 61](#)) then tones will not be provided regardless of any settings in the above Tone submenu.

The default factory setting for the tones is **Off**.

Analogue Video Menus – Top Level

The top level analogue video menu is shown in [Figure 14](#). The menus follow two common themes: either for Test Pattern signals or for Black/Burst configuration. The five analogue output BNCs on the 7600 frame are shown in [Figure 1 on page 34](#).

Figure 14. Top Level Menu – Analogue Video



The available five analogue output connectors are arranged as follows:

- A group of three, configured as:
 - All Black and Burst (see [Analogue Video – All Black and Burst on page 65](#))
 - YUV test pattern (see [Analogue Video – YUV on page 66](#))
 - A single composite video signal, plus two Black and Burst outputs (see [Analogue Video – Comp/BnB/BnB on page 67](#))
 - RGB test pattern ([Analogue Video – RGB on page 68](#))
 - A YC test pattern plus a single Black and Burst output (see [Analogue Video – RGB on page 68](#))
- A group of two, configured as:
 - Both Black and Burst
 - A single composite video signal, plus one Black and Burst Output
 - Y/C (luminance/chrominance)

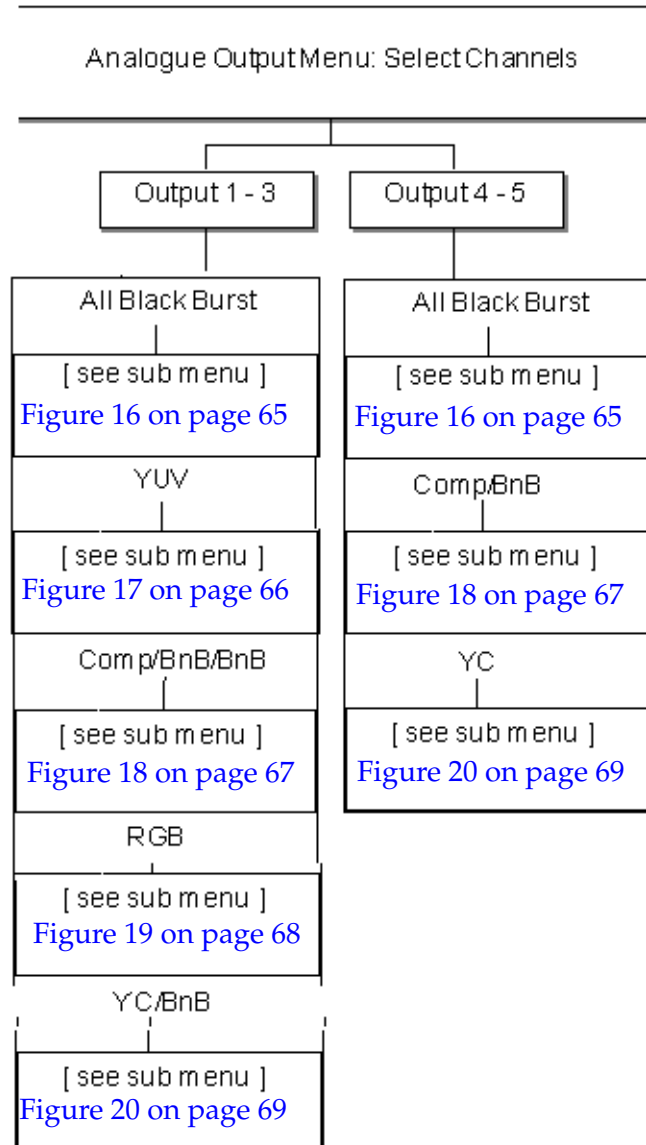
VITC in Analogue Waveforms

The 7600MHD-REF model will have the Timecode software option installed and will provide VITC (Vertical Interval Time code) menus in appropriate analogue video menus. For VITC in analogue waveforms refer to [Analogue Video – VITC \(7600MHD-REF Model\) on page 71](#).

VITC menus are described in this section unless they are the same as the LTC Timecode setup. For more information on LTC Timecode, refer to [Setup – LTC Menu \(7600MHD-REF Model\) on page 83](#).

The menus follow two common themes, either for the Test Pattern signals or for Black and Burst configuration as shown in [Figure 15](#).

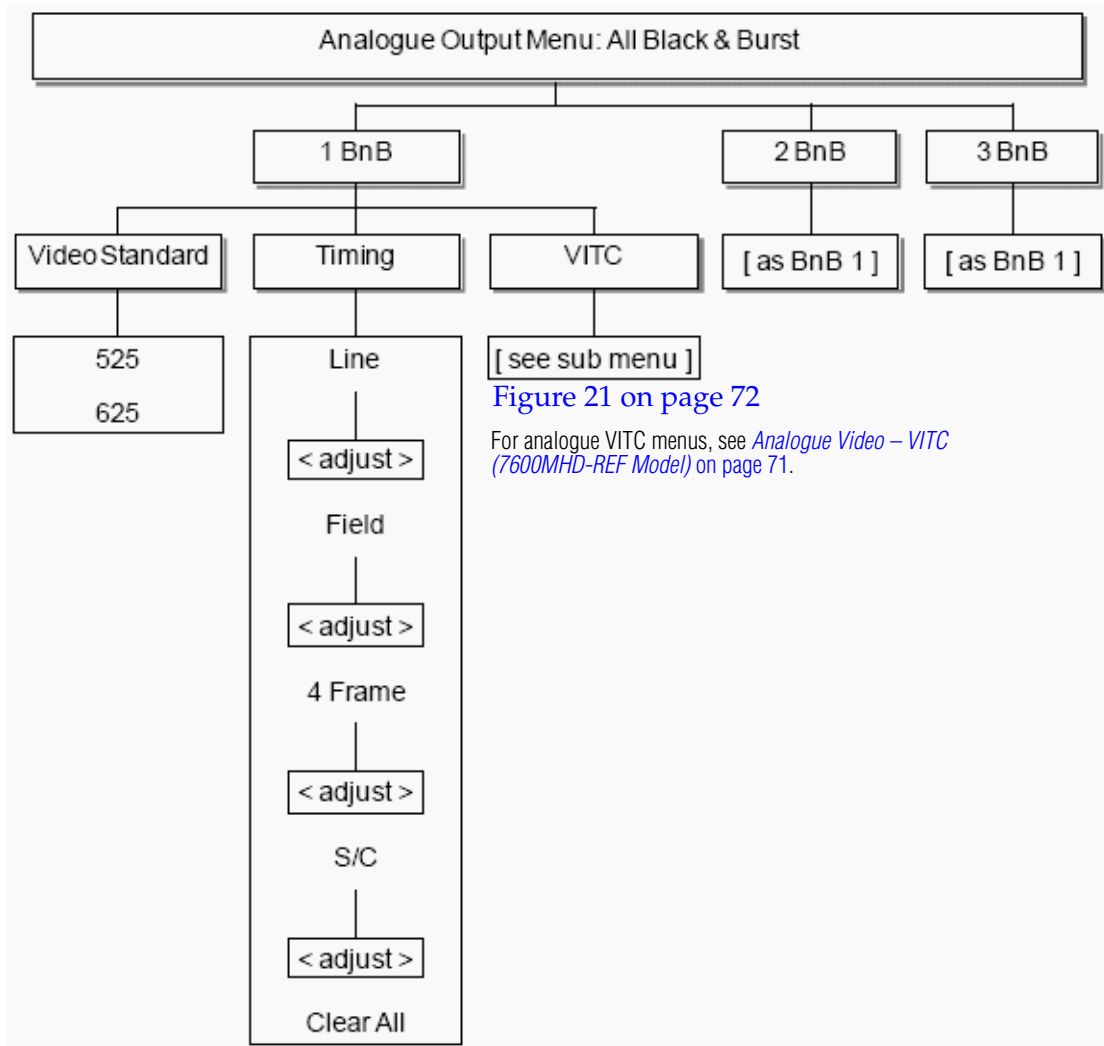
Figure 15. Analogue Video – Select Channels



Analogue Video – All Black and Burst

For configuring the analogue outputs for all black burst, refer to the configuration shown in [Figure 16](#).

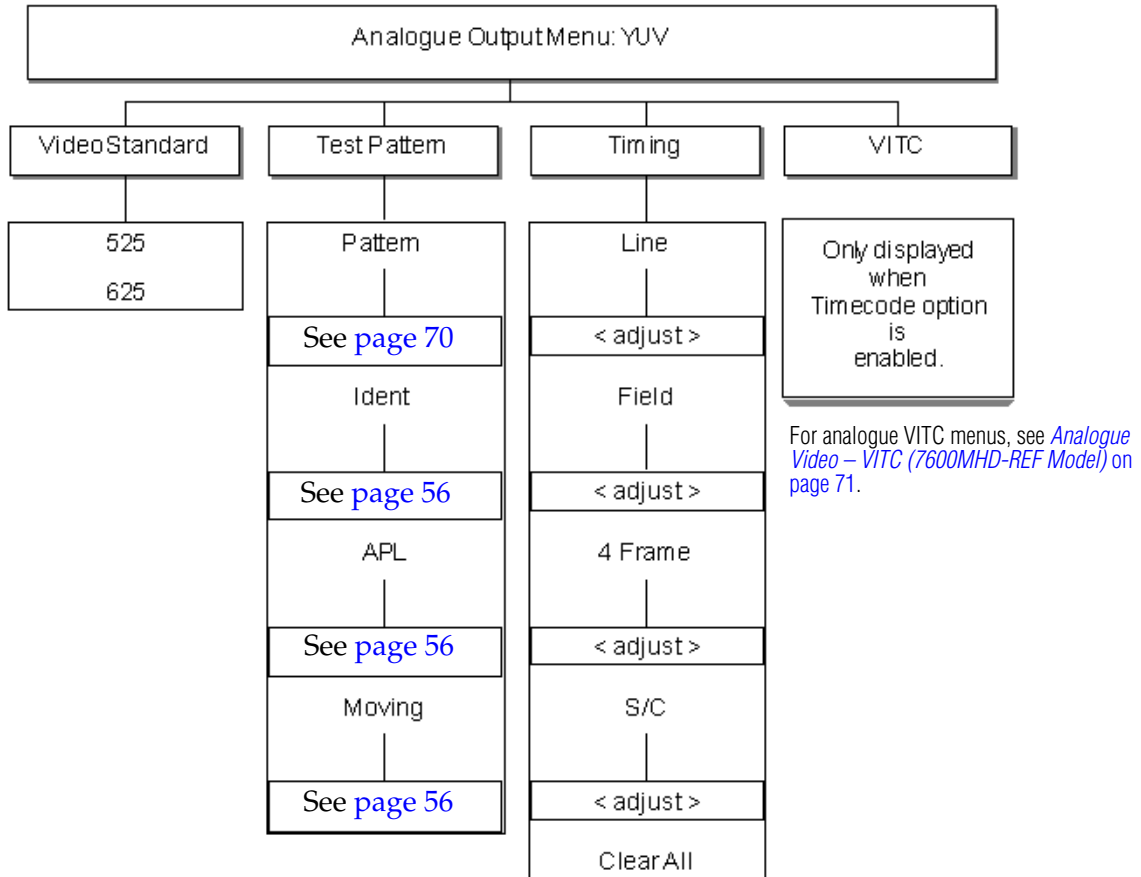
Figure 16. Analogue Video – All Black and Burst Menu



Analogue Video – YUV

For configuring the analogue outputs for YUV refer to the menu shown in [Figure 17](#). The analogue video test patterns available are listed in [Figure 10 on page 70](#) for 525 and [Figure 11 on page 70](#) for 625.

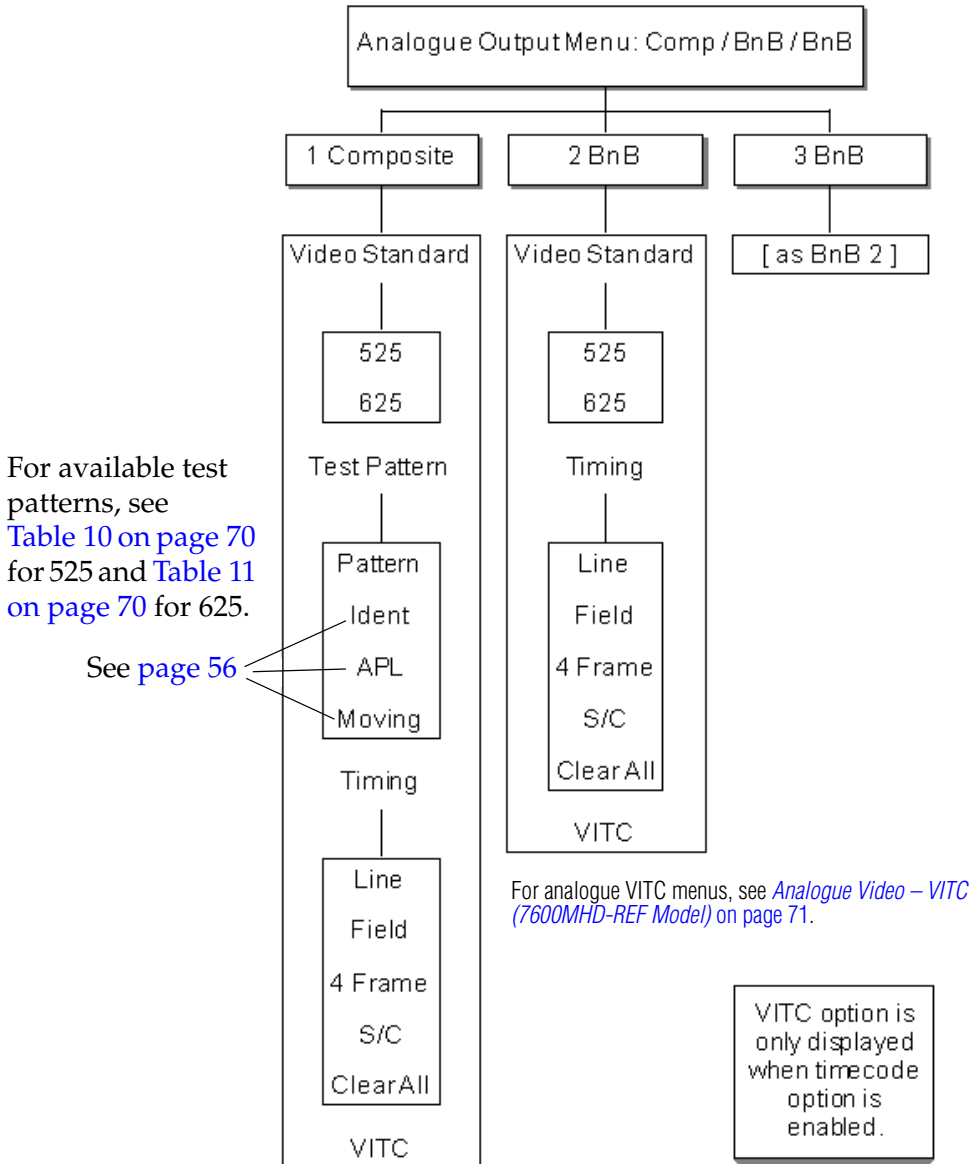
Figure 17. Analogue Video – Analogue Outputs YUV



Analogue Video – Comp/BnB/BnB

For configuring the analogue outputs for 1 composite output, and 2 Black Burst outputs refer to the menu shown in [Figure 18](#).

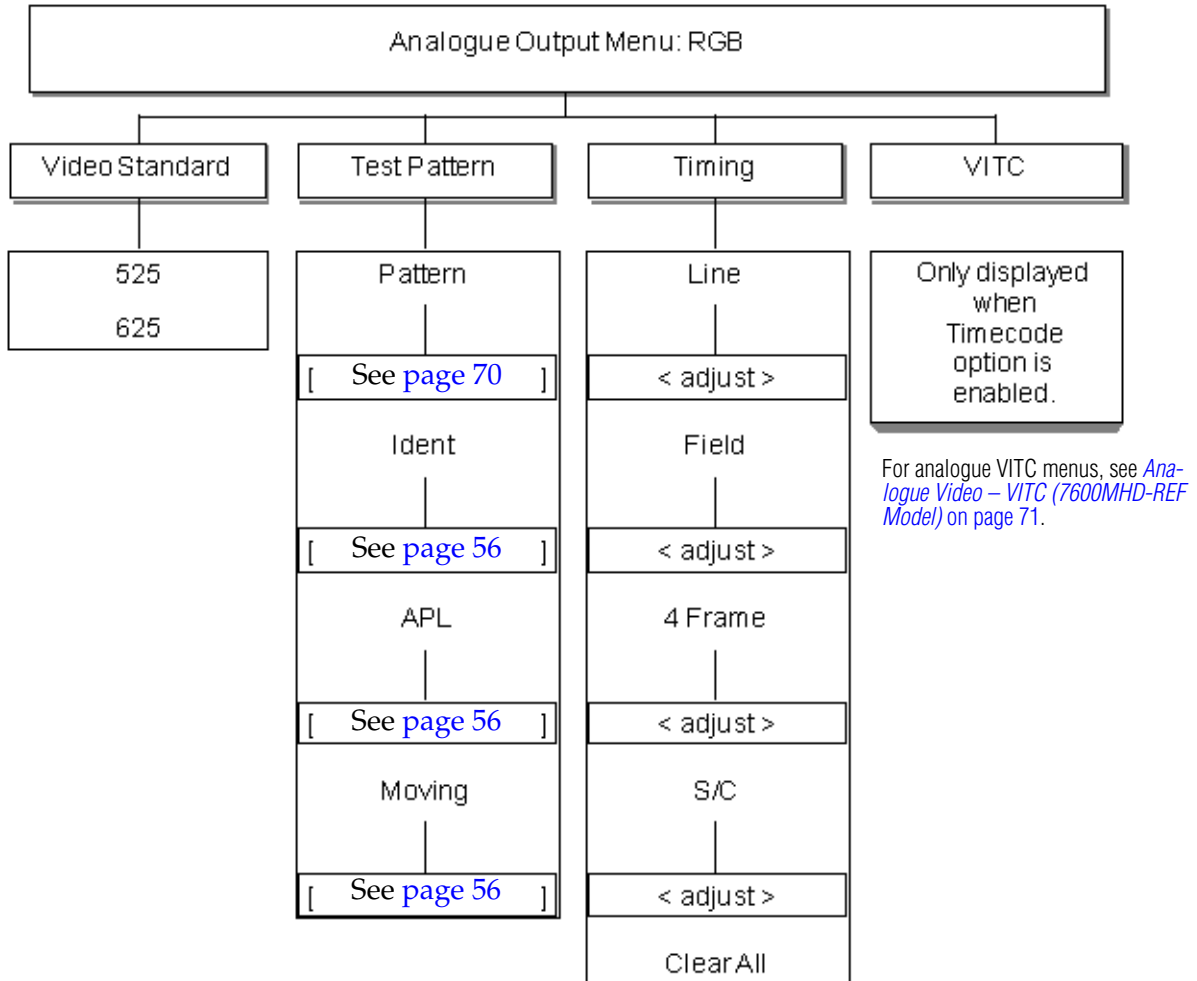
Figure 18. Analogue Video – Composite and Black and Burst



Analogue Video – RGB

The Analogue Output menu for RGB is shown in [Figure 19](#).

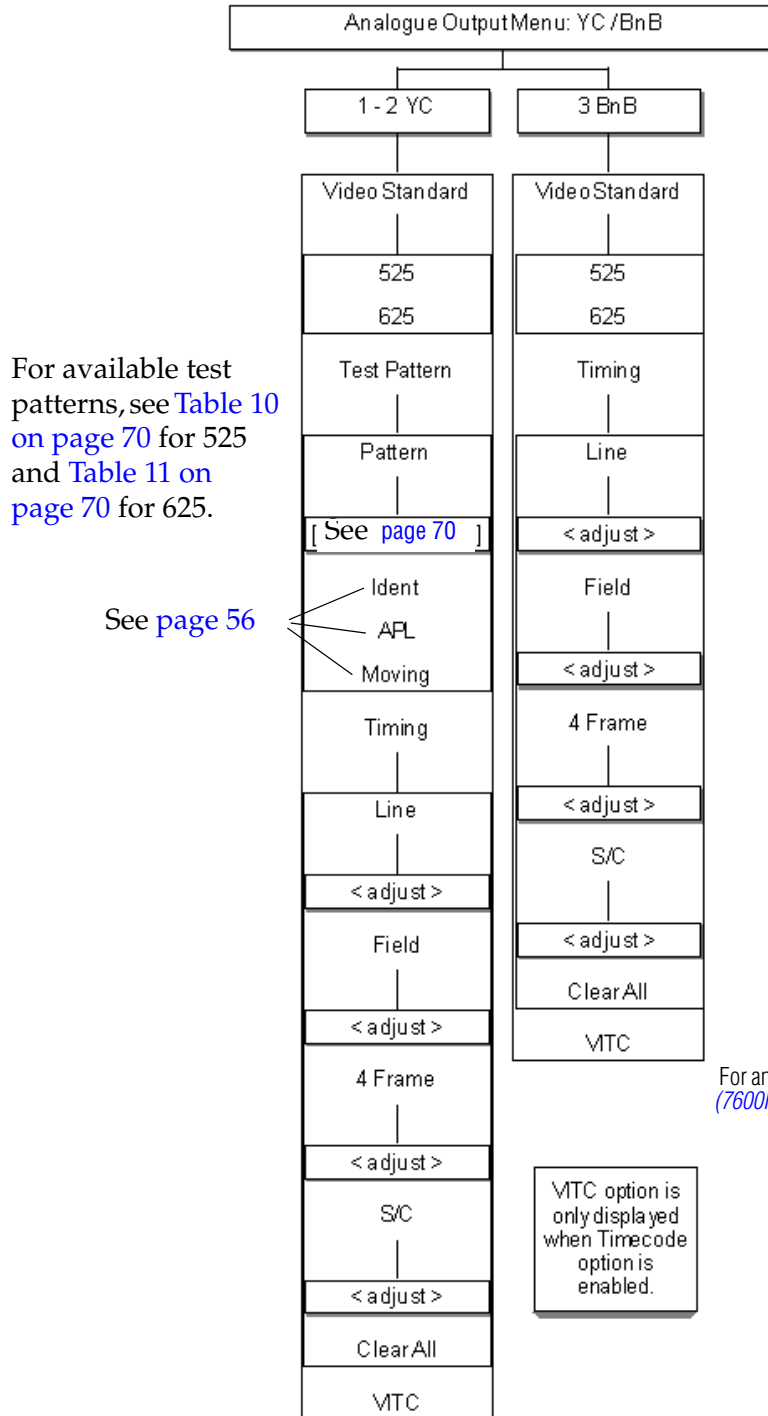
Figure 19. Analogue Video – Composite and Black and Burst



Analogue Video – YC/BnB

The Analogue Output menu for YC/BnB is shown in [Figure 20](#).

Figure 20. Analogue Output Menu – YC/BnB



Available Analogue Test Patterns

The range of available analogue test patterns depends on both the line standard selected and the output configuration (composite, YUV, etc.). Refer to [Table 10](#) for available 525 line standard test patterns and [Table 11](#) for available 625 line standard test patterns.

Table 10. 525 Line Standard Test Patterns

	Composite/ YC	RGB	YUV
Full Field Black	x	x	x
Full Field White	x	x	x
Full Field Red	x	x	x
Full Field Red 75%	x	x	x
Luminance Ramp	x	x	x
75% Colour Bars	x	x	x
5 Stair Step	x	x	x
SMPTE Bars	x	x	x
PLUGE	x	x	x
Multiburst	x	x	
Sin (x)/x	x	x	x

Table 11. 625 Line Standard Test Patterns

Pattern	Composite/ YC	RGB	YUV	Pattern	Composite /YC	RGB	YUV
Full Field Black	x	x	x	5 Riser Chroma Stair	x		x
Full Field White	x	x	x	Luminance Ramp	x	x	x
Full Field Red	x	x	x	Valid Ramp			x
100% Colour Bars	x	x	x	14x19 Grille	x	x	x
100% Colour Bars & Split	x	x	x	Linearity Grille	x	x	x
EBU Colour Bars & Split	x	x	x	Convergence Grille	x	x	x
EBU Color Bars	x	x	x	PLUGE	x	x	x
VT Colour Bars	x	x	x	SPLUGE	x	x	x
VT Bars & Split	x	x	x	15% White Window	x	x	x
2T Pulse & Bar	x	x	x	100% White Window	x	x	x
20T Chroma + 2T Pulse & Bar	x		x	Multiburst	x	x	
Valid Stair			x	Sin(x)/x	x	x	x
5 Riser Luma Stair	x	x	x				

Analogue Video – VITC (7600MHD-REF Model)

On 7600MHD-REF model with LTC timecode software installed, the additional branch for VITC in Analogue waveform is present in analogue video menus as appropriate.

An example of an Analogue VITC menu is shown for Analogue: Black/Burst in [Figure 21 on page 72](#).

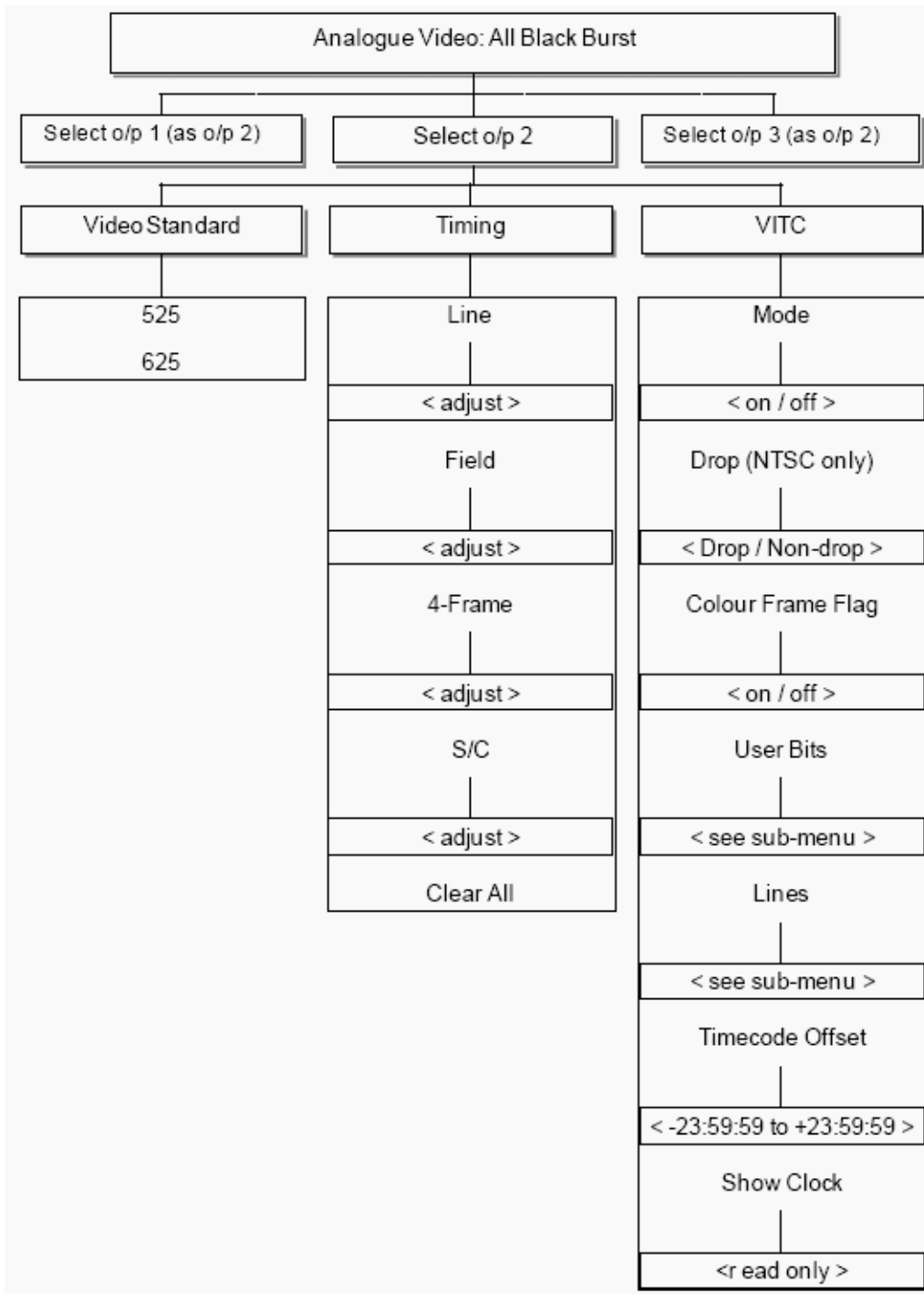
The analogue VITC setup includes the following controls:

- Mode – turn VITC on or off. (Factory default is off.)
- Drop (NTSC only) – relates to 525/NTSC line timecode and determines whether frames are dropped to compensate for the non-integer number of NTSC frames per second.

Note There is no Drop entry on the menu when the output in question is set to PAL mode. However, there is an extra Lines option on this menu to allow control over which line the VITC signal is inserted into.

- Colour Frame Flag – this is a single bit within the data stream which indicates whether timecode is related to the video signal. This menu option allows the operator to turn this bit on or off. This control is the same for LTC explained in [Setup – LTC Menu \(7600MHD-REF Model\) on page 83](#).
- User Bits – the primary function of the Binary Flag User Bits is to allow the operator to embed a date code within the data stream since timecode represents only embedded time. This conforms to SMPTE S309. See the User Bits sub-menu in [Figure 31 on page 84](#) in the LTC Menu section.
- Lines – in PAL mode, this menu allows control over which line the VITC is inserted into. See the Lines sub-menu in [Figure 22 on page 73](#).
- Timecode Offset – an additional offset may be applied to any timecode output with a value between -23h: 59m: 59s and +23h: 59m: 59s. The default is 0h: 0m: 0s. This offset is applied immediately. Timecode outputs using the same oscillator frequency will remain in-step using the Timecode JAM settings applied in the Timecode JAM menu.
- Show Clock – a read-only entry showing the current clock source.

Figure 21. Analogue Video – VITC Menu Example

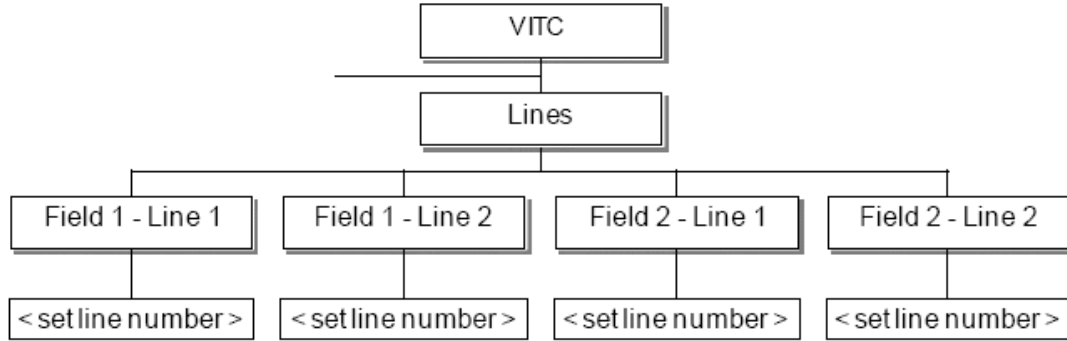


page 84

page 73

The analogue VITC Lines submenu (Figure 22) allows setting the lines VITC is inserted into when in PAL mode for example. Line 1 and Line 2 indicate the first and second lines in each Field which have VITC inserted.

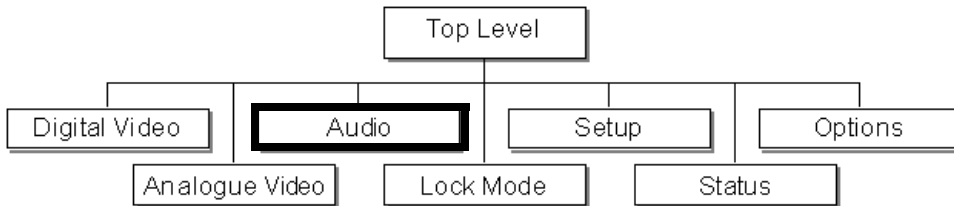
Figure 22. Analogue VITC – Lines Submenu



Audio Menus – Top Level

Access to the top level Audio menu is shown in [Figure 23](#). The Audio menu has two branches: AES and Analogue.

Figure 23. Top Level Menu – Audio



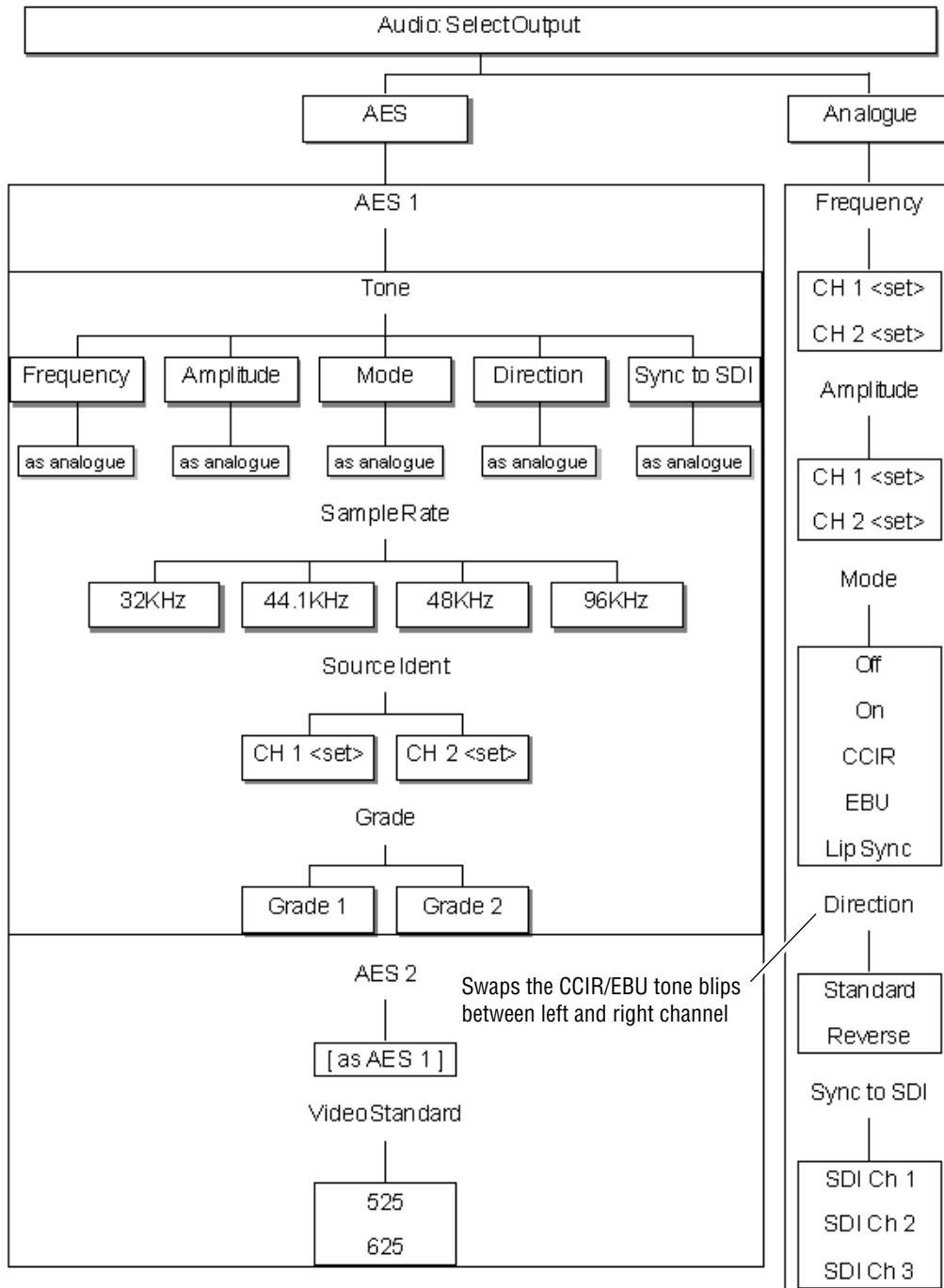
The Audio branch of the top level menu has two branches, AES 1/AES 2 and Analogue with the controls listed below. Parameters for all settings are shown in the Audio menu in [Figure 24 on page 75](#).

- AES – configure AES1/AES 2 outputs for the following:
 - Tone,
 - Sample Rate,
 - Source Ident, and
 - Grade,
 - AES 2 (as AES 1), and
 - Video Standard.

(The AES 2 menu is identical to the AES 1 menu.)

- Analogue – configure Analogue Audio output 1 and 2 for the following:
 - Frequency,
 - Amplitude,
 - Mode,
 - Direction (swaps the CCIR/EBU tone blips between the right and left channels), and
 - Sync to SDI.

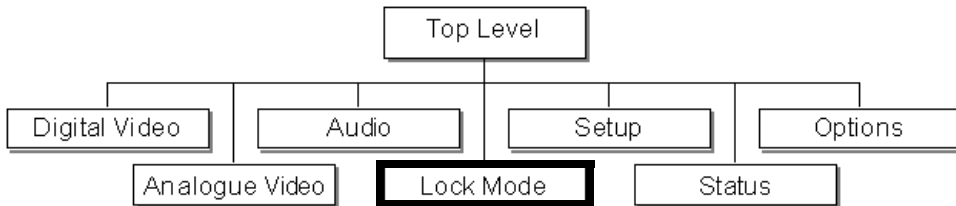
Figure 24. Audio: Select Output Menus



Lock Mode Menu – Top Level

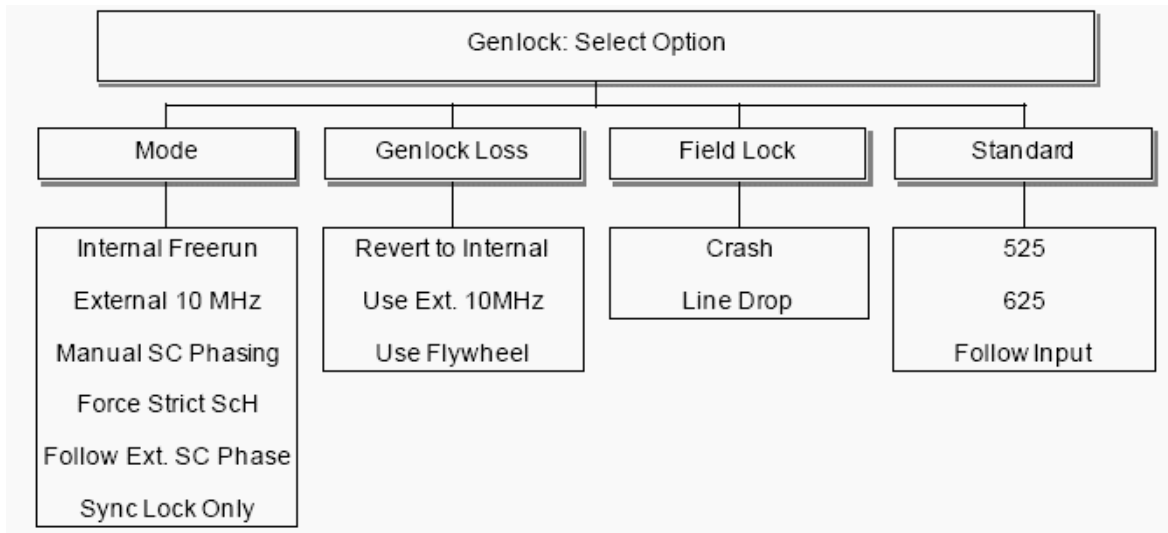
Access to the Lock Mode top level menu is shown in [Figure 25](#). The Genlock Mode (or Generator Lock) settings of the unit (for example, the current Genlock Mode and timing offsets) may be changed with the selections in the Genlock menu.

Figure 25. Top Level Menu – Lock Mode



Selecting the Lock mode brings up the Genlock: Select Option menu in [Figure 26](#).

Figure 26. Genlock: Select Option Menu



Set the following in the Genlock menu:

- **Mode** – changes the basic genlock mode such as internal (free run) to video ([Genlock – Mode on page 77](#)).
- **Genlock Loss** – sets the behavior of the unit following loss of the genlock signal ([Genlock Loss on page 77](#)).
- **Field Lock** – alters the field lock action – instantaneous or slow lock ([Genlock – Field Lock on page 78](#)).
- **Input Standard** – refer to [Genlock – Input Standard on page 78](#).

To enter a submenu, scroll to the function and select the **OK** button.

Genlock – Mode

Select the type of Genlock mode required by using the Encoder control. All available modes are discussed below.

Note Please be aware that the mode will change immediately when an option is selected.

- **Internal Free Run** – sets the unit to free running, relying on the internal oven oscillator for stability. The ScH of the unit will be set to zero.

Note The 7600REF must be set to free run when locking to a GPS signal.

- **External 10 MHz** – sets the unit to genlock to the 10 MHz input. There will be no fixed phase relationship with any other units locked to this signal. The ScH of the unit will be set to zero.
- **Manual SC Phasing** – sets the unit to genlock to the video input. The sub-carrier phase offset may be adjusted as required.
- **Force Strict ScH** – sets the unit to genlock to the video input. The ScH of the outputs of the unit is forced to zero regardless of the genlock input ScH. This is achieved by moving the line timing with respect to the genlock input until the correct ScH phase results.
- **Follow External SC Phase** – sets the unit to genlock to the video input. The subcarrier output phase is set to be the same as the input genlock video.
- **Sync Lock Only** – sets the unit to genlock to the video input. The system is genlocked using only the sync information of the genlock video input. the ScH phase of the output is forced to zero (i.e - correct).

Genlock Loss

Select the operational mode of the unit following loss of the genlock signal from the following choices:

- **Revert to Internal** – if the external reference signal is removed, the unit will use the internal oven maintained oscillator or GPS signal (when available) as its master oscillator.
- **External 10 MHz** – if the genlock video input is removed, the unit will use the 10 MHz input as its master oscillator. if the 10 Mhz input is not present when the video input fails, the unit will use the internal oven maintained oscillator or GPS signal (when available) as its master oscillator.
- **Flywheel** – if the genlock video input is removed, the unit will continue to operate - flywheel - at the same frequency as the genlock input just removed.

Note Note that if the unit is powered up in this mode with no genlock input applied, the 7600REF outputs may not be within specification.

Genlock – Field Lock

Select the mode required from the following choices using the Encoder control or Left and Right keys:

- **Crash** – sets the unit to lock near instantaneously to the field information of an applied genlock input. This is the normal state of operation.
- **Line Drop** – sets the unit to lock to the field information of an applied genlock video input by moving the outputs one line nearer the genlock video input every 5 fields until the unit is locked. This mode is useful if the instant locking of the Crash mode is found to upset any downstream equipment.

Genlock – Input Standard

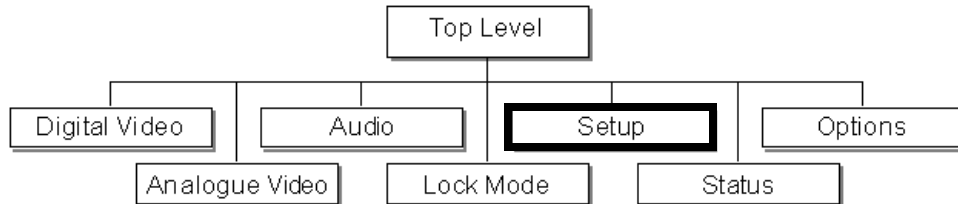
Select the video line standard of the input signal.

- **525**
- **625**
- **Auto detect (follow input)**

Setup Menus – Top Level

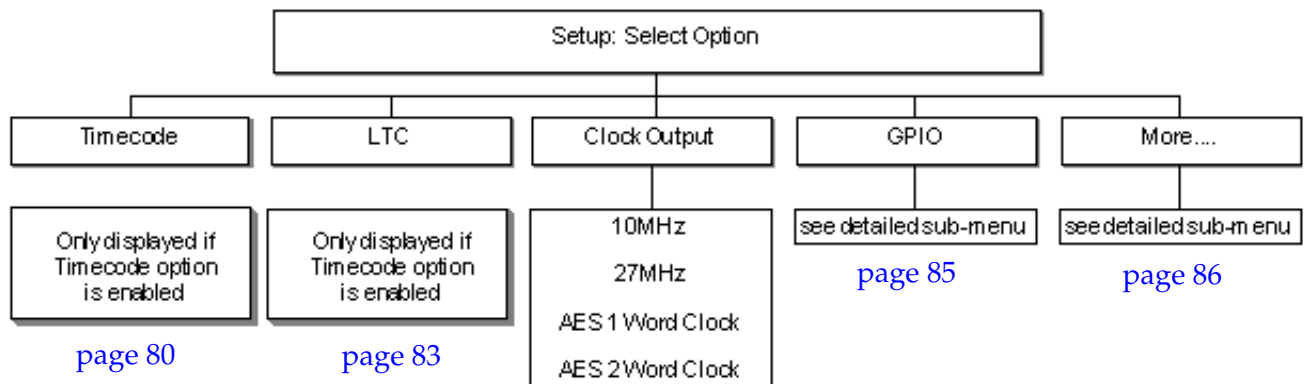
Access to the Setup top level menu is shown in [Figure 27](#).

Figure 27. Top Level Menu – Setup



Selecting the Setup top level menu brings up the Setup: Select Option menu ([Figure 28](#)).

Figure 28. Setup: Select Option Menu



The top level Setup menu has the following functions:

- Timecode (7600MHD-REF): see [page 80](#).
- LTC (Longitudinal Time Code) (7600MHD-REF only): see [page 83](#).
- Clock Output – configuration of the Clock Output source.
- GPIO – comprehensive control of General Purpose Inputs and Outputs, including:
 - the input response mode
 - the action resulting from a GPI trigger
 - the event causing a GPO state change

The GPIO submenu for setting up GPI control is explained and shown in [Setup – GPIO Control on page 85](#).

- More... see [Setup: More on page 86](#).

Setup – Timecode (7600MHD-REF only)

The Timecode function will appear in the Setup – Select Option menu (Figure 29 on page 82) in the 7600MHD-REF model and provides the following:

- Two outputs of Longitudinal Timecode (LTC) on the LTC 9 pin Sub-D connector (refer to [Timecode on page 40](#) for connector pinout information).
- Vertical Interval Timecode (VITC) superimposed on analogue video waveforms. This is enabled or disabled in accordance with the current group arrangement of the analogue signal outputs.
- Each SDI output offers a combination of:
 - Digital VITC (SMPTE S309) for SD SDI signals only, and
 - Ancillary Timecode (ATC) – (SMPTE UP 188) for standard definition or high definition SDI signals.

Timecode Jamming

Timecode jamming is the process of setting the time carried on the timecode stream. To avoid discontinuity, it is important to carry this out carefully. Some menu options apply to all base clock frequencies and are presented under the All Frequencies branch. Other options are available under individual frequencies (e.g. 23.98 Hz etc.) used to derive specific output signals. For example, to jam the timecode for a 625 PAL signal, follow the 25 Hz menu branch.

Four timecode formats are supported from the format menu; the chosen format applies to all timecode generated by the 7600REF. The different format options place date/time data into the binary groups of the VITC/LTC codeword in a different sequence. See [Table 12](#) for more details.

Table 12. SMPTE and Non-SMPTE Timecode Formats

	SMPTE 309M	Non-SMPTE 309M		
		European	U.S.	Leitch
Binary Group 1	Day units			
Binary Group 2	Day tens			Day units
Binary Group 3	Month units	Day units	Month units	Month units
Binary Group 4	Month tens	Day tens	Month tens	Month tens/Day tens
Binary Group 5	Year units	Month units	Day units	
Binary Group 6	Year tens	Month tens	Day tens	Year units
Binary Group 7		Year units	Year units	
Binary Group 8		Year tens	Year tens	Year tens

The Timecode menu ([Figure 29 on page 82](#)) includes the following settings:

- **Format** – select the timecode format (see [Table 12 on page 80](#)):
 - **SMPTE 309M**
 - Non-SMPTE format from one of the following:
 - **European**
 - **US**
 - **Leitch**
- All Frequencies – for all base frequencies, set the following (see [Timecode Jamming on page 80](#) for more information):
 - JAM Source:
 - **Manual** – enter values manually from the front panel or browser.
 - **RTC** – uses the Real Time Clock.
 - **VITC** – jams the timecode by sampling VITC on the 7600REF Genlock input. (Option displayed when a suitable signal is detected and only under the All Frequencies menu branch.)
 - JAM Mode:
 - **Auto** – sets a scheduled time for jamming to take place. This is a recurring action.
 - **Manual** – on command.
 - **Genlock** – when this option is selected, jamming takes place every time genlock is achieved.
 - JAM! – **Confirm** – initiates JAM procedure with OK/cancel options.
- 23.98 Hz, 24 Hz, 25 Hz, 29.97 Hz (df), 29.97 Hz, or 30 Hz – set for a specific frequency section (see [Timecode Jamming on page 80](#)):
 - JAM Source:
 - **Manual**
 - **RTC**
 - Jam Mode:
 - **Auto** – sets a scheduled time for jamming to take place. This is a recurring action.
 - **Manual** – on command.
 - **Genlock** – when this option is selected, jamming takes place every time genlock is achieved.
 - JAM! – **Confirm** – initiates JAM procedure with OK/cancel options.
 - Show Clock – shows the current timecode clock for each base frequency as read-only. This option is not displayed on the All Frequencies menu branch.

Figure 29. Setup – Timecode and LTC

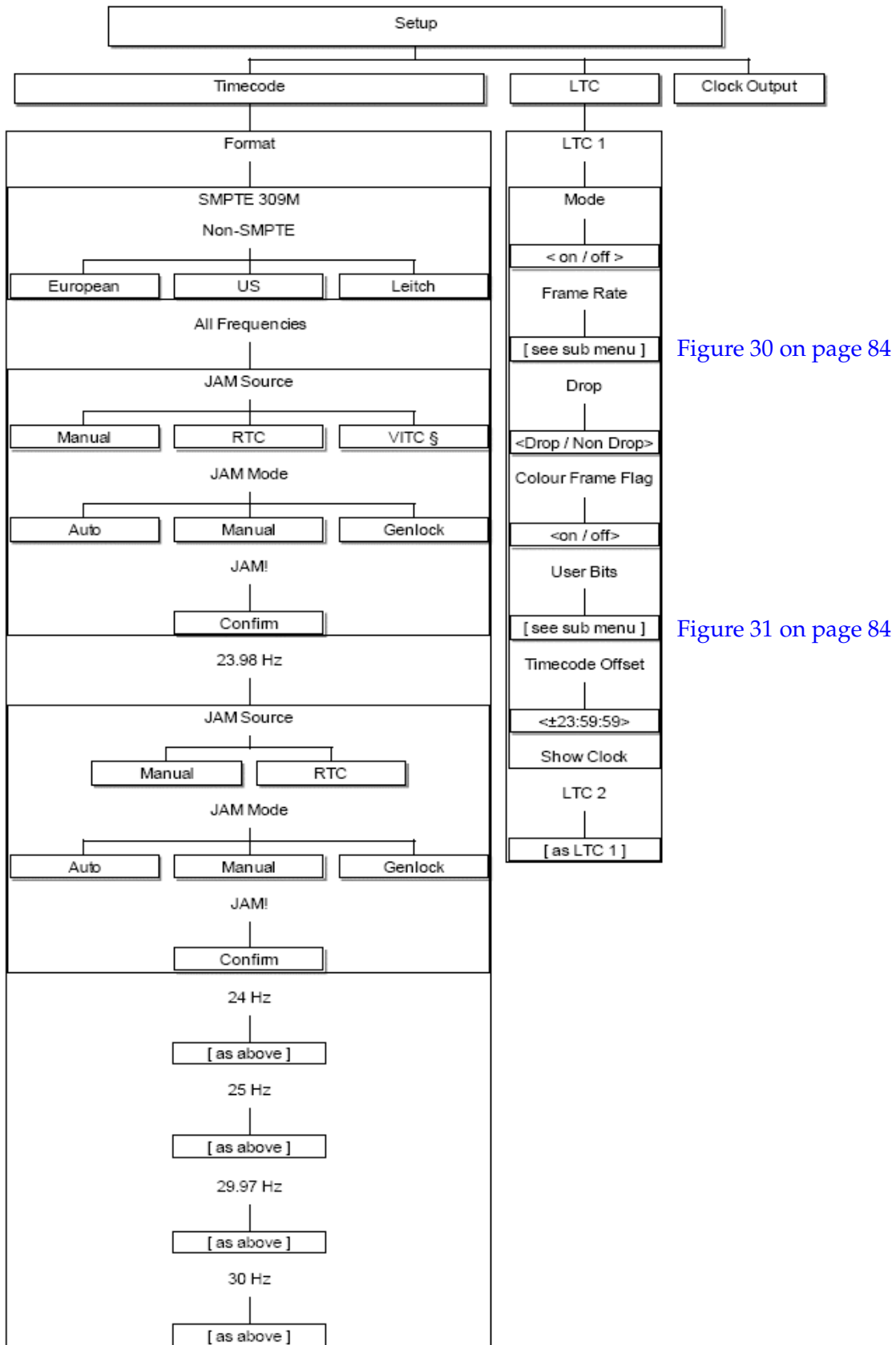


Figure 30 on page 84

Figure 31 on page 84

Setup – LTC Menu (7600MHD-REF Model)

The LTC (Longitudinal Time Code) branch of the Setup menu ([Figure 29 on page 82](#)) will appear on a 7600MHD-REF model with the Timecode menu.

The following can be set for LTC 1 and LTC 2:

- Mode – turns the LTC timecode on and off. Factory default setting is off.
- Frame Rate – since LTC is not contained within a video signal, the frame rate must be set either explicitly or associated with another system output.

Refer to the [LTC Frame Rate Submenu on page 84](#).

- Drop/Non-Drop – relates to 525/NTSC line timecode and determines whether frames are dropped to compensate for the non-integer number of NTSC frames per second.
- Color Frame Flag – this is a single bit within the data stream which indicates whether timecode is related to the video signal. This menu option allows the operator to turn this bit on or off.
- User Bits – the primary function of the User Bits is to allow the operator to embed a date code within the data stream since timecode represents only embedded time. This conforms to SMPTE S309.

Refer to the [LTC – Configure User Bits Submenu on page 84](#).

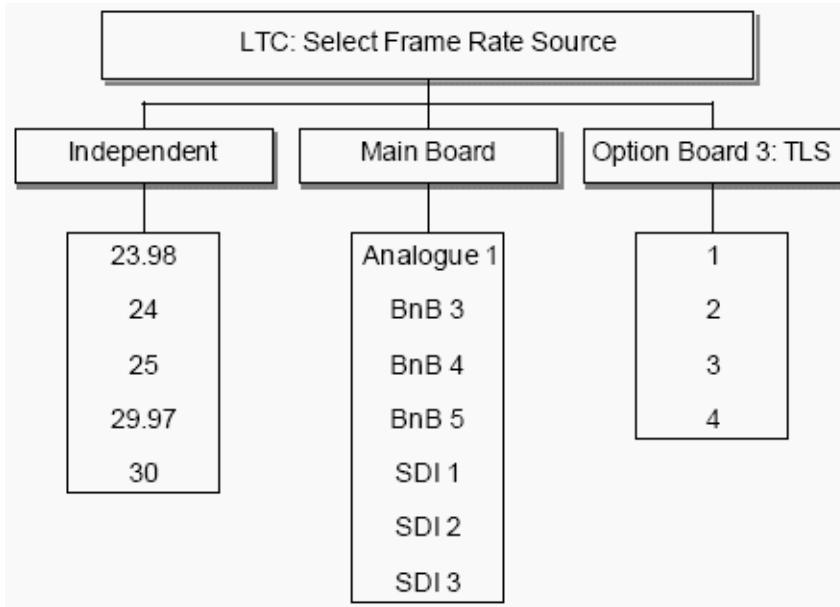
- Timecode Offset – an additional offset may be applied to any timecode output with a value between -23h: 59m: 59s and +23h: 59m: 59s. The default is 0h: 0m: 0s. This offset is applied immediately. Timecode outputs using the same oscillator frequency will remain in-step using the Timecode JAM settings applied in the Timecode JAM menu.

Refer to [Timecode Jamming on page 80](#).

LTC – Frame Rate Source Submenu

The LTC Frame Rate Source submenu is shown in [Figure 30](#).

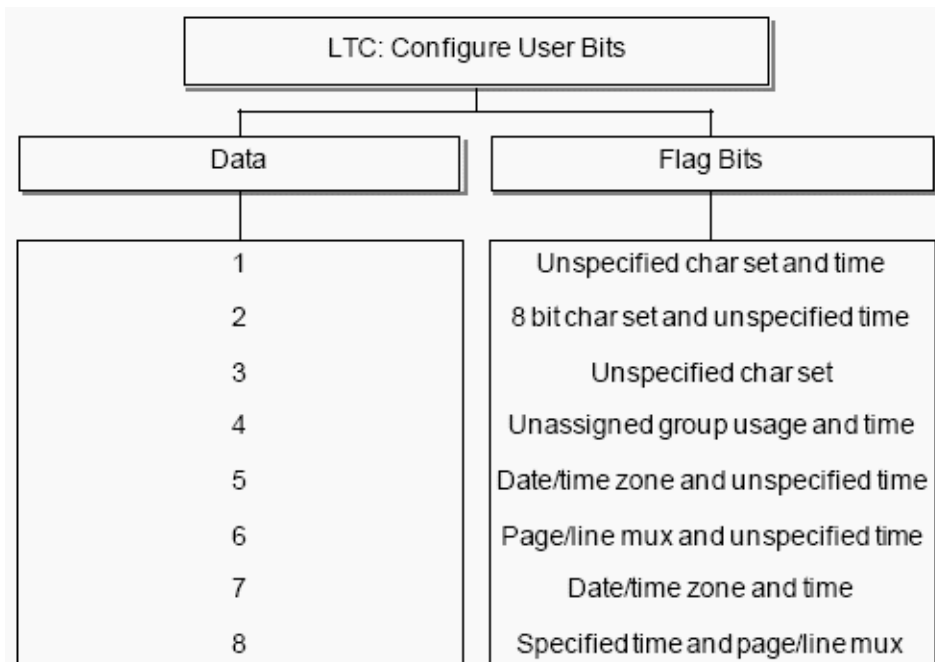
Figure 30. LTC Frame Rate Submenu



LTC – Configure User Bits Submenu

The LTC Configure User Bits submenu is shown in [Figure 31](#).

Figure 31. LTC Configure User Bits Submenu



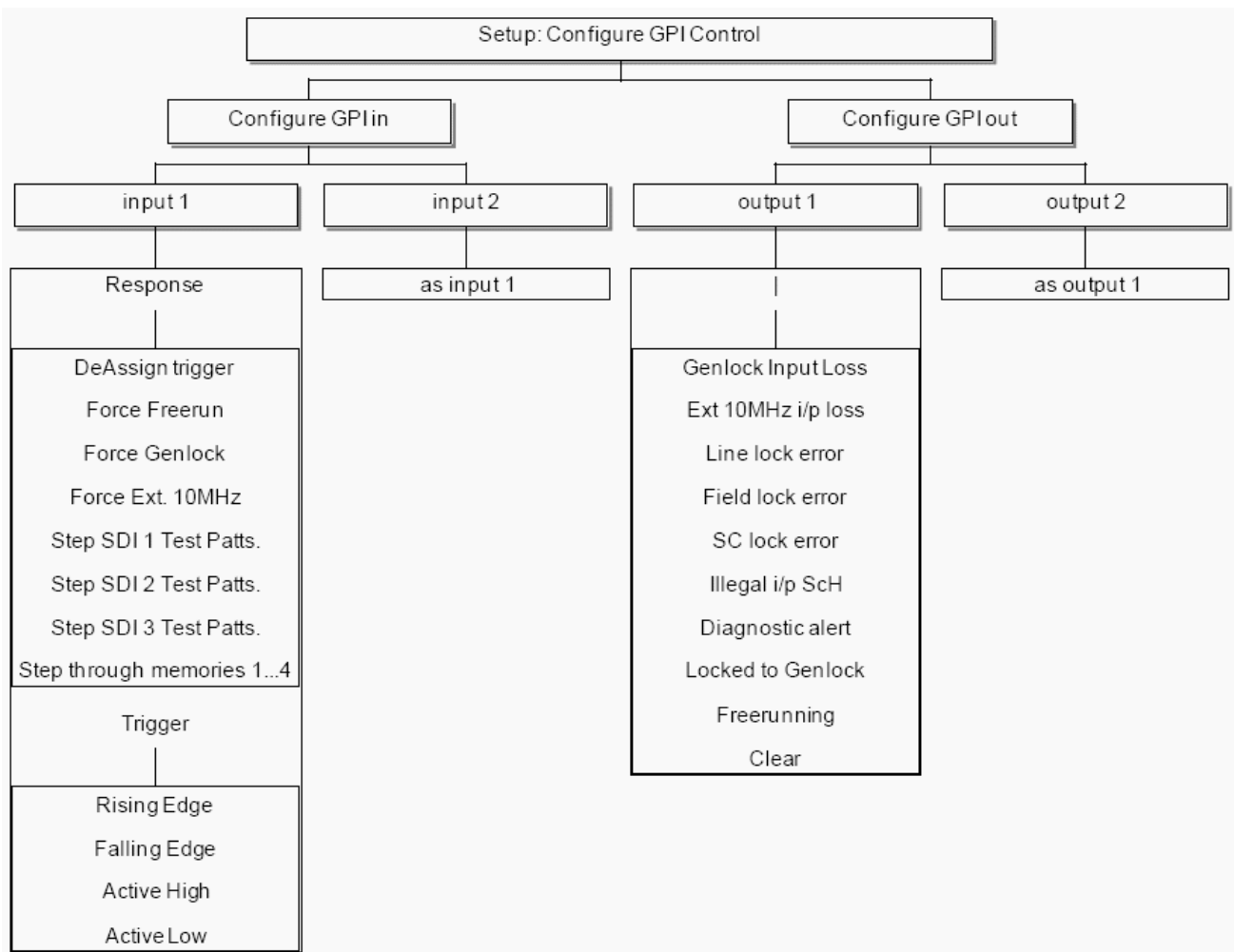
Setup – GPIO Control

The Setup: Configure GPI Control menu shown in [Figure 32](#) has the following configuration settings:

- Configure GPI in – the actions which the 7600REF will carry out when a control signal is applied to GPI Input 1 or 2.
- Configure GPI out– the events that will trigger the 7600REF GPI output. The available conditions include error and status messages.

GPI wiring is described in [GPI Inputs 1 and 2 on page 36](#) and [GPI Outputs 1 and 2 on page 37](#).

Figure 32. Configure GPI Control Menu

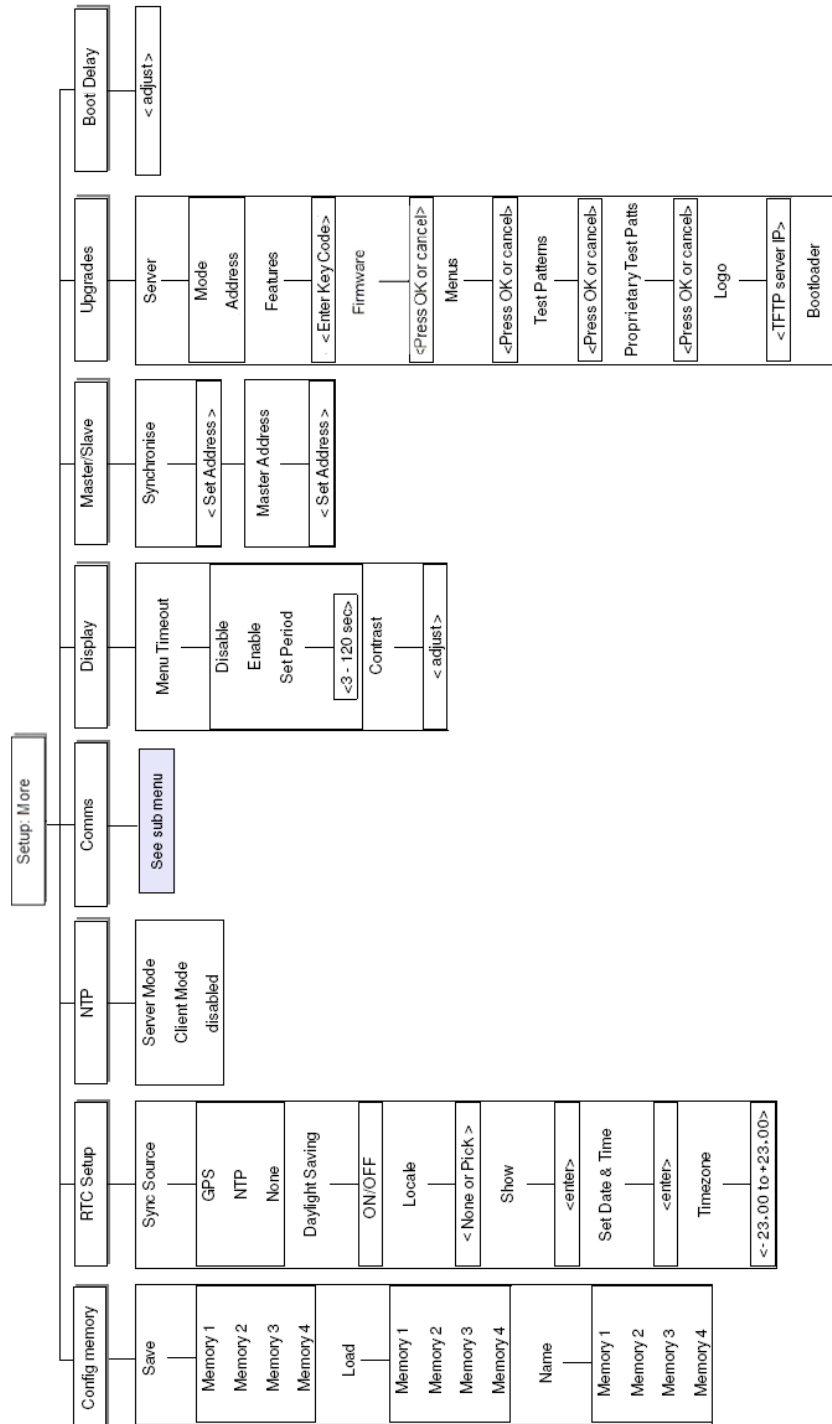


Setup: More

The Setup: More menu is shown in [Figure 33 on page 87](#) and includes branches for the following functions:

- Config memory – Manage internal memory banks 1-4. A complete operational setup may be stored or retrieved at any time.
- RTC Setup – Set up the real-time clock (RTC).
- NTP – Configure the Network Time (NTP) capability (7600MHD-REF model). Refer to [Setup: More – NTP \(7600MHD-REF Model\) on page 88](#) for more detailed information.
- Comms – Configure network communication with the 7600REF (see [Setup: More – Comms on page 89](#)),
- Display – Adjust the LCD display by:
 - Adjusting the display contrast.
 - Controlling the menu timeout whereby the menu steps back to the top level.
- Master/Slave – Configure the 7600REF as Slave, allowing settings to be retrieved from a Master. This is useful when configuring a pair of units in fail-safe mode. Only the Master need be configured; the Slave can request settings from a Master.
- Upgrade – Update the 7600REF including:
 - Server mode and address
 - Software updates
- Boot Delay – Adjust the boot delay if applicable.

Figure 33. Setup: More Menu



Setup: More – NTP (7600MHD-REF Model)

The Network Time Protocol (NTP) software function is included with the 7600MHD-REF model ([Figure 33 on page 87](#)) and offers the following for Server/Client operation:

- Both **Client** and **Server** modes are available. Only one of these modes may be enabled at one time.
- If installed, the menu will offer **Server**, **Client**, and **Disabled**. **Client** and **Server** are mutually exclusive. NTP is intended for change-over units to keep them both in sync.
- The Client can sync to any Internet NTP server.
- When acting as a server, the 7600REF should ideally, have a GPS module installed (included with the 7600MHD-REF model) but this is not a requirement. Even if the server is free running, a slave can still sync to it.

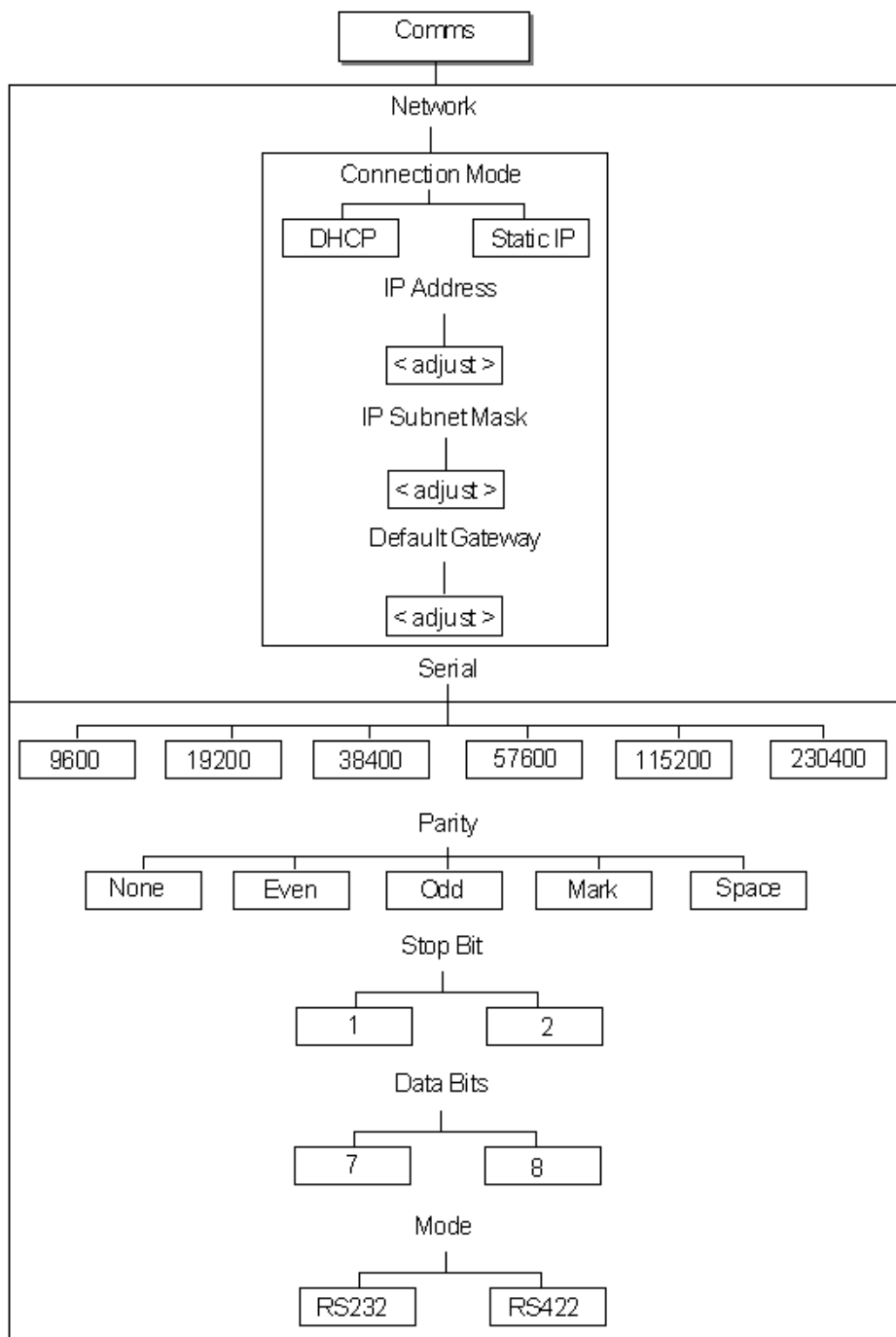
Setup: More – Comms

The Setup: More – Comms menu ([Figure 34 on page 90](#)), provides network and serial port setup.

The Ethernet Port is used to connect the 7600REF to a LAN, or to a laptop PC when performing upgrades. The settings required are primarily governed by the network arrangements at the site location. A network connection will also be required if the NTP function in the 7600MHD-REF model are used.

The serial port is used primarily during the manufacturing process but in RS422 mode it offers a range of functions. Contact Technical Support for more information.

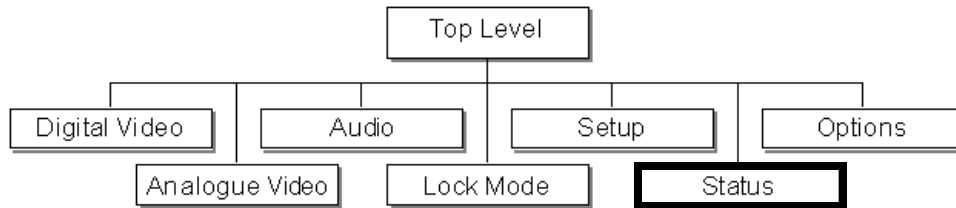
Figure 34. Setup: More – Comms Menu



Status Menu – Top Level

Access to the Status top level menu is shown in [Figure 35](#). Selecting Status will bring up the menu shown in [Figure 36 on page 92](#).

Figure 35. Top Level Menu – Status

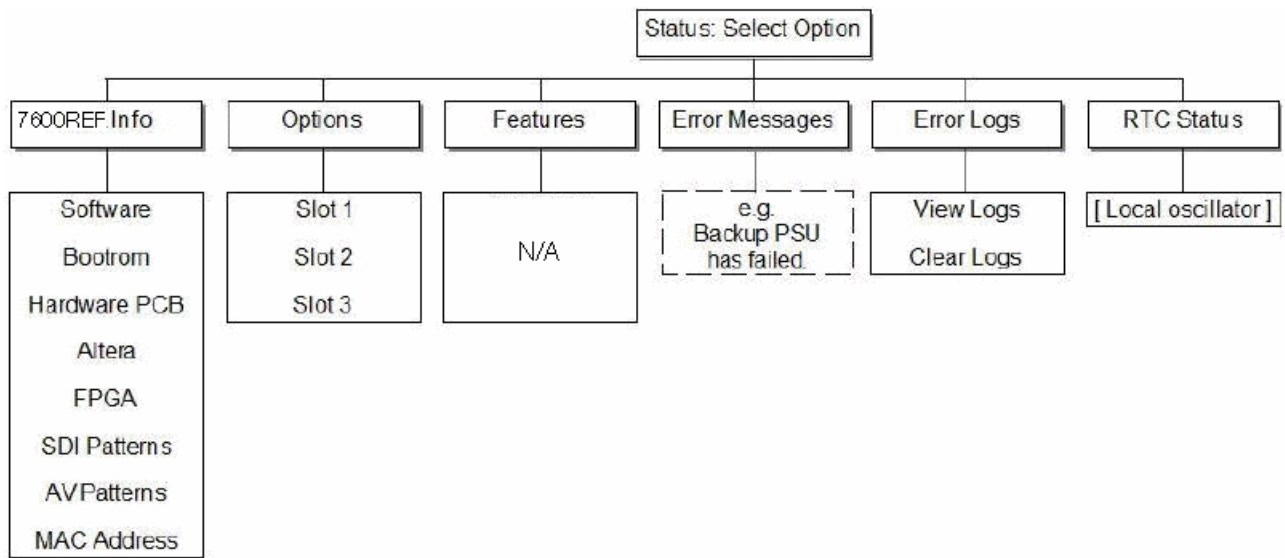


In addition, a dedicated **STATUS** button on the front panel will also bring up this Status menu. Should an error condition such as loss of genlock occur, the lamp in the **STATUS** button on the front panel will flash to draw the attention of the operator. The display text, which can be displayed by pressing the **STATUS** button, will change to indicate that an error message is available. Pressing the **STATUS** button at any time will display the unit's current status.

The Status menu ([Figure 36 on page 92](#)) includes the following status reporting items:

- 7600REF Info – reports software and hardware information about the frame.
- Options – shows status of the three possible options. See also [Options Menus –Top Level on page 93](#).
- Features – not applicable for this version.
- Error Messages – error messages will appear when applicable.
- Error Logs – Allows viewing or clearing of logs.
- RTC Status – reports the local oscillator.

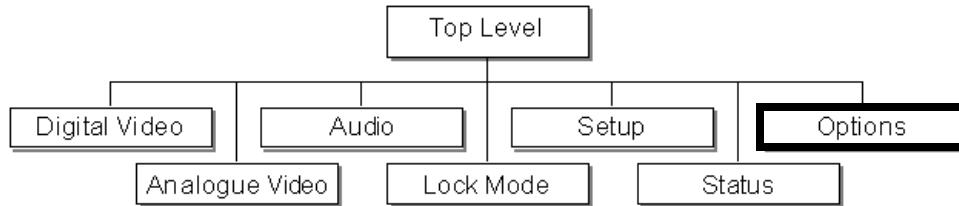
Figure 36. Top Level – Status Menu



Options Menus –Top Level

Access to the Options top level menu is shown in [Figure 37](#).

Figure 37. Top Level Menu – Options



Available hardware and software options on the different model types are enabled at the factory. An option will appear in the menu trees if it is included in the model. Refer to [7600REF Models on page 32](#) for the list of options included in each model.

There are three option slots for adding functionality for different 7600REF models. When options are installed, the Options menu will have the following menus:

- Option 1: GPS (see [Option Slot 1: GPS \(7600MHD-REF Model\) on page 94](#)) on the 7600MHD-REF model.
- Option 2: Not used in this application.
- Option 3: TLS option (see [Option 3: HD Tri-Level Sync on page 102](#)).

Option Slot 1: GPS (7600MHD-REF Model)

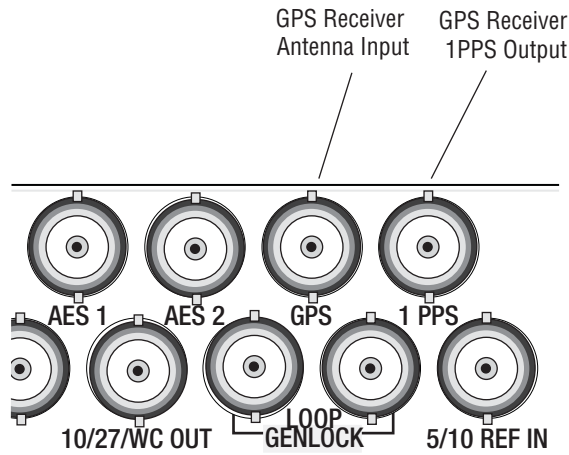
The 7600MHD-REF model will come with the Global Positioning System (GPS) module installed in Option Slot 1. The GPS is currently the only fully-functional Global Navigation Satellite System. More than two dozen GPS satellites are in medium Earth orbit, transmitting signals allowing GPS receivers to determine the receiver's location, speed, and direction.

Note The GPS receiver may only be installed in Slot 1.

GPS also provides a precise time reference used in many applications including synchronization of telecommunications networks.

The GPS BNCs active on the 7600MHD-REF model are shown in [Figure 38](#).

Figure 38. GPS BNCs



- The 1 PPS (1 Pulse Per Second) output is a precise TTL level pulse which may be terminated into 75 ohm when connected into external equipment.
- The Antenna input should be connected to a high quality 50 ohm GPS antenna.

GPS Antenna Requirements

The GPS requires an external antenna with the following characteristics:

- Active single antenna powered from the 7600REF antenna connector.
- Currently shipping versions require a 5V DC antenna.

Note Earlier versions (before 2007) required 3V DC. Check with Customer Service if you have any doubt about voltage requirement.

- Reception frequency optimized for 1575.42 MHz.
- 10dB to 50dB gain as measured at receiver input (antenna performance dictated by antenna manufacturer). Antenna types with lower gain performance cannot support longer cable runs.

Note Magnetic patch antennae suitable for vehicle mounting will also be satisfactory but only with very short cable runs.

Recommended antenna type (See [GPS Outside Manufacturer Equipment Disclaimer on page 97](#)):

- Trimble Bullet III with TNC or F termination at 5V DC. See note above concerning earlier frame 3V DC requirements.
- Other suitable antennae may be available. Check manufacturer's specifications.

Antenna Location

Ideally, the GPS antenna should have an unobstructed line of sight to the sky. Rooftops that are clear of other structures or geographic features overhead, with views to the horizon, generally make good installation locations. Such a clear view allows the antenna to track the maximum number of satellites throughout the day. A location on the side of a building can also offer good results but should be tested before completing the installation. Installations with obstructed views may experience impaired reception quality and may not be able to track simultaneously the maximum number of satellites.

When installing a GPS antenna, select a site at which the antenna will not become buried in drifting or accumulated snow. It should not be covered by foliage, fallen leaves, or placed in a position where it could become obstructed in this way.

Whenever possible, avoid placing the GPS antenna in close proximity to broadcast antennae or near television or FM radio transmitters. Certain frequencies are harmonics of the GPS signal and can impair reception.

GPS Cable Considerations

Theoretically, 50 ohm cable should be used to connect the GPS antenna. However, extensive testing by Trimble, manufacturer of our recommended antenna, has shown negligible attenuation differences between 50 ohm and 75 ohm cable types. In practice, it is far more important to select a cable with low attenuation characteristics around 1.6 GHz.

Using the recommended antenna, the overall attenuation of the installed antenna cable run should not exceed 20dB. In addition to the attenuation specified by the cable supplier, a number of additional factors can influence the overall result:

- Quality of terminations. Incorrectly terminated connectors can each contribute an additional 2dB to the overall attenuation.
- Multiple cables joined with barrels. Each join of this type can contribute an additional 3dB to the overall attenuation figure. Use a single, continuous cable.
- Cable location: Do not allow the cable to rest in standing water: the water will gradually permeate the cable jacket and degrade the signal. If a cable is run over a flat roof, suspend the cable from suitable cable hangers.

GPS Cable Type Suggestions

The following cable types are suggested (see [GPS Outside Manufacturer Equipment Disclaimer on page 97](#)). Refer to [Table 13 on page 97](#) for a cable summary.

- For cable runs <35m (120 feet) use RG59 cable. This is a low cost 75 ohm cable but is relatively easy to source and terminate.
- For cable runs <70m (230 feet) use cable type CT125 (known as CX125 in some markets). This is a 75 ohm cable used for CCTV and Satellite TV installations.
- For cable runs <100m (320 feet) use cable type LMR-400. This is a high-quality 50 ohm cable. An ultra flexible version is also available but with slightly higher attenuation, reducing the maximum cable length to 85m. BNC connectors are available for the LMR-400 series. Cable type CT150 can also be used for cable runs approaching 100m but it has 75 ohm impedance so the LMR-400 is preferred.

Table 13. Recommended Cable Types for Use with Trimble Bullet III Antenna

	RS59	CT125¹	CT167	LMR-400
Nominal Impedance (ohms)	75	75	75	50
Nominal Diameter (mm)	6.15	7.8	10.1	10.3
Cable run <35 meters	X	X	X	X
Cable run <50 meters	–	X	X	X
cable run < 70 meters	–	X	X	X
Cable run <100 meters	–	–	X	X

¹ CT125 also marketed as CX125

GPS Outside Manufacturer Equipment Disclaimer

Grass Valley USA LLC is not connected in any way with any of the above manufacturers. The information above is given in good faith from information in the public domain at the time of this manual release. Many similar antennae and cable types are available and specifications change over time. Some degree of experimentation may be required if the location is shrouded by adjacent structures, buildings, etc. Excessive cable length will adversely affect performance.

Grass Valley USA LLC has no control over the local conditions in which the equipment is installed and the customer is expected to have carried out a site survey to ensure that sufficient signal can be provided for the equipment to work in a satisfactory manner. Grass Valley will not be held responsible for failures caused by poor installation, maintenance, or changes in local conditions in which the required signals have been degraded such that time synchronization is lost.

GPS Acquisition Process

With satisfactory reception, the acquisition process commences automatically and takes around 15 minutes. An enhanced mode (Site Survey) is suitable for static installation and may be initiated from the Site Survey selection on the GPS menu.

Note A complete Site Survey can take around 2 hours. Once completed, it provides more accurate timing signals.

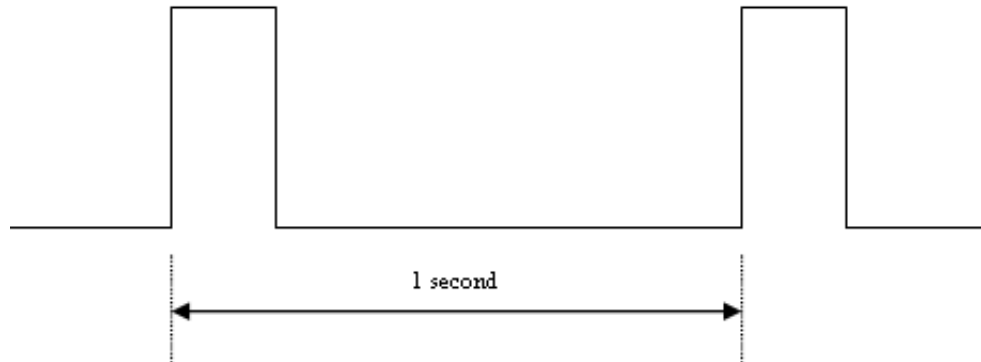
The front panel display provides information on both visible and tracked satellites. An indication of suitable values is given [Table 14](#) for guidance.

Table 14. Visible and Tracked Satellites

Satellites	Minimum	Optimum
Visible	8	10-12
Tracked	5	8-10

A 1 Pulse Per Second (1PPS) signal waveform is illustrated in [Figure 39](#).

Figure 39. 1PPS Signal Waveform



The leading edge of the positive going pulse provides the timing reference plane for locking external equipment. There is no agreed standard for the pulse width.

With “Lock to 1 PPS” turned on, this signal locks the internal 27 MHz PLL oscillator such that PAL output signals are both frequency locked and phase locked. Any NTSC output signals are frequency locked but cannot be phase locked. In addition, the real-time clock (RTC) is locked to GPS time.

GPS Menu Structure

With the 7600MHD-REF model, the GPS option is installed in Slot 1 and will appear in the Options menu branch shown in [Figure 40 on page 100](#).

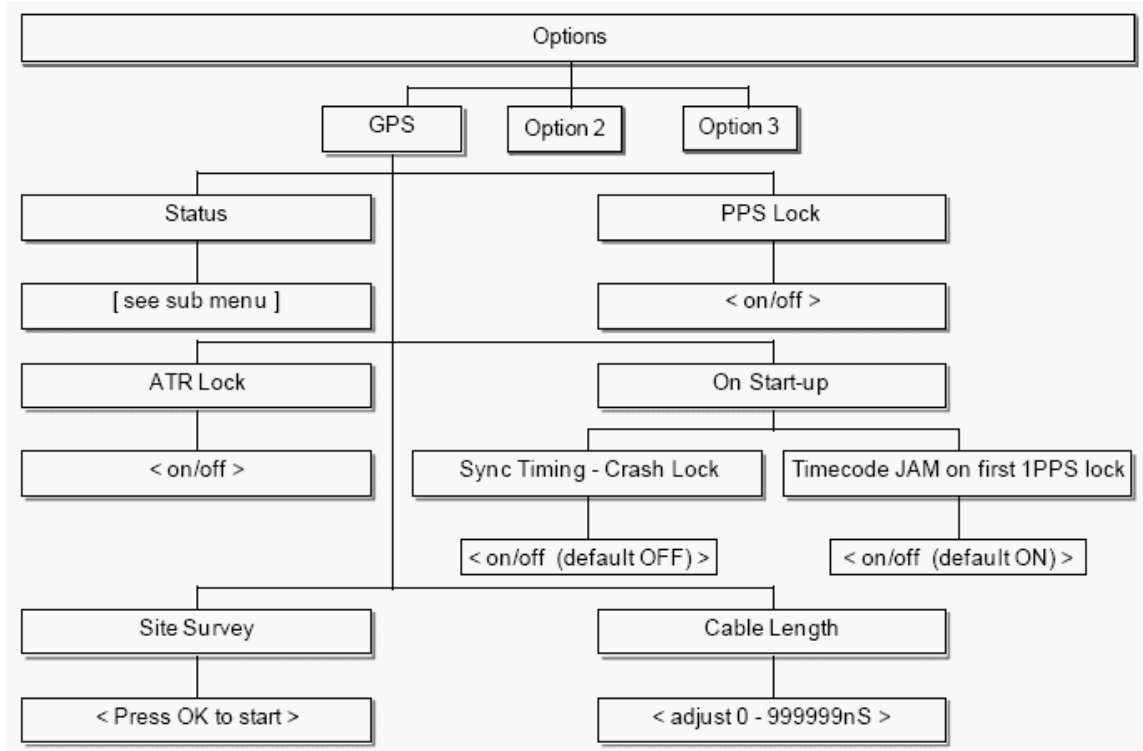
The Options GPS menu is detailed below.

- **Status** – see [Status Menu – Top Level on page 91](#).
- **PPS Lock** – if the PPS Lock mode is set to On, it only affects the Internal Free Run mode of genlock. The internal oscillator is then locked to the GPS reference.
- **Crash Lock** – if the Crash Lock mode is set to On, the output signal is subject to a single large disturbance followed by a period of approximately 10 minutes for settling. If the Crash Lock is Off, convergence may take many hours.
- **ATR Lock** – the concept of ATR (Absolute Time Reference) is covered by SMPTE Proposal 404 and is also known as SMPTE epoch. It defines a starting point of midnight on January 1st, 1958, at which time all generating equipment is deemed to be phase locked.

In order to make use of the ATR definition, precise date/time provided by the GPS receiver is required. This allows the current state of the 7600REF to be computed with regard to the epoch as defined by ATR. By accurate determination of current time, any ATR equipped items may be locked together again.

- **Site Survey** – a site survey can take up to 2 hours to complete. It may be initiated at any time, but would normally only be carried out when the unit is in a fixed installation location with a high quality antenna. Status of the Site Survey is shown in the Status submenu shown in [Figure 41 on page 101](#).
- **Cable Length** – provides compensation for the propagations delay of the antenna cable.

Figure 40. GPS Menu



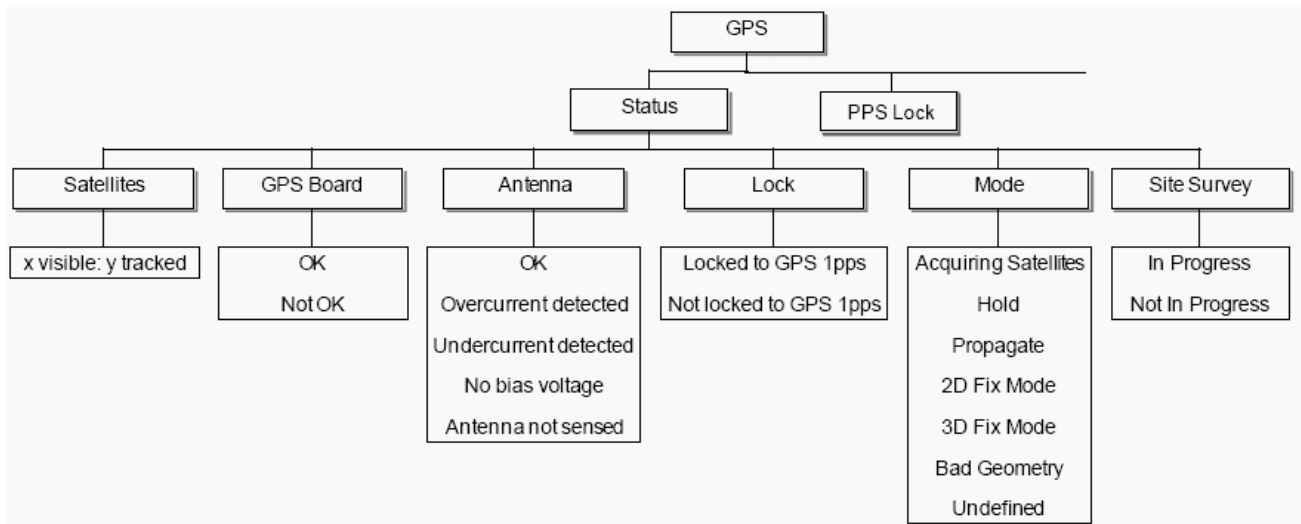
page 101

The GPS Status submenu is shown in [Figure 41 on page 101](#). It displays the status of the following GPS functions:

- **Satellites** – displays the number of satellites visible and those actively tracked (see [GPS Acquisition Process on page 98](#)). The time taken to acquire satellites can be 10 or 25 minutes since the almanac data is broadcast fairly infrequently.
- **GPS Board OK/Not OK** – shows the current status of the internal GPS board.
- **Antenna** – provides a basic functionality test of the GPS antenna and reports one of the the following:
 - OK
 - Overcurrent detected
 - Undercurrent detected
 - No bias voltage
 - Antenna not sensed
- **Lock** – indicates whether the board is locked to the GPS 1pps signal.

- **Mode** – displays the current mode of the antenna as:
 - Acquiring Satellites
 - Hold
 - Propagate
 - 2D Fix Mode
 - 3D Fix Mode
 - Bad Geometry
 - Undefined
- **Site Survey** – status is displayed as:
 - In Progress
 - Not In Progress

Figure 41. GPS Status Submenu



Option 3: HD Tri-Level Sync

High definition (HD) applications require a special synchronizing signal which is termed Tri-Level Sync or TLS. This differs from conventional reference signals since the horizontal and vertical timing components are combined within a single waveform.

The four available Tri-Level BNCs can be individually configured from the Options 3: TLS menu shown in [Figure 42](#). Each output can be selected for a particular standard as given in [Table 15 on page 103](#). The scan format is indicated by P (Progressive), I (Interlaced), or sF (segmented frame).

Note Some timing options are not available with specific standards; this is indicated in [Table 15 on page 103](#).

Figure 42. Option 3: TLS Menu

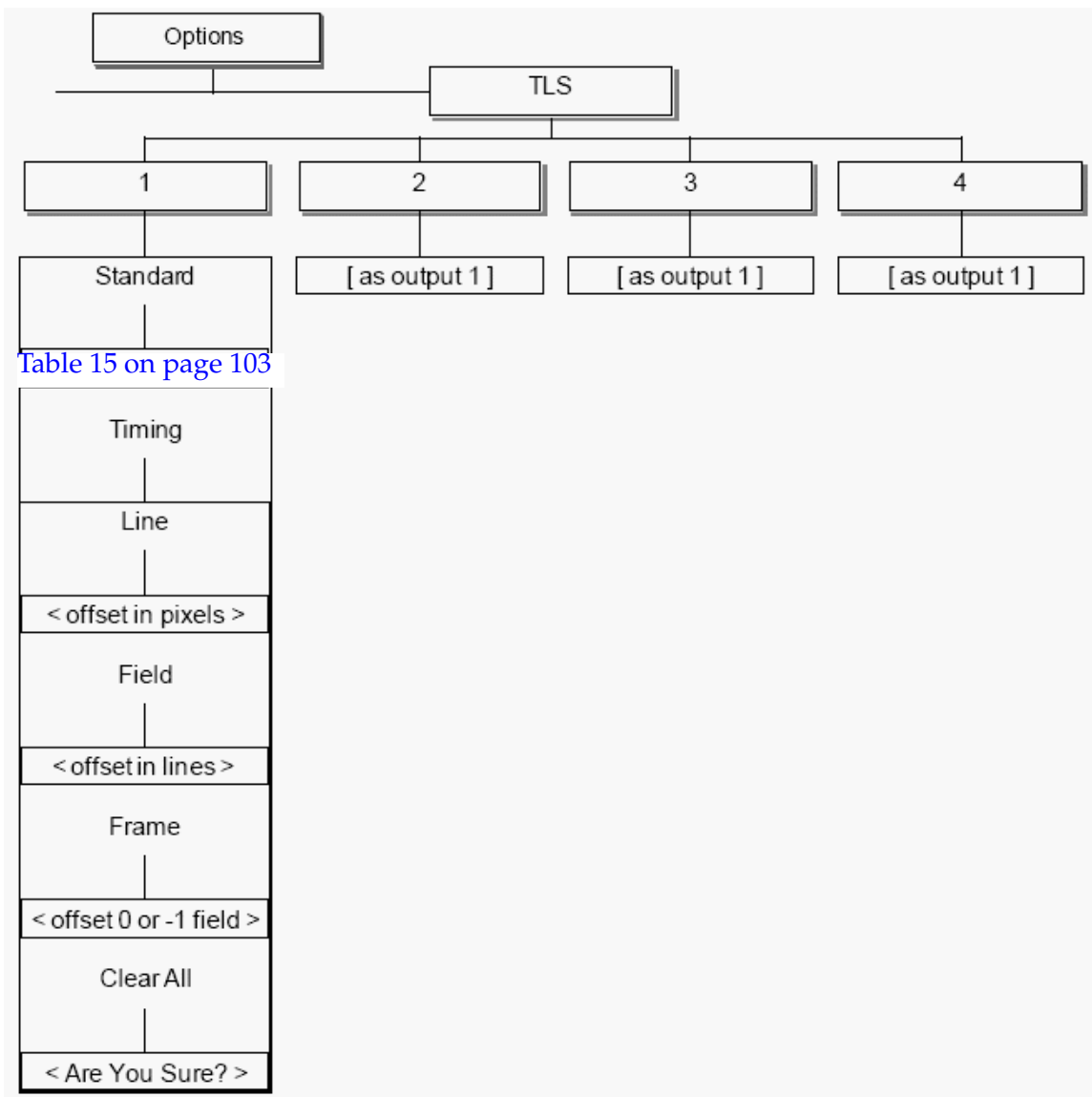


Table 15. Tri-Level Sync Standards

Description	Lines/Frame	Frame Rate	Scan	Timing		
				Line	Field	Frame
1920x1080/60/1:1	1125	60	P	Y	N	Y
1920x1080/59.94/1:1	1125	60	P	Y	N	Y
1920x1080/50/1:1	1125	50	P	Y	N	Y
1920x1080/60/2:1	1125	60	I	Y	Y	Y
1920x1080/59.94/2:1	1125	60	I	Y	Y	Y
1920x1080/50/2:1	1125	50	I	Y	N	Y
1920x1080/30/1:1	1125	30	P	Y	N	Y
1920x1080/29.97/1:1	1125	30	P	Y	N	Y
1920x1080/25/1:1	1125	25	P	Y	N	Y
1920x1080/24/1:1	1125	24	P	Y	N	Y
1920x1080/23.98/1:1	1125	24	P	Y	N	Y
1920x1080/30/sF	1125	30	I	Y	Y	Y
1920x1080/29.97/sF	1125	30	I	Y	Y	Y
1920x1080/25/sF	1125	25	I	Y	Y	Y
1920x1080/24/sF	1125	24	I	Y	Y	Y
1920x1080/23.98/sF	1125	24	I	Y	Y	Y
1280x720/60/1:1	750	60	P	Y	N	Y
1280x720/59.94/1:1	750	60	P	Y	N	Y
1280x720/50/1:1	750	50	P	Y	N	Y
1280x720/30/1:1	750	30	P	Y	N	Y
1280x720/29.97/1:1	750	30	P	Y	N	Y
1280x720/25/1:1	750	25	P	Y	N	Y
1280x720/24/1:1	750	24	P	Y	N	Y
1280x720/23.98/1:1	750	24	P	Y	N	Y
6 Hz (30/24)	6 Hz	-	-	N	N	N
6 Hz (29.97/23.98)	6 Hz	-	-	N	N	N
625/50	625	50	I	Y	Y	Y
525/59.94	525	60	I	Y	Y	Y

SNMP Support

Simple Network Management Protocol (SNMP) is a component of the Internet Protocol Suite as defined by the Internet Engineering Task Force (IETF). SNMP is used in network management systems to monitor network-attached devices for conditions that warrant administrative attention.

The version 5.0 software upgrade implements an SNMP agent on the 7600REF, allowing events on the 7600REF to be monitored by a third-party management system.

The following conditions and events are reported:

State information is provided as per the 7600REF error message screen:

- DHCP server status
- NTP server status
- External 5/10MHz status
- S318 presence
- Line lock status
- Subcarrier lock status
- Genlock input status
- Genlock ScH status
- Genlock video standard status
- Backup power supply status

GPS status reporting for 7600MHD-REF model:

- GPS status
- GPS antenna status
- GPS 1pps lock status
- GPS: number of visible satellites
- GPS: number of tracked satellites

The following SNMP relevant variables can be set:

- If notification is enabled, the 7600REF will generate a trap on the change in value of any of the state variables.
- The IP address where notification traps are sent.

The GPI Outputs may also be controlled using SNMP:

- When set to 'triggered' mode will force the GPO 1 state
- When set to 'triggered' mode will force the GPO 2 state

Common Configurations for the 7600REF

This section provides instructions on setting up your 7600REF in a number of commonly used modes.

GPS Locked SPG and Timecode Generator Configuration

Connect a suitable 50 ohm cable and antennae to your GPS output. Refer to [GPS Antenna Requirements on page 95](#).

Perform the following configuration:

1. Press Option on the front panel and select GPS.
 2. Set PPS Lock and ATR Lock on ([Figure 40 on page 100](#)).
- Note** With version 5.0 and later software, Crash Lock will default to off on start-up. Use of Crash lock will cause sync timing to be unstable until PPS lock is achieved although it will speed the process.
3. Select Options >> GPS >> Status and wait for **Locked to 1 PPS** to come on ([Figure 40 on page 100](#)).
 4. Navigate to Setup >> More >> RTC Setup >> Sync Source and select **GPS** ([Figure 33 on page 87](#)).
 5. Go to Setup >> Timecode >> All Frequencies, ensure **RTC** is selected in Jam Source ([Figure 29 on page 82](#)). Then press **JAM!**
 6. Press Options on the front panel and select GPS. From the “on start-up” menu, set Crash lock to off.

The 7600MHD-REF Timecode should now reflect the GPS time and the Black and Burst outputs should be locked to the GPS 1 PPS signal.

GPS Locked NTP Server Configuration

Connect a suitable 50 ohm cable and antennae to your GPS output. Refer to [GPS Antenna Requirements on page 95](#).

Perform the following configuration:

1. Press Options on the front panel and select GPS.
2. Set PPS Lock, Crash Lock and ATR Lock on ([Figure 40 on page 100](#)).
3. Select Options >> GPS >> Status and wait for **Locked to 1 PPS** to come on ([Figure 40 on page 100](#)).
4. Navigate to Setup>> More >>RTC Setup>>Sync Source and select **GPS**.
5. Go to Setup >> More >> Comms >> Network and enter appropriate values for IP Address, IP Subnet Mask and Default Gateway ([Figure 34 on page 90](#)).

Note The 7600 must be configured with a fixed (static) IP address. DHCP is not suitable for this application..

The 7600MHD-REF should now be serving requests for NTP time at the IP address.

Daylight Saving Time

The 7600REF has an automatic Daylight Saving Time adjust feature. To enable this from the front panel control, do the following:

1. Go to Setup >> More >> RTC Setup >> Timezone.
2. Select your locale from the list and press **OK** to confirm.

The real-time clock will now automatically adjust at the start and end of daylight saving time. However, to ensure continuity, timecode will not change until **Jam!** occurs. For more information on the different Jam modes available, please see [Timecode Jamming on page 80](#).

VITC As a JAM Source

VITC, DVITC, ATC and LTC are optionally able to Jam to VITC on a genlock input. VITC input timecode lock is activated from the front panel menus as follows:

- Setup >> Timecode >> All Frequencies >> JAM Source >> VITC
- Setup >> Timecode >> All Frequencies >> JAM! >> OK

Upon jamming, the VITC on the genlock input is sampled and all timecode outputs are updated. Timecode outputs then increment from this point, until another Jam! is initiated. If the 7600MHD-REF is genlock referenced and is set to output the same frame rate as the genlock input, then timecode will remain locked to the genlock input.

If the input genlock VITC changes, the 7600 will require a Jam! to reflect this change. This ensures continuity of output timecode.

Using a TFTP Server

The use of an TFTP (Trivial File Transfer Protocol) server with the 7600REF models allows the customer to generate a copy of the 7600REF log file to send to Technical Support for troubleshooting purposes.

Software upgrades from version 3.0.0.8 to version 5.0 also require the TFTP server to upgrade the Bootloader only. After upgrading to version 5.0 or later, the GV 7600REF web browser can be used to upgrade firmware and software. As with the majority of Grass Valley products, software update procedures are detailed in the product release notes.

The Release Notes contain the latest product information and complete installation instructions. Always use the 7600REF Release Notes to perform an upgrade. They can be found on the Grass Valley web site under Reference Generators/7600REF at this URL:

www.grassvalley.com/docs/modular

Generating the Log File (Digital Signature)

This process should only be necessary when working with Customer Service. Refer to the 7600REF Release Notes for preparing the TFTP server required to create a log file.

Once you have installed the TFTP server, do the following to create a log.

1. Navigate the 7600REF to Setup >> More >> Upgrades >> Features >> Generate Log.
2. A file will now be created in the TFTP root folder. Retrieve this file and email it to Technical Support as requested.
3. This process is for enabling options which should only be necessary when requested by Customer Service.

Specifications

The specifications for the 7600REF Reference Generator frame and modules are given in [Table 16](#).

Table 16. 7600REF Frame and Module Specifications

Parameter	Value
Frame Dimensions	
Width	19 in. rack mounting
Height	44 mm (1.75 in.) 1 Rack Unit
Depth	433 mm (17.0 in.) excluding connectors
Weight	4 kg , 8.82 lbs with no option modules 5 kg, 11 lbs, maximum with option modules
Operating temperature range	0 to 50 degrees C, 32 to 122 degrees F
Storage temperature range	-25 to 70 degrees C, -13 to 158 degrees F
Operating humidity	95% RH non-condensing
Power	
Mains input voltage range (x2)	90-264 VAC, 45-63 Hz, 440 Hz auto-select
Power consumption (maximum)	60 VA (depending on model)
Internal fuse	3.15 A
EMC¹	
Emissions	EN55103-1, Environment E2
Radiated	EN55103-2, Environment E2
Safety	EN60950
Internal Reference Oscillator Stability	
Nominal error	< ± 0.5 Hz (0.1ppm)
Temperature stability	< ± 0.05 ppm
Ageing rate (per year)	< 0.5 ppm
Warm-up setting time to <0.05 ppm	10 minutes @ 25 degrees C, 77 degrees F
Genlock Video Input Performance	
Note: The unit's lock mode is assumed set to manual subcarrier phasing, correct ScH or follow-external ScH phase, unless otherwise noted.	
Video input type	2 BNC, high impedance loop-through
Return loss @ subcarrier	< -40 dB
Video DC range	< ± 12 V
Video signal amplitude (to remain in spec.)	
625 operation	300 mV sync/burst ± 6 dB
525 operation	285 mV
Sync attenuation (below which signal is indicated as missing)	-8 dB (with respect to 300 mV/625 or 285 mV/525)
Burst attenuation (below which signal will be monochrome)	-8 dB (with respect to 300 mV/625 or 285 mV/525)
Sync frequency lock range	
625 operation	15.625 kHz ± 1.5 Hz (± 100 ppm)
525 operation	15.734 kHz ± 1.5 Hz (± 100 ppm)

Table 16. 7600REF Frame and Module Specifications

Parameter	Value
Subcarrier lock range	
625 operation	4.43361875 MHz \pm 200 Hz (\pm 50 ppm) ²
525 operation	3.57954 MHz \pm 200 Hz (\pm 50 ppm) ²
Genlock video lockup time	< 7 seconds
Output sync jitter with respect to clean genlock video input	< \pm 3 ns
Output subcarrier jitter with respect to clean genlock video input, lock mode = EXT 1/2/3	< \pm 0.25 degrees
Output subcarrier jitter with respect to clean genlock video input, lock mode = EXT 4	< \pm 2 degrees
Input video ScH phase (over which ScH error is indicated)	+90, \pm 15 degrees, -90, \pm 15 degrees (approximate)
Genlock video sync to output sync timing accuracy, over full operating temperature range	< 5 ns
Genlock video subcarrier to output subcarrier phase accuracy over full operating temperature range	< 5 degrees
Vertical lock up rate, genlock video to output (when unit is set to line drop mode)	1 line/5 fields
Genlock Operational Control	
Horizontal offset adjustment range	\pm 32 μ s
Horizontal offset resolution	1 ns
Horizontal offset accuracy	\pm 5 ns over full range
Subcarrier phase adjustment range	0 to 359.9 degrees
Subcarrier phase resolution	0.1 degree
Line offset adjustment range	1 line steps over entire 525/625 range
10 Mhz Input Performance (lock mode assumed set to external 10 MHz)	
10 MHz input type	1 BNC, 75 ohm terminated
10 MHz input return loss @ 10 MHz	< -35 dB
10 MHz DC range	< \pm 3 V
10 MHz signal amplitude (to stay within spec)	0.5 V to 3 V p-p (terminated)
Signal amplitude (below which signal will be indicated as missing)	0.4 V
10 MHz frequency lock range	10 MHz, \pm 200 Hz (\pm 20 ppm)
Lockup time	< 0.1 seconds
Output sync jitter with respect to clean 10 MHz input	< \pm 2 ns
Output subcarrier jitter with respect to clean 10 Mhz input	< \pm 0.2 degrees

Table 16. 7600REF Frame and Module Specifications

Parameter	Value
SD-SDI Outputs	
General	
Format	270Mb/s, 10 bit
Standards	ITU-R BT 601, 656, EBU Tech 3267, SMPTE 125M, 244M, 259M, 272M, RP165, RP178
Video	
Output impedance	75 ohm
Amplitude	800 mV p-p \pm 10%
Return loss	>15 dB at 270 MHz
Overshoot	< 10%
Jitter	< 0.2 UI, above 10 Hz jitter frequency
Rise/Fall times	0.4 to 1.5 ns (20-80%)
DC offset (AC coupled)	0 \pm 0.5 V
Time offset with respect to main black burst signal	< \pm 100 ns
Embedded Audio	
Active channels	4
Group	Selectable 1, 2, 3, or 4
Sample frequency	48 kHz
Digital coding	24 bits
Audio tone	25 Hz to 20 kHz in 25 Hz steps
Audio level	0 to -120 dBfs
Tone modes	On, Off, CCIR, and EBU
Embedded Audio	
Analogue Video Output Performance	
Output impedance	75 ohm, \pm 0.2%
Sync amplitude	
625 operation	300 mV, \pm 3 mV
525 operation	285 mV, \pm 3 mV
Burst Amplitude	
625 operation	300 mV, \pm 9 mV
525 operation	285 mV, \pm 9 mV
Black DC level	0 V, \pm 20 mV
Noise to 20 Mhz	< -60 dB (with respect to 700 mV)
Noise above 20 MHz	< -40 dB (with respect to 700 mV)
ScH accuracy, all controls set to zero	\pm 5 degrees
Sync edge rise time	
625 operation	250 ns, Gaussian
525 operation	140 ns, Gaussian
Burst edge rise time	
625 operation	350 ns, Gaussian
525 operation	300 ns, Gaussian

Table 16. 7600REF Frame and Module Specifications

Parameter	Value
Timing difference between any analogue video output and any other (all controls set to zero)	±10 ns
Timing difference between any black burst output and Genlock Video input (all controls set to zero)	±10 ns
Generation accuracy	10 bit
Timing accuracy channel to channel	< ±5 ns
Level, 0 dB: p-p	1 V, ±1%
Black level, DC	0 V, ±25 mV
Chrominance/Luminance gain	<1%
Chrominance/Luminance delay	< 5 ns
Chrominance phase accuracy	< ±5 degrees
Linearity	< 0.25%
Frequency response to 6 MHz	±0.2 dB
Differential gain	< 0.5%
Differential phase	< 0.5 degrees
2T K rating	< 0.5%K
ScH accuracy	±5 degrees
Line tilt	< 0.5%
Field tilt	< 0.5%
Channel crosstalk (0 to 5.8 MHz)	< -60 dB
AES/EBU Outputs	
Standard	ANSI S4.40 (AES3)
Output channels	4 (2 AES/EBU pairs)
Synchronism	The signal timing is derived from the video clock source, either the internal oven oscillator or the genlock feed. 48 kHz signal is related to video frame as per SMPTE/EBU recommendations.
Grade ³	Meets Grade 1 when genlock lock mode = internal or stable 10 MHz reference used.
Clock jitter ³	< 1 ns
Output connectors	D9 socket (balanced), BNC (unbalanced) - optional with 7600MHD-REF
Signal amplitude	5 V, ±0.3 V
Impedance	110 ohm, ±10%
Tone resolution	24 bit
Tone linearity error	< 1 ppm
Sample frequency control	Selectable from 32 kHz, 44.1 kHz, 48 kHz, or 96 kHz
Tone frequency adjustment	25 Hz to 20 kHz in 25 Hz steps. Left/right channel independent adjustment.
Tone amplitude adjustment	0 to -120 dBfs, left/right channel independent adjustment
Tone identification	Left/right channels can pulse according to EBU/CCIR recommendations
Grade	Grade bit manually adjustable between Grade 1 and Grade 2
User data	User configurable
Other	Both channels may be set to Silence. Channels can be swapped.
Analogue Audio Output Performance	
Signal source	Independent audio generator

Table 16. 7600REF Frame and Module Specifications

Parameter	Value
Number of channels	2
Output type	Differential, electronically balanced
Output impedance	Low impedance, < 10R
Tone amplitude	+20 dBu to -40 dBu, adjustable
Tone frequency	100 Hz to 20 kHz in 25 Hz steps, left/right channel independent adjustment
Tone identification	Left/right channels can pulse according to EBU/CCIR recommendations.
Clock Output	
Frequency	Selectable 10 MHz, 27 MHz, or Word Clock
Output impedance	75 ohm, ±1%
Word clock	CMOS compatible 32kHz, 44.1 kHz, 48 kHz, or 96 kHz (AES1 sample frequency).
10 MHz	1.2 V, ±100 mV
27 MHz	1 V, ±100 mV

Table 16. 7600REF Frame and Module Specifications

Parameter	Value
GPI	
GPIO Inputs	
Number	2
Type	Grounding
Maximum voltage	±20 V
Operating current	600 µA (approximately)
GPIO Outputs	
Number	2
Type	Open drain
Maximum voltage	30 V
Maximum current	190 mA
Maximum dissipation	600 mW
LTC Timecode (7600MHD-REF)	
Standard	SMPTE S12M, S309M
Output channels	2, electronically balanced
Connector	9-way, Sub-D socket
Level	2 V p-p into 1 kR
Impedance	< 25R per leg
Rise time	40 µs, ±10 µs between 10% and 90% points
Jitter	< 2 µs
Overshoot	< 5%
GPS Antenna (7600MHD-REF)	
Power	Active single antenna power from the receiver module via the antenna connector
Voltage from GPS module	5 V DC
Reception frequency	Optimized for 1575.42MHz
Gain	10dB to 50dB as measured at receiver point (depending on antenna type)
Recommended antenna model	Trimble Bullet III with TNC or F connectors, 5V DC
Miscellaneous	
Setup data retention when unit not powered	> 1000 hours. Unit must have been powered for > 24 hours prior to this.
Serial communication type	RS422/232 (software configured)
Power fail indication	Relay contact, closed under normal operation, open for any failure state.
Fan fail indication	Relay contact, closed under normal operation, open for any failure state.
Option interfaces	Four models are available with various options See 7600REF Models on page 32 .
Ethernet	RJ-45 interface. Software configured for DHCP or static IP address.

¹ Immunity is specified to criterion B – the output may suffer some degradation during the disturbance, but will recover on removal of the disturbance source and continue to operate as intended.

² Assumes 15625 Hz (15734.268 Hz NTSC) line frequency and subcarrier varied about nominal subcarrier frequency.

³ When the unit is locked to a genlock feed, the frequency stability of the AES signal is dependant on the quality of that feed.

GV 7600REF Web Browser Interface

Introduction

The current software (version 5.0) now provides a browser-based configuration tool offering:

- Greatly simplified initial setup
- Online editing of 7600REF configurations
- Partial or incremental updates without causing disruption (where possible)
- The ability to copy, backup and restore configuration data

The web browser tool is compatible with Internet Explorer 8 (and later) plus Mozilla Firefox web browsers.

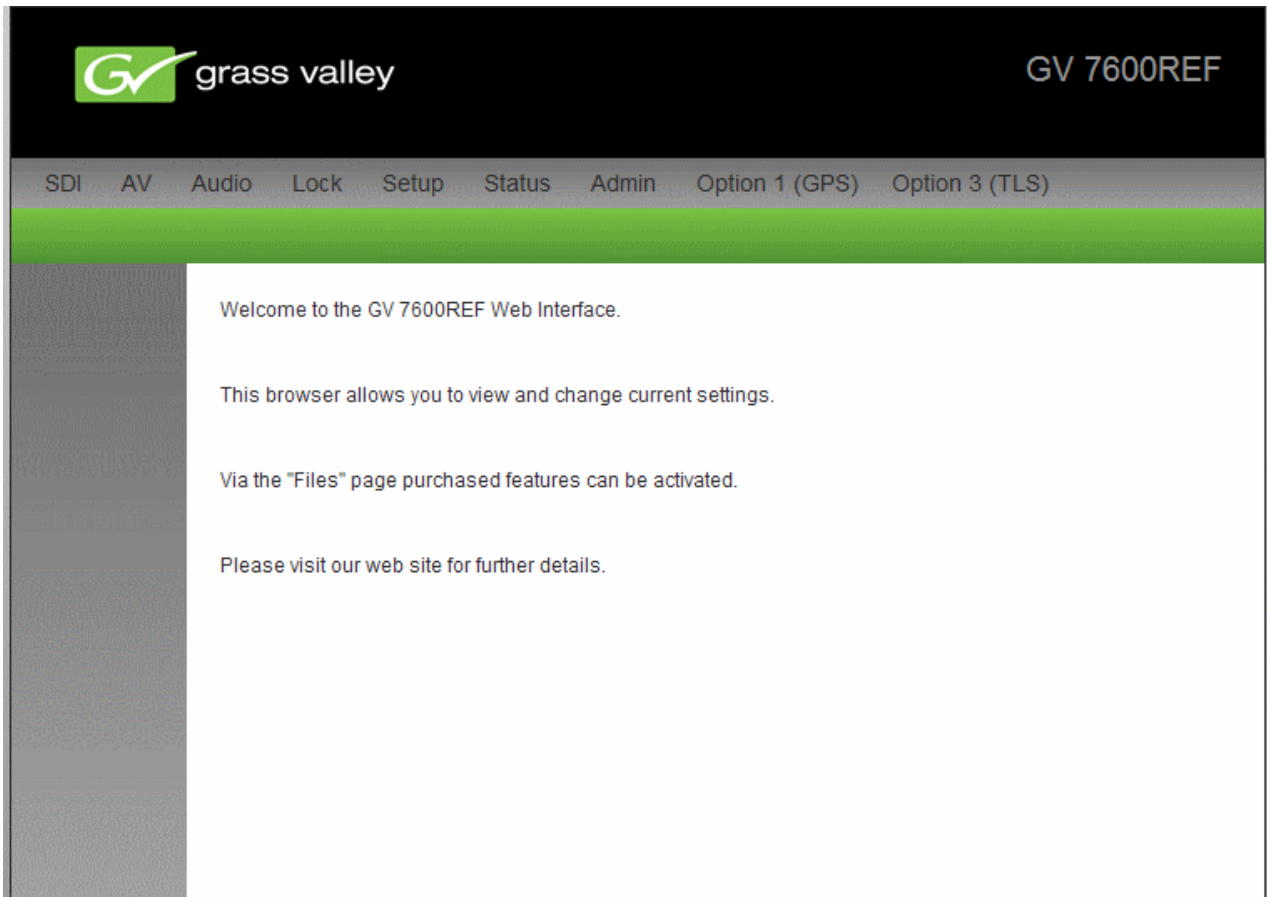
Accessing the Web Browser Interface

To access the GV 7600 web browser, do the following:

1. Power up the 7600REF running the latest software (version 5.0) and wait until it has initialized: this takes around 60 seconds.
2. Using the front panel controls, navigate to: **SETUP >> MORE >> COMMS >> NETWORK.**
3. Enter **IP ADDRESS** and **SUBNET MASK** values which are appropriate for your network. The gateway address is optional. Static IP addresses are preferred although DHCP is also offered. If you are unsure, consult your IT Administrator.
4. Press **Submit** to enter the values.
5. Connect the Ethernet port on the 7600REF to your network, using a standard RJ-45 cable.
6. On a PC connected to the same network as the 7600REF, open your web browser.

7. Navigate to the address `http://<address>` where `<address>` is that which you entered on the 7600REF front panel. For example, `http://192.168.1.50`.
8. At the log-in screen, enter the username and password which by default are both set as **admin**.
9. The main screen of the web browser interface should come up as shown in [Figure 43](#).
10. To change the User name and Password go to [Admin >> Login/IP](#) on [page 136](#) of this Appendix.

Figure 43. Main GV 7600REF Web Browser Screen



Configuring the 7600REF

You can use the web browser interface to configure and view the status of the same selections available from the front panel as described in [Configuration and Setup on page 46](#).

This Appendix gives an overview of the web browser web pages only. Links are provided to the main manual for complete configuration information for each selection.

SDI Channels 1-3 Configuration

Set up the three SD/HD-SDI channels using the SDI top level selection.

Set the following for Channel 1, Channel 2, and Channel 3:

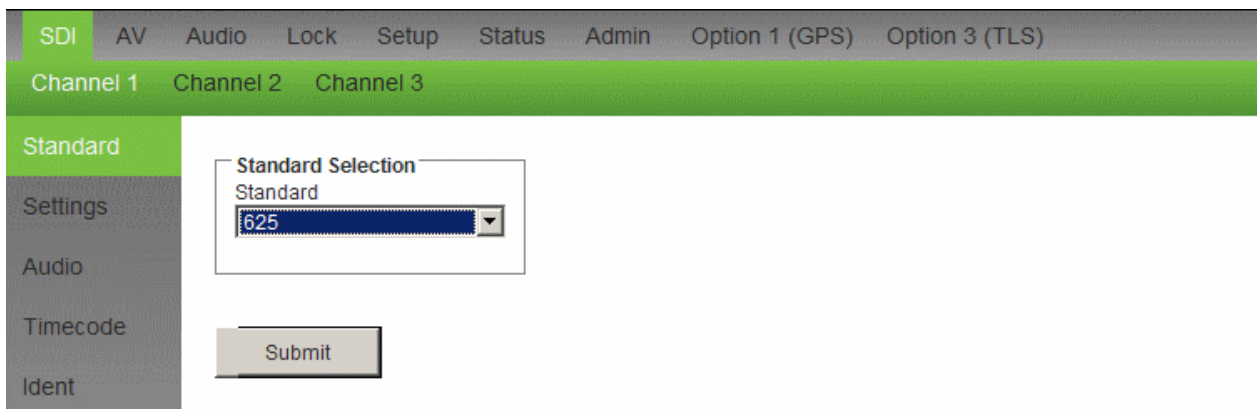
- Standard
- Settings
- Audio
- Timecode
- Ident

For explanations of the settings in this entire section, start at [Digital Video Menus – Top Level on page 50](#) in the main manual.

SDI 1 >> Channel 1-3 >> Standard

Select SDI >> Channel 1 >> Standard to set the line standard for SDI Channel 1-3 as shown in [Figure 44](#).

Figure 44. SDI 1, SDI 2, and SDI 3 Standard Selection



SDI >> Channel 1-3 >> Settings

Select SDI >> Channel 1-3 >> Settings to bring up the web page in [Figure 45](#) and refer to [Digital Video – Test Patterns on page 53](#) and [Digital Video – Timing on page 58](#) in the main manual.

Figure 45. SDI >> Channel 1-3 >> Display Settings/AFD

The screenshot shows the web browser interface for SDI >> Channel 1-3 >> Settings. The top navigation bar includes SDI, AV, Audio, Lock, Setup, Status, Admin, Option 1 (GPS), and Option 3 (TLS). Below this, there are tabs for Channel 1, Channel 2, and Channel 3. The left sidebar has a menu with Standard, Settings (highlighted), Audio, Timecode, and Ident. The main content area is divided into three sections:

- Display Settings:** Pattern (100% Colour Bars), EDH (On), APL (Off), Moving (Off).
- AFD:** Enable (Off), Code (0010: 16:9, top of frame), Field 1 Line Number (11), Field 2 Line Number (322).
- Timing:** Line (pixels) (0), Field (lines) (0), Frame (fields) (0).

A Submit button is located at the bottom of the form.

SDI >> Channel 1-3 >> Audio

Use the Audio web page (Figure 46) to set up the SDI Audio parameters for Channel 1-3 for Groups 1 - 4 and refer to *Digital Video – AES Configuration on page 61* in the main manual.

Figure 46. SDI >> Channel 1-3 >> Audio Groups 1-4

The screenshot displays the SDI Audio configuration interface. The top navigation bar includes 'SDI', 'AV', 'Audio', 'Lock', 'Setup', 'Status', 'Admin', 'Option 1 (GPS)', and 'Option 3 (TLS)'. Below this, a green bar shows 'Channel 1', 'Channel 2', and 'Channel 3'. A second green bar shows 'Group 1', 'Group 2', 'Group 3', and 'Group 4'. On the left, a vertical menu has 'Standard', 'Settings', 'Audio' (highlighted), 'Timecode', and 'Ident'. The main content area is organized into a grid of settings panels:

- Settings:** Contains 'Enable' (set to 'On') and 'Grade' (set to 'Grade 1') dropdown menus.
- Tone Direction:** Contains 'Channels 1-2' (set to 'Standard') and 'Channels 3-4' (set to 'Standard') dropdown menus.
- Tone Mode:** Contains 'Channels 1-2' (set to 'Off') and 'Channels 3-4' (set to 'Off') dropdown menus.
- Frequency (Hz):** Input fields for Channels 1, 2, 3, and 4, all set to '1000'.
- Amplitude (dBFS):** Input fields for Channels 1, 2, 3, and 4, all set to '-20.000000'.
- Ident Text:** Input fields for Channels 1, 2, 3, and 4, all set to 'V1C1', 'V1C2', 'V1C3', and 'V1C4' respectively.

A 'Submit' button is located at the bottom of the configuration area.

SDI >> Channel 1-3 >> Timecode

Configure the SDI Channel 1-3 timecode Settings, ATC, and User and Flag bits with the Timecode web page (Figure 47).

Timecode setup is explained in the main manual in [Setup – Timecode \(7600MHD-REF only\)](#) on page 80.

Figure 47. SDI >> Channel 1-3 >> Timecode

The screenshot shows the 'Timecode' configuration page for Channel 1. The interface is organized into a sidebar and a main content area. The sidebar on the left has a 'Timecode' menu item highlighted in green. The main content area is divided into three columns: 'Settings', 'ATC', and 'User Bits'. Each column contains several dropdown menus and text input fields. The 'Settings' column includes 'Colour Frame Flag' (set to Off), 'DVITC Mode' (set to Off), and 'Timecode Offset' (set to +00:00:00). The 'ATC' column includes 'Mode' (set to Off), 'Coding' (set to LTC), 'Duplicate' (set to Off), and 'Line' (set to 10). The 'User Bits' column includes a 'Data' section with eight bit positions (1-8) each set to 0, and a 'Flag Bits' section set to 'Date/time zone and time'. A 'Submit' button is located at the bottom left of the form area.

SDI >> Channel 1-3 >> Ident

The Ident web page (Figure 48) provides configuration for identification settings, and text for each SDI Channel 1-3 as explained in the main manual in *Using the Ident Menu* on page 56.

Figure 48. SDI >> Channel 1-3 >> Ident Web Page

Analogue Video Configuration

Use the Analogue video web pages to set up the five analogue outputs (BnB 1, BnB 2, BnB 3, BnB 4, and BnB 5) on the 7600REF for the following:

- Configure Channels 1-3 and Channels 4-5
- Standard
- Settings
- VITC

Refer to the explanation for these configuration in the main manual starting with [Analogue Video Menus – Top Level on page 63](#).

AV >> BnB 1 >> Configure

The Configure web page ([Figure 49](#)) provides format selection for Analogue outputs Channels 1-3 and 4-5 for BnB 1 – BnB 5.

Figure 49. AV >> BnB 1 - BnB 5 >> Configure

The screenshot shows the web browser interface for configuring analogue video outputs. The top navigation bar includes 'SDI', 'AV', 'Audio', 'Lock', 'Setup', 'Status', 'Admin', 'Option 1 (GPS)', and 'Option 3 (TLS)'. Below this, a green bar contains 'BnB 1', 'BnB 2', 'BnB 3', 'BnB 4', and 'BnB 5'. On the left, a vertical menu has 'Configure', 'Standard', 'Settings', and 'VITC'. The main content area is titled 'Format Selection' and contains two dropdown menus: 'Channels 1-3' and 'Channels 4-5', both currently set to 'All Black Burst'. A 'Submit' button is located at the bottom of the form.

AV >> BnB 1 - BnB 5 >> Standard

Set the analogue video standard for BnB 1 – BnB 5 with the web page shown in [Figure 50](#).

Figure 50. AV >> BnB 1- BnB 5 >> Standard

The screenshot shows a web interface for configuring video standards. At the top, there is a navigation bar with tabs for SDI, AV (selected), Audio, Lock, Setup, Status, Admin, Option 1 (GPS), and Option 3 (TLS). Below this is a sub-navigation bar with tabs for BnB 1, BnB 2, BnB 3, BnB 4, and BnB 5. On the left side, there is a vertical menu with options: Configure, Standard (selected), Settings, and VITC. The main content area is titled 'Standard Selection' and contains a dropdown menu labeled 'Standard' with the value '625' selected. Below the dropdown is a 'Submit' button.

AV >> BnB 1 - BnB 5 >> Settings

This web page ([Figure 51](#)) provides analogue video Timing settings.

Figure 51. AV >> BnB 1 - BnB 5 >> Settings

The screenshot shows a web interface for configuring video timing settings. At the top, there is a navigation bar with tabs for SDI, AV (selected), Audio, Lock, Setup, Status, Admin, Option 1 (GPS), and Option 3 (TLS). Below this is a sub-navigation bar with tabs for BnB 1, BnB 2, BnB 3, BnB 4, and BnB 5. On the left side, there is a vertical menu with options: Configure, Standard, Settings (selected), and VITC. The main content area is titled 'Timing' and contains four input fields: 'Line (pixels)' with the value '0.000000', 'Field (lines)' with the value '0', '4-Frame (fields)' with the value '0', and 'Sub Carrier (degrees)' with the value '0.000000'. Below the input fields is a 'Submit' button.

AV >> BnB 1 - BnB 5 >> VITC

Use this web page (Figure 52) to set the VITC in analogue waveforms as described in the main manual in *VITC in Analogue Waveforms* on page 63.

Figure 52. AV >> BnB 1 - BnB 5 >> VITC

The screenshot shows the VITC configuration page. At the top, there is a navigation bar with tabs for SDI, AV, Audio, Lock, Setup, Status, Admin, Option 1 (GPS), and Option 3 (TLS). Below this is a sub-navigation bar with tabs for BnB 1, BnB 2, BnB 3, BnB 4, and BnB 5. On the left side, there is a vertical menu with options: Configure, Standard, Settings, and VITC (which is highlighted in green). The main content area is divided into three columns:

- Settings:** Contains a dropdown for 'Colour Frame Flag' set to 'Off', a dropdown for 'Mode' set to 'Off', and a text input for 'Timecode Offset' with the value '+00:00:00'.
- Field Lines:** Contains four dropdown menus: 'Field 1 Line 1' (19), 'Field 1 Line 2' (21), 'Field 2 Line 1' (332), and 'Field 2 Line 2' (334).
- User Bits:** Contains a 'Data' section with eight dropdown menus (1-8) all set to '0', and a 'Flag Bits' section with a dropdown menu set to 'Date/time zone and time'.

At the bottom left of the main content area, there is a 'Submit' button.

Audio Configuration

Use the Audio web pages to configure AES 1 and AES 2 and Analogue audio test signal outputs.

The AES 1 and AES 2 unbalanced test signals BNC outputs are only present on the 7600MHD-REF and 7600MHD-3G-REF model. Their location is shown in [Figure 1 on page 34](#).

The Analogue audio outputs are available from the connector described in the [Analogue Audio/Remotes on page 35](#) and shown in [Figure 1 on page 34](#).

Audio >> AES 1/AES 2 >> AES

Use the Audio web pages (AES 1 shown in [Figure 53](#)) to configure the desired AES 1 and AES 2 output test signals.

Figure 53. Audio >> AES 1/AES 2 >> AES

The screenshot shows a web interface for configuring AES 1. The top navigation bar includes SDI, AV, Audio (selected), Lock, Setup, Status, Admin, Option 1 (GPS), and Option 3 (TLS). The left sidebar has Standard, AES (selected), and Analogue. The main content area is titled AES 1 and contains the following configuration panels:

- Settings:** Grade (Grade 2), Sample Rate (48 kHz).
- Tone Direction:** Channels 1-2 (Standard).
- Tone Mode:** Mode (Off), SDI Lip Sync Source (SDI 1).
- Frequency (Hz):** Channel 1 (1000), Channel 2 (1000).
- Amplitude (dBFS):** Channel 1 (-20.000000), Channel 2 (-20.000000).
- Ident Text:** Channel 1 (V1C1), Channel 2 (V1C2).

A Submit button is located at the bottom left of the configuration area.

Audio >> Analogue >> Settings

Use the Analogue Audio web page (Figure 54) to configure the two analogue output test signal channels as described in *Audio Menus – Top Level* on page 74 in the main manual.

Figure 54. Audio >> Analogue >> Settings

Settings	Frequency (Hz)	Amplitude (dBu)
Direction Standard	Channel 1 1000	Channels 1 0.000000
Mode Off	Channel 2 1000	Channel 2 0.000000
SDI Lip Sync Source SDI 1		

Submit

Lock Configuration

Lock >> Settings and Timing

The Lock web page (Figure 54) provides the genlock mode settings and timing configuration as described in the main manual starting in *Lock Mode Menus – Top Level* on page 76.

Figure 55. Lock >> Settings and Timing

Settings	Timing
Mode Internal Freerun	Line (us) 0.000000
Genlock Loss Use Fly wheel	Field (lines) 0
Field Lock Crash	Subcarrier Phase (degrees) 0.000000
Standard 625	
S318 Off	

Submit

Setup

The Setup web pages provide configuration for the following functions:

- GPIO 1 and GPIO 2
- Timecode
- LTC
- Misc

Setup >> GPIO >> GPIO 1/GPIO 2

The GPIO web page ([Figure 56](#)) provides configuration for GPIO 1 GPI inputs and outputs and GPIO 2 GPI inputs and outputs as described in the main manual starting in [Setup – GPIO Control on page 85](#).

Figure 56. Setup >> GPIO >> GPIO 1/GPIO 2

The screenshot shows the web browser interface for configuring GPIO settings. The top navigation bar includes SDI, AV, Audio, Lock, Setup (highlighted), Status, Admin, Option 1 (GPS), and Option 3 (TLS). Below this is a sub-navigation bar with GPIO (highlighted), GPIO 1, and GPIO 2. A left sidebar contains Timecode, LTC, and Misc. The main content area is divided into two columns: GPI and GPO. The GPI column has 'Response' set to 'Force Freerun' and 'Trigger' set to 'Unassigned'. The GPO column has several settings: 'Genlock Input Loss' (Off), 'Illegal Input SCH' (Off), 'External 10MHz Input Loss' (Off), 'Diagnostic Alert' (Off), 'Line Lock Error' (Off), 'Locked to Genlock' (Off), 'Field Lock Error' (Off), 'Free Running' (Off), and 'Subcarrier Lock Error' (Off). A 'Submit' button is located at the bottom left of the configuration area.

Setup >> Timecode >> Specific Frequency or All Frequencies

Select a specific frequency for setting timecode (Figure 57) if desired or use All Frequencies (Figure 58 on page 130) as described in the main manual starting in *Setup – Timecode (7600MHD-REF only)* on page 80.

You can immediately jam the timecode by pressing the **JAM** button.

Figure 57. Setup >> Timecode >> 23.98Hz >> Settings

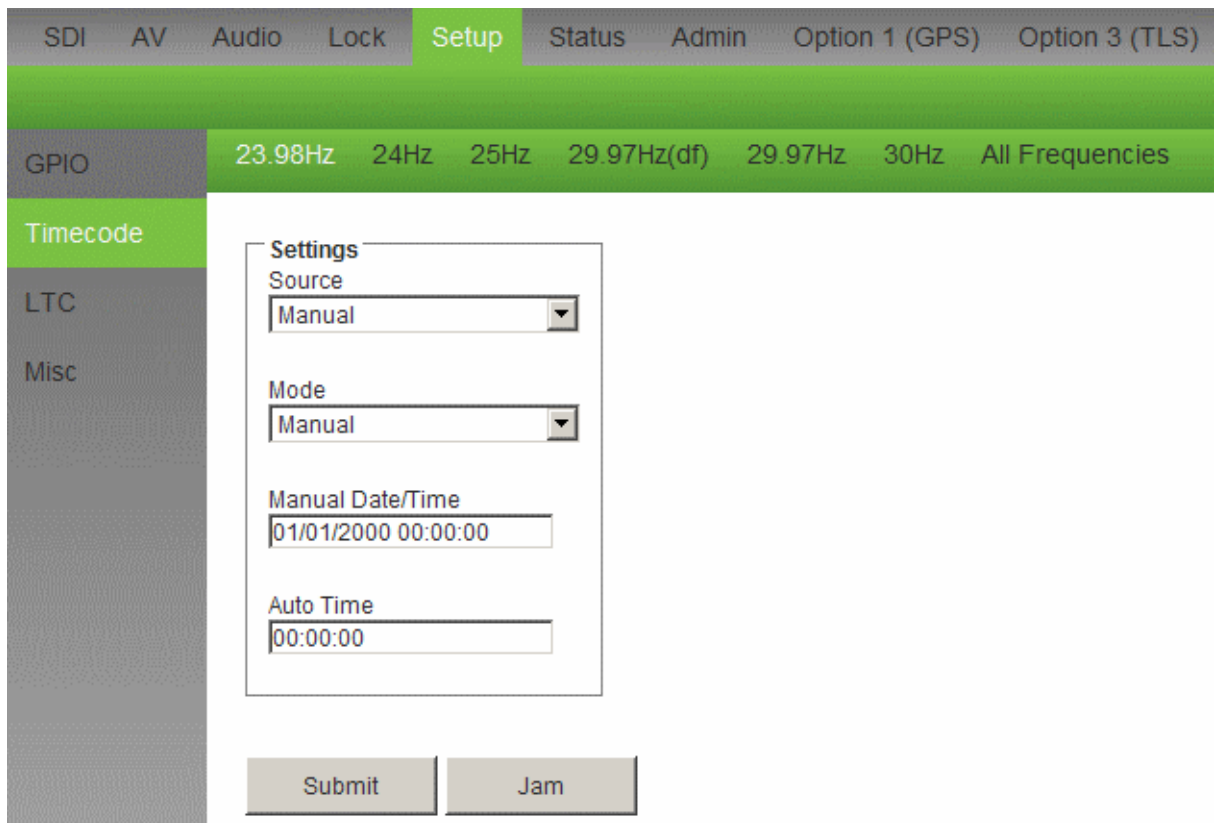
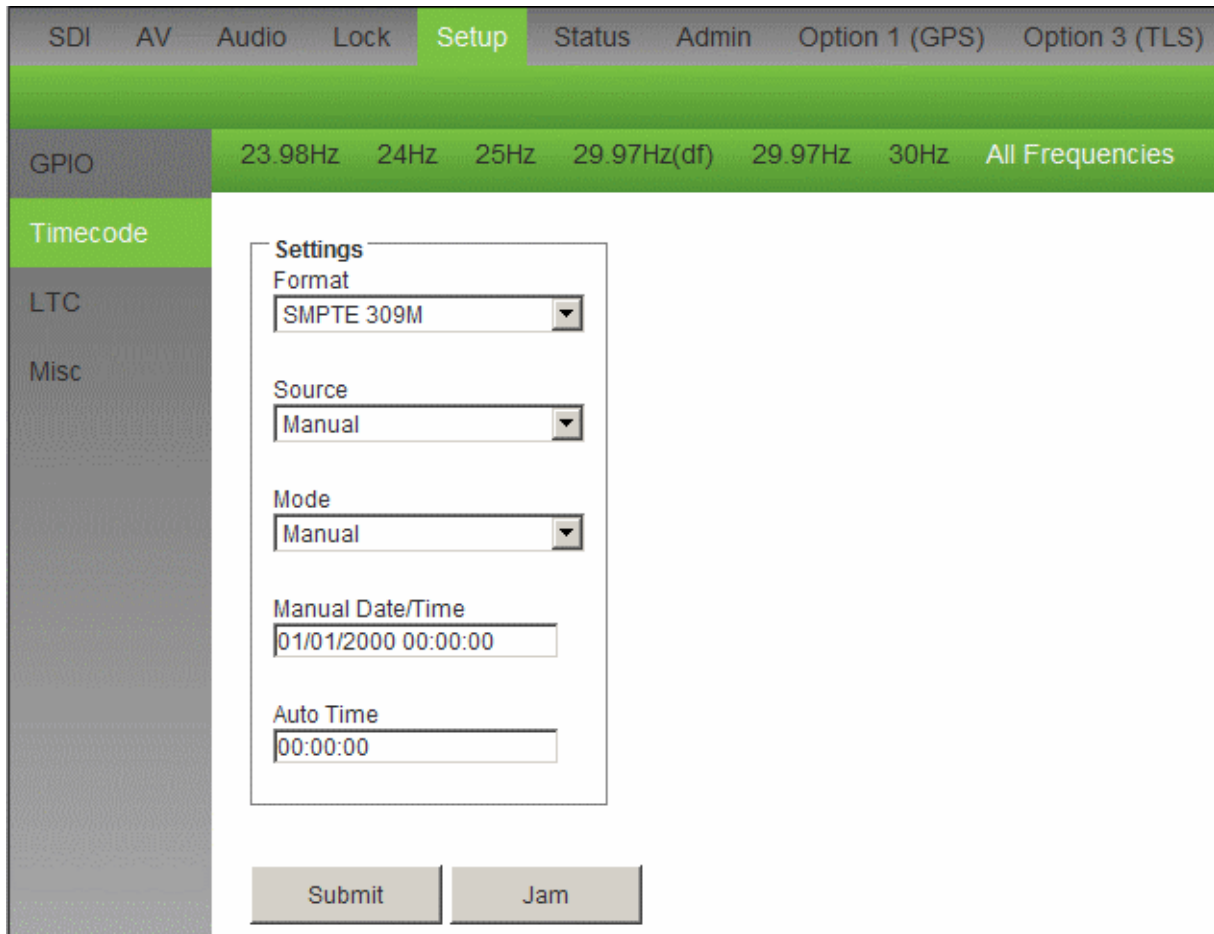


Figure 58. Setup >> Timecode >> All Frequencies >> All Frequencies



Setup >> LTC 1/LTC 2 >> LTC

Configure the Settings, Frame Rate, and User and Flag bits for LTC 1 and LTC 2 with the web page shown in [Figure 59](#) as described in the main manual starting in [Setup – LTC Menu \(7600MHD-REF Model\)](#) on page 83.

Figure 59. Setup >> LTC >> LTC 1/LTC 2

The screenshot shows a web interface for configuring LTC 1/LTC 2. The interface is divided into several sections:

- Navigation Menu (Left):** Includes SDI, AV, Audio, Lock, Setup (selected), Status, Admin, Option 1 (GPS), Option 3 (TLS). Below this are GPIO, Timecode, LTC (selected), and Misc.
- Sub-headers:** LTC 1 and LTC 2.
- Settings Column:**
 - Mode: Off
 - Colour Frame Flag: Off
 - Drop: Non drop
 - Timecode Offset: +00:00:00
- Frame Rate Column:**
 - Follow: Frame Rate Setting
 - Frame Rate: 25
- User Bits Column:**
 - Data: 8 bits, all set to 0.
 - Flag Bits: Date/time zone and time
- Submit Button:** Located at the bottom of the settings area.

Setup >> Misc

The Setup >> Misc web page (Figure 60) provides configuration for the following functions:

- Serial (Port) Settings (see [Setup: More – Comms on page 89](#))
- NTP (Network Time Protocol) Settings (see [Setup: More – NTP \(7600MHD-REF Model\) on page 88](#))
- RTC (Real Time Clock) Settings (see [Setup: More on page 86](#))
- Miscellaneous (see [Setup Menus – Top Level on page 79](#) for setting the Clock Output and [Setup: More on page 86](#) for Boot Delay)

Figure 60. Setup >> Misc

The screenshot displays the 'Setup >> Misc' configuration page. At the top, a navigation bar includes links for SDI, AV, Audio, Lock, Setup (highlighted), Status, Admin, Option 1 (GPS), and Option 3 (TLS). A left sidebar contains menu items for GPIO, Timecode, LTC, and Misc (highlighted). The main content area is divided into four configuration sections:

- Serial Settings:** Baud Rate (38400), Parity (None), Stop Bits (One), Number of Data Bits (Eight), and Mode (RS232).
- NTP Settings:** Mode (Disabled), Server Address (255.255.255.255), and Server Timeout (secs) (300).
- Miscellaneous:** Clock Output (10MHz) and Boot Delay (mins) (0).
- RTC Settings:** Time Zone (Manual UTC Offset) and Manual UTC Offset (+00:00).

A 'Submit' button is located at the bottom of the configuration area.

Status

The Status web page (Figure 61) provides a visual system status graphic and an Info web page (*Status >> Info* on page 134) giving the current versions, option versions and factory enabled features for the 7600REF frame. Refer to *Status Menu – Top Level* on page 91 in the main manual.

Figure 61. Status Web Page

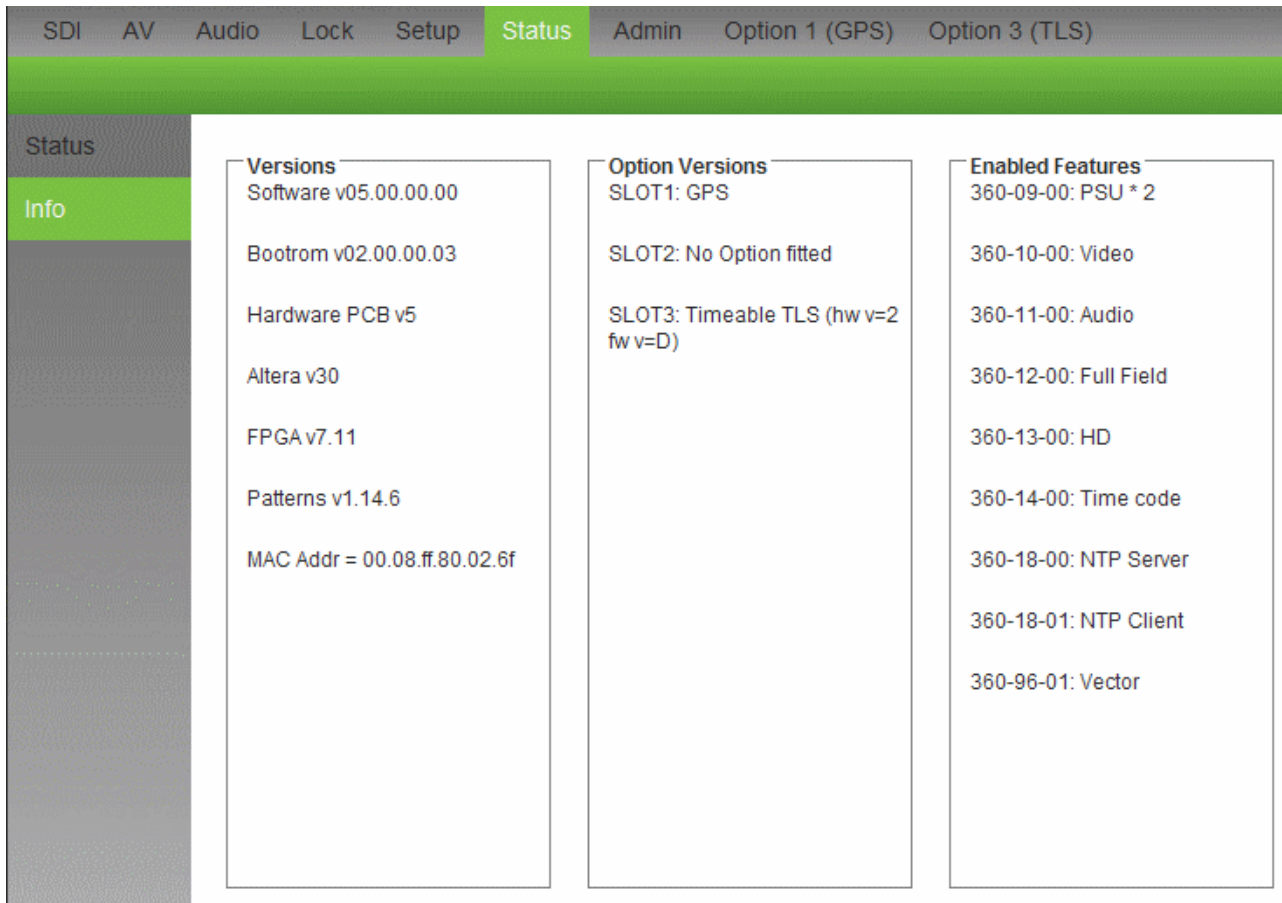
The screenshot shows the Status web page interface. At the top is a navigation bar with tabs: SDI, AV, Audio, Lock, Setup, Status (highlighted), Admin, Option 1 (GPS), and Option 3 (TLS). On the left is a sidebar with 'Status' (highlighted) and 'Info' tabs. The main content area contains two status tables and a log section.

System Status		
	DHCP failure	Outages: 0
	NTP server failure	Outages: 0
	Genlock input failure	Outages: 0
	Ext 10MHz input Failure	Outages: 0
	S318 is not present	Outages: 0
	No Line Lock	Outages: 0
	No subcarrier lock	Outages: 0
	Genlock input Sch error	Outages: 0
	Backup power supply failure	Outages: 1, last: 00:12:33 15/3/2012
	Fan failure	Outages: 0
	RTC	Internal oscillator

GPS Status		
	Input state	Outages: 0
	1pps lock	Outages: 1, last: 00:12:33 15/3/2012
	Antenna state	Outages: 0
	Satellites	Satellites visible: 9, Satellites tracked: 9

At the bottom of the status area, there is a 'Clear Logs' button and a 'Log file' link.

Figure 62. Status >> Info



Admin Configuration

There are three selections under the top Admin tab available on the left of the web page:

- Files – (not used in this application)
- Config – allows you to configure the four memory banks of the 7600REF.
- Login/IP – set a new user name and password for entering the web browser and set the networking information.

Admin >> Config

Under the top Admin tab, select Config on the left to bring up the Configuration Manager web page shown in [Figure 63](#). Use this page to save and load configurations after setup of the 7600REF.

Refer to [Setup: More on page 86](#) in the main manual for more details.

Figure 63. Admin >> Config >> Configuration Manager

Admin >> Login/IP

To change the User name and Password for access to the web browser, select the Admin tab then the Login/IP tab on the left of the screen on the main web browser page as shown in [Figure 64](#).

1. Enter the default password, **admin**, into the Current Password field.
2. Enter the desired New Login Name.
3. Enter a new password and confirm it.
4. Press **Submit** to enter this new login information.

This web page also allows you to set the Network parameters for the 7600REF IP Address, Subnet Mask, and Default Gateway.

For more networking information refer to [Setup: More – Comms](#) on page 89 in the main manual.

Figure 64. Admin >> Login/IP >> Administrator Login/Network

Administrator Login	Network
Current Password	IP Address
<input type="text"/>	192.168.72.20
New Login Name	Subnet Mask
<input type="text"/>	255.255.255.0
New Password	Default Gateway
<input type="text"/>	1.0.0.0
Confirm New Password	Submit
<input type="text"/>	
Submit	

Option 1 (GPS) Configuration

The Option 1 (GPS) web page ([Figure 65](#)) provides configuration for the GPS (Global Positioning System) functions on 7600MHD-REF and 7600MHD-3G-REF frames as described in the main manual starting in [Option Slot 1: GPS \(7600MHD-REF Model\)](#) on page 94.

Figure 65. Option 1 (GPS) >> On Startup/Settings

The screenshot displays the 'Option 1 (GPS)' configuration page. The navigation bar at the top includes 'SDI', 'AV', 'Audio', 'Lock', 'Setup', 'Status', 'Admin', 'Option 1 (GPS)', and 'Option 3 (TLS)'. The 'Option 1 (GPS)' tab is active. The page is divided into two main sections: 'On Startup' and 'Settings'. The 'On Startup' section contains two dropdown menus: 'JAM on initial PPS Lock' set to 'On' and 'Crash Lock on startup' set to 'Off'. The 'Settings' section contains three controls: 'ATR Lock' set to 'Off', 'PPS Lock' set to 'Off', and a text input field for 'Cable Delay (ns)' with the value '0'. A 'Submit' button is located at the bottom of the form.

Section	Parameter	Value
On Startup	JAM on initial PPS Lock	On
	Crash Lock on startup	Off
Settings	ATR Lock	Off
	PPS Lock	Off
	Cable Delay (ns)	0

Option 3 (TLS) Configuration

The Option 3 (TLS) web pages provide configuration for the Tri-Level Sync Standard and Timing functions on all four tri-level sync outputs available on all 7600REF models as described in the main manual in [Option 3: HD Tri-Level Sync on page 102](#).

Option 3 (TLS) >> Channel 1-4 >> Standard

On the Standard web page ([Figure 66](#)) configure the settings for the four tri-level sync channel outputs from the list in [Table 15 on page 103](#) of the main manual.

Figure 66. Option 3 (TLS) >> Standard >> Channel 1-4

The screenshot shows the web browser interface for the 'Option 3 (TLS)' configuration. The top navigation bar includes 'SDI', 'AV', 'Audio', 'Lock', 'Setup', 'Status', 'Admin', 'Option 1 (GPS)', and 'Option 3 (TLS)'. Below this, there are tabs for 'Channel 1', 'Channel 2', 'Channel 3', and 'Channel 4'. The left sidebar has 'Standard' selected and 'Timing' below it. The main content area shows a 'Settings' box with a dropdown menu set to 'Standard' and a value of '1920x1080 /60 /1:1 p'. A 'Submit' button is located below the settings box.

Option 3 (TLS) >> Channel 1-4 >> Timing

On the Timing web page ([Figure 67](#)), configure the timing for the four tri-level sync channel outputs and refer to [Option 3: HD Tri-Level Sync on page 102](#) in the main manual.

Figure 67. Option 3 (TLS) >> Timing >> Channel 1-4

The screenshot shows the web browser interface for the 'Option 3 (TLS)' configuration. The top navigation bar includes 'SDI', 'AV', 'Audio', 'Lock', 'Setup', 'Status', 'Admin', 'Option 1 (GPS)', and 'Option 3 (TLS)'. Below this, there are tabs for 'Channel 1', 'Channel 2', 'Channel 3', and 'Channel 4'. The left sidebar has 'Standard' and 'Timing' visible, with 'Timing' selected. The main content area shows a 'Timing' box with two input fields: 'Line (pixels)' with a value of '0' and 'Frame (Lines)' with a value of '0'.

Index

Numerics

10/27/WC output
description [38](#)

5/10 Ref In
description [38](#)

7600 HD-REF model
features [32](#)

7600MHD-REF model
features [32](#)

A

AC Mains
connection and fusing [41](#)

Active Format Description (AFD)
in SDI test patterns [35](#)
overview [57](#)

ADJUST knob [42](#)

Admin web pages [134](#)

AES 1/AES 2 Audio outputs
cabling (balanced) [39](#)
cabling (unbalanced) [39](#)
description [39](#)

analogue audio
connector pinouts [35](#)

Analogue BB Reference outputs
description [38](#)

Analogue Video Configuration web page [122](#)

Analogue Video menus
All Black and Burst [65](#)
Comp/BB/BnB [67](#)
overview [47](#)
RGB [68](#)
top level [63](#)
YC/BnB [69](#)
YUV [66](#)

Arrow buttons [42](#)

Audio configuration web pages [125](#)

AUDIO function button [42](#)

Audio menus
AES1/AES2 [74](#)

Analogue audio outputs [74](#)
overview [48](#)
top level [74](#)

C

cabling [34](#)

CANCEL button [42](#)

common configurations

Daylight Saving Time [106](#)

GPS Locked NTP server configuration [105](#)

GPS Locked SPG and Timecode Generator [105](#)

VITC as a JAM Source [106](#)

Comms Setup menu

detailed [89](#)

network and serial port setup [88](#)

Comms web page [136](#)

Config (memory banks) web page [134](#)

D

Daylight Saving Time
common configuration configuration [106](#)
enabling auto adjust [106](#)

Digital Video configuration web pages [117](#)

Digital Video menus

overview [47](#)

Pattern Submenu [55](#)

Test Patterns [53](#)

Timing [58](#)

Top Level [50](#)

Video Standard [52](#)

VITC [58](#)

documentation online [4](#)

E

Ethernet configuration (Login/IP) web page [136](#)

Ethernet port

description [34](#)

setup menu [89](#)

web page configuration [136](#)

F

- FAQ database [4](#)
- frequently asked questions [4](#)
- front panel
 - overall description [42](#)
- Front Panel Lock function [45](#)
- function buttons [42](#)

G

- genlock loop output
 - description [38](#)
- Genlock menus
 - Field Lock [78](#)
 - Genlock Loss [77](#)
 - Input Standard [78](#)
 - Mode [77](#)
 - Select Option [76](#)
- GPI inputs
 - description and connection [36](#)
- GPI outputs
 - description and connection [37](#)
- GPIO
 - 25-pin connector pinouts [35](#)
 - setup configuration menu [85](#)
 - web page configuration [128](#)
- GPS
 - BNCs [38](#)
 - detailed setup menu [99](#)
 - models with [32](#)
 - web page configuration [137](#)
- GPS 1PPS output
 - description [38](#)
- GPS antenna
 - cable considerations [96](#)
 - disclaimer [97](#)
 - installation location [95](#)
 - reception acquisition process [98](#)
 - recommended cable types [96](#)
 - requirements [95](#)
- GPS web pages [137](#)
- Grass Valley web site [4](#)
- grounding lug (earthing requirement) [34](#)
- GV 7600REF web browser interface
 - accessing [115](#)
 - change user name and password [136](#)

configuring [117](#)

I

- input standard
 - selecting [78](#)
- installation [33](#)
- Internal Memory Banks
 - using [86](#)

L

- LCD display
 - adjusting contrast [86](#)
 - overview [42](#)
- LOCK MODE function button [43](#)
- Lock Mode menu (genlocking)
 - overview [48](#)
 - top level [76](#)
- Lock web page [127](#)
- log file [107](#)
- Login/IP web page [136](#)
- LTC (Longitudinal Timecode)
 - description and pinouts [40](#)
 - menu [83](#)
 - web pages [131](#)

M

- Master/Slave Setup menu [86](#)
- Menu Timeout function
 - description [45](#)
- menus, top level
 - Audio [74](#)
 - Digital Video [50](#)
 - Main [47](#)
 - Setup [79](#)
- module installation [33](#)

N

- network and serial port setup [88](#)
- NTP (Network Time Protocol)
 - description [88](#)
 - GPS locked NTP server config [105](#)
 - overview [88](#)
 - setup [86](#)

web page [132](#)

O

OK button [42](#)

online documentation [4](#)

operation

basic description [43](#)

front panel [42](#)

OPTIONS function button [43](#)

Options menu

overview [49](#)

P

power supply

description [41](#)

replacement [41](#)

product overview [31](#)

R

rack mounting [33](#)

rear panel connections [34](#)

Release Notes [107](#)

Remote control connector

pinouts [35](#)

RTC (Real Time Clock)

setup [86](#)

web page [132](#)

S

SD/HD-SDI outputs

description [35](#)

SDI and ANALOG function buttons [42](#)

serial port [89](#)

web page configuration [132](#)

SETUP function button [43](#)

Setup menus

overview [48](#)

top level [79](#)

Setup web pages [128](#)

Setup-More menu

detailed [86](#)

SNMP support [104](#)

software download from web [4](#)

specifications [108](#)

10 MHz input performance [109](#)

AES/EBU outputs [111](#)

analog video output performance [110](#)

clock output [112](#)

EMC and Safety [108](#)

frame dimensions [108](#)

genlock operation control [109](#)

genlock video input performance [108](#)

GPI [113](#)

GPS antenna [113](#)

internal reference oscillator stability [108](#)

LTC timecode [113](#)

miscellaneous [113](#)

power [108](#)

SD-SDI outputs [110](#)

standard features [31](#)

STATUS button [43](#)

Status Info web page [133](#)

Status menu

detailed [91](#)

overview [49](#)

Status web page [133](#)

T

test patterns

analog [70](#)

digital [53](#)

TFTP Server

creating log file [107](#)

using [107](#)

timecode

menus [80](#)

web page configuration [129](#)

Tri-Level Sync (TLS)

description [34](#)

output BNCs [34](#)

setup menu [102](#)

sync standards table [103](#)

web page configuration [138](#)

U

unpacking unit [33](#)

Upgrade menu [86](#)

upgrading software [86](#)

V

VITC (Vertical Interval Timecode)

analog video [63, 71](#)

analogue web page configuration [124](#)

description [40](#)

Digital Video [58](#)

in Analogue waveforms [63](#)

SDI video waveform [50](#)

VITC as a JAM Source [106](#)

W

web browser interface

GV 7600REF [31, 46, 115](#)

web site

documentation [4](#)

FAQ database [4](#)

Grass Valley [4](#)

software download [4](#)