

TG700
TV Signal Generator Platform
User Manual



071-1970-01

Tektronix

TG700
TV Signal Generator Platform
User Manual

This document supports software version 5.2 and above.

www.tektronix.com

071-1970-01



Copyright © Tektronix. All rights reserved. Licensed software products are owned by Tektronix or its subsidiaries or suppliers, and are protected by national copyright laws and international treaty provisions.

Tektronix products are covered by U.S. and foreign patents, issued and pending. Information in this publication supersedes that in all previously published material. Specifications and price change privileges reserved.

TEKTRONIX and TEK are registered trademarks of Tektronix, Inc.

Contacting Tektronix

Tektronix, Inc.
14200 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Warranty

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE PRODUCT IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPAIR OR REPLACE DEFECTIVE PRODUCTS IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY. TEKTRONIX AND ITS VENDORS WILL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES IRRESPECTIVE OF WHETHER TEKTRONIX OR THE VENDOR HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

[W2 – 15AUG04]

IMPORTANT

READ BEFORE OPERATING EQUIPMENT

This software is provided under license from Tektronix, Inc. Retention of this program for more than thirty (30) days or use of the program in any manner constitutes acceptance of the license terms.

CAREFULLY READ THE ENCLOSED SOFTWARE LICENSE AGREEMENT. If you cannot agree to the license terms, promptly contact the nearest Tektronix Field Office for return assistance.

TEKTRONIX SOFTWARE LICENSE AGREEMENT

THE PROGRAM, OR PROGRAMS, ENCODED OR INCORPORATED WITHIN EQUIPMENT, IS FURNISHED SUBJECT TO THE TERMS AND CONDITIONS OF THIS AGREEMENT. RETENTION OF THE PROGRAM FOR MORE THAN THIRTY DAYS OR USE OF THE PROGRAM IN ANY MANNER WILL BE CONSIDERED ACCEPTANCE OF THE AGREEMENT TERMS. IF THESE TERMS ARE NOT ACCEPTABLE, THE UNUSED PROGRAM AND ANY ACCOMPANYING DOCUMENTATION SHOULD BE RETURNED PROMPTLY TO TEKTRONIX FOR A FULL REFUND OF THE LICENSE FEE PAID. (FOR INFORMATION REGARDING THE RETURN OF PROGRAMS ENCODED OR INCORPORATED WITHIN EQUIPMENT, CONTACT THE NEAREST TEKTRONIX SALES OFFICE.

DEFINITIONS. “Tektronix” means Tektronix, Inc., an Oregon corporation, or local Tektronix’ legal entity that is supplying the equipment.

“Program” means the Tektronix software product (executable program and/or data) enclosed with this Agreement or included within the equipment with which this Agreement is packed.

“Customer” means the person or organization in whose name the Program was ordered.

LICENSE. Customer may:

1. Use the Program on a single machine at any one time;
2. If the Program is provided in connection with a floating–user license, the Program may be used on multiple machines provided that the user is authorized, and the total number of users at any one time does not exceed the total number of licensed concurrent users;
3. Modify the Program or merge it with another for use on the single machine; and
4. Copy the Program for archival or backup purposes, provided that no more than one (1) such copy is permitted to exist at any one time. If the Program is provided in connection with a floating–user license, the Program may be copied onto multiple machines for use by authorized users.

Each copy of the Program made by Customer must include a reproduction of any copyright notice or restrictive rights legend appearing in or on the copy of the Program as received from Tektronix.

Customer may not:

1. Use the Program on more than one machine at any one time, unless covered by a floating-user license or separate site license;
2. Transfer the Program to any person or organization outside of Customer or the corporation of which Customer is a part without the prior written consent of Tektronix, except in connection with the transfer of the equipment within which the programs are encoded or incorporated;

3. Export or re-export, directly or indirectly, the program, any associated documentation, or the direct product thereof, to any country to which such export or re-export is restricted by law or regulation of the United States or any foreign government having jurisdiction without the prior authorization, if required, of the Office of Export Administration, Department of Commerce, Washington, D.C. and the corresponding agency of such foreign government;
4. For object-code Programs only, reverse compile or disassemble the Program for any purpose; or
5. Copy the documentation accompanying the Program.

For Programs designed to reside on a single-machine and support one or more additional machines, either locally or remotely, without permitting the Program to be transferred to an additional machine for local execution, the additional machines shall be considered within the definition of "single machine". For programs permitting the Program to be transferred to an additional machine for local execution, a separate license shall be required for each such machine with which the Program may be used, or each concurrent user authorized under a floating-user license.

Title to the Program and all copies thereof, but not the media on which the Program or copies may reside, shall be and remain with Tektronix or others for whom Tektronix has obtained a respective licensing right.

Customer shall pay when due all property taxes that may now or hereafter be imposed, levied or assessed with respect to the possession or use of the Program or this license and shall file all reports required in connection with such taxes.

Any portion of the Program modified by Customer or merged with another program shall remain subject to these terms and conditions.

If the Program is acquired by or for an agency of the U.S. Government, the Program shall be considered computer software developed at private expense and the license granted herein shall be interpreted as granting Customer restricted rights in the Program and related documentation as defined in the applicable acquisition regulation.

THE PROGRAM MAY NOT BE USED, COPIED, MODIFIED, MERGED, OR TRANSFERRED TO ANOTHER EXCEPT AS EXPRESSLY PERMITTED BY THESE TERMS AND CONDITIONS.

UPON TRANSFER OF ANY COPY, MODIFICATION, OR MERGED PORTION OF THE PROGRAM, THE LICENSE GRANTED HEREIN IS AUTOMATICALLY TERMINATED.

TERM. The license granted herein is effective upon acceptance by Customer, and shall remain in effect until terminated as provided herein. The license may be terminated by Customer at any time upon written notice to Tektronix. The license may be terminated by Tektronix or any third party from whom Tektronix may have obtained a respective licensing right if Customer fails to comply with any term or condition and such failure is not remedied within thirty (30) days after notice hereof from Tektronix or such third party. Upon termination by either party, Customer shall return to Tektronix or destroy, the Program and all associated documentation, together with all copies in any form.

LIMITED WARRANTY. Tektronix warrants that the media on which the Program is furnished and the encoding of the Program on the media will be free from defects in materials and workmanship for a period of three (3) months from the date of shipment. If any such medium or encoding proves defective during the warranty period, Tektronix will provide a replacement in exchange for the defective medium. Except as to the media on which the Program is furnished, the Program is provided "as is" without warranty of any kind, either express or implied. Tektronix does not warrant that the functions contained in the Program will meet Customer's requirements or that the operation of the Program will be uninterrupted or error-free.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period. If Tektronix is unable to provide a replacement that is free from defects in materials and workmanship within a reasonable time thereafter, Customer may terminate the license for the Program and return the Program and any associated materials for credit or refund.

THIS WARRANTY IS GIVEN BY TEKTRONIX WITH RESPECT TO THE PROGRAM IN LIEU OF ANY OTHER WARRANTIES, EXPRESS OR IMPLIED. TEKTRONIX AND ITS VENDORS DISCLAIM ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. TEKTRONIX' RESPONSIBILITY TO REPLACE DEFECTIVE MEDIA, OR REFUND CUSTOMER'S PAYMENT IS THE SOLE AND EXCLUSIVE REMEDY PROVIDED TO THE CUSTOMER FOR BREACH OF THIS WARRANTY.

LIMITATION OF LIABILITY, IN NO EVENT SHALL TEKTRONIX OR OTHERS FROM WHOM TEKTRONIX HAS OBTAINED A LICENSING RIGHT BE LIABLE FOR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES ARISING OUT OF OR CONNECTED WITH CUSTOMER'S POSSESSION OR USE OF THE PROGRAM, EVEN IF TEKTRONIX OR SUCH OTHERS HAS ADVANCE NOTICE OF THE POSSIBILITY OF SUCH DAMAGES.

THIRD-PARTY DISCLAIMER. Except as expressly agreed otherwise, third parties from whom Tektronix may have obtained a licensing right do not warrant the program, do not assume any liability with respect to its use, and do not undertake to furnish any support or information relating thereto.

GENERAL. This Agreement contains the entire agreement between the parties with respect to the use, reproduction, and transfer of the Program.

Neither this Agreement nor the license granted herein is assignable or transferable by Customer without the prior written consent of Tektronix.

This Agreement and the license granted herein shall be governed by the laws of the state of Oregon.

All questions regarding this Agreement or the license granted herein should be directed to the nearest Tektronix Sales Office.

Table of Contents

General Safety Summary	ix
Service Safety Summary	xi
Compliance Information	xii
EMC Compliance	xii
Safety Compliance	xiv
Environmental Considerations	xvi
Preface	xvii
Products	xvii
About This Manual	xvii
Related Manuals	xviii
Getting Started	1
Product Description	1
Mainframe Memory Requirements	2
Accessories	3
Options	4
Initial Product Inspection	5
Mainframe Installation	5
Module Installation and Removal	11
Functional Checks	16
Operating Basics	45
Front-Panel Controls	45
Rear-Panel Connectors	47
Frame Reset Signals	59
Clock Conflict Messages	60
Fan Failure Warning Message	61
Using the Mainframe Menus	62
Connecting to a Network	76
Using the Mainframe General Purpose Interface (GPI)	79
Inspection and Cleaning	89
AG7 Audio Generator Module	91
Product Description	91
Operating Procedure	92
AG7 Module Main Menu	93
Factory Default Settings	96
AGL7 Analog Genlock Module	97
Product Description	97
Operating Procedure	98
AGL7 Module Main Menu	99
Factory Default Settings	107

ATG7 Analog Test Generator	108
Product Description.....	108
Operating Procedure.....	109
Selecting an Output Signal.....	110
ATG7 Module Main Menu.....	112
Factory Default Settings	120
AVG7 Analog Video Generator.....	121
Product Description.....	121
Operating Procedure.....	122
Selecting an Output Signal.....	123
AVG7 Module Main Menu	129
Factory Default Settings	141
AWVG7 Analog Wideband Video Generator	142
Product Description.....	142
Operating Procedure.....	143
Selecting an Output Signal.....	144
AWVG7 Module Main Menu	146
Factory Default Settings	158
BG7 Black Generator	159
Product Description.....	159
Operating Procedure.....	160
BG7 Module Main Menu	161
Factory Default Settings	167
DVG7 Digital Video Generator.....	169
Product Description.....	169
Operating Procedure.....	170
Selecting an Output Signal.....	171
DVG7 Module Main Menu.....	174
Factory Default Settings	191
GPS7 GPS Synchronization and Timecode Module.....	193
Product Description.....	193
Operating Procedure.....	194
Configure the GPS7 Module.....	195
GPS7 Module Main Menu.....	206
Factory Default Settings	233
HD3G7 HD 3 Gb/s SDI Video Generator	235
Product Description.....	235
Operating Procedure.....	237
Selecting an Output Signal.....	238
HD3G7 Module Main Menu	241
Factory Default Settings	253

HDLG7 HD Dual Link Video Generator	254
Product Description.....	254
Operating Procedure.....	256
Selecting an Output Signal.....	257
HDLG7 Module Main Menu	265
Factory Default Settings	270
HDVG7 HDTV Digital Video Generator.....	271
Product Description.....	271
Operating Procedure.....	272
Selecting an Output Signal.....	273
HDVG7 Module Main Menu.....	275
Factory Default Settings	292
Index	

List of Figures

Figure 1: Installing the rackmount hardware	7
Figure 2: Placing the TG700 in the rack	8
Figure 3: TG700 slot numbering	12
Figure 4: Removing the blank panel	13
Figure 5: Installing the module	13
Figure 6: Securing the module	14
Figure 7: Removing the module	15
Figure 8: TG700 front panel	45
Figure 9: TG700 rear panel.....	47
Figure 10: AG7 module connectors	48
Figure 11: Location of J452 on the AG7 module	48
Figure 12: AGL7 module connectors	49
Figure 13: Location of the J040 and J960 on the AGL7 module.....	50
Figure 14: ATG7 module connectors.....	51
Figure 15: AVG7 module connectors	51
Figure 16: AWVG7 module connectors	52
Figure 17: BG7 module connectors	52
Figure 18: DVG7 module connectors (Option BK)	53
Figure 19: GPS7 module connectors	54
Figure 20: HD3G7 module connectors	56
Figure 21: HDLG7 module connectors	57
Figure 22: HDVG7 module connectors (Option BK)	58
Figure 23: Mainframe main menu	62
Figure 24: PRESET submenu	63
Figure 25: SEQUENCE submenu	65
Figure 26: FRAME RESET STATUS submenu	66
Figure 27: UTILITY submenu	67
Figure 28: SIGNAL KEY ASSIGN submenu.....	69
Figure 29: NETWORK INFORMATION submenu.....	70
Figure 30: NETWORK SETUP submenu	71
Figure 31: DIAGNOSTICS submenu	73
Figure 32: Internal frequency calibration menu.....	74
Figure 33: Gain calibration menu.....	75
Figure 34: Pin connections for a 10BASE-T crossover Ethernet cable	76
Figure 35: Top cover removal.....	80
Figure 36: Location of the mainframe GPI connectors on the A10 MAIN board.....	80
Figure 37: Applying the mainframe GPI label to the rear panel	81
Figure 38: Mainframe GPI ALARM menu.....	84

Figure 39: AG7 module main menu.....	93
Figure 40: AG7 module CHANNEL PARAMETERS submenu.....	95
Figure 41: AG7 module AUDIO TIMING submenu.....	96
Figure 42: AGL7 module main menu.....	99
Figure 43: AGL7 module GENLOCK submenu.....	100
Figure 44: AGL7 module OUTPUT submenu.....	102
Figure 45: AGL7 module SIGNAL submenu.....	104
Figure 46: AGL7 module TIMING submenu.....	105
Figure 47: Front-panel test signal buttons.....	110
Figure 48: ATG7 module main menu.....	112
Figure 49: ATG7 module SELECT OUTPUT submenu.....	114
Figure 50: ATG7 module SELECT SIGNAL submenu.....	115
Figure 51: ATG7 module ID TEXT submenu.....	116
Figure 52: ATG7 module TIMING submenu.....	118
Figure 53: ATG7 module APL submenu.....	119
Figure 54: Front-panel test signal buttons.....	124
Figure 55: AVG7 module main menu.....	129
Figure 56: AVG7 module MOVING PICTURE submenu.....	131
Figure 57: AVG7 module OVERLAY submenu.....	132
Figure 58: AVG7 module LOGO submenu.....	133
Figure 59: AVG7 module ID TEXT submenu.....	134
Figure 60: AVG7 module CIRCLE submenu.....	136
Figure 61: AVG7 module TIMING submenu.....	137
Figure 62: AVG7 module VIDEO submenu.....	138
Figure 63: AVG7 module APL submenu.....	140
Figure 64: Front-panel test signal buttons.....	145
Figure 65: AWVG7 module main menu.....	146
Figure 66: AWVG7 module MOVING PICTURE submenu.....	148
Figure 67: AWVG7 module OVERLAY submenu.....	149
Figure 68: AWVG7 module LOGO submenu.....	150
Figure 69: AWVG7 module ID TEXT submenu.....	151
Figure 70: AWVG7 module CIRCLE submenu.....	153
Figure 71: AWVG7 module TIMING submenu.....	154
Figure 72: AWVG7 module VIDEO submenu.....	156
Figure 73: BG7 module main menu.....	161
Figure 74: BG7 module SELECT FORMAT submenu.....	162
Figure 75: BG7 module SELECT SIGNAL submenu.....	163
Figure 76: BG7 module TIMING submenu.....	164
Figure 77: BG7 module TIMECODE submenu.....	165
Figure 78: BG7 module VITC submenu.....	167
Figure 79: Front-panel test signal buttons.....	172

Figure 80: DVG7 module main menu.....	175
Figure 81: DVG7 module MOVING PICTURE submenu	177
Figure 82: DVG7 module OVERLAY submenu.....	178
Figure 83: DVG7 module LOGO submenu	179
Figure 84: DVG7 module ID TEXT submenu	180
Figure 85: DVG7 module CIRCLE submenu.....	182
Figure 86: DVG7 module AUDIO GROUP submenu	183
Figure 87: DVG7 module AUDIO CHANNEL submenu	184
Figure 88: DVG7 module TIMING submenu.....	186
Figure 89: DVG7 module VIDEO submenu	187
Figure 90: DVG7 module BLACK submenu (Option BK only).....	189
Figure 91: Simplified antenna system.....	198
Figure 92: Time flow block diagram	202
Figure 93: GPS7 module main menu.....	207
Figure 94: GPS7 module REFERENCE submenu.....	210
Figure 95: GPS7 module BLACK submenu	212
Figure 96: GPS7 module TIMING submenu.....	213
Figure 97: GPS7 module TIMECODE submenu	214
Figure 98: GPS7 module VITC submenu	216
Figure 99: GPS7 module GPS SETUP submenu	217
Figure 100: GPS7 module TIME OF DAY submenu	220
Figure 101: GPS7 module TIME ZONE OFFSET submenu.....	221
Figure 102: GPS7 module DST SCHEDULE submenu	222
Figure 103: GPS7 module PROGRAM TIME submenu	223
Figure 104: GPS7 module JAM SYNC submenu	224
Figure 105: GPS7 module LEAP SECOND submenu	225
Figure 106: GPS7 module ALARM TIME submenu	226
Figure 107: GPS7 module DELAY submenu	227
Figure 108: GPS7 module LTC submenu.....	228
Figure 109: GPS7 module LTC TIMING submenu	229
Figure 110: GPS7 module GPI submenu	230
Figure 111: GPS7 module GPO submenu	231
Figure 112: GPS7 module DIAGNOSTICS submenu	232
Figure 113: Front-panel test signal buttons.....	239
Figure 114: HD3G7 module main menu.....	242
Figure 115: HD3G7 module STATUS menu in generator mode.....	244
Figure 116: HD3G7 module OUTPUT MODE submenu.....	245
Figure 117: HD3G7 module MOVING PICTURE submenu	246
Figure 118: HD3G7 module TIMING submenu	247
Figure 119: HD3G7 module VIDEO submenu	248
Figure 120: HD3G7 module TRIGGER OUTPUT submenu	249

Figure 121: HD3G7 module DIAGNOSTICS submenu	250
Figure 122: Front-panel test signal buttons.....	260
Figure 123: HDLG7 module main menu	265
Figure 124: HDLG7 module LINK OFFSET submenu.....	268
Figure 125: HDLG7 module MOVING PICTURE submenu	269
Figure 126: Front-panel test signal buttons.....	274
Figure 127: HDVG7 module main menu	276
Figure 128: HDVG7 module MOVING PICTURE submenu.....	278
Figure 129: HDVG7 module OVERLAY submenu	279
Figure 130: HDVG7 module LOGO submenu.....	280
Figure 131: HDVG7 module ID TEXT submenu	281
Figure 132: HDVG7 module CIRCLE submenu	283
Figure 133: HDVG7 module AUDIO GROUP submenu.....	284
Figure 134: HDVG7 module AUDIO CHANNEL submenu.....	285
Figure 135: HDVG7 module TIMING submenu	287
Figure 136: HDVG7 module TIMECODE submenu.....	288
Figure 137: HDVG7 module VIDEO submenu.....	289
Figure 138: HDVG7 module BLACK submenu (Option BK only)	291

List of Tables

Table 1: Standard and optional accessories.....	3
Table 2: Instrument and module options.....	4
Table 3: TG700 environmental requirements	8
Table 4: AC line power requirements	10
Table 5: GPS7 module LTC/GPI connector pin assignments.....	55
Table 6: Mainframe GPI jumper settings on the A10 MAIN board	81
Table 7: Pin assignments of the 10 BASE-T connector for the mainframe GPI.....	82
Table 8: Signal level combinations and the corresponding preset for the mainframe GPI.....	82
Table 9: External inspection check list.....	89
Table 10: AG7 module factory default settings	96
Table 11: Timing adjustment ranges for AGL7 input signals	106
Table 12: Timing adjustment ranges for AGL7 output signals.....	106
Table 13: AGL7 module factory default settings	107
Table 14: ATG7 signal sets assigned to the test signal buttons.....	111
Table 15: Test signals in the ATG7 SELECT SIGNAL submenu.....	115
Table 16: ATG7 module factory default settings.....	120
Table 17: AVG7 signal sets assigned to the test signal buttons.....	124
Table 18: AVG7 module factory default settings	141
Table 19: AWVG7 signal set assigned to the test signal buttons.....	145
Table 20: Timing adjustment ranges for AWVG7 module output signals.....	155
Table 21: AWVG7 module factory default settings	158
Table 22: BG7 module signals for each signal format	163
Table 23: BG7 module factory default settings	167
Table 24: DVG7 module signal set assigned to the test signal buttons.....	172
Table 25: DVG7 module factory default settings	191
Table 26: Figures of merit for signal quality	200
Table 27: GPS7 module output signal formats	212
Table 28: LTC output signal formats	229
Table 29: GPS7 module factory default settings	233
Table 30: HD3G7 module test signal set assigned to the test signal buttons	240
Table 31: HD3G7 module factory default settings	253
Table 32: HDLG7 module signal formats	258
Table 33: HDLG7 module HD test signal set assigned to the test signal buttons	261
Table 34: HDLG7 module projector test pattern set assigned to the test signal buttons.....	262
Table 35: HDLG7 module sample structure/depth signal formats	267
Table 36: HDLG7 module factory default settings	270
Table 37: HDVG7 module signal set assigned to the test signal buttons.....	274
Table 38: HDVG7 module factory default settings.....	292

General Safety Summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

To Avoid Fire or Personal Injury

Use Proper Power Cord. Use only the power cord specified for this product and certified for the country of use.

Ground the Product. This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

Observe All Terminal Ratings. To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Power Disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Do Not Operate Without Covers. Do not operate this product with covers or panels removed.

Do Not Operate With Suspected Failures. If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Avoid Exposed Circuitry. Do not touch exposed connections and components when power is present.

Do Not Operate in Wet/Damp Conditions.

Do Not Operate in an Explosive Atmosphere.

Keep Product Surfaces Clean and Dry.

Provide Proper Ventilation. Refer to the manual's installation instructions for details on installing the product so it has proper ventilation.

Terms in this Manual These terms may appear in this manual:



WARNING. *Warning statements identify conditions or practices that could result in injury or loss of life.*



CAUTION. *Caution statements identify conditions or practices that could result in damage to this product or other property.*

Symbols and Terms on the Product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.
- WARNING indicates an injury hazard not immediately accessible as you read the marking.
- CAUTION indicates a hazard to property including the product.

The following symbol(s) may appear on the product:



CAUTION
Refer to Manual



Protective Ground
(Earth) Terminal

Service Safety Summary

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

Do Not Service Alone. Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect Power. To avoid electric shock, switch off the instrument power, then disconnect the power cord from the mains power.

Use Care When Servicing With Power On. Dangerous voltages or currents may exist in this product. Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

To avoid electric shock, do not touch exposed connections.

Compliance Information

This section lists the EMC (electromagnetic compliance), safety, and environmental standards with which the instrument complies.

EMC Compliance

EC Declaration of Conformity – EMC

Meets intent of Directive 2004/108/EC for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities:

EN 55103:1996. Product family standard for audio, video, audio-visual and entertainment lighting control apparatus for professional use.^{1 2}

- Environment E2 – commercial and light industrial
- Part 1 Emission
 - EN 55022:1987. Class B radiated and conducted emissions
 - EN 55103-1:1996 Annex A. Radiated magnetic field emissions
- Part 2 Immunity
 - IEC 61000-4-2:2001. Electrostatic discharge immunity
 - IEC 61000-4-3:2006. RF electromagnetic field immunity
 - IEC 61000-4-4:2004. Electrical fast transient / burst immunity
 - IEC 61000-4-5:2005. Power line surge immunity
 - IEC 61000-4-6:2003. Conducted RF Immunity
 - IEC 61000-4-11:2004. Voltage dips and interruptions immunity
 - EN 55103-2:1996 Annex A Radiated magnetic field immunity

EN 61000-3-2:2006. AC power line harmonic emissions

EN 61000-3-3:1995. Voltage changes, fluctuations, and flicker

European Contact.

Tektronix UK, Ltd.
Western Peninsula
Western Road
Bracknell, RG12 1RF
United Kingdom

EMC Compliance

Meets the intent of Directive 2004/108/EC for Electromagnetic Compatibility when it is used with the product(s) stated in the specifications table. Refer to the EMC specification published for the stated products. May not meet the intent of the directive if used with other products.

European Contact.

Tektronix UK, Ltd.
Western Peninsula
Western Road
Bracknell, RG12 1RF
United Kingdom

- ¹ To ensure compliance with the EMC standards listed here, high quality shielded interface cables should be used.
- ² Equal to or < 40A peak in-rush current for equal or less than 5 line cycles, after the instrument has been turned off for at least 30 seconds.

**Australia / New Zealand
Declaration of
Conformity – EMC**

Complies with the EMC provision of the Radiocommunications Act per the following standard, in accordance with ACMA:

- EN 55022:1987. Radiated and conducted emissions, Class B, in accordance with EN 55103-1:1996.

Safety Compliance

EC Declaration of Conformity – Low Voltage

Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:

Low Voltage Directive 2006/95/EC.

- EN 61010-1: 2001. Safety requirements for electrical equipment for measurement control and laboratory use.

U.S. Nationally Recognized Testing Laboratory Listing

- UL 61010B-1, 1st Edition. Safety requirements for electrical equipment for measurement control and laboratory use.

Canadian Certification

- CAN/CSA C22.2 No. 1010.1-92 & 1010.1B-97, 1st Edition. Safety requirements for electrical equipment for measurement, control, and laboratory use. Part 1.

Additional Compliances

- IEC 61010-1: 2001. Safety requirements for electrical equipment for measurement, control, and laboratory use.

Equipment Type

Test and measuring equipment.

Safety Class

Class 1 – grounded product.

Safety Certification of Plug-in Modules

The safety certification is valid only when installed in an appropriately approved (by a USA NRTL or a Canada Certified Organization) mainframe.

Pollution Degree Description

A measure of the contaminants that could occur in the environment around and within a product. Typically the internal environment inside a product is considered to be the same as the external. Products should be used only in the environment for which they are rated.

- Pollution Degree 1. No pollution or only dry, nonconductive pollution occurs. Products in this category are generally encapsulated, hermetically sealed, or located in clean rooms.
- Pollution Degree 2. Normally only dry, nonconductive pollution occurs. Occasionally a temporary conductivity that is caused by condensation must be expected. This location is a typical office/home environment. Temporary condensation occurs only when the product is out of service.
- Pollution Degree 3. Conductive pollution, or dry, nonconductive pollution that becomes conductive due to condensation. These are sheltered locations

where neither temperature nor humidity is controlled. The area is protected from direct sunshine, rain, or direct wind.

- Pollution Degree 4. Pollution that generates persistent conductivity through conductive dust, rain, or snow. Typical outdoor locations.

Pollution Degree

Pollution Degree 2 (as defined in IEC 61010-1). Note: Rated for indoor use only.

**Installation (Overvoltage)
Category Descriptions**

Terminals on this product may have different installation (overvoltage) category designations. The installation categories are:

- Measurement Category IV. For measurements performed at the source of low-voltage installation.
- Measurement Category III. For measurements performed in the building installation.
- Measurement Category II. For measurements performed on circuits directly connected to the low-voltage installation.
- Measurement Category I. For measurements performed on circuits not directly connected to MAINS.

Overvoltage Category

Overvoltage Category II (as defined in IEC 61010-1)

Environmental Considerations

This section provides information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling an instrument or component:

Equipment Recycling. Production of this equipment required the extraction and use of natural resources. The equipment may contain substances that could be harmful to the environment or human health if improperly handled at the product's end of life. In order to avoid release of such substances into the environment and to reduce the use of natural resources, we encourage you to recycle this product in an appropriate system that will ensure that most of the materials are reused or recycled appropriately.



This symbol indicates that this product complies with the applicable European Union requirements according to Directives 2002/96/EC and 2006/66/EC on waste electrical and electronic equipment (WEEE) and batteries. For information about recycling options, check the Support/Service section of the Tektronix Web site (www.tektronix.com).

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive.

Preface

This manual describes the capabilities of the TG700 TV Signal Generator Platform.

Products

The information in this manual applies to the following products:

- TG700 TV Generator Platform
- AG7 Audio Generator Module
- AGL7 Analog Genlock Module
- ATG7 Analog Test Generator Module
- AVG7 Analog Video Generator Module
- AWVG7 Analog Wideband Video Generator Module
- BG7 Black Generator Module
- DVG7 Digital Video Generator Module
- GPS7 GPS Synchronization and Timecode Module
- HD3G7 HD 3 Gb/s SDI Video Generator Module
- HDLG7 HD Dual Link Generator Module
- HDVG7 HDTV Digital Video Generator Module

About This Manual

This manual is composed of the following sections:

- *Getting Started* shows you how to configure and install your TG700 system and provides an Incoming Inspection procedure. The section also describes the mainframe options and how to install modules.
- *Operating Basics* provides an overview of the front-panel controls and rear-panel connections.
- *TG700 Modules Operation* provides operating information about each of the modules that can be added to the TG700 mainframe.

Related Manuals

The following documents are also available for the TG700:

- The *TG700 TV Signal Generator Platform PC Tools Technical Reference* (Tektronix part number 077-0138-XX) describes how to use the PC tools that are available for the mainframe and related modules.
- The *TG700TV Signal Generator Platform Specifications and Performance Verification Technical Reference* (Tektronix part number 077-0137-XX) describes the mechanical, electrical, and environmental specifications for the mainframe and related modules. This manual also provides performance verification procedures.
- The *TG700TV Signal Generator Platform Programmer Manual* (Tektronix part number 077-0139-XX) provides programming information for the mainframe and related modules.
- The *TG700 TV Signal Generator Platform Service Manual* (Tektronix part number 077-0230-XX) describes how to service the TG700 mainframe to the module level (circuit boards, fuses). Specific service information for a module is located in a subsection of the Service manual specific to the module. The Service manual is optional and must be ordered separately.
- The *TG700 TV Signal Generator Platform Release Notes* (Tektronix part number 077-0229-XX) describes the new features, improvements, and limitations of the most recent available firmware for the TG700 TV Signal Generator Platform. This information is provided in both Japanese and English.

Getting Started

This section contains the following information:

- Product description
- Mainframe memory requirements
- List of instrument accessories and options
- Initial product inspection procedure
- Installation instructions (mainframe and modules)
- Functional check procedures

Product Description

The TG700 TV Signal Generator Platform is a multiformat TV signal generator platform supporting both analog and digital video standards. The TG700 consists of a mainframe and up to four plug-in modules. The modules are either signal generators or they provide special functions, such as genlock capability.

Key Features

The TG700 and the available modules provide the following features:

- Simultaneous generation of HDTV/SDTV multiformat synchronized signal and test signal
- Modular architecture with up to four generators or special function modules
- Analog genlock function dealing with NTSC or PAL black burst signal, HDTV trilevel sync signal, and CW signals (AGL7)
- Synchronization with the GPS timing signal (GPS7)
- Timecode generator with VITC (GPS7 and BG7), with LTC (GPS7), and with ATC (HDVG7) when a GPS7 module is installed
- Dual link SDI generator and converter (HDLG7)
- 3 Gb/s SDI video generator and converter (HD3G7)
- Independent setting of amplitudes, frequencies, and audio clicks of 16 channel embedded audio signal (DVG7 and HDVG7)
- Circle, logo, and text overlays on test signals (DVG7 and HDVG7)
- Moving picture generation function by scrolling the active area of the signal (DVG7, HD3G7, HDLG7, and HDVG7)
- Reference generator performance level
- Ethernet interface for remote control and downloading various files such as signal files, logo files, and preset files

A signal library, software application packages, and product documentation are included in the standard accessory DVD to execute the following operations:

- Upload and download files such as signal files, logo files, and preset files
- Download the signals from the signal library to the TG700
- Create a logo (logo file) to be inserted into the test signal
- Create a frame picture file using the generation of a picture or test pattern

Mainframe Memory Requirements

The GPS7 and HD3G7 modules require that the TG700 mainframe have at least 32 MB of memory installed and software version 5.2 or above installed. If your mainframe has 32 MB of memory and you load the TG700 memory with signals from the Frame Picture Generator application, you may not be able to upgrade the instrument to software version 5.2.

If you receive a memory error while attempting to upgrade the software version, you need to either delete some of the Frame Picture Generator signals or upgrade you instrument to 64 MB of memory.

NOTE. *Option FP provided extra memory, which allowed the TG700 mainframe to support the Frame Picture Generator application. This option is no longer necessary for new TG700 mainframes.*

If you have an older mainframe with less than 64 MB of memory, you can increase the memory in your mainframe to 64 MB by ordering the following upgrade kit: 040-1698-xx. Contact your local Tektronix representative for more information.

Accessories

The following table lists the standard and optional accessories provided with the TG700 mainframe and modules.

Table 1: Standard and optional accessories

Accessory	Std.	Opt.	Tektronix part number
TG700 TV Signal Generator Platform User Manual One of the following: English, Option L0 or Japanese, Option L5	•		071-1970-xx (Option L0) 071-1971-xx (Option L5)
TG700 Signal Generator Platform Software Library and Product Documentation DVD Packaging Kit	•		020-2721-xx
Rackmounting hardware	•		351-0859-00
Power cord (See page 4, <i>International Power Plug Options.</i>)	•		Varies by option
TG700 TV Signal Generator Platform Service Manual		•	077-0230-xx
Blank rear panel		•	614-A021-00
LTC and GPI breakout cable (GPS7 module only)		•	012-1717-00

Options

The following table lists the options that can be ordered with the TG700 mainframe and modules.

Table 2: Instrument and module options

Option	Description	Instrument/Module
D1	When you order Option D1, a Calibration Test Data Report is provided with the instrument and/or module for which the option is specified.	TG700 mainframe, AG7, AGL7, ATG7, AVG7, AWVG7 GPS7 HD3G7, HDLG7, HDVG7
BK	When you order Option BK, two serial digital black signal outputs are added to the module.	DVG7, HDVG7
CB	When you order Option CB, 10 field ID and NTSC/PAL color bars signals can be output from the BLACK3 and BLACK4 outputs.	BG7

NOTE. Option FP provided extra memory, which allowed the TG700 mainframe to support the Frame Picture Generator application. This option is no longer necessary for new TG700 mainframes. If you have an older mainframe with less than 64 MB of memory, you can upgrade your mainframe to 64 MB by ordering the following upgrade kit: 040-1698-xx. Contact your local Tektronix representative for more information.

International Power Plug Options

The following international power plug options are available:

- Opt. A0 – North America power (standard).
- Opt. A1 – Universal EURO power.
- Opt. A2 – United Kingdom power.
- Opt. A3 – Australia power.
- Opt. A4 – 240 V, North America power.
- Opt. A5 – Switzerland power.
- Opt. A6 – Japan power.
- Opt. A11 – India power.

Production Documentation Options

The following product documentation options are available:

- Opt. L0 – Printed English user manual.
- Opt. L5 – Printed Japanese user manual.

Initial Product Inspection

Perform the following product inspection procedure when you receive your instrument:

1. Inspect the TG700 shipping carton for external damage, which may indicate damage to the instrument.
2. Remove the TG700 from the shipping carton, and then check that the instrument has not been damaged in transit. Prior to shipment the instrument is thoroughly inspected for mechanical defects. The exterior should not have any scratches or impact marks.

NOTE. *Save the shipping carton and packaging materials for instrument repackaging in case shipment becomes necessary.*

3. Verify that the shipping carton contains the basic instrument, all modules you ordered, the standard accessories and any optional accessories that you ordered listed in the table. (See Table 1.)

Contact your local Tektronix Field Office or representative if there is a problem with your instrument or if your shipment is incomplete.

Mainframe Installation

This section provides installation information for the TG700 mainframe.

Hardware Installation

The TG700 is shipped with the optional modules that you ordered already installed and configured. You can add or remove modules as necessary for your application. (See page 11, *Module Installation and Removal*.)

Rackmount Installation



WARNING. *Personal injury or damage to the instrument can occur if the instrument is not properly secured in the equipment rack.*

The TG700 is configured at shipment for use in an equipment rack. Use the information in the following figure to connect the rackmount hardware to the rack. (See Figure 1.)

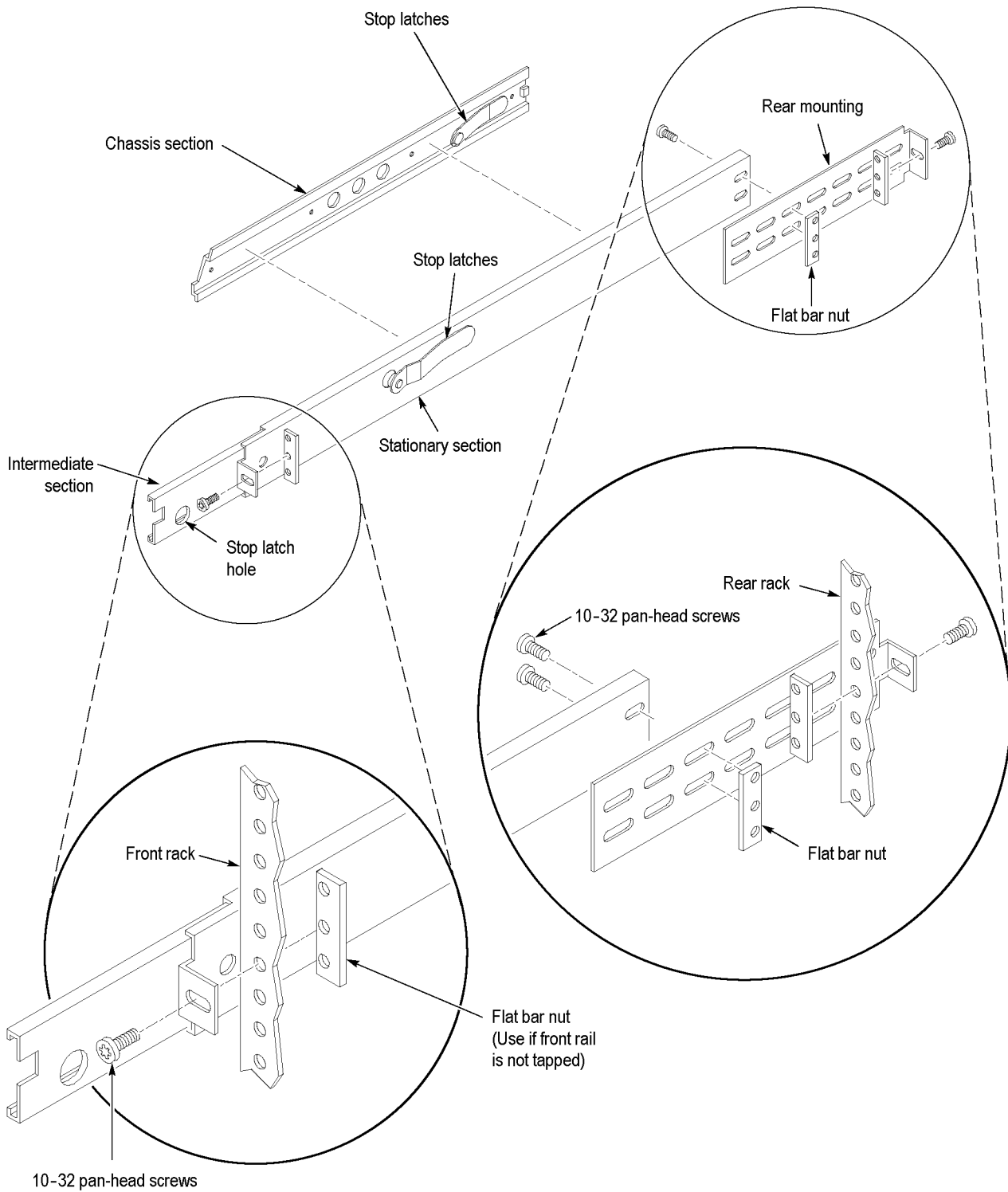


Figure 1: Installing the rackmount hardware

The following figure shows how to install the TG700 into the rack. Carefully insert the rack slides attached to the TG700 into the pieces attached to the rack. Support the TG700 until the stop latches click into place on both sides. The installation is not secure until this latching occurs. Continue to slide the TG700 completely into the rack.

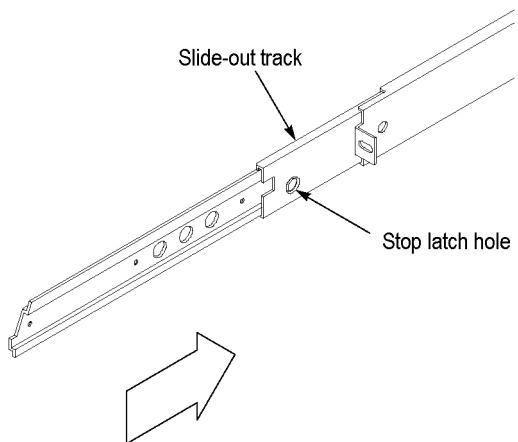


Figure 2: Placing the TG700 in the rack

To remove the TG700 from the rack, slide it out until it stops at the catches. Support the TG700 while you press in on the stop latch buttons on each side. This action will free the TG700 to slide completely out of the rack. Provide support while you slide the TG700 mainframe out of the rack.

Environmental Operating Requirements

Check that the location of your installation has the proper operating environment as listed in the following table. (See Table 3.)



CAUTION. *Damage to the instrument can occur if this instrument is powered on at temperatures outside the specified temperature range.*

Table 3: TG700 environmental requirements

Parameter		Description
Temperature	Operating	0 °C to +50 °C
	Nonoperating	-20 °C to +60 °C
Relative Humidity	Operating	20% to 80% (No condensation); Maximum wet-bulb temperature 29.4 °C
	Nonoperating	5% to 90% (No condensation); Maximum wet-bulb temperature 40.0 °C

Table 3: TG700 environmental requirements (cont.)

Parameter		Description
Altitude	Operating	To 4.5 km (15,000 feet) Maximum operating temperature decreases 1 °C each 300 m above 1.5 km.
	Nonoperating	To 15 km (50,000 feet)

Leave space for cooling by ensuring standard side clearance for rack mounting or 2 inches (5.1 cm) of side clearance for benchtop use. Also, ensure sufficient rear clearance (approximately 2 inches) so that cables are not damaged by sharp bends.

For complete specifications for the instrument, refer to the *TG700 Specifications and Performance Verification Technical Reference* provided on the CD that shipped with your instrument.

Connecting Power

The TG700 operates from a single-phase power source with the neutral conductor at or near earth ground. The line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the power cord is essential for safe operation.



CAUTION. *The instrument does not have a power switch. When you connect the power cable to the AC line connector, the instrument powers on.*

AC Power Requirements. Check that your location provides the proper electrical power requirements as listed in the following table. (See Table 4.)

Table 4: AC line power requirements

Parameter	Description
Line Voltage Range	100 - 240 VAC ($\pm 10\%$)
Line frequency	48 Hz - 63 Hz
Maximum power	100 W

Connecting the Power Cable. Connect the power cable to the instrument first, and then connect it to the AC power source. Connecting the power cable causes the instrument to power on.

After connecting the power, make sure that the fan on the rear panel is working. If the fan is not working, turn off the power by disconnecting the power cable from the AC power source, and then contact your local Tektronix Field Office or representative.

Module Installation and Removal

The following procedures describe how to install and remove modules from the TG700 mainframe. A screwdriver with a #1 Phillips tip is the only tool you need to install or remove a module.



CAUTION. *To prevent damage to the mainframe and module, always remove the power cord before installing or removing a module.*

Preventing Component Damage



CAUTION. *Electrostatic discharge (ESD) can damage components on the module and mainframe. To prevent ESD or other component damage, follow the guidelines below when installing, removing or handling a module.*

- Wear a grounded antistatic wrist strap to discharge the static voltage from your body while installing or removing modules from the TG700 mainframe.
- Transport and store modules in a static-protected bag or container.
- Do not slide the module over any surface.
- Handle modules as little as possible.
- Do not touch module components or connector pins.
- Do not use any devices capable of generating or holding a static charge in the work area where you remove, install, or handle modules.
- Avoid handling modules in areas that have a floor or work-surface covering capable of generating a static charge.
- Do not remove the module circuit board assembly from the shield. The shield is an important stiffener which prevents damage to surface-mount components.

Installing a Module

To install a module into an empty slot in the mainframe, perform the following procedure:

1. Unplug the power cord from the power connector on the rear panel of the mainframe.
2. Use the following guidelines to select the slot where you will install the module. The following figure shows a sample module configuration with the associated slot numbers.
 - For AGL7 and GPS7 modules, only one of these modules can be installed in the TG700 mainframe at a time, and it must be installed only in slot 1. All other modules may be installed in any slot location.

NOTE. When installing a GPS7 module into an existing mainframe, you must perform the TG700 mainframe oven calibration. (See page 74, CAL OVEN Submenu.)

- For AG7, ATG7, AVG7, BG7, DVG7, and HDLG7 modules, up to four of the modules can be installed in the TG700 mainframe.
- For AWVG7 and HDVG7 modules, only a combined total of two (2) of these modules can be installed in the TG700 mainframe at the same time when the HDVG7 module has a rear-panel fan. If the HDVG7 module does not have a rear-panel fan, then a combined total of three (3) of these modules can be installed.
- For HD3G7 modules, up to three of these modules can be installed in the TG700 mainframe.

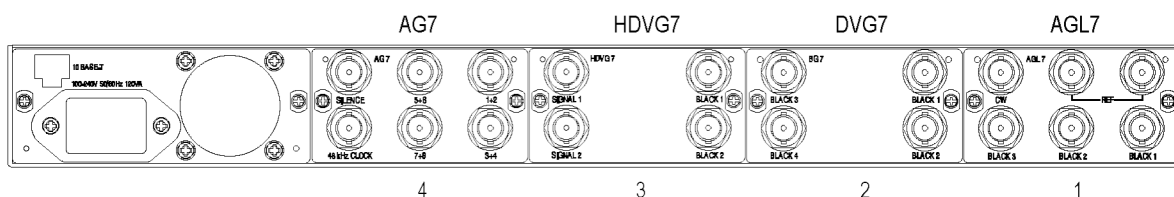


Figure 3: TG700 slot numbering

3. Use a screwdriver with a #1 Phillips tip to loosen the two screws of the blank panel attached to the slot you want to use, and then pull it away from the instrument. Save the blank panel for future use. (See Figure 4.)

If you are installing a new module into a slot that already contains a module, remove the existing module. (See page 14, *Removing a Module*.)

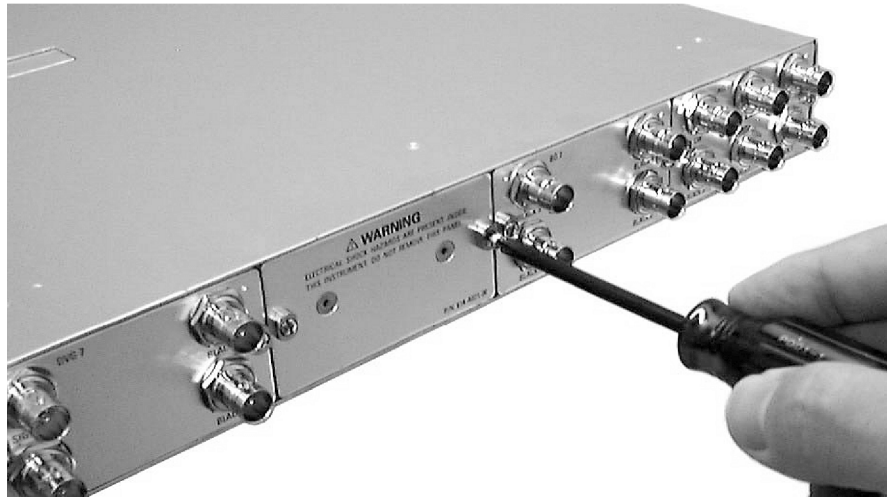


Figure 4: Removing the blank panel



CAUTION. Be careful not to damage the parts and cables inside of the module when you insert the module into the mainframe.

4. Insert the module into the slot, paying attention to the module orientation. (See Figure 5.) Push the module into the slot until the connector board of the module is firmly engaged with the Main board of the mainframe.

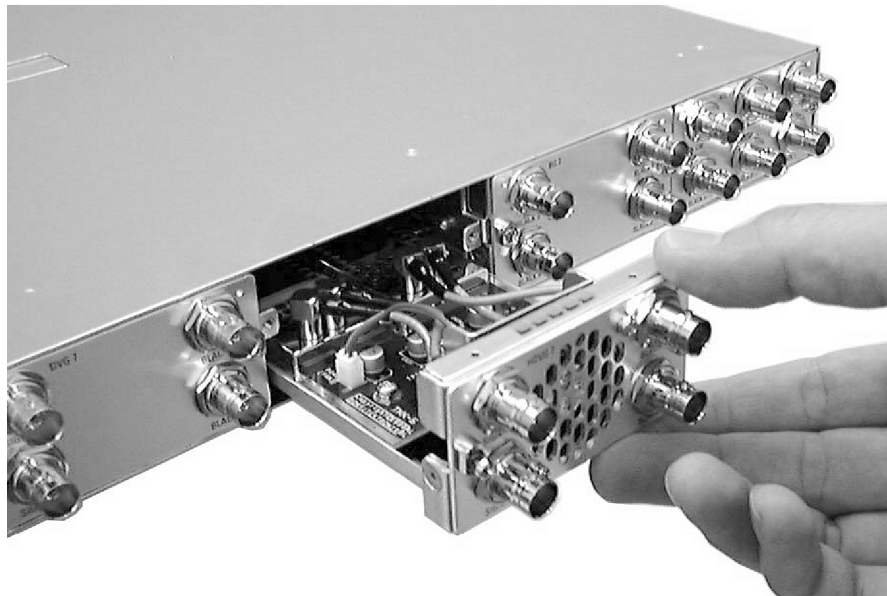


Figure 5: Installing the module

5. Tighten the two screws to secure the module to the mainframe. (See Figure 6.)

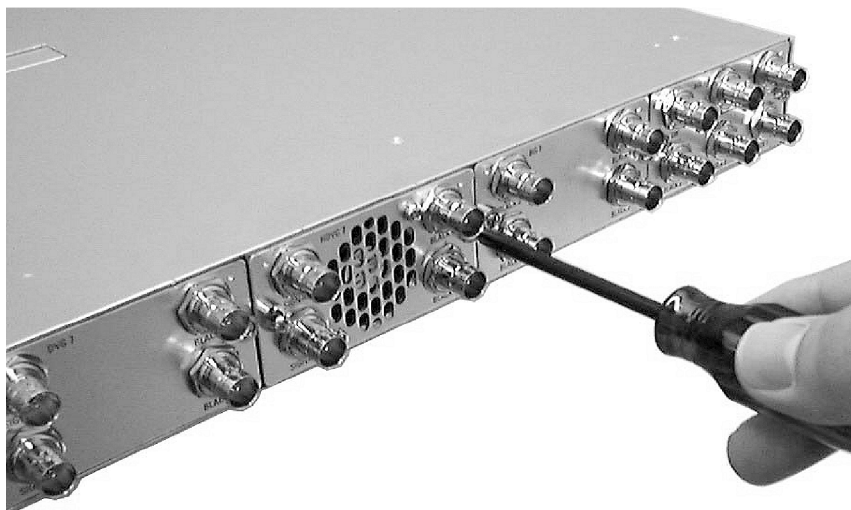


Figure 6: Securing the module

Removing a Module

To remove a module from the mainframe, perform the following procedure:



CAUTION. To facilitate module removal, attach terminations or BNC cables to the module connectors. The connector may be damaged if too much force is applied to it during module removal.

1. Unplug the power cord from the power connector on the mainframe rear panel.
2. Attach 75 Ω terminations or BNC cables to the BNC connectors on the module to be removed. Module removal becomes easier if the terminations or cables are attached to the connectors at the left and right ends.
3. Use a screwdriver with a #1 Phillips tip to loosen the two screws securing the module to the mainframe.



CAUTION. Be careful not to damage the parts and cables inside of the module when you remove the module from the mainframe.

4. Pull the module slowly toward you while supporting the terminations or BNC cables attached to the connectors. (See Figure 7.)

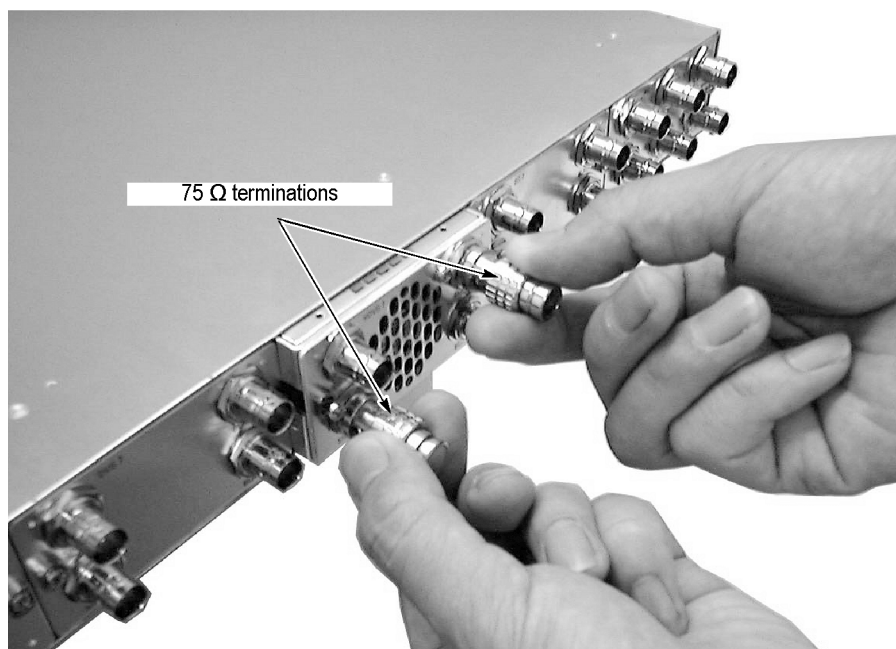


Figure 7: Removing the module

5. If this empty slot will not be used, you must attach a blank panel to the mainframe to control instrument cooling and EMI emissions.
 - a. Align the blank panel with the open slot of the mainframe.
 - b. Tighten the two screws to secure the blank panel to the mainframe.

A blank panel is available as an optional accessory for the TG700 mainframe. Refer to *Accessories*. (See page 3.)

6. If you want to install another module into the slot from which the module is removed, perform *Installing a Module* starting at step 4. (See page 11, *Module Installation and Removal*.)

Functional Checks

Use the following procedures to check that the TG700 modules installed in your instrument are functional.

AG7 Module Functional Check

Use the following procedure to check that the AG7 Audio Generator module is functional.

Required Equipment.

- Digital audio monitor
- Oscilloscope
- 75 Ω BNC cable
- 75 Ω Termination

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.
5. Press the front-panel **MODULE** button until the AG7 main menu as shown below appears.

AG7 [x] : CHANNEL PARAMETERS
Channel 1

6. Connect the **1+2** connector to the digital audio monitor using the 75 Ω BNC cable.
7. Set the digital audio monitor to display the status for the audio data.
8. Check that any CRC error does not appear on the monitor.

9. Change the BNC cable from the **1+2** connector to the **3+4** connector, and check that no CRC errors appear on the monitor.
10. Change the BNC cable from the **3+4** connector to the **5+6** connector, and check that no CRC errors appear on the monitor.
11. Change the BNC cable from the **5+6** connector to the **7+8** connector, and check that no CRC errors appear on the monitor.
12. Change the BNC cable from the **7+8** connector to the **SILENCE** connector, and check that no CRC errors appear on the monitor.
13. Connect the **48 kHz CLOCK** connector to the oscilloscope CH1 input using the 75 Ω BNC cable and 75 Ω termination.
14. Check that the appropriate clock signal is displayed on the screen.

AGL7 Module Functional Check

Use the following procedure to check that the AGL7 Analog Genlock module is functional.

Required Equipment.

- TV signal generator
- NTSC/PAL waveform monitor
- HDTV waveform monitor
- 75 Ω BNC cable
- 75 Ω termination

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.

Genlock Function.

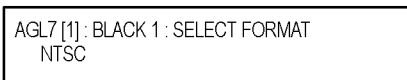
5. Press the front-panel **MODULE** button until the AGL7 main menu shown below appears.



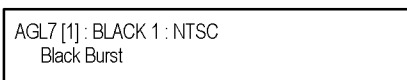
6. Press the up (▲) or down (▼) arrow button to select **GENLOCK** from the main menu and then press the **ENTER** button.
7. Press the left (◀) or right (▶) arrow button to select **Internal** and then press the **ENTER** button.
8. Check that **INT.REF** indicator at the right side of the front panel lights. This shows that the instrument is using the internal reference signal.
9. Connect one of the TV signal generators output connectors to the AGL7 **REF** connector, using the 75 Ω BNC cable. Terminate the other side of the **REF** connector with the 75 Ω termination.
10. Press the left (◀) or right (▶) arrow button to select the menu item corresponding to the input signal and then press the **ENTER** button.
11. Check that **EXT.REF** indicator at the right side of the front panel lights. This shows that the instrument is locked to the input signal.
12. Disconnect the BNC cable from the REF connector.
13. Check that **EXT.REF** indicator at the right side of the front panel blinks. This shows that the external reference signal is not being input to the REF connector.

Black Signal Outputs.

14. Press the front-panel **CANCEL** button.
15. Press the up (▲) or down (▼) arrow button to select **SELECT OUTPUT** from the main menu.
16. Press the left (◀) or right (▶) arrow button to select **BLACK 1**, then press the **ENTER** button. The SELECT FORMAT submenu shown below appears.



17. Press the left (◀) or right (▶) arrow button to select **NTSC** or **PAL** for your waveform monitor and then press the **ENTER** button.



18. Press the left (◀) or right (▶) arrow button to select **Black Burst**, then press the **ENTER** button.
19. Connect the **BLACK 1** connector to the NTSC/PAL waveform monitor using the 75 Ω BNC cable.
20. Set the waveform monitor to view the black burst signal.
21. Check that the appropriate black burst signal is displayed.
22. Press the **CANCEL** button twice to display the **SELECT OUTPUT** menu.
23. Press the left (◀) or right (▶) arrow button to select **BLACK 2**, then press the **ENTER** button.
24. Repeat steps 17 and 18.
25. Connect the **BLACK 2** connector to the NTSC/PAL waveform monitor using the 75 Ω BNC cable.
26. Set the waveform monitor to view the black burst signal.
27. Check that the appropriate black burst signal is displayed.
28. Press the **CANCEL** button twice to display the **SELECT OUTPUT** menu.
29. Press the left (◀) or right (▶) arrow button to select **BLACK 3** and then press the **ENTER** button. This displays the **SELECT FORMAT** submenu.
30. Press the left (◀) or right (▶) arrow button to select **1080 60i** and then press the **ENTER** button.
31. Connect the **BLACK 3** connector to the HDTV waveform monitor using the 75 Ω BNC cable.
32. Check that the appropriate HDTV trilevel sync signal is displayed.

ATG7 Module Functional Check

Use the following procedure to check that the ATG7 Analog Test Generator module is functional.

Required Equipment.

- NTSC/PAL waveform monitor
- 75 Ω BNC cable
- 75 Ω terminator

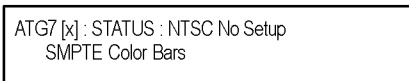
NOTE. *If the software version of your TG700 mainframe is version 1.3 or earlier, you must upgrade the software of the mainframe before using the ATG7 module. Refer to the TG700 technical reference for the procedures.*

Procedure.

1. Install the module into the TG700 mainframe. (See page 11, *Module Installation and Removal*.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the display.
4. Warm up the instrument for 20 minutes.

SIGNAL Output.

5. Use the 75 Ω BNC cable to connect the **SIGNAL** connector to one of the input connectors on the waveform monitor rear panel.
6. Use the 75 Ω terminator to terminate the other loop through connector on the waveform monitor rear panel.
7. Press the front-panel **MODULE** button until the ATG7 main menu shown below appears.



8. Press the front-panel **FORMAT** button and use the left (◀) or right (▶) arrow button to select **NTSC** or **PAL**.
9. Press one of the front-panel test signal buttons (for example **COLOR BAR**) to output a signal.
10. Set the waveform monitor to view the signal.
11. Check that the signal appears as expected. For example, if you selected a color bars signal in step 7, check that the color bars signal appears.

BLACK 1 and BLACK 2 Outputs.

12. Disconnect the BNC cable from the **SIGNAL** connector, and then connect it to the **BLACK 1** connector.
13. Press the up (▲) or down (▼) arrow button to select **SELECT OUTPUT** from the main menu.
14. Press the left (◀) or right (▶) arrow button to select **BLACK 1**.

15. Press the front-panel **ENTER** button. The SELECT FORMAT submenu shown below appears.

```

ATG7 [x] : BLACK 1 : SELECT FORMAT
NTSC

```

16. Press the left (◀) or right (▶) arrow button to select **NTSC** or **PAL**.
17. Press the **ENTER** button. The SELECT SIGNAL submenu shown below appears.

```

ATG7 [x] : BLACK 1 : SELECT SIGNAL
Black Burst

```

18. Press the left (◀) or right (▶) arrow button to select **Black Burst**. Press the **ENTER** button to enable the selection.
19. Set the waveform monitor to view the blanking area of the signal.
20. Check that the appropriate black burst signal is displayed.
21. Move the BNC cable from the **BLACK 1** connector to the **BLACK 2** connector.
22. Press the front-panel **CANCEL** button twice to return to the main menu.
23. Repeat steps 14 through 20 to check the **BLACK 2** output.

BARS Output.

24. Move the BNC cable from the **BLACK2** connector to the **BARS** connector.
25. Press the **CANCEL** button twice to return to the main menu.
26. Press the left (◀) or right (▶) arrow button to select **BARS**.
27. Press the **ENTER** button. The SELECT FORMAT submenu appears.
28. Press the left (◀) or right (▶) arrow button to select **NTSC** or **PAL**.
29. Press the **ENTER** button. The SELECT SIGNAL submenu appears.
30. Press the left (◀) or right (▶) arrow button to select **100% Color Bars**. Press the **ENTER** button to enable the selection.
31. Set the waveform monitor to view the color bars signal.
32. Check that the appropriate color bars signal appears.

AVG7 Module Functional Check

Use the following procedure to check that the AVG7 Analog Video Generator module is functional.

Required Equipment.

- Waveform monitor
- 75 Ω BNC cable

Procedure.

1. Install the module into the TG700 Platform mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.
5. Press the front-panel **MODULE** button until the AVG7 main menu shown below appears.

AVG7 [x] : STATUS : NTSC
 SMPTE Color Bars

6. Press the **FORMAT** button and use the left (\blacktriangleleft) or right (\blacktriangleright) arrow button to select a format, and then press the **ENTER** button.
7. Press one of the front-panel test signal buttons (for example **COLOR BAR**) to output a signal.
8. Press the **CANCEL** button to display the main menu.
9. Press the up (\blacktriangle) or down (\blacktriangledown) arrow button to select **VIDEO** from the main menu and then press the **ENTER** button. The VIDEO submenu shown below appears.

AVG7 [x] : VIDEO : CONFIGURATION
 CH1/2/3: Composites

10. Press the left (\blacktriangleleft) or right (\blacktriangleright) arrow button to select **CH1/2/3: Composites** and then press the **ENTER** button.
11. Connect the upper (or lower) **CH 1** connector to the waveform monitor using the 75 Ω BNC cable.
12. Set the waveform monitor to view the signal.
13. Check that the signal appears as expected. For example, if you selected a color bar signal in step 7, check that the color bar signal appears.
14. Disconnect the BNC cable from the **CH 1** connector, and then connect the BNC cable to the **CH 2** connector.

15. Check that the signal appears as expected.
16. Disconnect the BNC cable from the **CH 2** connector, and then connect the BNC cable to the **CH 3** connector.
17. Check that the signal appears as expected.
18. Disconnect the BNC cable from the **CH 3** connector, and then connect the BNC cable to the **CH 1** connector.
19. Press the test signal button again to output the another test signal in the same signal set.
20. Check that the signal on the waveform monitor changes. You need not perform this check for the CH 2 and CH 3 connectors.
21. Repeat steps 11 through 20 for the lower (or upper) output channels.

AWVG7 Module Functional Check

Use the following procedure to check that the AWVG7 Analog Wideband Video Generator module is functional.

Required Equipment.

- HDTV waveform monitor
- Three 75 Ω BNC cables
- Three 75 Ω terminators

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.
5. Press the front-panel **MODULE** button until the AWVG7 main menu shown below appears.

AWVG7 [x] : STATUS : 1080 59i YPbPr
100% Color Bars

6. Press the **FORMAT** button and use the left (**◀**) or right (**▶**) arrow button to select a format, then press the **ENTER** button.
7. Press one of the front-panel test signal buttons (for example **COLOR BAR**) to output a signal.

8. Use the 75 Ω BNC cables to connect the upper (or lower) **CH 1**, **CH 2**, and **CH 3** connectors to the **CH A**, **CH B**, and **CH C** inputs of the waveform monitor respectively.
9. Use the 75 Ω terminators to terminate the other loop-through connectors on the waveform monitor real panel.
10. Press the **CH A** button on the waveform monitor, and set the waveform monitor to view the signal.
11. Check that the signal appears as expected. For example, if you selected a color bar signal in step 7, check that the color bar signal appears.
12. Press the **CH B** button on the waveform monitor.
13. Check that the signal appears as expected. For example, if you selected a color bar signal in step 7, check that the color bar signal appears.
14. Press the **CH C** button on the waveform monitor.
15. Check that the signal appears as expected. For example, if you selected a color bar signal in step 7, check that the color bar signal appears.
16. Press the **CH A** button on the waveform monitor.
17. Press the test signal button again to output another test signal in the same signal set.
18. Check that the signal on the waveform monitor changes. You do not need to perform this check for the CH 2 and CH 3 connectors.
19. Disconnect the BNC cable from the upper (or lower) **CH 1**, **CH 2**, and **CH 3** connectors, and then connect the BNC cables to the lower (or upper) **CH 1**, **CH 2**, and **CH 3** connectors.
20. Repeat steps 10 through 18 for the lower (or upper) output channels.

BG7 Module Functional Check

Use the following procedure to check that the BG7 Black Generator module is functional.

Required Equipment.

- NTSC/PAL waveform monitor
- HDTV waveform monitor
- 75 Ω BNC cable

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.
5. Press the front-panel **MODULE** button until the BG7 main menu shown below appears.

```
BG7 [x]: SELECT OUTPUT
BLACK 1
```

6. Press the front-panel **ENTER** button. The SELECT FORMAT submenu shown below appears.

```
BG7 [x]: BLACK 1 : SELECT FORMAT
NTSC
```

7. Press the left (◀) or right (▶) arrow button to select **NTSC** or **PAL**.
8. Press the **ENTER** button. The SELECT SIGNAL submenu shown below appears.

```
BG7 [x]: BLACK 1 : SELECT SIGNAL
Black Burst
```

9. Press the left (◀) or right (▶) arrow button to select **Black Burst** and then press the **ENTER** button to enable the selection.
10. Connect the **BLACK 1** connector to the NTSC/PAL waveform monitor using the 75 Ω BNC cable.
11. Set the waveform monitor to view the blanking area of the signal.
12. Check that the appropriate black burst signal is displayed.
13. Press the front-panel **CANCEL** button to return to the SELECT FORMAT submenu shown in step 6.
14. Press the left (◀) or right (▶) arrow button to select **HD SYNC**.
15. Press the **ENTER** button. The SELECT SIGNAL submenu shown in step 8 appears to select the HDTV trilevel sync signal.
16. Press the left (◀) or right (▶) arrow button to select **1080 59.94i** and then press the **ENTER** button to enable the selection.
17. Disconnect the BNC cable from the NTSC/PAL waveform monitor, and then reconnect it to the HDTV waveform monitor.

18. Check that the appropriate HDTV trilevel sync signal is displayed.
19. Repeat this procedure for the **BLACK 2**, **BLACK 3**, and **BLACK 4** outputs.

DVG7 Module Functional Check

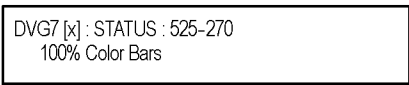
Use the following procedure to check that the DVG7 Digital Video Generator module is functional.

Required Equipment.

- Serial digital waveform monitor
- 75 Ω BNC cable

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.
5. Press the front-panel **MODULE** button until the DVG7 main menu shown below appears.



6. Press the **FORMAT** button and use the left (**◀**) or right (**▶**) arrow button to select a format, then press the **ENTER** button.
7. Press one of the front-panel test signal buttons (for example **COLOR BAR**) to output a signal.
8. Connect the **SIGNAL 1** connector to the serial digital waveform monitor using the 75 Ω BNC cable.
9. Set the waveform monitor to view the signal.
10. Check that the signal appears as expected. For example, if you selected a color bar signal in step 7, check that the color bar signal appears.
11. Disconnect the BNC cable from the **SIGNAL 1** connector, and then connect the BNC cable to the **SIGNAL 2** connector.
12. Check that the signal appears as expected.

GPS7 Module Functional Check

Use the following procedure to check that the GPS7 GPS Synchronization and Timecode module is functional.

NOTE. *Depending on which other modules are present and what formats they generate, you may get a clock conflict message. If this occurs, press the ENTER button to accept the change and continue the test. This may happen at multiple steps in one or several of the functional tests.*

Required Equipment.

- GPS antenna feed with good signal level
- SDI video signal source (can be external, or a DVG7 or HDVG7 module in either a reference instrument or the mainframe under test)
- WFM7120 with Option CPS
- Voltmeter
- LTC/GPIO breakout adapter cable (Tektronix part number 012-1717-XX)
- Female XLR connector, three wires, and one 9-pin DSUB male header with solder cups, assembled as described in the LTC Functional Test
- BNC-to-banana-plug adapter
- (2) 75 Ω coaxial terminators (Tektronix part number 011-0163-XX)
- (2) BNC T connectors
- (3) 1 meter BNC cables

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization of all the installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.
5. Run the GPS7 module diagnostics:
 - a. Press the **MODULE** button until **GPS7** appears.
 - b. Use the up (▲) or down (▼) arrow button to select **DIAGNOSTICS**.
 - c. Press the **ENTER** button.
 - d. Use the left (◀) or right (▶) arrow button to scroll through the menu. Take note of any errors or warnings.
6. Load the factory preset:
 - a. Press the **MODULE** button until **TG700** appears.
 - b. Press **ENTER** to select **Preset**.
 - c. If needed, use the up (▲) or down (▼) arrow button to select **Recall**.
 - d. Press the left (◀) arrow button until **Factory Preset** appears.
 - e. Press the **ENTER** button to load the preset.
7. When loading is complete, press the **CANCEL** button to exit the Factory Default menu.

DC antenna output power voltage.

1. Connect the BNC-to-Banana-plug adapter to the voltmeter.
2. Connect the BNC T to the adapter.
3. Connect a 75 Ω BNC cable to the other end of the BNC T connector.
4. Connect the other end of the cable to the antenna input on the rear of the module.
5. Set the antenna power to 3.3 V:
 - a. Press the **MODULE** button to navigate to the **GPS7** module.
 - b. Use the up (**▲**) or down (**▼**) arrow button to select **GPS SETUP**.
 - c. Press the **ENTER** button.
 - d. Use the up (**▲**) or down (**▼**) arrow button to select **Antenna Power**.
 - e. Use the left (**◀**) or right (**▶**) arrow button to select **3.3 V**.
 - f. Press the **ENTER** button.
6. Check that the voltmeter shows between 3.3 V and 4 V.
7. Use the left (**◀**) arrow to set the antenna voltage to 5 V.
8. Press the **ENTER** button.
9. Check that the voltmeter shows between 5 V and 6 V.

Antenna current and fault thresholds.

1. Connect the BNC-to-Banana-plug adapter to the voltmeter.
2. Connect the BNC T to the adapter.
3. Set the antenna power to 5 V:
 - a. Press the **MODULE** button to navigate to the **GPS7** module.
 - b. Use the up (**▲**) or down (**▼**) arrow button to select **GPS SETUP**.
 - c. Press the **ENTER** button.
 - d. Use the up (**▲**) or down (**▼**) arrow button to select **Antenna Power**.
 - e. Use the left (**◀**) or right (**▶**) arrow button to select **5 V**.
 - f. Press the **ENTER** button.
4. Connect a 75 Ω BNC cable to the other end of the BNC T connector.
5. Connect the other end of the cable to the antenna input on the rear of the module.
6. Check that the LED located between the DSUB connector and the antenna input on the rear panel of the module is flashing green. Green indicates an open circuit.
7. Apply a 75 Ω terminator to the BNC T and check that the voltage is between 4.5 V and 5 V.
8. Check that the LED on the module back panel is a steady green. This indicates a nominal load.
9. Connect the second BNC T and 75 Ω terminator to the antenna system to exceed the allowed antenna current.
10. Check that the LED on the module rear panel is a steady red. This indicates a short circuit.
11. Remove the terminators and the connection to the voltmeter.

Lock to GPS through antenna.



CAUTION. *To avoid antenna damage, do not turn on the DC antenna power until you know that the antenna is designed to handle the selected voltage. Antenna damage can occur if the antenna is not designed to handle the voltage you select.*

1. Set the antenna voltage as needed by the antenna in the test system.
2. Navigate to the signal quality menu:
 - a. Press the **MODULE** button to navigate to the **GPS7** module.
 - b. Use the up (▲) or down (▼) arrow button to select **STATUS** from the GPS7 module menu.
 - c. Use the left (◀) or right (▶) arrow button to select **Signal Quality**.
3. Connect the GPS input signal feed to the antenna input on the rear of the module.
4. Check that the signal quality changes from *No Signal* to *Low Signal* to *Acquiring satellites* to *Adjusting phase* to *Locked*.

NOTE. *It is okay if some steps are skipped. Depending on the signal level, it may take from a few seconds to several minutes to leave the “No Signal” state.*

5. Make sure that the instrument has been running for at least 20 minutes before performing the next step.
6. Enter the Diagnostics menu and check for “fine” status. This indicates the GPS is operating at the maximum stability:
 - a. Use the up (▲) or down (▼) arrow button to select **DIAGNOSTICS**.
 - b. Press the **ENTER** button.
 - c. Use the left (◀) or right (▶) arrow button to select **TUNE** and check that the instrument shows **Fine** on the right side of the display.
7. Press the **CANCEL** button to exit the Diagnostics menu.

Black output functional test and frame pulse test.

1. Connect an SDI signal, like one from a DVG7 or HDVG7 module, to the SDI A input of a WFM1720, and select that input as the active input on the waveform monitor.
2. Connect a cable from the Black 1 output on the GPS7 module to the reference input of the WFM7120. Terminate the loop through on the monitor with a 75 Ω terminator.
3. Press the **EXT REF** button on the WFM7120.
4. Set Black 1 to NTSC on the GPS7 module:
 - a. Use the up (▲) or down (▼) arrow button to **SELECT OUTPUT**.
 - b. Use the left (◀) or right (▶) arrow button to select **Black 1**.
 - c. Press the **ENTER** button.

- d. Use the left (◀) or right (▶) arrow button to select **NTSC**.
 - e. Press the **ENTER** button.
 - f. Use the left (◀) or right (▶) arrow button to select **Black Burst**.
 - g. Press the **ENTER** button.
 - h. Press the **CANCEL** button to exit the NTSC submenu.
5. Check that the WFM7120 shows NTSC as the reference input.
6. Use the left (◀) or right (▶) arrow button to select **1080 60i** in the Select Format menu.
7. Press the **ENTER** button.
8. Check that the WFM7120 shows a 1080 60i signal on the reference input.
9. Disconnect the Black 1 signal from the module and the WFM7120.
10. Connect the Black 2 signal from the module to the reference input of the WFM7120.
11. Set Black 2 to a 1080 50i signal on the GPS7 module:
 - a. Press the **CANCEL** button to exit the Black 1 submenu.
 - b. Use the left (◀) or right (▶) arrow button to select **Black 2**.
 - c. Press the **ENTER** button.
 - d. Use the left (◀) or right (▶) arrow button to select **1080 50i**.
 - e. Press the **ENTER** button.
12. Check that the WFM7120 shows a 1080 50i signal on the reference input.
13. Use the left (◀) arrow button to select **PAL**.
14. Press the **ENTER** button.
15. Use the left (◀) arrow button to select **Black Burst**.
16. Press the **ENTER** button.
17. Check that the WFM7120 shows PAL on the reference input.
18. Press the **CANCEL** button to exit the PAL submenu.
19. Press the **CANCEL** button again to exit the Select Format submenu.
20. Disconnect the Black 2 signal from the module and the WFM7120.
21. Connect the Black 3 signal from the module to the reference input of the WFM7120.
22. Set Black 3 to a PAL signal on the GPS7 module:
 - a. Use the right (▶) arrow button to select **Black 3**.

- b. Press the **ENTER** button.
 - c. Use the right (▶) arrow button to select **PAL**.
 - d. Press the **ENTER** button.
 - e. Use the left (◀) or right (▶) arrow button to select **Black Burst**.
 - f. Press the **ENTER** button.
 - g. Press the **CANCEL** button to exit the PAL submenu.
- 23.** Check that the WFM7120 shows PAL on the reference input.
- 24.** Use the left (◀) or right (▶) arrow button to select **1080 24p**.
- 25.** Press the **ENTER** button.
- 26.** Check that the WFM7120 shows 1080 24p on the reference input.
- 27.** Press the **CANCEL** button to exit the Select Formats menu.

Black output VITC test.

1. Connect a cable from the Black 1 output on the module to the CMPST A input on the WFM7120, and terminate the loop through with a 75 Ω terminator. Activate the input by pressing the C input button on the front panel of the monitor.
2. On the WFM7120, press the CONFIG button and select VITC as the timecode source.
3. On the TG700, press the **MODULE** button until **GPS7** appears.
4. Use the up (**▲**) or down (**▼**) arrow button to select **SELECT OUTPUT**.
5. Use the left (**◀**) or right (**▶**) arrow button to select **Black 1**.
6. Press the **ENTER** button.
7. Use the left (**◀**) or right (**▶**) arrow button to select button to select **NTSC**.
8. Press the **ENTER** button.
9. Use the left (**◀**) or right (**▶**) arrow button to select **Black Burst**.
10. Press the **ENTER** button.
11. Press the **CANCEL** button to exit the NTSC submenu.
12. Use the up (**▲**) or down (**▼**) arrow button to select **Timecode**.
13. Press the **ENTER** button.
14. Use the left (**◀**) or right (**▶**) arrow button to select **Time of Day** as the Timecode Source.
15. Press the **ENTER** button.
16. Use the up (**▲**) arrow to select the **VITC** submenu and press the **ENTER** button to select **VITC 1**.
17. Press the right (**▶**) arrow to select **Output : Enable**.
18. Press the **ENTER** button.
19. Use the down (**▼**) arrow to select **Line number**.
20. Press the left (**◀**) arrow to select **Line number: 14**.
21. Check that the time of day is correctly updating on the WFM7120 Timecode display.
22. Repeat the procedure for Black 2 and Black 3 signals.

LTC functional test.

1. Connect the LTC/GPIO breakout adapter cable to the LTC/GPI DSUB on the back of the GPS7 module.
2. Construct an adapter by soldering wires between a female XLR and a 9-pin DSUB male header with solder cups, with this pin out:
 - a. XLR pin 1 to DSUB pin 1.
 - b. XLR pin 2 to DSUB pin 2.
 - c. XLR pin 3 to DSUB pin 3.
3. Connect the LTC 1 output on the breakout cable to the XLR adapter you just made.
4. Connect the DSUB end of the adapter you just made to the remote connector on the WFM7120.
5. Configure the WFM7120 to use LTC as the Timecode source.
6. Configure the LTC 1 output of the GPS7 module for 30 fps drop frame:
 - a. Press the **MODULE** button until **GPS7** appears.
 - b. Use the up (▲) or down (▼) arrow button to select **LTC**.
 - c. Press the **ENTER** button.
 - d. Use the left (◀) or right (▶) arrow button to select **LTC 1**.
 - e. Press the **ENTER** button.
 - f. Use the left (◀) or right (▶) arrow button to select **30 fps drop frame**.
 - g. Press the **ENTER** button.
 - h. Use the up (▲) or down (▼) arrow button to select **Source**.
 - i. Use the left (◀) or right (▶) arrow button to select **Time of Day**.
 - j. Press the **ENTER** button.
7. Check that the time of day is correctly updating on the WFM7120 timecode display.
8. Repeat this procedure for LTC 2 at 30 fps.
9. Repeat this procedure for LTC 3 at 25 fps.
10. Repeat this procedure for LTC 4 at 24 fps.

GPI output functional test.

1. Check that the antenna signal is connected to the antenna input of the module and that the instrument shows the signal is locked:
 - a. Press the **MODULE** button until **GPS7** appears.
 - b. Use the up (▲) or down (▼) arrow button, if needed, to select **STATUS**.
 - c. Check that the top line of the status display shows **Locked**.
2. Connect the GPI 1 output to the voltmeter:
 - a. Connect the BNC-to-Banana-plug adapter to the voltmeter.
 - b. Connect the LTC/GPIO breakout adapter cable to the LTC/GPI DSUB on the back of the GPS7 module.
 - c. Connect the GPI 1 connector on the breakout cable to the BNC-to-Banana-plug adapter.
3. Configure the GPI 1 output to be asserted on unlock:
 - a. Press the **MODULE** button until **GPS7** appears.
 - b. Use the up (▲) or down (▼) arrow button to select **SELECT GPIO**.
 - c. Press the **ENTER** button.
 - d. Use the left (◀) or right (▶) arrow button to select **Output 1**.
 - e. Press the **ENTER** button.
 - f. Use the left (◀) or right (▶) arrow button to select **Loss of lock**.
 - g. Press the **ENTER** button.
4. Check that the voltage on the GPI 1 output measures between 4.5 V and 5.5 V.
5. Disconnect the antenna input. After 15 seconds, check that the GPI 1 output is below 0.5 V.
6. Repeat this procedure for the GPI 2 output.

GPI input functional test.

1. Configure the GPS7 GPI input to reset the program time:
 - a. Press the **MODULE** button until **GPS7** appears.
 - b. Use the up (**▲**) or down (**▼**) arrow button to select **SELECT GPIO**.
 - c. Press the **ENTER** button.
 - d. Use the left (**◀**) or right (**▶**) arrow button to select **Input 1**.
 - e. Press the **ENTER** button.
 - f. Use the left (**◀**) or right (**▶**) arrow button to select **Reset Program Time**.
 - g. Press the **ENTER** button.
 - h. Press the **CANCEL** button to exit the Select GPIO menu.
2. Press the up arrow to select the **STATUS** display.
3. If needed, use the left (**◀**) or right (**▶**) arrow button to display **Program Time**.
4. Write down the program time.
5. Connect the LTC/GPIO breakout adapter cable to the LTC/GPI DSUB on the back of the GPS7 module.
6. Attach a 75 Ω terminator to the GPI input for 2 seconds, and then remove it.
7. Look at the program time now and compare it to the program time you wrote down before. The time on the display should have reset to the default start time of 00:00:00:00 and now be counting again.

HD3G7 Module Functional Check

Use the following procedure to check that the HD3G7 HD 3 Gb/s SDI Video Generator module is functional.

Required Equipment.

- HD-SDI video signal generator
- 3 Gb/s waveform monitor
- Two 1 m (3 ft) BNC to BNC high-bandwidth cables

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization of all the installed modules is executed.
3. Check that no error messages appear on the LCD display.

Generator Function.

4. Press the front-panel **MODULE** button until the HD3G7 main menu shown below appears.

HD3G7 [x] : STATUS : 75% Color Bars 3G-A 1080 59.94p YCbCr 4:2:2 10b>>

1970/230

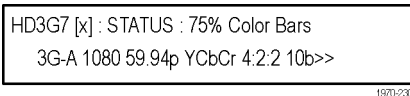
5. Press the **FORMAT** button and use the left (◀) or right (▶) arrow button to select **1080 50p**, then press **ENTER**.
6. Press the **COLOR BAR** button and select a signal to output.
7. Press the **ENTER** button.
8. Press the **CANCEL** button to exit the COLOR BARS menu.
9. Connect the **SIGNAL 1** connector to the HDTV waveform monitor using the 75 Ω BNC cable.
10. Press the up (▲) arrow button to display the **DIAGNOSTICS** menu.
11. Press the **ENTER** button.
12. Press the right (▶) arrow to scroll through the Diagnostics readouts.
13. Check that the PLL Status **Flex1** reading and the DDS Status **DDS1 Phase** reading show **Lock**.
14. Press the right (▶) arrow button to display the **CRC Errors** submenu and monitor the CRC error counts for five seconds.
15. Press the right (▶) arrow button to scroll through the menus and check that the voltage readings show **(OK)**.
16. Set the waveform monitor to view the signal.
17. Check that the signal appears as expected. Check for errors on the video session screen of the waveform monitor.
18. Disconnect the BNC cable from the **SIGNAL 1** connector, and then connect the BNC cable to the **SIGNAL 2** connector.
19. Press the **FORMAT** button and use the left (◀) or right (▶) arrow button to select **1080 59.94p**, then press **ENTER**.
20. Check that the signal appears as expected on the waveform monitor and check for errors on the video session screen.

Converter Function.

21. Set the HDTV video generator as indicated below:

- Output signal: Ramp
- Format: 1080 59.94i

22. Press the front-panel **MODULE** button until the HD3G7 main menu shown below appears.



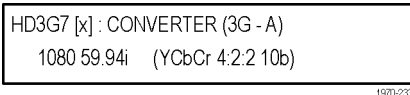
23. Connect the output connector on the HDTV video generator to the **HD SDI IN** connector on the HD3G7 using the 75 Ω BNC cable.

24. Connect the **SIGNAL 1** output connector on the HD3G7 to an SDI input connector on the waveform monitor using a 75 Ω BNC cable.

25. Press the **FORMAT** button and use the left (◀) or right (▶) arrow button to select **1080 59.94p**, and then press the **ENTER** button.

26. Press the **OTHER** button to select the converter mode.

27. Press the **CANCEL** button to return to the **STATUS** menu, which should now look like the one below:



28. Check that the **STATUS** display shows **1080 59.54i** as the input.

29. Press the up (▲) arrow button to display the **DIAGNOSTICS** menu.

30. Press the **ENTER** button.

31. Check that the **Jit** reading shows **Lock**.

32. Press the right (▶) arrow button to display the **CRC Errors** submenu and monitor the CRC error counts for five seconds.

33. If there are CRC errors, press the right (▶) arrow button until you see the **Clear CRC Errors** menu, and then press the **ENTER** button to clear the errors.

34. Press the right (▶) arrow button to scroll through the menus and check that the voltage readings show **(OK)**.

35. Check that a 1080 59.94p ramp signal is displayed on the waveform monitor.

HDLG7 Module Functional Check

Use the following procedure to check that the HDLG7 HD Dual Link Video Generator module is functional.

Required Equipment.

- HDTV digital video generator
- HDTV waveform monitor
- Three 75 Ω BNC cables

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 mainframe by connecting it to the power source. The initialization of all the installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.

Generator Function.

5. Press the front-panel **MODULE** button until the HDLG7 main menu shown below appears.

HDLG7 [x] : STATUS : SMPTE RP219 Color Bars 1080 59.94i GBR 4:4:4 12 bits
--

6. Press the **FORMAT** button and use the left (◀) or right (▶) arrow button to select the **1080 59.94p** format, and then press the **ENTER** button.
7. Press the **COLOR BAR** button to select **SMPTE RP219 Color Bars**, and then press the **CANCEL** button to return to the main menu.
8. Connect the upper **LINK A** connector to the **INPUT A** connector on the HDTV waveform monitor using a 75 Ω BNC cable.
9. Connect the upper **LINK B** connector to the **INPUT B** connector on the HDTV waveform monitor using the 75 Ω BNC cable.
10. Set the waveform monitor to view the INPUT A signal.
11. Check that the appropriate color bars signal is displayed.
12. Set the waveform monitor to view the INPUT B signal.
13. Check that the appropriate color bars signal is displayed.
14. Change the BNC cable from the upper **LINK A** connector to the lower **LINK A** connector.
15. Change the BNC cable from the upper **LINK B** connector to the lower **LINK B** connector.
16. Repeat steps 10 through 13 for the lower LINK A and LINK B connectors.

Converter Function.

17. Set the HDTV digital video generator as indicated below:
 - Output signal: 100% Color Bars
 - Format: 1080 59.94i
18. Connect the output connector on the HDTV digital video generator to the **HD SDI IN** connector on the HDLG7 using the 75 Ω BNC cable.
19. Press the **FORMAT** button and use the left (**◀**) or right (**▶**) arrow button to select **1080 59.94p**, and then press the **ENTER** button.
20. Press the **OTHER** button to select the converter mode.
21. Set the waveform monitor to view the INPUT A signal.
22. Check that the appropriate color bars signal is displayed.
23. Set the waveform monitor to view the INPUT B signal.
24. Check that the appropriate color bars signal is displayed.
25. Change the BNC cable from the lower **LINK A** connector to the upper **LINK A** connector.
26. Change the BNC cable from the lower **LINK B** connector to the upper **LINK B** connector.
27. Repeat steps 21 through 24 for the upper LINK A and LINK B connectors.

HDVG7 Module Functional Check

Use the following procedure to check that the HDVG7 HDTV Digital Video Generator module is functional.

Required Equipment.

- HDTV waveform monitor
- 75 Ω BNC cable

Procedure.

1. Install the module into the TG700 mainframe. (See page 11.)
2. Power on the TG700 TV Signal Generator Platform by connecting it to the power source. The initialization process for all installed modules is executed.
3. Check that no error messages appear on the LCD display.
4. Warm up the instrument for 20 minutes.
5. Press the front-panel **MODULE** button until the HDVG7 main menu shown below appears.



```
HDVG7 [x]: STATUS : 1080.59.94i  
100% Color Bars
```

6. Press the **FORMAT** button and use the left (**◀**) or right (**▶**) arrow button to select a format, then press **ENTER**.
7. Press one of the front-panel test signal button (for example **COLOR BAR**) to output a signal.
8. Connect the **SIGNAL 1** connector to the HDTV waveform monitor using the 75 Ω BNC cable.
9. Set the waveform monitor to view the signal.
10. Check that the signal appears as expected. For example, if you selected a color bar signal in step 6, check that the color bar signal appears.
11. Disconnect the BNC cable from the **SIGNAL 1** connector, and then connect the BNC cable to the **SIGNAL 2** connector.
12. Check that the signal appears as expected.

Operating Basics

This section introduces you to the basics of operating the TG700. Common module functions are discussed here, while module-specific functions are discussed in the module-specific sections of this manual. This section contains the following topics:

- Front-panel controls
- Rear-panel connectors
- About the frame reset signals
- Note for format settings

Front-Panel Controls

The following figure shows the locations of the front-panel controls. A brief discussion of each feature follows the illustration.

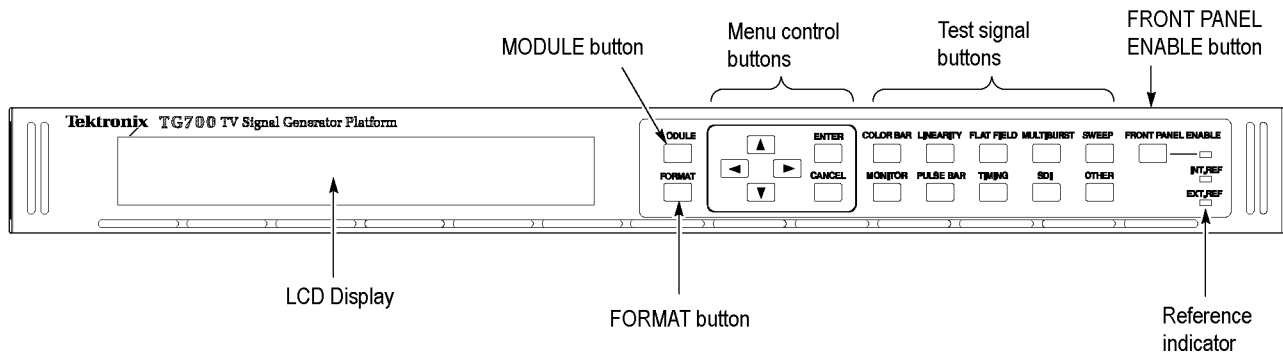


Figure 8: TG700 front panel

LCD Display

The LCD display is a two-line, 40-character-per-line display. Almost all menus have two lines of text, where the first line shows the current position in the current menu, and the second line shows the current selection (if there is not a submenu). If nothing is on the second line, press the ENTER button to access the corresponding submenu.

You can adjust the contrast of the LCD display using the UTILITY submenu. (See page 67, *UTILITY Submenu*.)

MODULE Button

Use the MODULE button to select the mainframe or installed module to control. Repeatedly pressing this button scrolls through the main menu, which shows the mainframe and the installed modules. Select the one you want to control.

FORMAT Button When the ATG7, AVG7, AWVG7, DVG7, HD3G7, HDLG7, or HDVG7 module is selected (active), use the FORMAT button to change the video format for the output signal. Pressing this button displays the menu to allow you to select a format for the active module.

Menu Control Buttons Use these buttons to control the menu display. (See page 62, *Using the Mainframe Menus.*)

Arrow (▲), (▼), (◀), and (▶) Buttons. Use these arrow buttons to scroll through the available menu items.

ENTER button. Use the ENTER button to enable the selected menu item.

CANCEL Button. Use the CANCEL button to disable the selected menu item and return to the previous menu item.

Test Signal Buttons Use these buttons to select the output test signals. Each of these 10 buttons represents a signal set, or group of the same type of test signals. You scroll through the test signals in a signal set by repeatedly pressing the test signal button.

You can change the signal assignment using the SIGNAL KEY ASSIGN submenu. (See page 69, *SIGNAL KEY ASSIGN Submenu.*)

FRONT PANEL ENABLE button Use this button to enable or disable the front-panel buttons. When pressing this button for about one second while the front-panel buttons are enabled, all of the front-panel buttons are disabled. If you have selected a timeout period in the FRONT PANEL DISABLE item in the UTILITY submenu, and that period passes without a button push, all of the front-panel buttons are also disabled.

Press and hold this button for about three second to enable the front-panel buttons. The timeout counter is restarted (if the timeout period is already set) and the indicator next to the button lights to show that the front-panel is enabled.

Refer to *UTILITY Submenu* for more information about the settings the period until the front panel times out. (See page 67.)

Reference Indicators The reference indicators indicate whether the TG700 is locked externally or internally.

INT.REF. This indicator lights when the TG700 is using its internal reference oscillator.

EXT.REF. This indicator lights when the TG700 is locked to an external reference signal or when a GPS7 module is locked to a satellite signal. If this indicator is blinking, the TG700 is configured to use the external reference signal but is unable to lock to the signal.

Rear-Panel Connectors

The following figure shows the locations of the TG700 mainframe and module connectors on the rear panel. A brief discussion of each connector follows the illustration.

CAUTION. *If power is applied to the mainframe, be sure to terminate any unused outputs on any of the modules using 75 Ω terminators.*

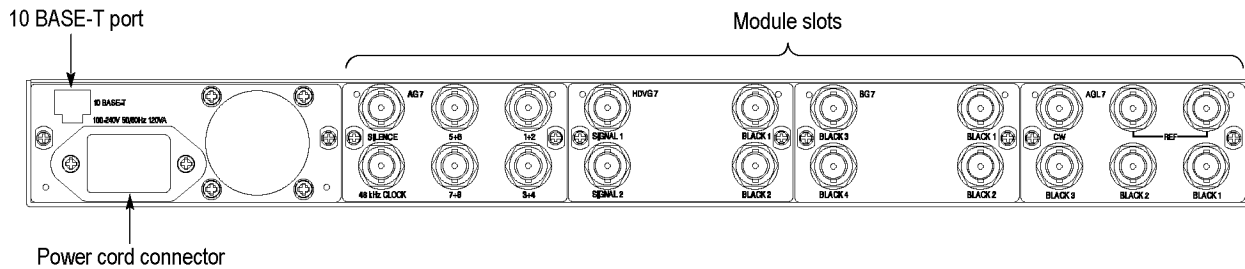


Figure 9: TG700 rear panel

Power Connector

The TG700 is designed to operate from a single-phase power source with the neutral conductor at or near earth ground. Only the line conductor is fused for over-current protection. A protective ground connection through the grounding conductor in the power cord is essential for safe operation.

WARNING. *Injury or death can occur as the result of electrical shock. To avoid electrical shock, do not connect power to the TG700 when the top cover is off. Dangerous potentials are present on the Power circuit board.*

The TG700 operates from an AC line frequency of 48 to 63 Hz, over the range of 100 - 240 VAC ($\pm 10\%$), without the need for configuration. (See Table 4 on page 10.)

10 BASE-T Port

Use this port to connect to your local Ethernet network. You can control the TG700 mainframe and all installed modules remotely through the port. Also, you can upload and download various files such as signal files, logo files, and preset files through the port.

AG7 Module Connectors

The AG7 Audio Generator module is equipped with six BNC connectors as described below. (See Figure 10.)

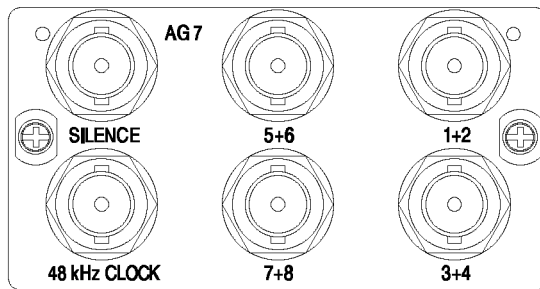


Figure 10: AG7 module connectors

- **1+2:** Outputs channels 1 and 2 of the selected AES/EBU serial digital audio signal.
- **3+4:** Outputs channels 3 and 4 of the selected AES/EBU serial digital audio signal.
- **5+6:** Outputs channels 5 and 6 of the selected AES/EBU serial digital audio signal.
- **7+8:** Outputs channels 7 and 8 of the selected AES/EBU serial digital audio signal.
- **SILENCE:** Outputs a silence signal (DAR signal).
- **48 kHz CLOCK:** Outputs a 48 kHz clock signal. The clock output level can be set as described below.

Setting the Clock Output Level. Use jumper **J452** on the AG7 module to set the output level of the 48 kHz clock signal. (See Figure 11.)

Install the jumper on pins 3+4 of J452 (factory-default position) to set the clock output level to CMOS compatible. Install the jumper on pins 1+2 of J452 to set the clock output level to 1V.

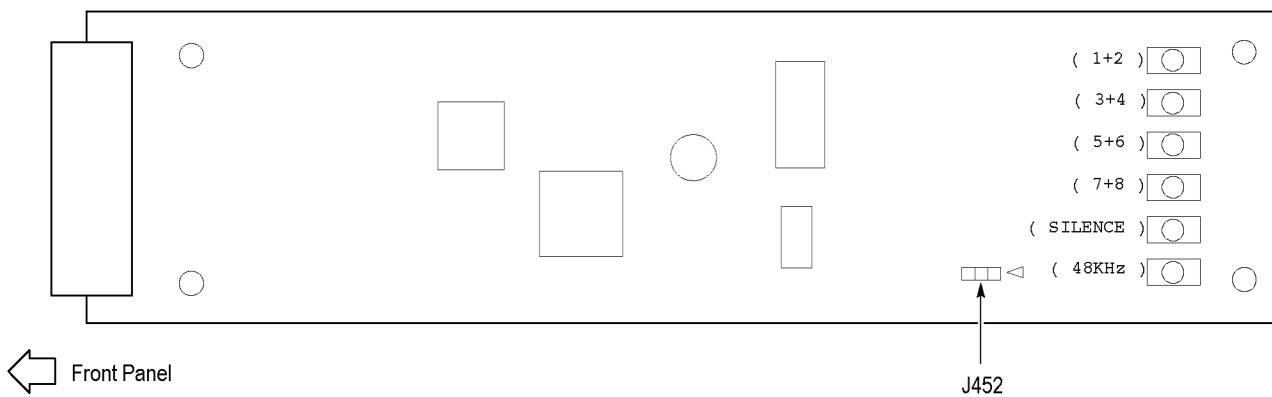


Figure 11: Location of J452 on the AG7 module

AGL7 Module Connectors

The AGL7 Analog Genlock module is equipped with six BNC connectors as described below. (See Figure 12.)

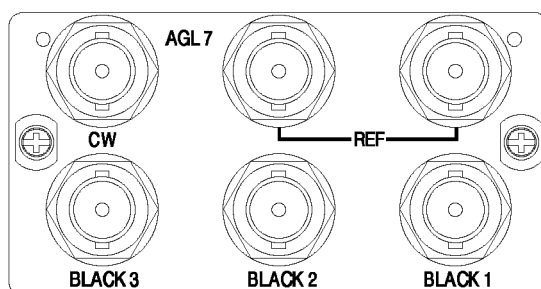


Figure 12: AGL7 module connectors

- **REF:** Input loopthrough connectors for an external reference signal, which can be NTSC/PAL black burst or HDTV trilevel sync signals. The signal input requires proper external termination.
- **CW:** Internally terminated input connector for CW (Continuous Wave) signals: 1, 3.58, 4.43, 5, and 10 MHz.

You can configure the CW connector to output a 48 kHz word clock signal. (See page 50, *Changing the Input/Output Configuration*.)

- **BLACK 1:** Outputs the selected black burst signal.

NOTE. You cannot output HDTV trilevel sync signals from the **BLACK 1** connector.

- **BLACK 2:** Outputs the selected black burst or HDTV trilevel sync signal.
- **BLACK 3:** Outputs the selected black burst signal or HDTV trilevel sync signal.

Alarm Output. When the mainframe GPI interface is enabled, you can configure the **BLACK 1**, **BLACK 2**, or **BLACK 3** connector to output an alarm. When an alarm condition is detected, the output signal from the selected connector turns off for about 60 ms.

The AGL7 module alarm output is available only when the mainframe GPI is enabled and the GPI ALARM OUTPUT menu item is set to Enable. (See page 79, *Using the Mainframe General Purpose Interface (GPI)*.)

Changing the Input/Output Configuration. The CW connector is configured at the factory to be an input for CW signals. You can reconfigure the connector to output a 48 kHz word clock signal by changing the position of an internal cable.



CAUTION. *To prevent damage to the mainframe and the module, be sure to disconnect the power cord before removing the module.*

To output a 48 kHz word clock signal from the CW connector:

1. Disconnect the coaxial cable from the connector labeled **J040** on the AGL7 module. (See Figure 13.)
2. Reconnect the cable to the connector labeled **J960** on the AGL7 module.
3. Place the **48 kHz CLOCK** label provided with the module on the rear panel below the CW connector.

NOTE. *The word clock signal automatically follows the format of the Black 1 signal.*

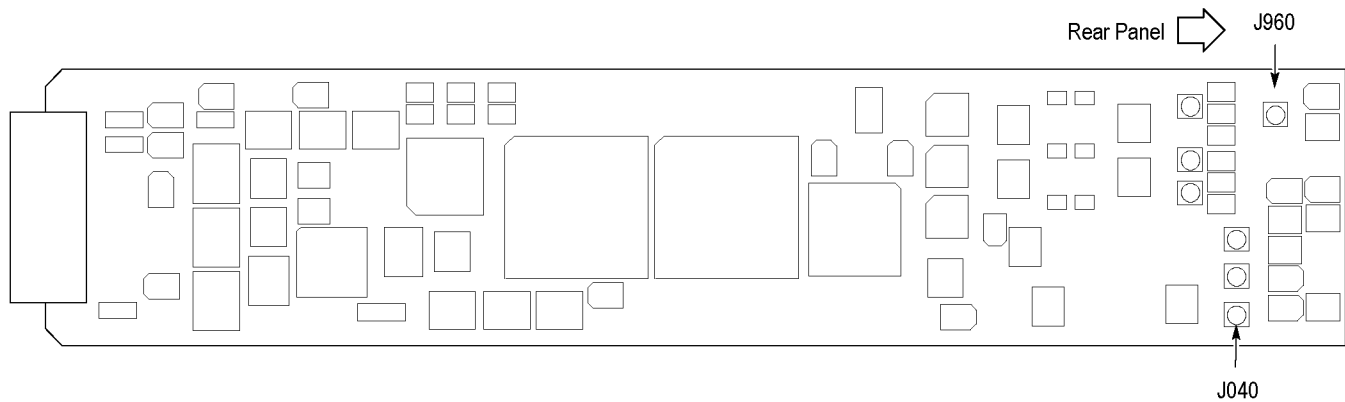


Figure 13: Location of the J040 and J960 on the AGL7 module

ATG7 Module Connectors

The ATG7 Analog Test Generator module is equipped with four BNC connectors as described below. (See Figure 14.)

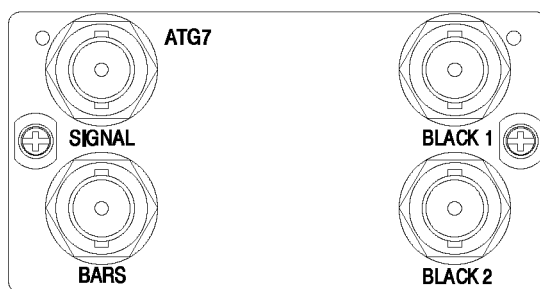


Figure 14: ATG7 module connectors

- **BLACK 1:** Outputs the selected black burst, timing pulse, or subcarrier signal.
- **BLACK 2:** Outputs the selected black burst, timing pulse, or subcarrier signal.
- **SIGNAL:** Outputs the signal selected using the front-panel test signal buttons. (See Table 14 on page 111.)
- **BARS:** Outputs the selected black burst or color bars signal.

AVG7 Module Connectors

The AVG7 Analog Video Generator module is equipped with three pairs of BNC connectors as described below. (See Figure 15.)

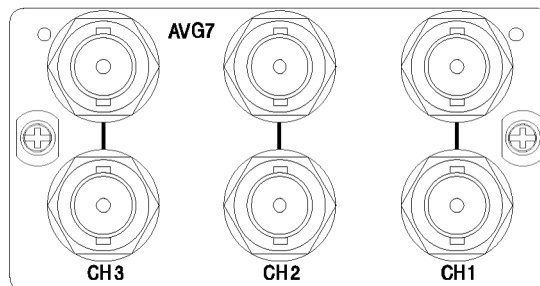


Figure 15: AVG7 module connectors

NOTE. Each pair of connectors (CH 1, CH 2, and CH 3) output the same signal.

- **CH 1:** Outputs the selected analog component or composite video signal.
- **CH 2:** Outputs the selected analog component or composite video signal.
- **CH 3:** Outputs the selected analog component or composite video signal.

AWVG7 Module Connectors

The AWVG7 Analog Wideband Video Generator module is equipped with three pairs of BNC connectors as described below. (See Figure 16.)

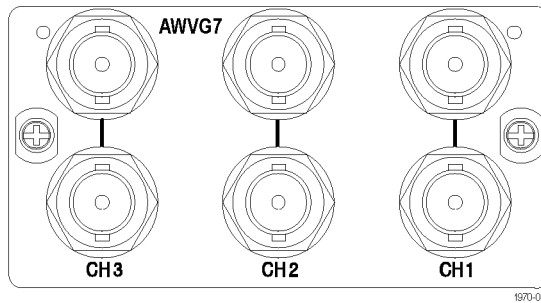


Figure 16: AWVG7 module connectors

NOTE. Each pair of connectors (CH 1, CH 2, and CH 3) output the same signal.

- **CH 1:** Outputs the selected analog component video signal.
- **CH 2:** Outputs the selected analog component video signal.
- **CH 3:** Outputs the selected analog component video signal.

BG7 Module Connectors

The BG7 Black Generator module is equipped with four BNC connectors as described below. (See Figure 17.)

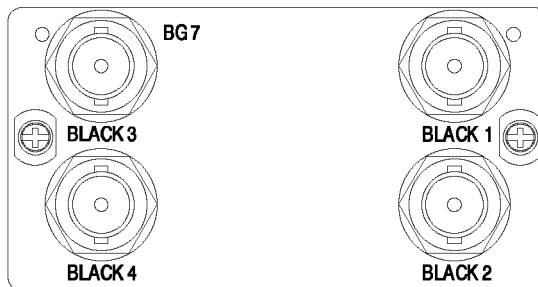


Figure 17: BG7 module connectors

- **BLACK 1:** Outputs the selected black burst or HDTV trilevel sync signal.
- **BLACK 2:** Outputs the selected black burst or HDTV trilevel sync signal.
- **BLACK 3:** Outputs the selected black burst or HDTV trilevel sync signal. Option CB enables this connector to also output a 10 field ID or color bars signal.
- **BLACK 4:** Outputs the selected black burst or HDTV trilevel sync signal output. Option CB enables this connector to also output a 10 field ID or color bars signal.

DVG7 Module Connectors

The standard DVG7 Digital Video Generator module is equipped with two BNC connectors to output serial digital video signals. Option BK adds two additional BNC connectors to output serial digital black signals. (See Figure 18.)

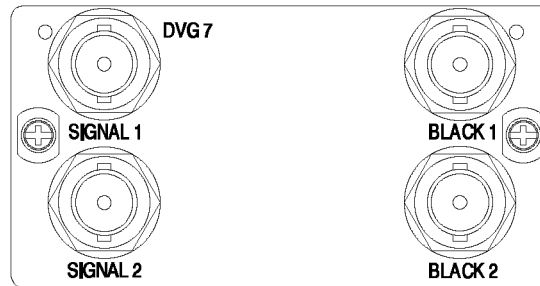


Figure 18: DVG7 module connectors (Option BK)

NOTE. *The SIGNAL 1 and SIGNAL 2 connectors output the same test signal, and the BLACK 1 and BLACK 2 connectors output the same black signal.*

- **SIGNAL 1:** Outputs the selected serial digital video signal.
- **SIGNAL 2:** Outputs the selected serial digital video signal.
- **BLACK 1:** Outputs the selected serial digital black signal (Option BK only).
- **BLACK 2:** Outputs the selected serial digital black signal (Option BK only).

GPS7 Module Connectors

The GPS7 GPS Synchronization and Timecode module is equipped with four BNC connectors and one 15-pin, D-sub connector as described below. (See Figure 19.)

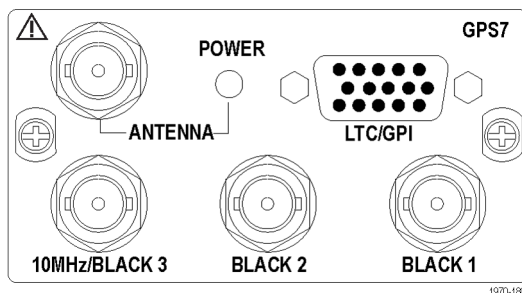


Figure 19: GPS7 module connectors

- **ANTENNA:** Input connector for a GPS antenna. The antenna input must meet specific requirements. (See page 198, *GPS Antenna Requirements*.)

You can use the GPS7 module menu to enable this connector to provide 3.3 V or 5 V DC power to the antenna. When the connector is configured to provide power to the antenna, the rear-panel POWER indicator lights as follows:

- Blinks green to indicate an open circuit. This occurs if no antenna is connected or if the current load is less than expected because a splitter or DC block is being used.
- Displays solid red if the connected antenna is shorted. A shorted antenna will not damage the GPS7 module. If a splitter is used on the antenna, it may appear as a short at DC but will still pass through the RF signal, which will allow the GPS to function.
- Displays solid green if the current load of the antenna is within the nominal range.

- **LTC/GPI:** 15 pin, D-sub connector that carries four differential LTC signals, one ground closure input, and two ground closure outputs. You can use the menus to independently set the format and timing of the four LTC signals and to select the function of the ground closure input and outputs.

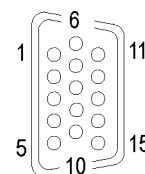
The LTC/GPI connector provides full functionality when you use the LTC DSUB-to-XLR breakout cable that is available as an optional accessory with the GPS7 module. The LTC/GPI connector provides partial functionality when you use a standard RGBHV (VGA-to-BNC) breakout cable. (See Table 5.)

NOTE. You do not need the optional LTC and GPI breakout cable if you are using only VITC and/or ATC as a timecode signal.

For correct operation if you use a VGA-to-BNC breakout cable, pins 6, 7, 8, and 10 must be internally grounded together in the cable and to the connector shell.

Table 5: GPS7 module LTC/GPI connector pin assignments

Pin #	Function	VGA cable
1	GP01	Red BNC
2	GP02	Green BNC
3	GPI	Blue BNC
4	No connection	
5	LTC4N	
6	Ground	Ground
7	LTC3N	Ground
8	LTC2N	Ground
9	No connection	
10	LTC1N	Ground
11	No connection	
12	LTC3P	
13	LTC2P	H BNC
14	LTC1P	V BNC
15	LTC4P	



- **BLACK 1:** Outputs the selected black burst or HDTV trilevel sync signal.
- **BLACK 2:** Outputs the selected black burst or HDTV trilevel sync signal. You can configure this output connector to turn off if certain errors are detected. The output will remain off as long as the error occurs. Use this function to trigger a downstream ECO to switch to backup.
- **10 MHz /BLACK 3:** Outputs the selected black burst or HDTV trilevel sync signal. You can also configure this connector to output a 10 MHz sine wave.

NOTE. You can use the menus to independently set the format and timing of the three black outputs and to enable VITC to be applied to the output signal.

HD3G7 Module Connectors

The HD3G7 3 Gb/s SDI Video Generator module provides four BNC connectors as described below. (See Figure 20.)

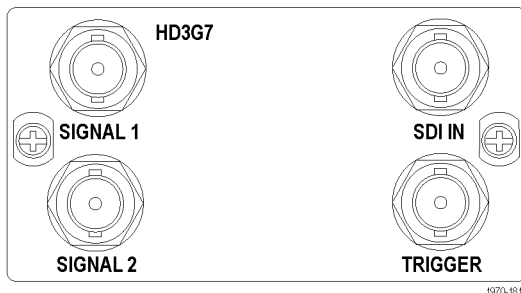


Figure 20: HD3G7 module connectors

- **SIGNAL 1:** Outputs the selected HD-SDI serial digital video test signal or an upconverted version of the input signal on the SDI IN connector.
- **SIGNAL 2:** Outputs the selected HD-SDI serial digital video test signal or an upconverted version of the input signal on the SDI IN connector.
- **SDI IN:** Input connector for an HD-SDI (4:2:2) video signal that you want to be upconverted.
- **TRIGGER:** Outputs a selected signal. The available choices for output are: a sample clock (148.5 MHz), a frame pulse (once per video frame), or a line pulse (once per video line).

NOTE. *The SIGNAL 1 and SIGNAL 2 connectors output the same test signal.*

HDLG7 Module Connectors

The HDLG7 HD Dual Link Video Generator is equipped with five BNC connectors as described below. (See Figure 21.)

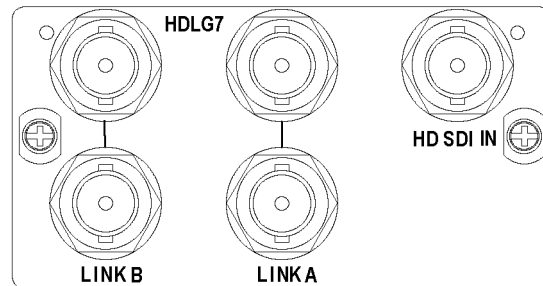


Figure 21: HDLG7 module connectors

- **HD SDI IN:** Input connector for an HD-SDI (4:2:2) video signal that you want to be upconverted.

NOTE. Each pair of connectors (*LINK A* and *LINK B*) output the same signal.

- **LINK A:** Outputs the selected HD-SDI dual-link video test signal or an upconverted version of the signal on the HD SDI IN connector.
- **LINK B:** Outputs the selected HD-SDI dual-link video test signal or an upconverted version of the signal on the HD SDI IN connector.

HDVG7 Module Connectors

The standard HDVG7 Digital Video Generator module is equipped with two BNC connectors to output serial digital video signals. Option BK adds two additional BNC connectors to output serial digital black signals. (See Figure 22.)

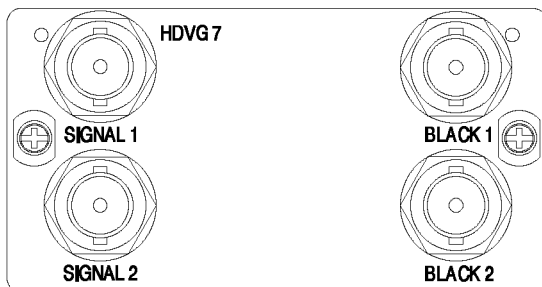


Figure 22: HDVG7 module connectors (Option BK)

NOTE. *The SIGNAL 1 and SIGNAL 2 connectors output the same test signal, and the BLACK 1 and BLACK 2 connectors output the same black signal.*

- **SIGNAL 1:** Outputs the selected serial digital video signal.
- **SIGNAL 2:** Outputs the selected serial digital video signal.
- **BLACK 1:** Outputs the selected serial digital black signal (Option BK only).
- **BLACK 2:** Outputs the selected serial digital black signal (Option BK only).

Frame Reset Signals

The TG700 uses the three frame reset signals described below to output different video formats simultaneously.

FRAME RESET 1 This frame reset signal supports the 1/1.001 system signal, and is used by the following video formats. These signals are synchronized with each other.

NTSC	1080 23.98sF	LTC
525-270	1080 29.97p	30 fps DF
525-143	1080 59.94i	23.98
1035	720 59.94p	
59.94i		
1080		
23.98p		

FRAME RESET 2 This frame reset signal supports the integer system signal, and is used by the following video formats. These signals are synchronized with each other.

PAL	1080 30p	LTC
625-270	1080 50i	24 fps
1035 60i	1080 60i	25 fps
1080 25p	720 60p	30 fps

FRAME RESET 3 When frame reset signal 2 is selected, the following video formats are available to frame reset signal 3:

1080 24p	LTC
1080 24sF	24 fps
	25 fps
	30 fps

The frequency of frame reset signal 2 is always an integral multiple of the frame reset signal 3 frequency. Frame reset signal 3 is synchronized with frame reset signal 2.

Frame reset signal 1 is not synchronized with frame reset signals 2 or 3 unless a GPS7 module is installed. When a GPS7 module is installed, the frame reset signal 1 synchronization is related to the frame reset signals 2 and 3 through the GPS7 epoch timing.

You can see which of the three frame reset signals are used by each output of each module by using the FRAME RESET STATUS submenu. (See page 66, *FRAME RESET STATUS Submenu*.)

Clock Conflict Messages

The TG700 uses various shared clocks to operate the mainframe and to output test signals from the installed modules. In some cases, when you change the signal format of a module output, the associated SD or HD clock frequency changes to support the new format.

If you attempt to change the signal format of a module output, and if that format change requires a frequency change to the SD or HD clock being used by the output(s) of any other installed module(s), a clock conflict occurs since the instrument cannot output both of the requested signal formats simultaneously.

In this case, the TG700 displays a Clock Select message asking whether you want to disable the currently used clock to enable the signal format change you have input. Press **ENTER** to enable the signal format change or press **CANCEL** to cancel your signal format change.

After you enable the signal format change, you need to change the signal format of the other output(s) that were using the SD or HD clock that you just changed.



CAUTION. *If you disable a clock that is being used by another signal output, the timing of the other signal output will no longer conform to its configured format.*

Examples of specific conditions under which the clock conflict message is displayed are described below.

SD Clock Conflicts

If your DVG7 module has Option BK installed, an SD clock conflict message will appear if you attempt to output 525-143 format signals and 525-270 (or 625-270) format signals simultaneously from the module. For example, if you attempt set the signal format for the BLACK outputs to 525-143 when the signal format for the SIGNAL outputs is currently set to 525-270, the following message appears:

```

*   DVG7 Clock Select, Disable 270 MHz?   *
*           Yes : ENTER / No : CANCEL           *
```

This message asks if you want to disable the 270 MHz clock that is currently in use by the SIGNAL outputs. Press the **CANCEL** button to cancel the new format setting or press the **ENTER** button to enable the clock and signal format change. If you enable the clock change, you will then need to change the signal format for the SIGNAL outputs that were using the clock you disabled.

This message will not appear if you have two DVG7 modules installed and simultaneously output 525-143 format signals from one DVG7 module and 525-270 (or 625-270) format signals from the other DVG7 module.

HD Clock Conflicts

An HD clock conflict message will appear when you attempt to output serial digital signals and/or analog trilevel black signals using the 74.25 MHz clock and 74.25/1.001 MHz clock simultaneously. The HD clock may be used by the following modules: AGL7, AWVG7, BG7, GPS7, HDLG7, and HDVG7.

For example, if you have a BG7 module installed and you attempt to set the HDTV trilevel sync signal format for the BLACK 1 output to 1080 59.94i when the HDTV trilevel sync signal format for the AGL7 module BLACK 2 output is set to 1080 50i, the following message appears:

```

*   HD Clock Select, Disable 74.25 MHz?   *
*           Yes : ENTER / No : CANCEL     *
```

This message asks if you want to disable the 74.25 MHz clock that is currently in use by the AGL7 module. Press the **CANCEL** button to cancel the new format setting or press the **ENTER** button to enable the clock and signal format change. If you enable the clock change, you need to change the signal format for the AGL7 output(s) that were using the clock you disabled.



CAUTION. *The HDLG7 module does not generate the Clock Select warning message when you change the signal format on the HDLG7 module and create a clock conflict with other modules using the HD clock.*

Fan Failure Warning Message



CAUTION. *If the fan on the rear panel stops working, internal components could be damaged. To prevent this damage, disconnect the power cable from the AC power source.*

The TG700 displays the following warning message if the fan on the rear panel stops working. If this warning message appears, disconnect the power cable from the AC voltage line and contact your local Tektronix Field Office or representative.

```

*   FAN FAULT ALARM   *
* Main Cooling Fan Serious Problem *
```

While the warning message appears, the front-panel buttons are disabled. You can operate the buttons temporarily by pressing the FRONT PANEL ENABLE button until the indicator next to the button lights. After five minutes of not using the front panel, the warning message will reappear and disable the front-panel buttons.

Using the Mainframe Menus

When you power on the TG700 and the initializing process for all of the installed module is completed, the top menu item of the mainframe main menu appears on the LCD display. Press the up (▲) or down (▼) arrow button to scroll through the available menu selections in the main menu.

The mainframe main menu allows you to access submenus to set the various system settings. The following figure shows the mainframe main menu.

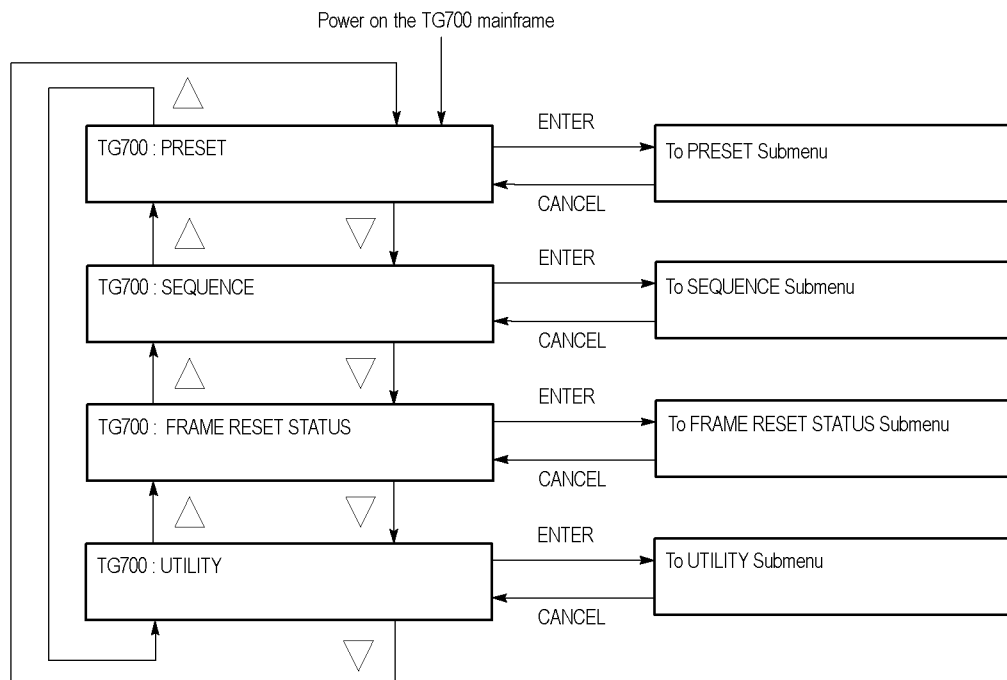


Figure 23: Mainframe main menu

PRESET. Recalls instrument settings saved as a preset, or saves the current instrument settings as a preset. When you select this menu item and then press the ENTER button, you access the PRESET submenu. (See page 63.)

SEQUENCE. Selects and executes a sequence program loaded into the TG700. Select this menu item and press the ENTER button, to access the SEQUENCE submenu. (See page 65.)

FRAME RESET STATUS. Displays the status of the frame reset signals. Select this menu item and press the ENTER button to access the FRAME RESET STATUS submenu. (See page 66.) Refer to *Frame Reset Signals* for detailed information about the frame reset signals. (See page 59.)

UTILITY. Sets the system related settings such as network parameters and signal sets assignment to the front-panel test signal buttons. Select this menu item and press the ENTER button, to access the UTILITY submenu. (See page 67.)

PRESET Submenu

Use this menu to recall instrument settings saved as a preset or save the current instrument settings to a preset. Use the up (▲) or right (▶) arrow button to scroll through the menu items. (See Figure 24.)

The following three presets are named at the factory and can be used for your own application:

- **Power On Default:** Use this preset to save instrument settings that you want automatically loaded when the TG700 powers on. If one of the seven presets is selected in the mainframe GPI (General Purpose Interface), that preset takes precedence over this Power On Default preset. You cannot assign this preset name to another preset.

NOTE. If you want to save network parameters to a preset, use the Power On Default preset.

- **User Default:** Use this preset to save user-specified default settings. If you save new instrument settings in this preset, a confirmation message appears to prevent overwriting.
- **Factory Default:** Use this preset to reset the mainframe and all of the installed modules to the factory default settings. The following settings are not affected by the factory default: LCD contrast, front-panel timeout, and network parameters.

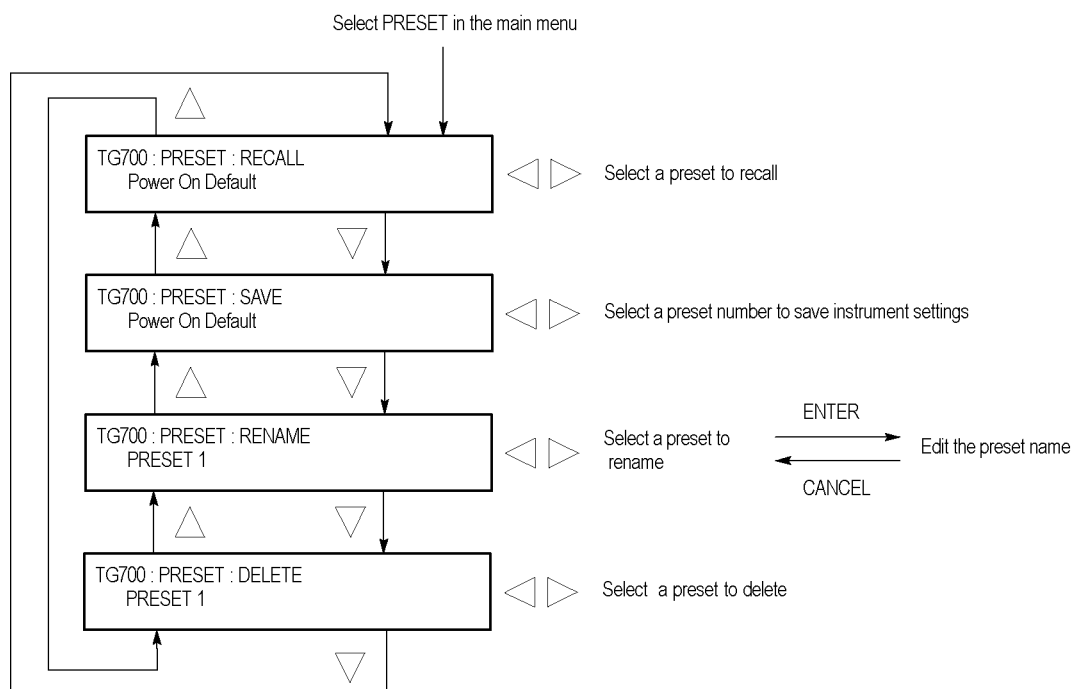


Figure 24: PRESET submenu

RECALL. Recalls instrument settings saved in the selected preset. Use the left (◀) or right (▶) arrow button to select a different preset, and then press the ENTER button to implement the selection.

While the preset is loading into the instrument, the message "Now Loading ..." appears on the display. When the loading is complete, the message "Done (Press CANCEL)" appears. Press the CANCEL button.

SAVE. Saves the current instrument settings to one of the 14 available presets. Use the left (◀) or right (▶) arrow button to select the destination preset, and then press the ENTER button to implement the selection.

RENAME. Renames the selected preset. Perform the following steps to rename a preset:

1. Use the left (◀) or right (▶) arrow button to select the preset you want to rename.
2. Press the **ENTER** button twice to begin editing the preset name. The underscore character (_) appears under the first letter of the preset name.
3. Use the left (◀) or right (▶) arrow button to move the underscore character to the letter you want to modify.
4. Use the up (▲) or down (▼) arrow button to select the new character.

The available characters include the full alphabet, numerals from 0 to 9, and many standard ASCII symbols. The text strings may contain up to 32 characters.

5. Enter all of the desired characters then press **ENTER** button.
6. Press the **CANCEL** button twice to exit the PRESET submenu. This returns to the top of the mainframe main menu.
7. Press the **ENTER** button to reenter the PRESET submenu.
8. Use the up (▲) or down (▼) arrow button to select the SAVE menu item.
9. Use the left (◀) or right (▶) arrow button to select the preset name edited in step 2.
10. Press **ENTER** button to save the preset with the new name.

DELETE. Deletes the specified preset. Use the left (◀) or right (▶) arrow button to select the preset you want to delete, and then press the ENTER button to implement the selection. You cannot delete the following presets: Power on Default, User Default, and Factory Default.

SEQUENCE Submenu

Use this menu to select and run a sequence that is already loaded into the TG700. (See Figure 25.) A sequence is a series of generator settings defined using the Tcl language and SCPI commands. The TG700 loads a sequence and runs the command and settings in the order dictated by the sequences file.

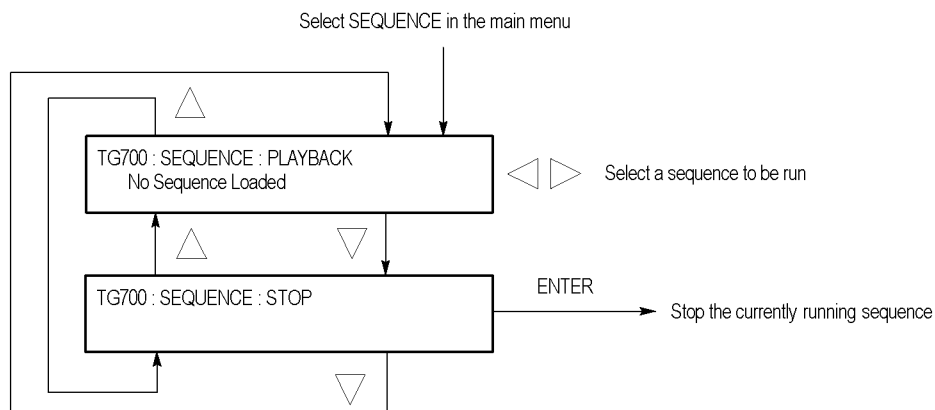


Figure 25: SEQUENCE submenu

PLAYBACK. Selects and runs a sequence. Use the left (◀) or right (▶) arrow button to select the sequence you want to run, and then press the ENTER button to run the sequence.

If no sequence is loaded into the instrument, the message "No Sequence Found" is displayed on the second line.

STOP. Stops the currently running sequence. When you select the menu item and then press the ENTER button, the sequence is stopped.

Refer to the *TG700 Programmer Manual* for detailed information about using sequences.

FRAME RESET STATUS
Submenu

Use this menu to display which of the three frame reset signals is used by the output of the installed modules. Use the up(▲) or down(▼) arrow button to scroll through the menu items. The following figure shows the FRAME RESET STATUS submenu.

NOTE. The character after the module name represents the output connector of the module. For example, **B1** represents the **BLACK 1** connector.

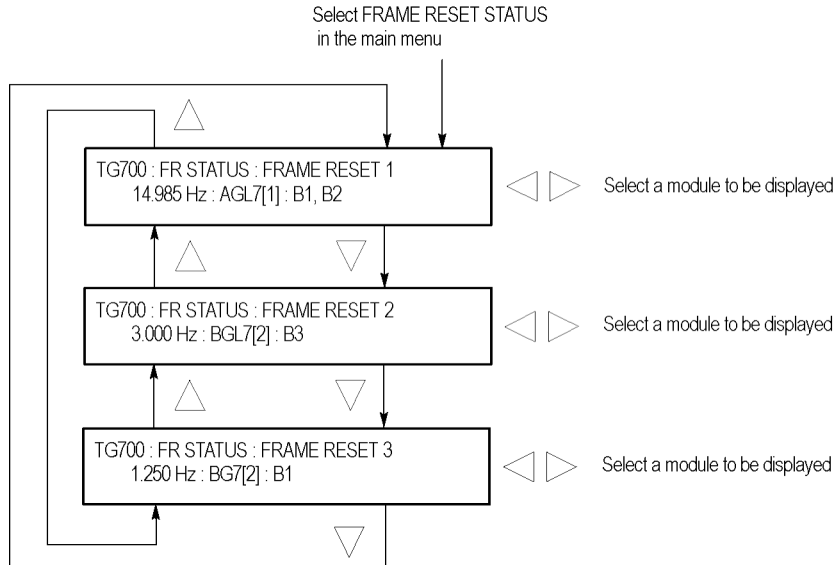


Figure 26: FRAME RESET STATUS submenu

FRAME RESET 1. Displays the module(s) and output(s) using frame reset signal 1. If two or more modules are using this frame reset signal, use the left (◀) or right (▶) arrow button to select which modules are displayed.

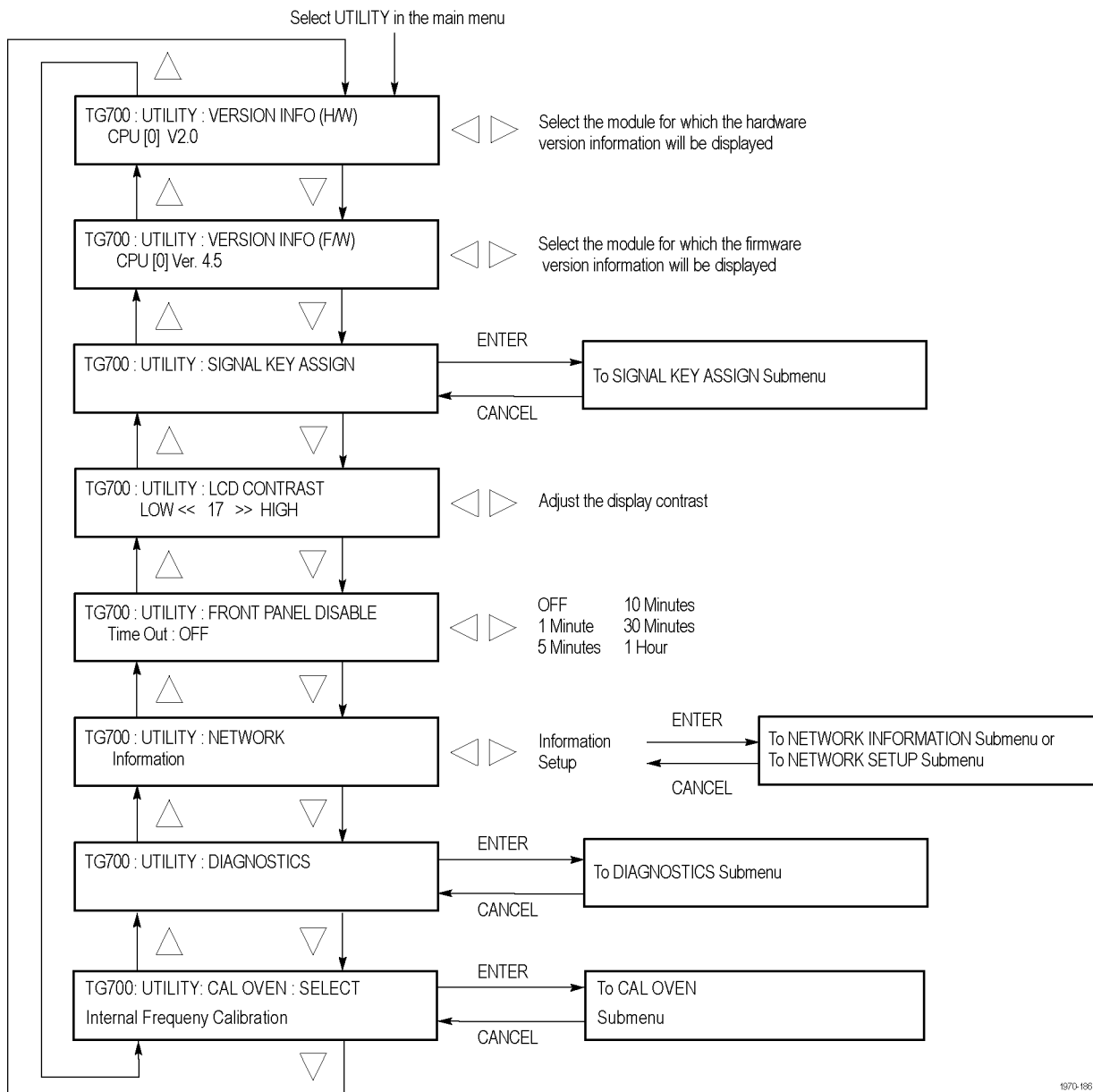
FRAME RESET 2. Displays the module(s) and output(s) using frame reset signal 2. If two or more modules are using this frame reset signal, use the left (◀) or right (▶) arrow button to select which modules are displayed.

FRAME RESET 3. Displays the module(s) and output(s) using frame reset signal 3. If two or more modules are using this frame reset signal, use the left (◀) or right (▶) arrow button to select which modules are displayed.

UTILITY Submenu

Use this menu to set the system-related settings such as the contrast of the LCD display and the network parameters. Use the up (▲) or down (▼) arrow button to scroll through the menu items. The following figure shows the UTILITY submenu.

NOTE. When the GPI is enabled, the NETWORK menu item is replaced by GPI alarm menu items in the UTILITY submenu. (See page 84, ALARM Menu.)



1970-186

Figure 27: UTILITY submenu

VERSION INFO (H/W). Displays the hardware version of the mainframe and the installed modules. Use the left (◀) or right (▶) arrow button to select the module for which you want to display the hardware version.

VERSION INFO (F/W). Displays the firmware version number of the mainframe and the installed modules. Use the left (◀) or right (▶) arrow button to select the module for which you want to display the firmware version.

SIGNAL KEY ASSIGN. Assigns signal sets to the front-panel test signal buttons. If your mainframe has 64 MB of memory installed, this menu selection also assigns a frame picture file created by the Frame Picture Generator to the OTHER test signal button. (See page 2, *Mainframe Memory Requirements*.) Select this menu item, and then press the **ENTER** button to access the SIGNAL KEY ASSIGN submenu. (See page 69.)

LCD CONTRAST. Adjusts the contrast of the LCD display. Use the left (◀) or right (▶) arrow button to decrease or increase the display contrast.

FRONT PANEL DISABLE. Sets the time-out period until the front-panel buttons are disabled. Use the left (◀) or right (▶) arrow button to select from the following choices: **OFF**, **1 Minute**, **5 Minutes**, **10 Minutes**, **30 Minutes**, and **1 Hour**. Press the **ENTER** button to enable the selection.

When you select any of these time-out periods (except OFF), the front-panel buttons are disabled when that time passes without a button push. If this happens, press and hold the FRONT PANEL ENABLE button for about 1 second to restart the time-out counter and enable the front-panel buttons.

The indicator next to the FRONT PANEL ENABLE button lights when the front-panel buttons are enabled.

NETWORK. Displays the current network parameters of the mainframe or sets the network parameters for the 10BASE-T port on the mainframe. Use the left (◀) or right (▶) arrow button to toggle between **Information** and **Setup**.

When you select Information and press the **ENTER** button, you will access the NETWORK INFORMATION submenu. (See page 70.) When you select Setup and press the **ENTER** button, you will access the NETWORK SETUP submenu. (See page 71.)

DIAGNOSTICS. Executes the diagnostic routines for the mainframe and installed modules. When you select DIAGNOSTICS and then press the **ENTER** button, you access the DIAGNOSTICS submenu. (See page 232.)

CAL OVEN. Calibrates the frequency of the mainframe internal oscillator without removing the instrument from service. This menu item appears only when the mainframe has software version 5.1 or above installed and when there is GPS7 module installed in the mainframe. Select CAL OVEN, and then press the **ENTER** button to access the CAL OVEN submenu. (See page 74.)

**SIGNAL KEY ASSIGN
Submenu**

Use this menu to assign signal sets to a specific front-panel test signal button. If your mainframe has 64 MB of memory installed, you can also assign a frame picture file created by the Frame Picture Generator to the OTHER test signal button. The following figure shows the SIGNAL KEY ASSIGN submenu. (See page 2, *Mainframe Memory Requirements*.)

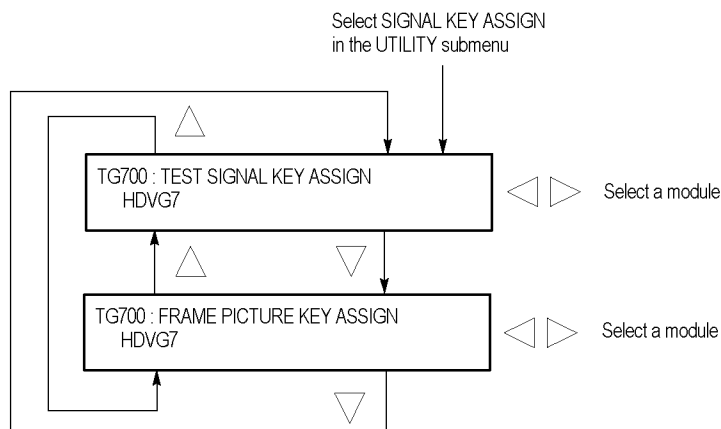


Figure 28: SIGNAL KEY ASSIGN submenu

TEST SIGNAL KEY ASSIGN. Assigns signal sets to a specific front-panel test signal button. The mainframe is shipped from the factory with signal sets corresponding to each button name already assigned. For example, when you press the **COLOR BAR** test signal button, the three types of color bars signals (100% Color Bars, 75% Color Bars, and SMPTE Color Bars) are available for output.

Perform the following steps to assign signal sets to a specific test signal button.

1. Use the left (◀) or right (▶) arrow button to select the module to which you want to assign signal sets, and then press the **ENTER** button.

This will display the following submenu to assign signal sets. The first line shows the name of the test signal button, and second line shows the name of the assigned signal set.



2. Use the up (▲) or down (▼) arrow button to select the test signal button to which you want to assign a signal set (for example **COLOR BAR KEY**).
3. Use the left (◀) or right (▶) arrow button to select the signal set you want to assign to the selected test signal button (for example **COLOR BAR**).
4. Press the **ENTER** button to assign the signal set to the selected test signal button.
5. Repeat steps 2 to 4 until all signal set assignments are completed.

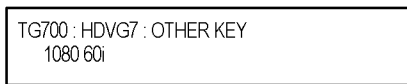
FRAME PICTURE KEY ASSIGN. Assigns frame picture files downloaded to the TG700 to the OTHER test signal button. This operation is required to output the frame picture files as a picture (natural picture or test pattern).

NOTE. To download a frame picture file created by the Frame Picture Generator application and output it as a picture, your TG700 mainframe must have 64 MB of memory installed. (See page 2, Mainframe Memory Requirements.)

Perform the following steps to assign a frame picture file to the OTHER test signal button:

1. Use the left (◀) or right (▶) arrow button to select the module to which you want to assign a frame picture file, and press the **ENTER** button.

This will display the following submenu. The second line shows the folder name that was created when the frame picture file was downloaded to the TG700.



2. Use the left (◀) or right (▶) arrow button to select the folder in which the frame picture file is saved.
3. Press the **ENTER** button to assign the frame picture file to the OTHER button.

Refer to the *TG700 PC Tools Technical Reference* for detailed information about creating a frame picture file and downloading the file from a PC to the TG700.

NETWORK INFORMATION Submenu

Use this menu to display all of the current network parameters. Use the left (◀) or right (▶) arrow button to select a network parameter and display the assigned address. The following selections are available: **IP Address**, **Subnet Mask**, **Broadcast Address**, **Gateway Address**, **MAC Address**, and **DHCP Server**.

The following figure shows NETWORK INFORMATION submenu.

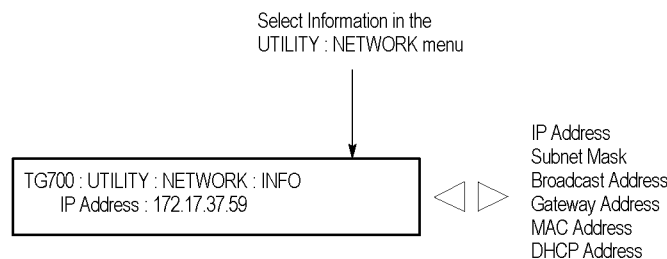


Figure 29: NETWORK INFORMATION submenu

NETWORK SETUP Submenu

Use this menu to set the network parameters for the 10 BASE-T port on the TG700, which will be used when you remotely control the TG700 using a PC and when you transfer files between the TG700 and a PC. Refer to *Connecting to a Network* for detailed information about connecting the TG700 to a PC. (See page 76.) Use the up (▲) or right (▶) arrow button to scroll through the menu items. The following figure shows the NETWORK SETUP submenu.

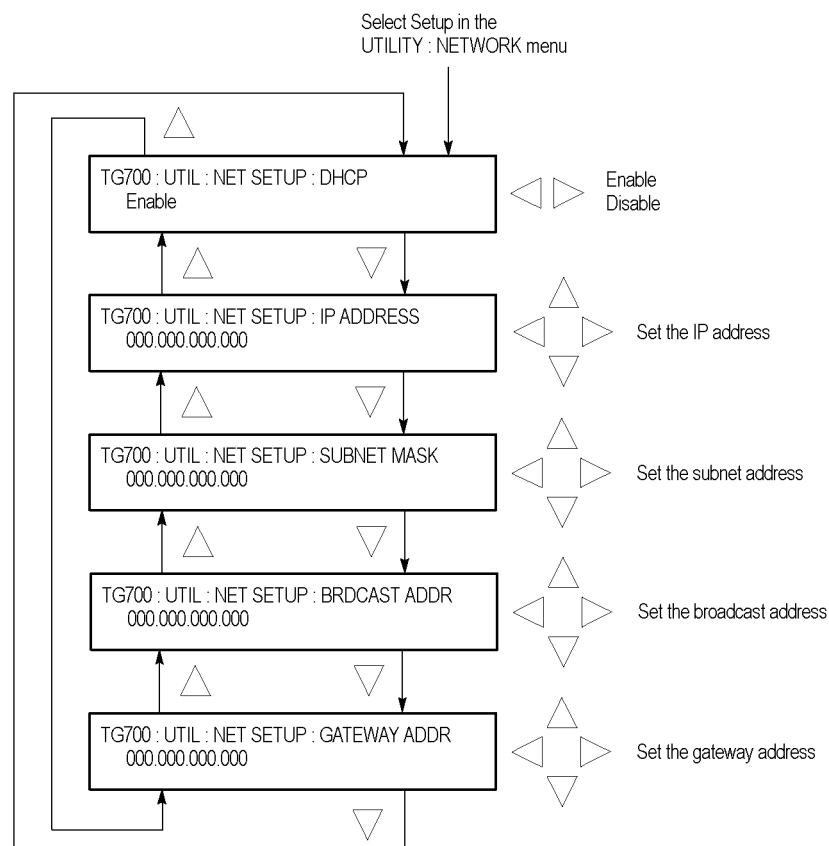


Figure 30: NETWORK SETUP submenu

DHCP. Enables or disables the TG700 to receive IP address settings using the DHCP (Dynamic Host Configuration Protocol) service on your network. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the ENTER button to implement the selection. If you select Disable in this menu, you will need to set address values in each of the following menu items.

NOTE. Under some network environments, the TG700 might not be able to get the IP address automatically from a DHCP server. In this case, you need to enter the appropriate address value in each submenu item.

Refer to your network administrator or to the user documentation supplied with your network server operating system (OS) for detailed information about DHCP server functions.

IP ADDRESS. Sets the IP address of the TG700. When no value is set, the default value is used. If DHCP service is enabled, the IP address obtained from the DHCP server is used instead of the address entered here. Refer to *Manually Setting a Network Address* below for instructions on how to enter an address.

NOTE. *If you enter blank characters for the IP address, the network function of the TG700 becomes invalid.*

SUBNET MASK. Sets the subnet address of the TG700. When no value is set, the default value is used. If DHCP service is enabled, the subnet address obtained from the DHCP server is used instead of the address entered here. Refer to *Manually Setting a Network Address* below for instructions on how to enter an address.

BRDCAST ADDR. Sets the broadcast address of the TG700. If DHCP service is enabled, the broadcast address obtained from the DHCP server is used instead of the address entered here. Refer to *Manually Setting a Network Address* below for instructions on how to enter an address.

GATEWAY ADDR. Sets the gateway address of the TG700. Refer to *Manually Setting a Network Address* below for instructions on how to enter an address.

Manually Setting a Network Address. Use the following procedure to manually enter a network address:

1. Press the **ENTER** button to enter the edit mode to input the address.
2. Use the left (◀) or right (▶) arrow button to move the underscore character (_), and use the up (▲) or down (▼) arrow button to enter the address value.
3. After you enter the address value, press the **ENTER** button to enable the address.

DIAGNOSTICS Submenu

Use this menu to execute the diagnostic routines for the mainframe and installed modules. The following figure shows the DIAGNOSTICS submenu.

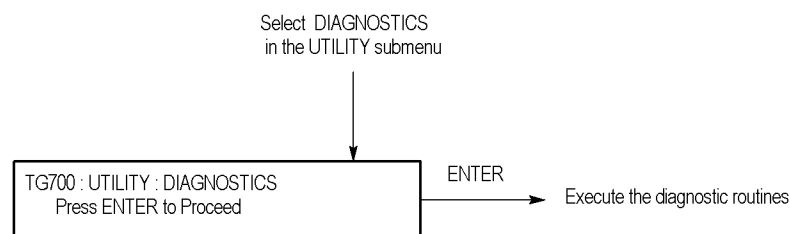


Figure 31: DIAGNOSTICS submenu



CAUTION. *When you execute the diagnostic routines, be sure to save the current instrument settings to a preset. After the diagnostics is completed, reboot the instrument and then recall the saved settings.*

Press the **ENTER** button to execute the diagnostic routines (note that the GPS7 module has its own diagnostics submenu; running the diagnostics here does not run the GPS7 diagnostics). If all of the diagnostic routines are completed without any errors, the instrument will display "Pass".

If a diagnostic error is displayed, contact your local Tektronix Field Office or representative.

NOTE. *The front-panel buttons are disabled until the diagnostic routines are completed.*

CAL OVEN Submenu

This menu can be accessed in regular or factory mode. When the instrument is in regular mode, you can access the internal frequency calibration, which can be performed while the instrument is in service. When the instrument is in factory mode, you can access the internal frequency calibration and you can characterize the oscillator frequency as a function of voltage. The latter characterization is only available on the GPS7 module and should only be performed when the instrument is out of service.

Internal frequency calibration. Use this menu to set the internal frequency of the mainframe internal oscillator. This may be done without removing the instrument from service, allowing you to compensate for oven drift while the instrument is in its operating environment. This menu only appears when the mainframe has software version 5.1 or greater installed and when there is a GPS7 module installed.

The mainframe oscillator is calibrated by storing the current frequency of the oscillator while it is locked to a GPS or a reference video signal. This stored frequency value is used when the instrument boots up and when there is a loss of signal lock and the instrument is configured to switch to internal timing.

The following figure shows the CAL OVEN submenu. You can find a complete internal frequency calibration procedure in the *Oven Calibration Procedures* section. (See page 195.)

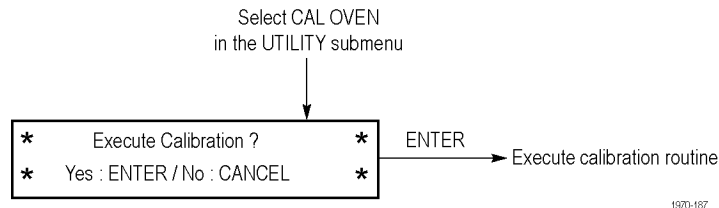


Figure 32: Internal frequency calibration menu

Press the **ENTER** button to execute the oscillator frequency calibration routine or press the **CANCEL** button to exit the menu.

Gain calibration. Use this menu to characterize the oscillator frequency as a function of voltage. This menu is only available when the mainframe is in factory mode, has software version 5.1 or above installed, and has a GPS7 module installed. Do not run this characterization if the unit is in service because this step requires a temporary frequency shift.

You can find a complete gain calibration procedure in the Oven Calibration section. (See page 195.)

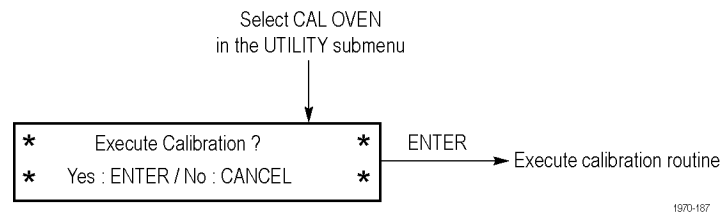


Figure 33: Gain calibration menu

Press the **ENTER** button to start the gain calibration routine or press the **CANCEL** button to exit the menu.



CAUTION. To prevent an incorrect oscillator frequency from being stored as the calibrated value, be sure that the instrument is locked to one of the following signal sources before you run the internal frequency calibration routine: Rubidium clock, GPS antenna (GPS7 module only), or the master sync signal of your video installation. To run the gain calibration, the instrument must be locked to a GPS reference.

Connecting to a Network

The TG700 has a 10 BASE-T port on the rear panel that allows you to use a PC to remotely control the instrument and to upload and download files such as signal or logo files.

This section provides instructions for connecting the TG700 to a single PC or to a network, and for setting the network parameters on 10 BASE-T port.

Refer to the *TG700 PC Tools Technical Reference* for detailed information about how to upload and download files using the 10 BASE-T port.

Connecting the TG700 to your PC(s)

The TG700 uses the rear-panel 10 BASE-T port to communicate with a PC or network. Use one of the following two methods to connect the TG700 to your PC(s). (See Figure 9 on page 47.)

- If you are connecting the TG700 directly to a single PC, use a crossover Ethernet cable to connect between the 10 BASE-T port on the TG700 and the Ethernet port on the PC.

If you need to construct your own crossover cable, use the following figure to change the pin connections on a straight cable to produce a crossover cable. (See Figure 34.)

- If you are connecting the TG700 to your local Ethernet network, use a straight Ethernet cable to connect between the 10 BASE-T port on the TG700 and the Ethernet hub port of your local network. By connecting to an Ethernet network, you can access the TG700 using any PC on the network.

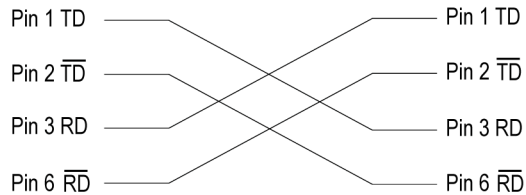


Figure 34: Pin connections for a 10BASE-T crossover Ethernet cable

Setting Ethernet Network Parameters

Use the NETWORK SETUP submenu to set the network parameters for the TG700.

Accessing the NETWORK SETUP Submenu. Perform the following procedure to access the NETWORK SETUP submenu.

1. Press the front-panel **MODULE** button repeatedly to display the mainframe main menu.
2. Use the up (▲) or down (▼) arrow button to select **UTILITY**, and then press the **ENTER** button. This accesses the UTILITY submenu.
3. Use the up (▲) or down (▼) arrow button to select **Network**.
4. Use the left (◀) or right (▶) arrow button to select **Setup**. This accesses the NETWORK SETUP submenu. (See Figure 30 on page 71.)

Setting the Parameters on a Network with a DHCP Server. If your network has a DHCP server, use the NETWORK SETUP submenu to enable the TG700 to function as a DHCP client. When the TG700 is connected to the network and DHCP service is enabled, the TG700 obtains the necessary network addresses automatically from the DHCP server.

NOTE. *Under some network environments, the TG700 may not be able to get the IP address automatically from a DHCP server. In this case, you need to enter the appropriate address value in each submenu item.*

Refer to your network administrator or to the user documentation supplied with your network server operating system (OS) for detailed information about DHCP server functions.

Setting the Parameters on a Network without a DHCP Server. If your network does not have a DHCP server, perform the following procedure to set the network parameters.

1. If you connect the TG700 directly to a single PC:
 - a. Set the **IP ADDRESS** parameter to be the same IP address as the PC's address except for the last number. The last number must be different than the last number in the PC's IP address.
 - b. Set the **SUBNET MASK** parameter to be the same net mask (subnet mask) used by the PC. Do not enter a number if the PC does not have a net mask.
 - c. You do not need to enter a **BRDCAST ADDR** and **GATEWAY ADDR** if you are directly connected to a single PC.
2. If you connect the TG700 to your local Ethernet network, see the *Caution* note below.



CAUTION. *To prevent communication conflicts on your Ethernet network, ask your local network administrator for the correct numbers to enter in the NETWORK PARAMETERS submenu if you connect the TG700 to your local Ethernet network.*

3. Verify the Ethernet connection by using a ping command from the PC.

Using the Mainframe General Purpose Interface (GPI)

You can use the 10 BASE-T port of the TG700 mainframe as a General Purpose Interface (GPI) by changing internal jumper settings. When you enable the mainframe GPI, you can recall one of the seven available presets, output an alarm signal, and display an alarm status on the LCD.

This section describes how to set the mainframe GPI and its available features.



WARNING. *Electrical shock can cause injury or death. Reduce the risk of shock by referring to the General Safety Summary and the Service Safety Summary before performing any service level adjustments. Only trained personnel should perform service procedures.*



CAUTION. *When you enable the mainframe GPI, do not connect the TG700 to a network. The network might be damaged.*

NOTE. *When you enable the mainframe GPI, you cannot perform network operations such as sending and receiving remote commands or downloading signals.*

After you enable the mainframe GPI, be sure to apply the GPI label (provided with the instrument) to the rear panel to show that the instrument cannot connect to a network.

Enabling the Mainframe GPI

The mainframe GPI is enabled by changing the jumper settings of the connectors J000, J002, J004, J006, and J008 on the A10 MAIN board. Since the A10 MAIN board is located inside the chassis, you must remove the top cover to change the jumper settings.

Perform the following procedure to enable the mainframe GPI. You need a screwdriver with a # 2 Phillips tip to remove the top cover.



WARNING. *To avoid electrical shock, remove the power cord before removing the top cover. Failure to remove the power cord can result in serious injury or death.*

1. Disconnect the power cord from the TG700.
2. Remove the screws securing the top cover to the instrument.
3. Lift the top cover off the instrument. Depending on the version of your instrument, you might need to slide the top cover toward the rear before lifting it off the instrument. (See Figure 35.)

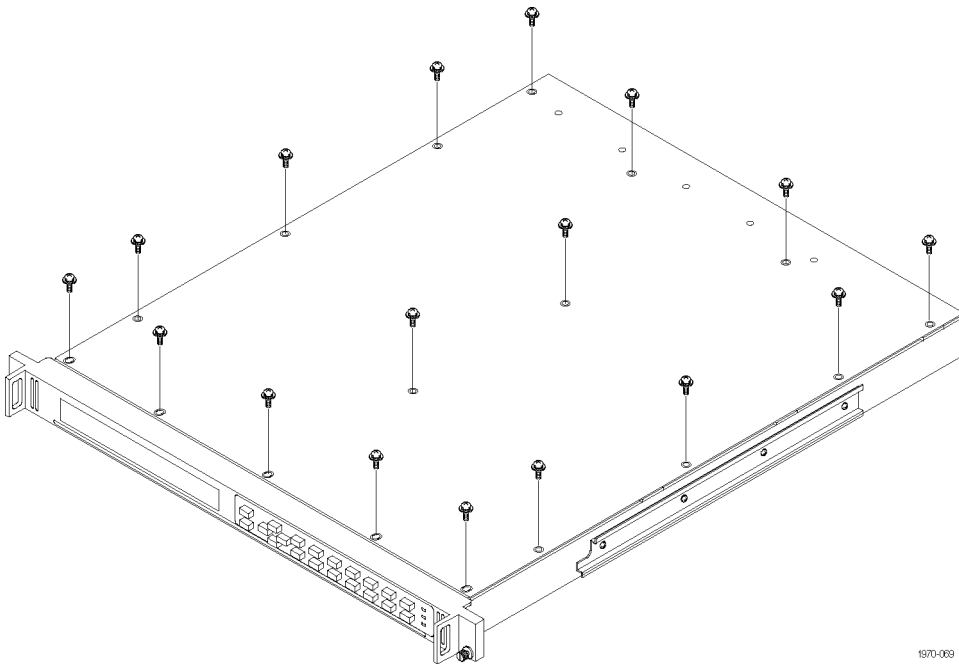


Figure 35: Top cover removal

4. Locate the connectors **J000**, **J002**, **J004**, **J006**, and **J008** on the A10 MAIN board. (See Figure 36.)

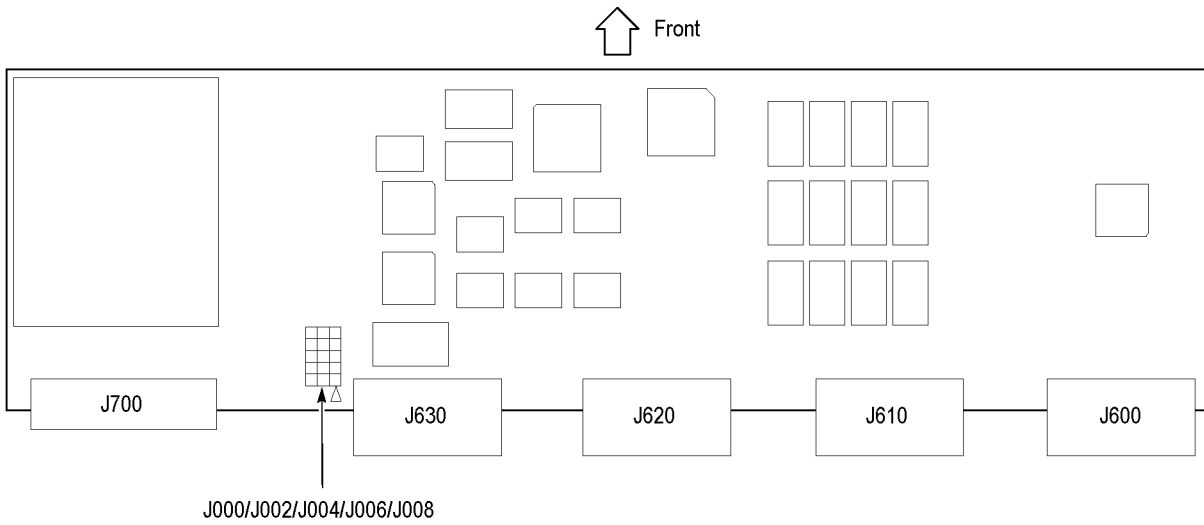


Figure 36: Location of the mainframe GPI connectors on the A10 MAIN board

5. Move all of the jumpers from pins 1-2 to pins 2-3. The following table shows the jumper settings of the connectors and their function.

NOTE. To enable the GPI, be sure to move all of the jumpers to pins 2-3.

Table 6: Mainframe GPI jumper settings on the A10 MAIN board

Jumper illustration	Jumper setting	Function
	All of the jumpers short pins 1-2. (factory default settings)	LAN (Ethernet)
	All of the jumpers short pins 2-3.	GPI

6. After you move the jumpers, replace the top cover on the instrument.
7. Reinstall the screws securing the top cover to the instrument.
8. Remove the protective backing from the GPI label provided with the instrument, and then apply it to the rear panel. (See Figure 37.)

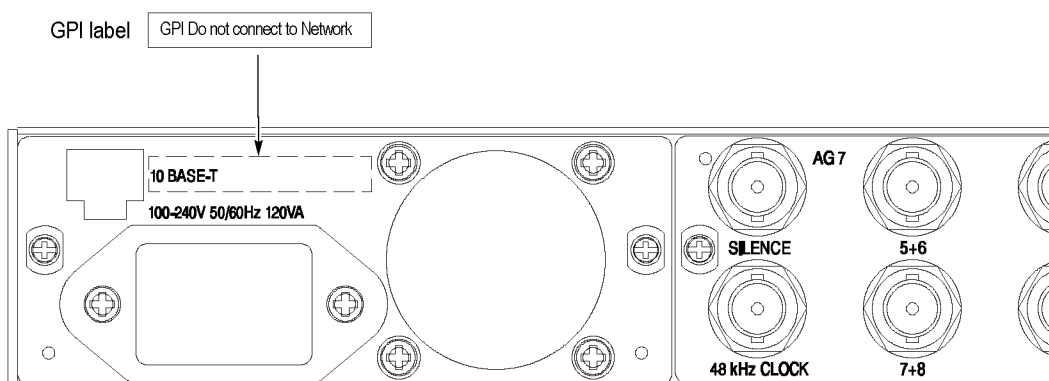
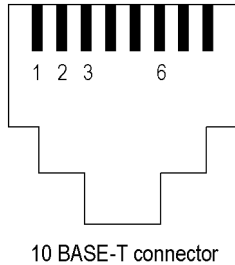


Figure 37: Applying the mainframe GPI label to the rear panel

Pin Assignments of the 10 BASE-T Connector



The following figure shows the pin assignments of the 10 BASE-T connector when the mainframe GPI is enabled. Use pins 1, 2, and 3 to input signals for recalling a preset. Use pin 4 to output an alarm signal. Frame ground is used for the ground return. When using a shielded LAN cable (shielded twisted pair cable), you can use the shield of the cable as ground.

Table 7: Pin assignments of the 10 BASE-T connector for the mainframe GPI

Pin number	Function	Level
1, 2, and 3	Input	High > 1.4 V or open (connected to an internal 10 kΩ pull-up resistor) Low < 0.4 V or ground (input impedance: 10 kΩ)
6	Output	Low < 0.4 V or ground (when sinking 100 ma; maximum on-resistance 4 Ω)

Recalling a Preset

When you enable the mainframe GPI, you can recall one of the seven presets by combinations of signal levels for pins 1, 2, and 3 of the 10 BASE-T connector. The following table shows the combinations of signal levels for the pins and the preset number to be recalled.

Table 8: Signal level combinations and the corresponding preset for the mainframe GPI

Pin 1	Pin 2	Pin 3	Preset number
High	High	Low	1
High	Low	High	2
High	Low	Low	3
Low	High	High	4
Low	High	Low	5
Low	Low	High	6
Low	Low	Low	7

All of the input signals are active low. When the signal level(s) for the specified pin(s) goes from High to Low, the corresponding preset is recalled. For example, when the signal level for pin 3 goes from High to Low, preset 1 is recalled.

NOTE. *Since the signal transition cannot be detected on the edge of the signal, the signal level needs to be held low for about 0.5 seconds before the preset signal is recognized. The time required to change the instrument settings depends on the contents of the selected preset.*

Outputting an Alarm Signal

When you enable the mainframe GPI, the TG700 can output an alarm signal from pin 6 on the 10 BASE-T connector when an internal error occurs. Since the output signal is an active low; the signal level for pin 6 goes from High to Low when any errors occur. In addition, you can specify a BLACK output on the AGL7 module as an alarm output.

NOTE. *The AGL7 must be running software version 4.6 or later to output an alarm signal. Additionally, the AGL7 hardware must be at Version 3.x or above to support outputting an alarm signal.*

The alarm signal is output when one of the following internal errors occurs:

- The fan stops working (GPI alarm only).
- A genlock signal is not connected.
- The TG700 does not lock to a genlock signal.
- The frequency of the genlock signal and the internal reference shift considerably, and the TG700 is near loss of lock.

The alarm signal output can be enabled using the GPI ALARM OUTPUT and AGL7 ALARM OUTPUT menu items in the UTILITY submenu. These items appear only after the mainframe GPI is enabled. (See page 86.) (See page 88.)

NOTE. *After the instrument is powered on, it takes about three minutes to detect a stable error signal (this time is required to stabilize the temperature in the temperature-controlled oven in the internal reference oscillator). You can see the remaining time before the alarm becomes effective in the AGL7 main menu as shown below.*

AGL7 [x] : GENLOCK : STATUS
 Genlock Alarm : 120 seconds to Enable

1970-190

ALARM Menu. When the mainframe GPI is enabled, the ALARM menu items are displayed in the UTILITY submenu instead of the NETWORK menu item.

Use the ALARM menu items to enable or disable the alarm signal output, to reset the alarm signal output, or to display the alarm status. The following figure shows the ALARM menu.

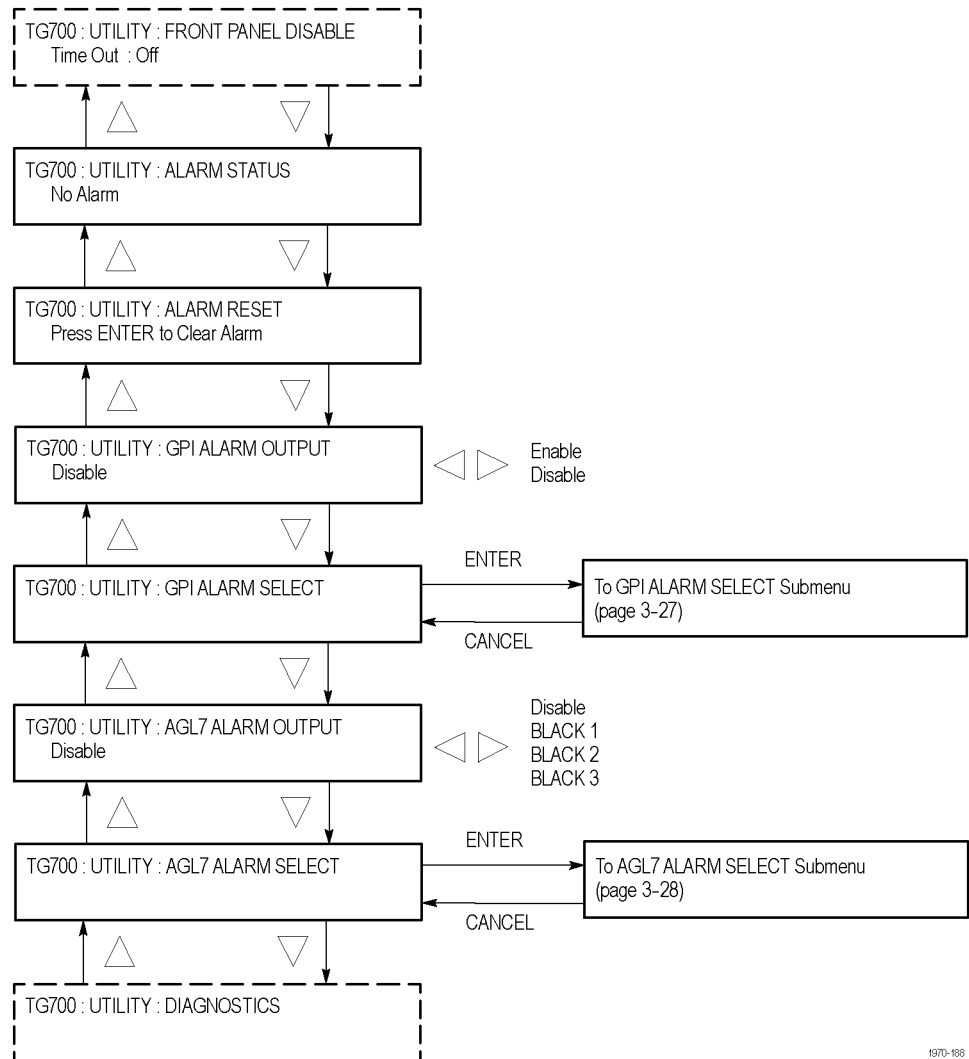


Figure 38: Mainframe GPI ALARM menu

1970-188

The ALARM menu contains the following selections:

- **ALARM STATUS:** Displays the alarm status detected inside the instrument. The following status messages may be displayed.
 - **No Alarm:** No errors have been detected.
 - **Genlock: Near Loss of Lock:** The frequency of the genlock signal and the internal reference signal have shifted considerably, and the TG700 is near loss of lock. If this message appears, check the frequency of the genlock signal or the internal reference signal of the TG700.
 - **Genlock: Loss of Lock:** The TG700 cannot lock to the genlock signal.
 - **Genlock: No Signal:** A genlock signal is not connected.
 - **Fan Fault:** The fan on the rear panel has stopped working.

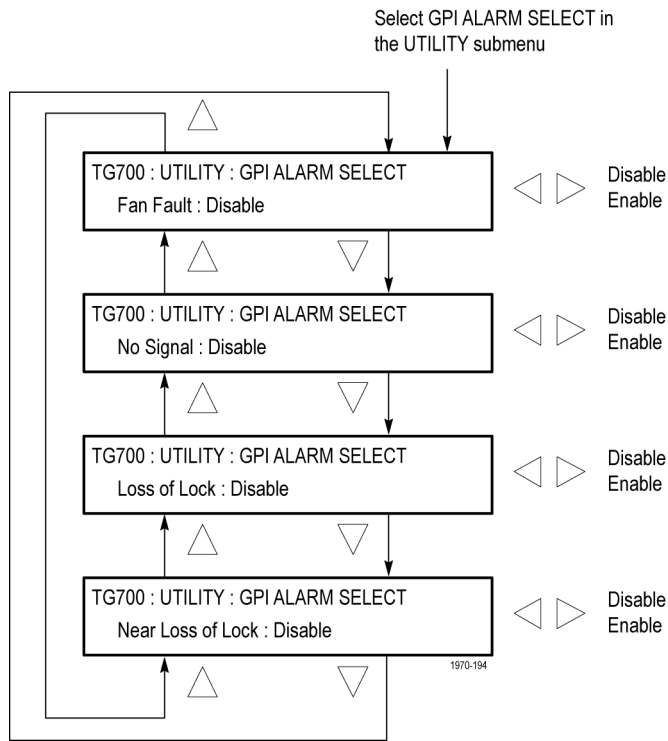
NOTE. *In the alarm status display, the instrument displays an error message that has been detected in the past. In order to refresh the display, you need to access another menu item (press the CANCEL button), and then reselect the ALARM STATUS menu item.*

- **ALARM RESET:** Resets the alarm status. The TG700 holds the alarm status even if the cause of the alarm is eliminated. Use this menu item when you need to reset the status. If the cause of the error is not eliminated, the alarm status is set again when you reset the status.
- **GPI ALARM OUTPUT:** Enables or disables the alarm signal output. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**, and then press the **ENTER** button to confirm the selection. When the GPI alarm output is enabled, an alarm signal is output from pin 6 of the 10 BASE-T connector when any error is detected inside the instrument. Since the output signal is an active low; the signal level for pin 6 goes from High to Low when any errors occur.
- **GPI ALARM SELECT:** Selects which GPI alarms are enabled or disabled. Select this menu item, and then press the **ENTER** button to access the GPI ALARM SELECT submenu. (See page 86.)
- **AGL7 ALARM OUTPUT:** Enables or disables the alarm output from one of the BLACK outputs on the AGL7 module. Use the left (◀) or right (▶) arrow button to select **Disable**, **BLACK 1**, **BLACK 2**, or **BLACK 3**. When you select BLACK 1, BLACK 2, or BLACK 3 and an enabled error occurs, the output signal from the selected connector turns off for about 60 ms. When you select Disable, the alarm output to the AGL7 module is disabled. Press the **ENTER** button to confirm the selection.

NOTE. *The AGL7 module alarm output is available only when the GPI ALARM OUTPUT menu item is set to Enable.*

- **AGL7 ALARM SELECT:** Selects which of the AGL7 alarms are enabled or disabled. Select this menu item, and then press the **ENTER** button to access the AGL7 ALARM SELECT submenu. (See page 88.)

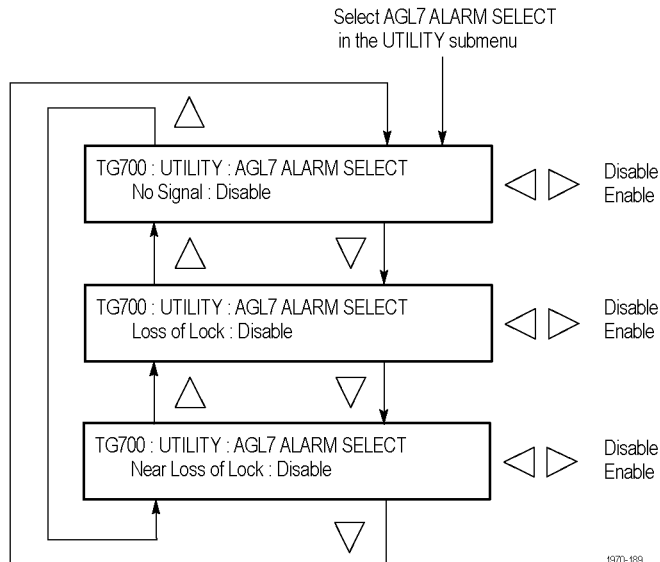
GPI ALARM SELECT Submenu. Use this menu to select which mainframe GPI alarms are enabled or disabled. Use the up (▲) or down (▼) arrow button to scroll through the menu items. The following figure shows the GPI ALARM SELECT submenu.



The GPI ALARM SELECT submenu contains the following selections:

- **Fan Fault:** Enables or disables the mainframe GPI alarm when the fan stops working. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to implement the selection.
- **No Signal:** Enables or disables the mainframe GPI alarm when a genlock signal is not connected. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to implement the selection.
- **Loss of Lock:** Enables or disables the mainframe GPI alarm when the TG700 does not lock to a genlock signal. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to implement the selection.
- **Near Loss of Lock:** Enables or disables the mainframe GPI alarm when the frequency of the genlock signal and the internal reference shift considerably, and the TG700 seems to be near loss of lock. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to implement the selection.

ALG7 ALARM SELECT Submenu. Use this menu to select which AGL7 module alarms are enabled or disabled. Use the up (▲) or down (▼) arrow button to scroll through the menu items. The following figure shows the AGL7 ALARM SELECT submenu.



The AGL7 ALARM SELECT submenu contains the following selections:

- **No Signal:** Enables or disables the AGL7 module alarm when a genlock signal is not connected. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to implement the selection.
- **Loss of Lock:** Enables or disables the AGL7 module alarm when the TG700 does not lock to a genlock signal. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to implement the selection.
- **Near Loss of Lock:** Enables or disables the AGL7 module alarm when the frequency of the genlock signal and the internal reference shift considerably, and the TG700 appears to be near loss of lock. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to implement the selection.

Inspection and Cleaning

Inspect and clean the instrument as often as your operating conditions require. The collection of dirt can cause instrument overheating and operational failure. Dirt acts as an insulating blanket, preventing efficient heat dissipation. Dirt also provides an electrical conduction path that can cause an instrument failure, especially under high-humidity conditions.



CAUTION. *Avoid the use of chemical cleaning agents that might damage the plastics used in this instrument. Use only deionized water when cleaning the front-panel controls. Use a 75% Isopropyl alcohol solution as a cleaner, and rinse with deionized water.*

Avoid the use of high-pressure compressed air when cleaning dust from the interior of this instrument. High-pressure air can cause Electro Static Discharge (ESD). Instead, use low-pressure compressed air (about 9 psi).

Exterior Inspection

Using the following table as a guide, inspect the outside of the instrument for damage, wear, and missing parts. You should thoroughly check instruments that appear to have been dropped or otherwise abused to verify correct operation and performance. Immediately repair defects that could cause personal injury or lead to further damage to the instrument.

Table 9: External inspection check list

Item	Inspect for	Repair action
Cabinet and front panel	Cracks, scratches, deformations, damaged hardware	Replace defective module
Front-panel buttons	Missing or damaged	Repair or replace missing or defective buttons
Connectors	Broken shells, cracked insulation, deformed contacts, and dirt in connectors	Replace defective modules; clear or wash out dirt
Accessories	Missing items or parts of items, bent pins, broken or frayed cables, and damaged connectors	Replace damaged or missing items, frayed cables, and defective modules

Exterior Cleaning Perform the following steps when you clean the exterior of the instrument:



WARNING. *To avoid injury or death, unplug the power cord from line voltage before cleaning the instrument. Avoid getting moisture inside the instrument during external cleaning. Use only enough liquid to dampen the cleaning cloth.*

1. Remove loose dust on the outside of the instrument with a lint-free cloth.
2. Remove remaining dirt with a lint-free cloth dampened with a 75% Isopropyl alcohol-and-water solution. Do not use abrasive cleaners.
3. Clean the monitor screen with a lint-free cloth dampened with a 75% Isopropyl alcohol-and-water solution.

AG7 Audio Generator Module

This section describes the module-specific functions of the AG7 Audio Generator module. Refer to the following locations for additional information about the module:

- *AG7 Module Connectors* for a description of the rear-panel connectors. (See page 48.)
- *AG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 16.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The AG7 Audio Generator module is designed to be installed in the TG700 TV Signal Generator Platform.

The module can output serial digital audio signals that comply with the AES/EBU standard. The module contains the following features:

- 8 channels (4 AES/EBU audio pairs) of serial digital audio outputs with 24 or 20 bits resolution
- Adjustable frequencies, amplitudes, and audio clicks in every channel
- Silence and 48 kHz clock (word clock) outputs
- Full remote control using Ethernet interface

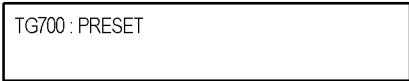
The module also supports the following audio frequencies:

Silence	500 Hz	2000 Hz	8000 Hz
50 Hz	600 Hz	2400 Hz	9600 Hz
100 Hz	750 Hz	3000 Hz	10000 Hz
150 Hz	800 Hz	3200 Hz	12000 Hz
200 Hz	1000 Hz	4800 Hz	15000 Hz
250 Hz	4000 Hz	5000 Hz	16000 Hz
300 Hz	1200 Hz	6000 Hz	20000 Hz
400 Hz	1500 Hz	1600 Hz	

Operating Procedure

After the AG7 module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that there are no error messages on the display.
3. After the initialization process, the mainframe main menu appears as shown below.



TG700 : PRESET

4. Press the front-panel **MODULE** button until the AG7 module main menu appears as shown below.



AG7 [x] : CHANNEL PARAMETERS
Channel 1

5. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus. (See page 93, *AG7 Module Main Menu*.)

AG7 Module Main Menu

Use the AG7 module main menu to perform the following tasks:

- Select the audio channel whose parameters are to be changed
- Select the audio data resolution
- Select the frame reset signal to be synchronized
- Select the timing offset for the audio signal outputs

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the AG7 module main menu.

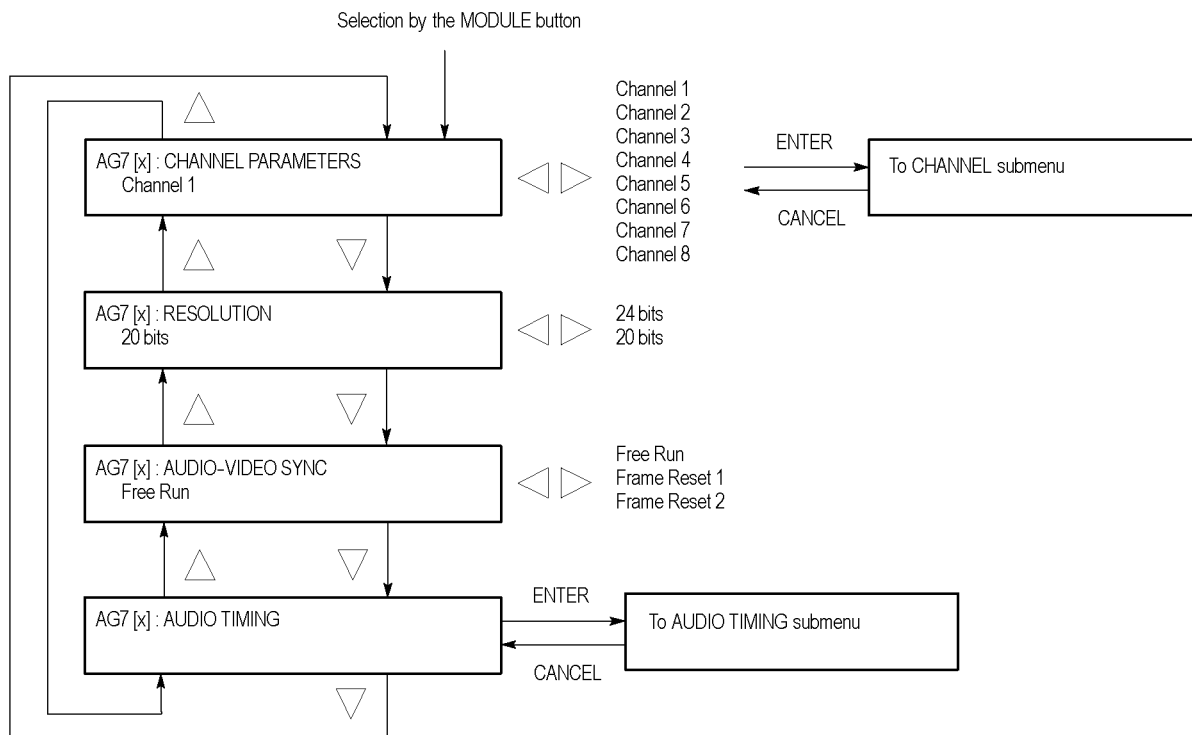


Figure 39: AG7 module main menu

CHANNEL PARAMETERS. Selects the channel for which the parameters are to be set (from Channel 1 to Channel 8). Use the left (◀) or right (▶) arrow button to make the selection.

Press the front-panel **ENTER** button to access the **CHANNEL PARMAMETERS** submenu where you can set frequency, amplitude, and audio click insertion. (See page 95.)

RESOLUTION. Sets the resolution of the serial digital audio signal data. Use the left (◀) or right (▶) arrow button to make the selection. The choices are **24 bits** or **20 bits**. Press the **ENTER** button to enable the selection.

AUDIO-VIDEO SYNC. Selects the frame reset signal that is synchronized with the digital audio signals. Use the left (◀) or right (▶) arrow button to make the selection. The selection items are **Free Run**, **Frame Reset 1**, and **Frame Reset 2**. For Free Run, the audio signal is not synchronized with any of the frame reset signals. Press the **ENTER** button to enable the selection.

NOTE. *If the frame reset signal used by the audio signals is reset by the change of the video format, the audio signal timing is also reset.*

AUDIO TIMING. Sets the timing offset of the audio signal outputs relative to the genlock signal or the internal reference signal. Select this menu item and press the **ENTER** button to access the **AUDIO TIMING** submenu. (See page 96, *AUDIO TIMING Submenu*.)

CHANNEL PARAMETERS
Submenu

Use this menu to set the frequency, amplitude, and audio click of the selected audio channel. Use the up (▲) or down (▼) arrow button to scroll through the menu items. The following figure shows the CHANNEL PARAMETERS submenu.

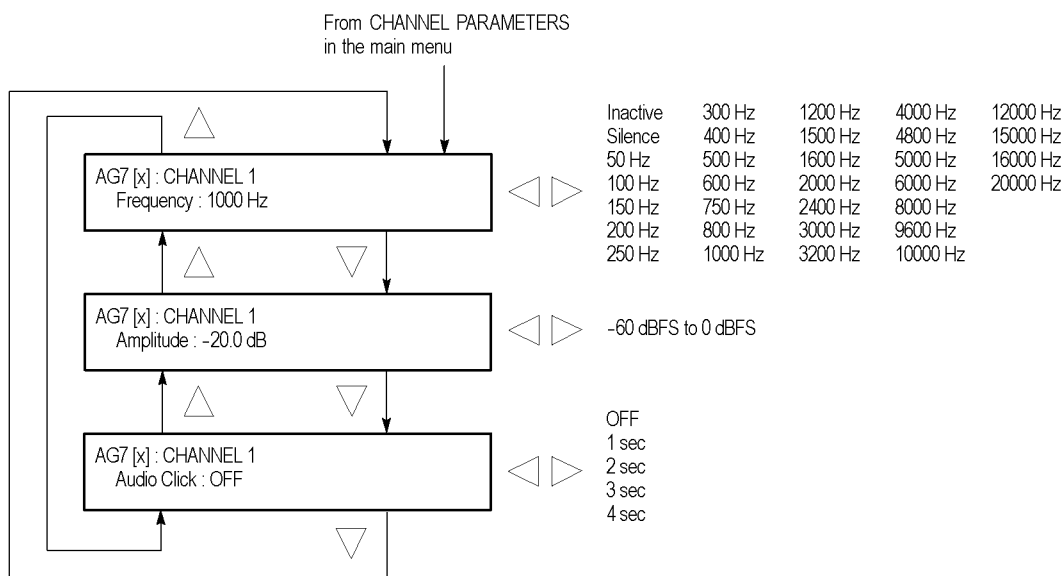


Figure 40: AG7 module CHANNEL PARAMETERS submenu

Frequency. Sets the audio signal frequency for the selected audio channel. Use the left (◀) or right (▶) arrow button to make the selection. The choices are:

Inactive	400 Hz	1600 Hz	6000 Hz
Silence	500 Hz	2000 Hz	8000 Hz
50 Hz	600 Hz	2400 Hz	9600 Hz
100 Hz	750 Hz	3000 Hz	10000 Hz
150 Hz	800 Hz	3200 Hz	12000 Hz
200 Hz	1000 Hz	4000 Hz	15000 Hz
250 Hz	1200 Hz	4800 Hz	16000 Hz
300 Hz	1500 Hz	5000 Hz	20000 Hz

When **Inactive** is selected, audio data output is disabled. Press the **ENTER** button to enable the selection.

Amplitude. Sets the audio signal amplitude for the selected audio channel. Use the left (◀) or right (▶) arrow button to set the value. You can set the value from -60 dBFS to 0 dBFS in 1 dBFS steps.

Audio Click. Inserts audio clicks in the selected audio channel. The audio tone, if any, is turned off for an interval around the audio click. Use the left (◀) or right (▶) arrow button to make the selection. The choices are **OFF**, **1 sec**, **2 sec**, **3 sec**, and **4 sec**. Press the **ENTER** button to enable the selection.

Audio Click becomes valid when you select **1 sec** to **4 sec** for the Audio Click rate. When Audio Click is valid, Audio Tone is turned off for 0.25 seconds around

the click. For example, if you select **3 sec** for the click rate, the audio tone will be output for 2.75 seconds, and silent for 0.25 seconds; the click occurs during this silence. When Audio Click is **OFF**, the Audio Tone selected in the **FREQUENCY** menu is output continuously. Audio Click makes it easy to identify any of the four output channels.

AUDIO TIMING Submenu

Use this menu to adjust the timing offset of the audio signal outputs relative to the internal reference signal (frame reset signal). The following figure shows the **AUDIO TIMING** submenu.



Figure 41: AG7 module AUDIO TIMING submenu

Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -160 ms to +160 ms in 1 ms steps. A minus timing value is set as **Delay** and plus is set as **Advance**.

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

Factory Default Settings

The following table shows the factory default settings for the AG7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 10: AG7 module factory default settings

Menu item name	Settings
CHANNEL 1 to CHANNEL 8	
Frequency	1000 Hz
Amplitude	-20.0 dBFS
Audio Click	OFF
RESOLUTION	20 bits
AUDIO-VIDEO SYNC	Free Run
AUDIO TIMING	
Delay or Advance	0.0 msec

AGL7 Analog Genlock Module

This section describes the module-specific functions of the AGL7 Analog Genlock module. Refer to the following locations for additional information about this module:

- *AGL7 Module Connectors* for a description of the rear-panel connectors. (See page 49.)
- *AGL7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 17.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The AGL7 Analog Genlock module is designed to be installed in the TG700 TV Signal Generator Platform.

The module provides genlock function for the mainframe and installed modules. It is equipped with two reference inputs, the loophrough inputs and the terminated CW input. The AGL7 module can genlock the following signals:

- NTSC black burst signal: burst lock or sync lock
- PAL black burst signal: burst lock and sync lock
- HDTV trilevel sync signal
- CW: 1, 3.58 (NTSC sub-carrier), 4.43 (PAL sub-carrier), 5, and 10 MHz
- Alarm output capability (The AGL7 must be running software version 4.6 or later to output an alarm signal. Additionally, the AGL7 hardware must be at Version 3.x or above to support outputting an alarm signal.)

NOTE. *The AGL7 module alarm output is available only when the mainframe GPI is enabled and the GPI ALARM OUTPUT menu item is set to Enable. (See page 79, Using the Mainframe General Purpose Interface (GPI).)*


PAL-M and PAL-N are not supported by the AGL7, ATG7, and BG7 modules.

There are three rear-panel output connectors that can output black burst signals and HDTV trilevel sync signals.

Operating Procedure

After the AGL7 module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that there are no error messages on the display.
3. After the initialization process, the mainframe main menu appears as shown below.



TG700 : PRESET

4. Press the front-panel **MODULE** button until the AGL7 module main menu appears as shown below.



AGL7 [1] : GENLOCK : STATUS
Internal

5. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus. (See page 99, *AGL7 Module Main Menu*.)

AGL7 Module Main Menu

Use the AGL7 module main menu to select the genlock source and the output whose parameters are to be changed.

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the AGL7 module main menu.

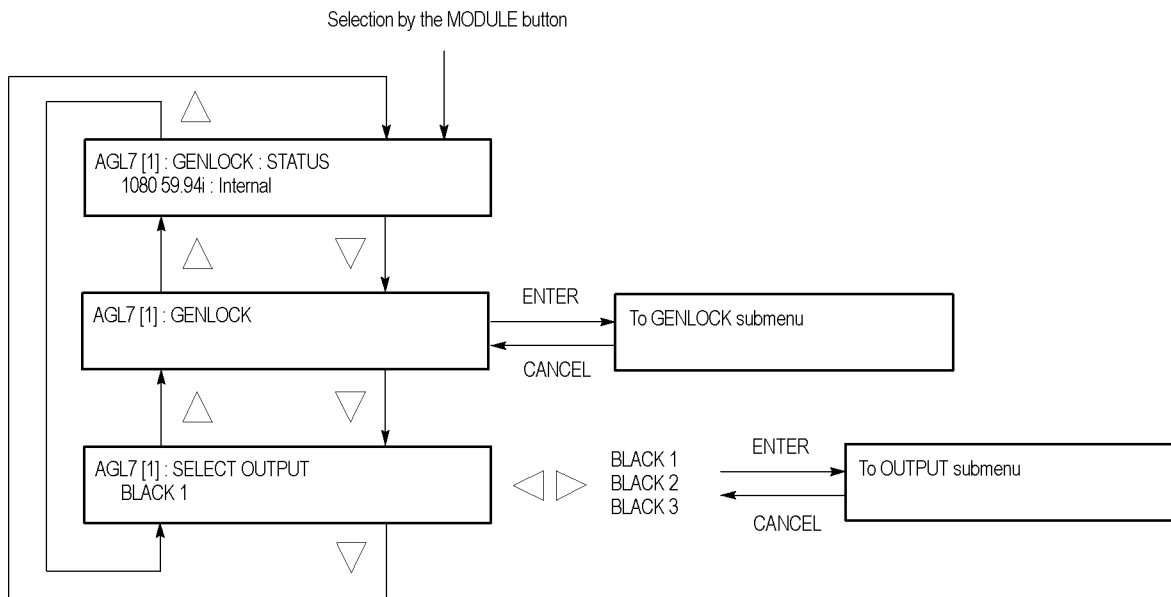


Figure 42: AGL7 module main menu

STATUS. Displays the genlock source and status. The following status messages may appear: **Locked**, **Loss of Lock**, and **No signal**.

GENLOCK. Selects the genlock source and sets the timing offset of the genlock signal relative to the internal reference signal. When you select this menu item and press the ENTER button, you will access the GENLOCK submenu. (See page 100.)

SELECT OUTPUT. Selects the output for you to change the signal format, output signal, and timing offset relative to the internal reference signal (frame reset signal). Use the left (◀) or right (▶) arrow button to select **BLACK 1**, **BLACK 2**, or **BLACK 3**. When you select any of these and press the ENTER button, you will access the OUTPUT submenu to set the parameters of the selected output. (See page 102.)

GENLOCK Submenu

Use this menu to select the genlock source for the mainframe and the installed modules, set the timing offset, and set the instrument actions when lock is lost. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the GENLOCK submenu.

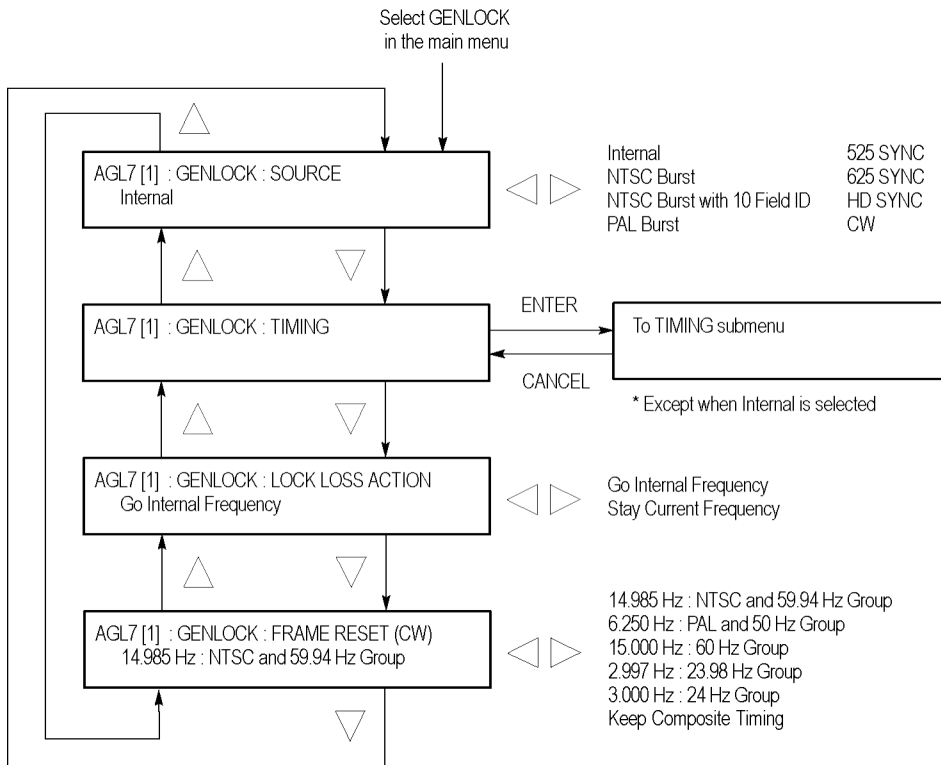


Figure 43: AGL7 module GENLOCK submenu

SOURCE. Selects the signal source to genlock the mainframe and the installed modules. Use the left (◀) or right (▶) arrow button to select the genlock source, and then press the **ENTER** button to confirm the selection. Select from the following genlock sources:

- **Internal:** Uses the internal reference signal.
- **NTSC Burst:** Burst locks to an NTSC black burst signal applied to the REF connector.
- **NTSC Burst with 10 Field ID:** Burst locks to an NTSC black burst with 10 Field ID signal applied to the REF connector.
- **PAL Burst:** Burst locks to a PAL black burst signal applied to the REF connector.

- **525 SYNC:** Sync locks to an NTSC black burst signal applied to the REF connector.
- **625 SYNC:** Sync locks to a PAL black burst signal applied to the REF connector.
- **HD SYNC:** Locks to an HDTV trilevel signal applied to the REF connector.
- **CW:** Locks to the 1, 3.58, 4.43, 5, or 10 MHz continuous wave signal applied to the CW connector.

TIMING. Adjusts the timing offset of the input signal relative to the internal reference signal (frame reset signal). When you select this menu item and press the ENTER button, you will access the TIMING submenu. (See page 154.)

LOCK LOSS ACTION. Sets the way the AGL7 module reacts when a loss of genlock state occurs (for example, genlock source is absent or incompatible). Use the left (◀) or right (▶) arrow button to select the action, and then press the ENTER button to confirm the selection. Select from the following actions:

- **Go Internal Frequency:** Switches automatically to the internal reference and blinks the EXT.REF indicator.
- **Stay Current Frequency:** Maintains the current state.

FRAME RESET (CW). Selects the frame reset signal frequency to be used when a CW signal is applied to the CW connector. Use the left (◀) or right (▶) arrow button to select the frequency, and then press the ENTER button to confirm the selection. Select from the following frequencies:

- **14.985 Hz : NTSC and 59.94 Hz Group:** Uses a frame reset signal with a frequency of 14.985 Hz.
- **6.250 Hz : PAL and 50 Hz Group:** Uses a frame reset signal with a frequency of 6.250 Hz.
- **15.000 Hz : 60 Hz Group:** Uses a frame reset signal with a frequency of 15.000 Hz.
- **2.997 Hz : 23.98 Hz Group:** Uses a frame reset signal with a frequency of 2.997 Hz.
- **3.000 Hz : 24 Hz Group:** Uses a frame reset signal with a frequency of 3.000 Hz.
- **Keep Composite Timing:** Keeps the synchronization shock small by using the previous NTSC or PAL timing whenever possible, even if you change the genlock source to CW while the instrument is genlocked to a NTSC or PAL black burst signal. The frame frequency is the same as the NTSC or PAL frequency that was previously used. Use a 5 MHz, 10 MHz, 3.58 MHz (for NTSC), or 4.43 MHz (for PAL) signal as a CW signal source.

OUTPUT Submenu

Use this submenu to set the signal format and the timing offset for the output selected in the SELECT OUTPUT menu item. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the OUTPUT submenu.

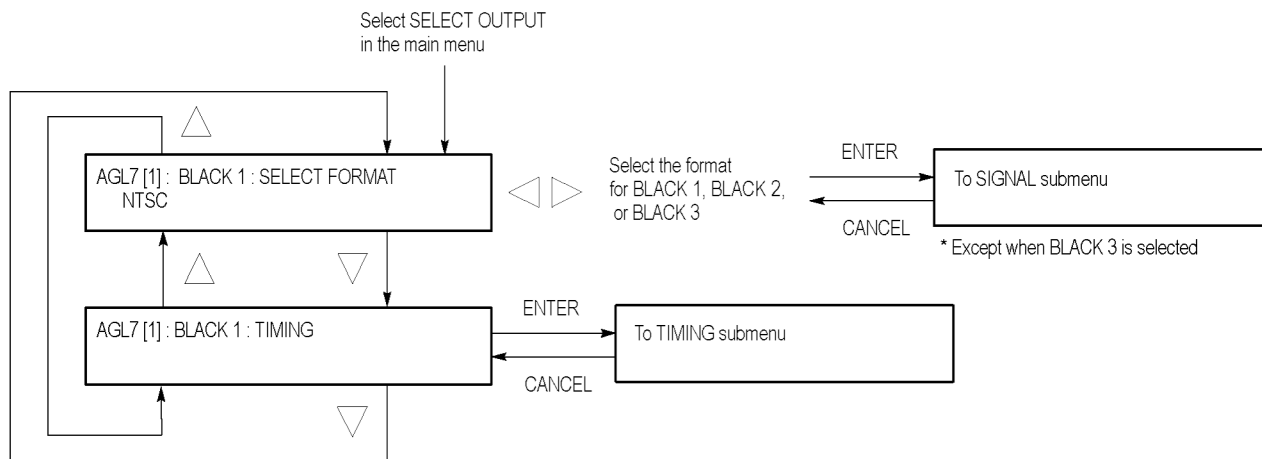


Figure 44: AGL7 module OUTPUT submenu

SELECT FORMAT. Selects the format for the signal output from the BLACK 1, BLACK 2, or BLACK 3 connector. Use the left (◀) or right (▶) arrow button to select the format. The available choices described below depend on which output connector you select.

NOTE. When you change signal format, synchronization shock occurs.

- When **BLACK 1** is selected, the formats listed below are available. Press the **ENTER** button to confirm the selection and to access the SIGNAL submenu where you will select a black burst signal. (See page 104.)

NTSC
 NTSC No Setup
 PAL

- When **BLACK 2** is selected, the formats listed below are available. Press the **ENTER** button to confirm the selection and to access the SIGNAL submenu where you will select a black burst signal. (See page 104.)

NTSC
 NTSC No Setup
 PAL
 HD SYNC (Same as BLACK 3)

- When **BLACK 3** is selected, the formats listed below are available. Press the **ENTER** button to confirm the selection and to enable the selected trilevel sync signal or the black burst signal when Black Burst (Same as BLACK2) is selected.

1080 60i
1080 59.94i
1080 50i
1080 24sF
1080 23.98sF
1080 30p
1080 29.97p
1080 25p
1080 24p
1080 23.98p
720 60p
720 59.94p
720 50p
Black Burst (Same as BLACK 2)

TIMING. Adjusts the timing offset for the output signals relative to the internal reference signal (frame reset signal). When you select this menu item and press the **ENTER** button, you will access the TIMING submenu where you will select the timing offset. (See page 154.)

You cannot set the timing offset under the following conditions:

- When HD SYNC (Same as BLACK 3) is selected as a format for the BLACK 2 output.
- When Black Burst (Same as BLACK 2) is selected as a format for the BLACK 3 output.

SIGNAL Submenu

Use this menu to select the black burst signal for the NTSC, NTSC No Setup, and PAL formats. Use the left (◀) or right (▶) arrow button to select the black burst signal, and then press the **ENTER** button to confirm the selection. The following figure shows the SIGNAL submenu.

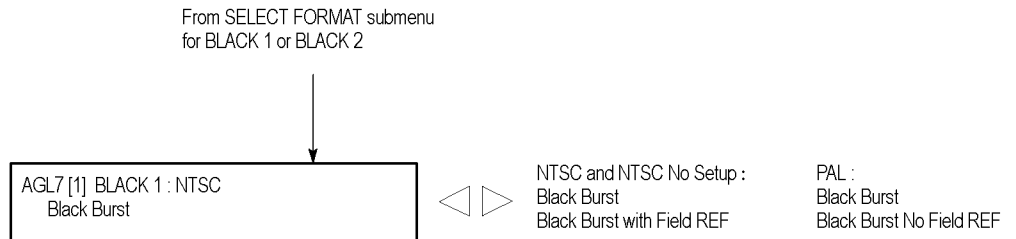


Figure 45: AGL7 module SIGNAL submenu

The available choices described below depend on which format you select.

- When the **NTSC** or **NTSC No Setup** format is selected, the signals listed below are available:
 - Black Burst
 - Black Burst with Field REF
- When the **PAL** format is selected, the signals listed below are available:
 - Black Burst
 - Black Burst with No Field REF

TIMING Submenu

Use this menu to adjust the timing offset of the input and output signals relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to scroll through the menu.

The TIMING submenu uses the same menu structure for both input and output signals, except for the menu items displayed in the first line. The following figure shows the TIMING submenu.

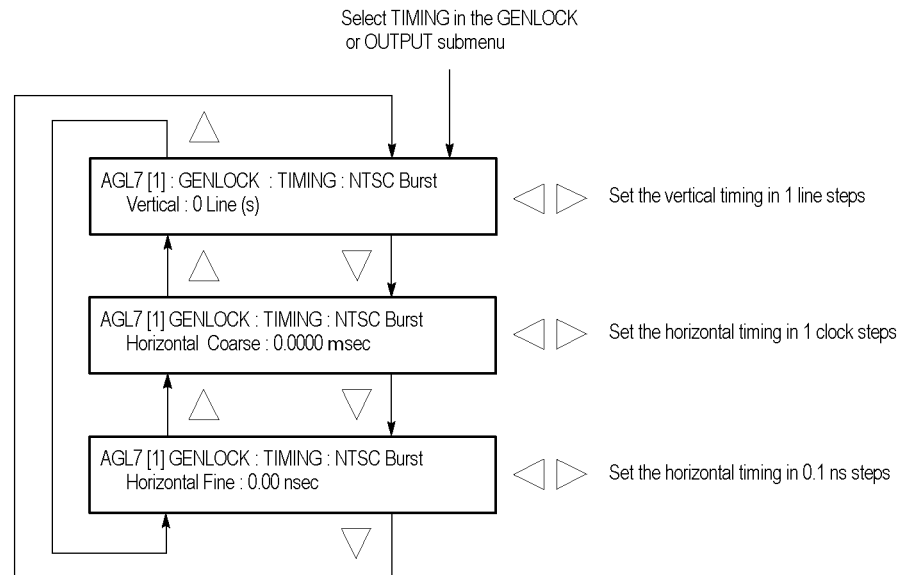


Figure 46: AGL7 module TIMING submenu

Vertical. Use the left (◀) or right (▶) arrow button to adjust the vertical offset. The range of the timing adjustment depends on the selected signal format. (See Table 11.) (See Table 12.)

Horizontal Coarse. Use the left (◀) or right (▶) arrow button to adjust the coarse horizontal offset. The range of the timing adjustment depends on the selected signal format. (See Table 11.) (See Table 12.)

Horizontal Fine. Use the left (◀) or right (▶) arrow button to adjust the fine horizontal offset. The range of the timing adjustment depends on the selected signal format. (See Table 11.) (See Table 12.)

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

Table 11: Timing adjustment ranges for AGL7 input signals

Format name	Line settings	Coarse settings (μ s)	Fine settings (ns)
NTSC	± 525	± 63.5556	± 10.00
PAL	± 1250	± 64.0000	± 10.00
1080 60i	± 562	± 29.6296	± 10.00
1080 59.94i	± 562	± 29.6593	± 10.00
1080 50i	± 562	± 35.5556	± 10.00
1080 24sF	± 562	± 37.0370	± 10.00
1080 23.98sF	± 562	± 37.0741	± 10.00
1080 30p	± 562	± 29.6296	± 10.00
1080 29.97p	± 562	± 29.6593	± 10.00
1080 25p	± 562	± 35.5556	± 10.00
1080 24p	± 562	± 37.0370	± 10.00
1080 23.98p	± 562	± 37.0741	± 10.00
720 60p	± 375	± 22.2222	± 10.00
720 59.94p	± 375	± 22.2444	± 10.00

Table 12: Timing adjustment ranges for AGL7 output signals

Format name	Line settings	Coarse settings (μ s)	Fine settings (ns)
NTSC	± 525	± 63.5556	± 10.00
PAL	± 1250	± 64.0000	± 10.00
1080 60i	± 562	± 29.6296	± 7.00
1080 59.94i	± 562	± 29.6593	± 7.00
1080 50i	± 562	± 35.5556	± 7.00
1080 24sF	± 562	± 37.0370	± 7.00
1080 23.98sF	± 562	± 37.0741	± 7.00
1080 30p	± 562	± 29.6296	± 7.00
1080 29.97p	± 562	± 29.6593	± 7.00
1080 25p	± 562	± 35.5556	± 7.00
1080 24p	± 562	± 37.0370	± 7.00
1080 23.98p	± 562	± 37.0741	± 7.00
720 60p	± 375	± 22.2222	± 7.00
720 59.94p	± 375	± 22.4444	± 7.00
720 50p	± 375	± 26.6667	± 7.00

Factory Default Settings

The following table shows the factory default settings of the AGL7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 13: AGL7 module factory default settings

Menu item name	Settings
GENLOCK : SOURCE	Internal
GENLOCK : TIMING	
Vertical	0 Line(s)
Horizontal Coarse	0.0000 ms
Horizontal Fine	0.00 nsec
GENLOCK : LOCK LOSS ACTION	Go Internal Frequency
GENLOCK : FRAME RESET (CW)	14.985 Hz : NTSC and 59.94 Hz Group
OUTPUT : BLACK 1	
FORMAT	NTSC
SIGNAL	Black Burst
OUTPUT : BLACK 2	
FORMAT	NTSC
SIGNAL	Black Burst
OUTPUT : BLACK 3	
FORMAT	1080 59.94i
SIGNAL	Trilevel Sync
BLACK x : TIMING	
Vertical	0 Line(s)
Horizontal Coarse	0.0000 ms
Horizontal Fine	0.00 nsec

ATG7 Analog Test Generator

This section describes the module-specific functions of the ATG7 Analog Test Generator module. Refer to the following locations for additional information about this module:

- *ATG7 Module Connectors* for a description of the rear-panel connectors. (See page 51.)
- *ATG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 19.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The ATG7 Analog Test Generator module is designed to be installed in the TG700 TV Signal Generator Platform.

The module is an analog test signal generator that provides NTSC/PAL analog composite signals. The ATG7 module provides the following features:


- SIGNAL output connector, which outputs test signals selected from the front-panel test signal buttons. You can overlay ID text on this video signal output.
- BARS output connector, which outputs NTSC (with or without setup) and PAL color bars signals, black burst signals, and other video test signals. You can overlay ID text on this video signal output.
- BLACK 1 and BLACK 2 output connectors, which output NTSC (with or without setup) and PAL black burst signals, composite sync and composite blanking signals, NTSC (with or without setup) and PAL subcarrier signals, H/V drive signals, and other video signals.
- Individual format and timing control for each output.
- Full remote control using Ethernet interface.

NOTE. *PAL-M and PAL-N are not supported by the AGL7, ATG7 and BG7 modules.*

Operating Procedure

After the ATG7 module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that there are no error messages on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below.



TG700 : PRESET

4. Press the front-panel **MODULE** button until the ATG7 module main menu appears as shown below.



ATG7 [x] : STATUS : NTSC
SMPTE Color Bars

5. Select the signal format and the test signal that you want to output from the SIGNAL connector. (See page 110, *Selecting an Output Signal*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus to select the signal format and test signal you want to output from the BLACK 1, BLACK 2, and BARS connectors, and to set the other output parameters.

Refer to *ATG7 Module Main Menu* for detailed information about the main menu and the submenu items. (See page 112.)

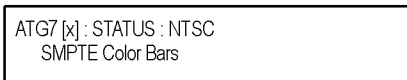
Selecting an Output Signal

The SIGNAL connector on the ATG7 module provides the capability to output test signals assigned to the front-panel test signal buttons. To output a signal from the connector, you need to select a signal format and an output signal as described below.

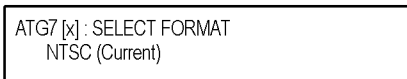
Select the Signal Format

Perform the following steps to select the signal format:

1. If the ATG7 module menu is not displayed, press the front-panel **MODULE** button until the ATG7 module main menu appears as shown below.



2. Press the **FORMAT** button. The menu display changes as follows:



3. Use the left (◀) or right (▶) arrow button, or press the **FORMAT** button repeatedly, to select one of the signal formats, and then press the **ENTER** button to confirm the selection.

NOTE. When you change the signal format, synchronization shock occurs.

Select the Test Signal

All of the signal sets that are available in the module are already assigned to the corresponding test signal buttons. When the ATG7 module is selected and you press any of the front-panel test signal buttons, the selected signal in the signal set is output on the SIGNAL connector. (See Figure 47.)

For example, when you press the **COLOR BAR** test signal button, a signal in the Color Bars signal set is output. Press the left (◀) or right (▶) arrow button, or press the **COLOR BAR** test signal button repeatedly to select a different signal from the Color Bars signal set.

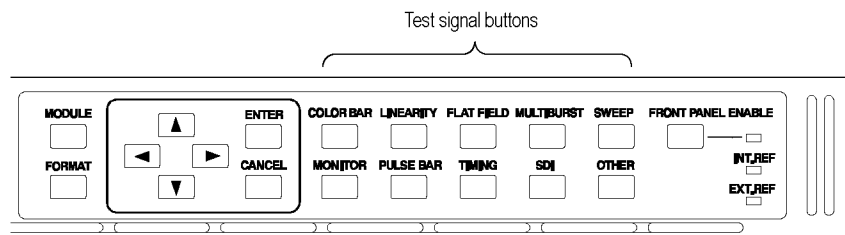


Figure 47: Front-panel test signal buttons

The following table lists the ATG7 signal sets that are assigned to the test signal buttons and shows the test signals that are available in each signal set. The list of available signals changes depending on the selected signal format.

Table 14: ATG7 signal sets assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
NTSC and NTSC No Setup formats		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, SMPTE Color Bars
LINEARITY	Linearity	5 Step, 10 Step, Modulated 5 Step, Modulated Pedestal, Modulated Ramp, Ramp, Shallow Ramp
FLAT FIELD	Flat Fields	0% Flat Field (NTSC format only), 10% Flat Field, 40% Flat Field, 50% Flat Field, 100% Flat Field, Field Square Wave, Black Burst, Black Burst with Field Ref
MULTIBURST	Multiburst	100% Multiburst, 60% Multiburst, Multipulse
SWEEP	Sweep	100% Sweep, 60% Sweep, Chroma Frequency Response
MONITOR	Monitor	100% Red Field, 75% Red Field, 2 Level Pedestal & Pluge, 4 Level Pedestal & Pluge, Convergence Pattern, Grey Window, White Window, Safe Area, Monitor Setup
PULSE BAR	Pulse & Bar	Window 2T Pulse & Bar, Sin X/X
OTHER	Other	FCC Composite, FCC Multiburst, NTC7 Combination, NTC7 Composite, Matrix 1, SNG Color Bars
PAL format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, 100% Color Bars Over Red, 75% Color Bars Over Red
LINEARITY	Linearity	5 Step, 10 Step, Modulated 5 Step, Modulated 10 Step, Modulated Pedestal, Modulated Ramp, Ramp, Shallow Ramp
FLAT FIELD	Flat Fields	40% Flat Field, 50% Flat Field, 100% Flat Field, Field Square Wave, Black Burst, Black Burst with No Field Ref, Field Square Wave
MULTIBURST	Multiburst	100% Multiburst, 60% Multiburst, Multipulse
SWEEP	Sweep	100% Sweep, 60% Sweep
MONITOR	Monitor	100% Red Field, 75% Red Field, 2 Level Pedestal & Pluge, 4 Level Pedestal & Pluge, Convergence Pattern, Grey Window, White Window, Safe Area, Monitor Setup Matrix
PULSE BAR	Pulse & Bar	2T Pulse & Bar, Sin X/X
OTHER	Other	CCIR 17, CCIR 18, CCIR 330, CCIR 331, UK ITS 1, UK ITS 2, UK 1 Line ITS, ITS Matrix 1

ATG7 Module Main Menu

Use the ATG7 module main menu to perform the following tasks:

- Set the text overlay on the SIGNAL output
- Set the timing offset on the SIGNAL output
- Set the APL settings on the SIGNAL output
- Set the output parameters for the BLACK 1, BLACK 2, and BARS outputs using the SELECT OUTPUT submenu. (See page 212.)

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the ATG7 module main menu.

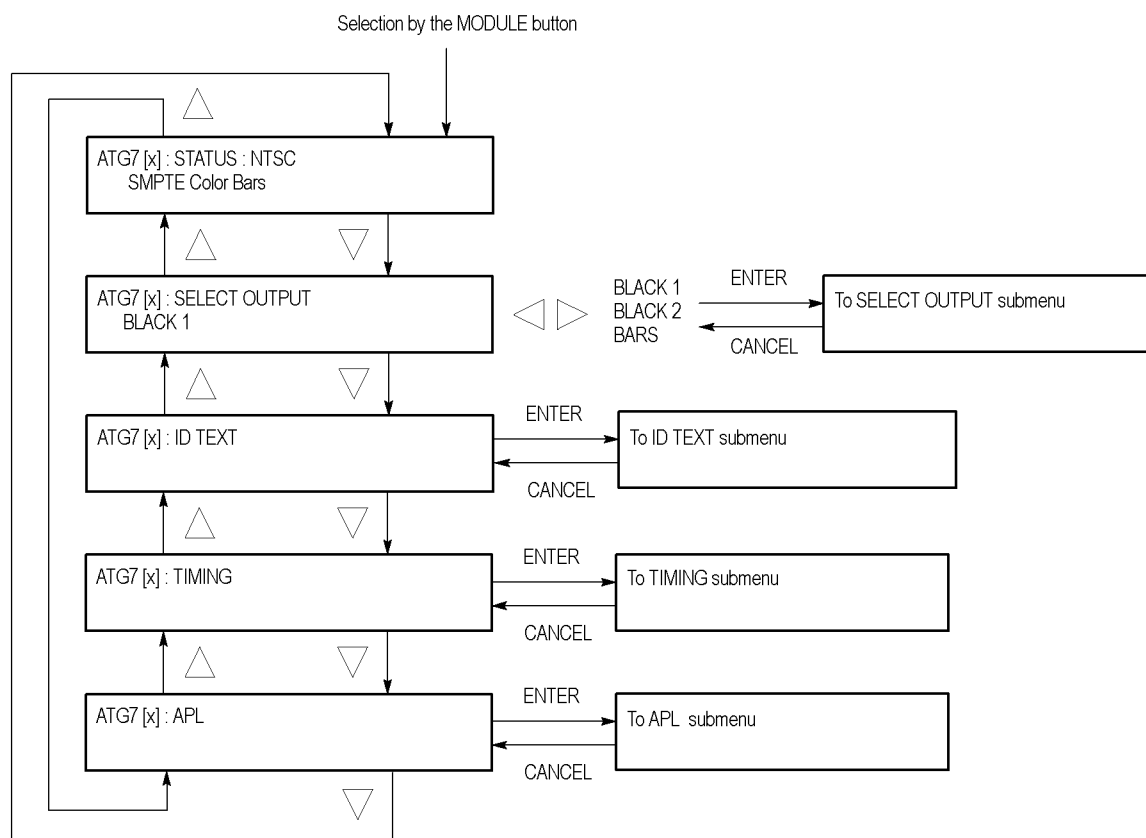


Figure 48: ATG7 module main menu

STATUS. Displays the current video standard and the selected signal for the SIGNAL output.

SELECT OUTPUT. Selects the output whose parameters will be set. Use the left (◀) or right (▶) arrow button to make the selection. The choices are **BLACK 1**, **BLACK 2**, or **BARS**. Select any of the items, and then press the **ENTER** button to access the SELECT OUTPUT submenu. (See page 212.)

ID TEXT. Sets a text that is overlaid on the test signal output from the SIGNAL connector. Select this menu item, and then press the **ENTER** button to access the ID TEXT submenu. (See page 116.)

TIMING. Sets the timing offset of the SIGNAL output relative to the internal reference signal (frame reset signal). Select this menu item, and then press the **ENTER** button to access the TIMING submenu. (See page 118.)

APL. Sets the APL and Bounce features available for the test signal output from the SIGNAL connector. Select this menu item, and then press the **ENTER** button to access the APL submenu. (See page 119.)

SELECT OUTPUT Submenu

Use this menu to set the video format, signal, and timing offset for the BLACK 1, BLACK 2, or BARS output. You can also use this menu to set the ID text overlay for the BARS output. The following figure shows the SELECT OUTPUT submenu.

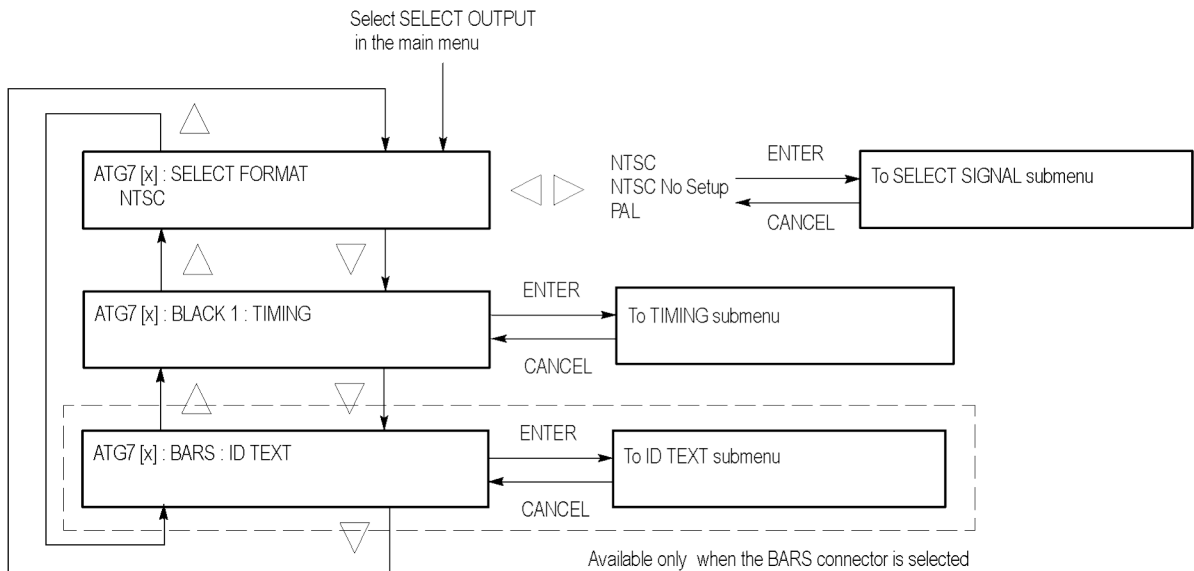


Figure 49: ATG7 module SELECT OUTPUT submenu

SELECT FORMAT. Selects the video format for the selected output. Use the left (◀) or right (▶) arrow button to select **NTSC**, **NTSC No Setup**, or **PAL**.

NOTE. When you change the video format, synchronization shock will occur; the video format changes immediately at the output as you change the format selection.

Select the format you want, then press the front-panel **ENTER** button to access the **SELECT SIGNAL** submenu, where you select the output signal to use. (See page 115.)

TIMING. Sets the timing offset of the selected output relative to the internal reference signal (frame reset signal). Select this menu item and press the **ENTER** button, to access the **TIMING** submenu. (See page 118.)

ID TEXT. Sets a text that is overlaid on the test signal output from the **BARS** connector. Select this menu item and press the **ENTER** button to access the **ID TEXT** submenu. (See page 116.)

SELECT SIGNAL Submenu

Use this menu to select an output signal for the BLACK 1, BLACK 2, or BARS connector. The following figure shows the SELECT SIGNAL submenu.

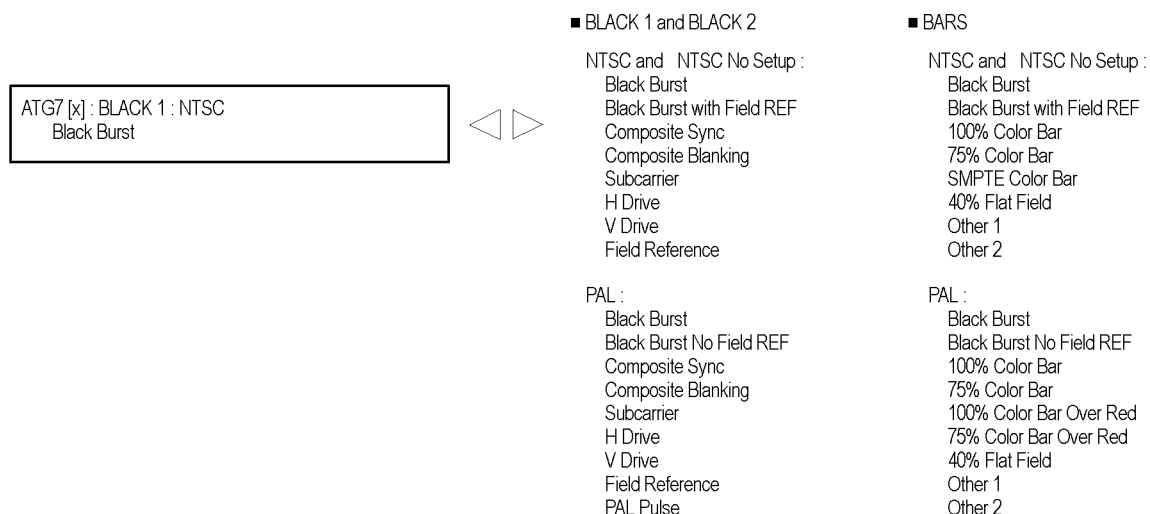


Figure 50: ATG7 module SELECT SIGNAL submenu

Use the left (◀) or right (▶) arrow button to scroll through the selections. Press the **ENTER** button to enable the selected signal.

Which signals are available depend on the selected output connector and the video format. The following table lists the available signals for each output connector and video format.

Table 15: Test signals in the ATG7 SELECT SIGNAL submenu

Format	Test signals
BLACK1 and BLACK 2 connectors	
NTSC and NTSC No Setup	Black Burst, Black Burst with Field REF, Composite Sync, Composite Blanking, Subcarrier, H Drive, V Drive, Field Reference
PAL	Black Burst, Black Burst No Field REF, Composite Sync, Composite Blanking, Subcarrier, H Drive, V Drive, Field Reference, PAL Pulse
BARS connector	
NTSC and NTSC No Setup	Black Burst, Black Burst with Field REF, 100% Color Bar, 75% Color Bar, SMPTE Color Bar, 40% Flat Field, Other 1 (SNG Color Bars), Other 2 (Monitor Setup Matrix)
PAL	Black Burst, Black Burst No Field REF, 100% Color Bar, 75% Color Bar, 100% Color Bar Over Red, 75% Color Bar Over Red, 40% Flat Field, Other 1 (4 Level Pedestal & Pluge), Other 2 (Monitor Setup Matrix)

ID TEXT Submenu

Use this menu to edit text that is overlaid on the signal for the SIGNAL and BARS outputs, and to set the display position of the text. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following table shows the ID TEXT submenu.

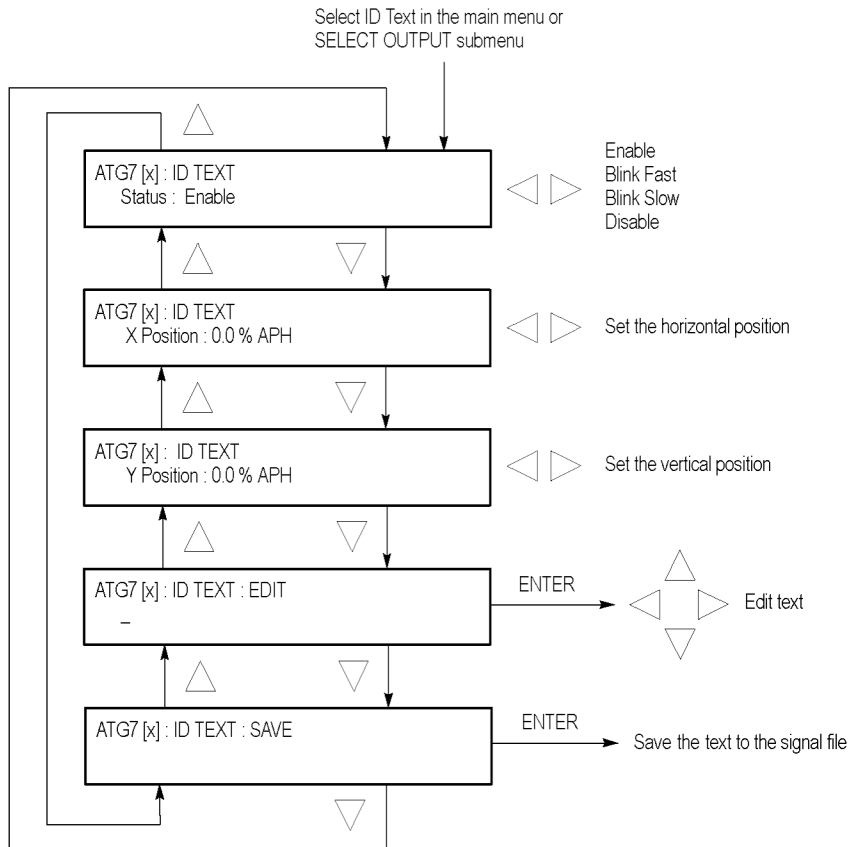


Figure 51: ATG7 module ID TEXT submenu

Status. Sets the blinking mode of the text overlay. Use the left (◀) or right (▶) arrow button to select one of the following blink modes, and then press the **ENTER** button to confirm the selection.

- **Enable:** Turns on the blinking function of the overlay.
- **Blink Fast:** Sets the overlay to blink at approximately 0.5 second intervals.
- **Blink Slow:** Sets the overlay to blink at approximately 1.0 second intervals.
- **Disable:** Turns off the blinking function of the overlay.

X Position. Sets the horizontal position of the text. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

Y Position. Sets the vertical position of the text. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

EDIT. Edits the text you want to display on the output test signal. Perform the following steps to edit the text:

NOTE. *You can use up to 18 characters for the text. Use the blank character to erase unneeded character(s).*

1. Use the left (◀) or right (▶) arrow button to select **EDIT**, and then press the **ENTER** button to enable the text edit mode.
2. Use the left (◀) or right (▶) arrow button to move the underscore character () to the character you want to change.
3. Use the up (▲) or down (▼) arrow button to select the desired character.
4. After you enter all of the desired characters, press the **ENTER** button to exit the text editing mode.
5. Use the left (◀) or right (▶) arrow button to select **SAVE**, and then press the **ENTER** button to save the text and its position to the signal file being output.

SAVE. Saves the text and its position to the signal file currently being output. Press the **ENTER** button to save them to the signal file.

TIMING Submenu

Use this menu to adjust the timing offset of the selected output relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the TIMING submenu.

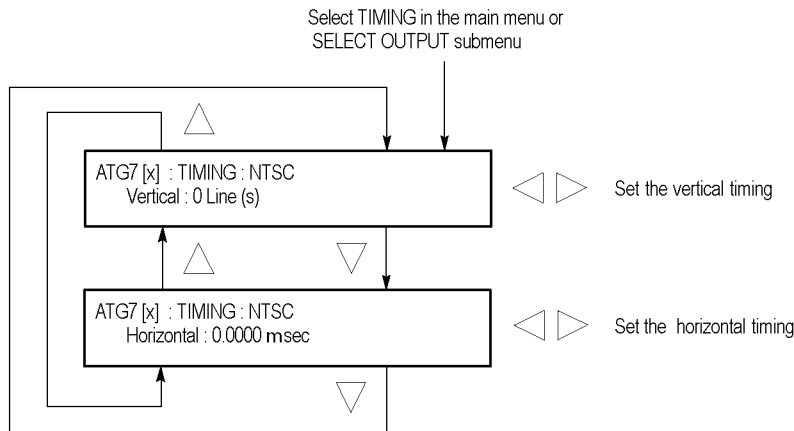


Figure 52: ATG7 module TIMING submenu

Vertical. Sets the vertical timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1/2 color frame to +1/2 color frame in 1 line steps.

Horizontal. Sets the horizontal timing offset. Use the left (◀) or right (▶) arrow button to adjust the timing offset. You can set the value from -1 line to +1 line in one clock steps (18.5 ns).

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

The ATG7 horizontal timing can only be adjusted in clock cycle increments. You can match the AGL7 or GPS7 module timing to the ATG7 module by adjusting the fine timing controls on the AGL7 or GPS7 module.

APL Submenu

Use this menu to set the APL and Bounce features for the test signal output from the SIGNAL connector. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the APL submenu.

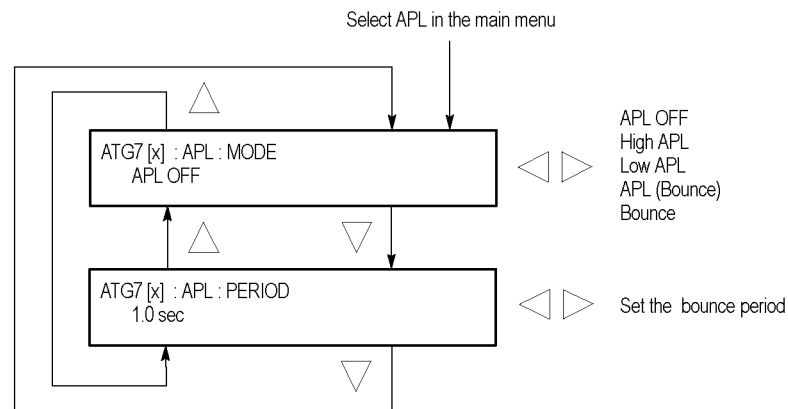


Figure 53: ATG7 module APL submenu

MODE. Sets the output mode of the APL signal. Use the left (◀) or right (▶) arrow button to select the mode, and then press the **ENTER** button to confirm the selection. The choices are:

- **APL OFF:** Outputs the selected signal without making any changes.
- **High APL:** Divides the video lines of the selected signal into 5 lines (for NTSC) or 4 lines (for PAL) and changes the lines except the last line to the 100% flat field signal, and then outputs them.
- **Low APL:** Divides the video lines of the selected signal into 5 lines (for NTSC) or 4 lines (for PAL) and changes the lines except the last line to the 0% flat field signal, and then outputs them.
- **APL (Bounce):** Outputs the High APL signal and Low APL signal alternately for the period set in the PERIOD menu item.
- **Bounce:** Outputs the 100% flat field signal and 0% flat field signal alternately (regardless of the selected signal) for the period set in the PERIOD menu item.

PERIOD. Sets the time interval between two signals when they are output in APL (Bounce) or Bounce mode. Use the left (◀) or right (▶) arrow button to change the interval. You can set the value from 0.5 seconds to 2.0 seconds in 0.5 second steps.

Factory Default Settings

The following table shows the factory default settings for the ATG7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 16: ATG7 module factory default settings

Menu item name	Settings
STATUS (Shows the signal format and signal name output from the SIGNAL connector)	NTSC SMPTE Color Bars
OUTPUT : BLACK 1 and BLACK 2	
FORMAT	NTSC
SIGNAL	Black Burst
OUTPUT : BARS	
FORMAT	NTSC
SIGNAL	SMPTE Color Bar
ID TEXT	
Status	Disable
TIMING	
Vertical	0 Line(s)
Horizontal	0.0000 msec
APL	
Mode	APL OFF
Period	1.0 sec

AVG7 Analog Video Generator

This section describes the module-specific functions of the AVG7 Analog Video Generator module. Refer to the following locations for additional information about this module:

- *AVG7 Module Connectors* for a description of the rear-panel connectors. (See page 51.)
- *AVG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 22.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The AVG7 Analog Video Generator module is designed to be installed in the TG700 TV Signal Generator Platform. The TG700 platform must be running version 3.1 or later software.


The module is an analog video signal generator which provides analog composite and component video signals in various formats. The module contains the following features:

- Supports the following system formats: NTSC, NTSC no setup, PAL, 525 GBR, 525 YPbPr, 525 Beta, 625 GBR, and 625YPbPr.
- Six analog composite or component video outputs.
- Outputs a frame picture created by the Frame Picture Generator application when 64 MB of memory is installed. (See page 2, *Mainframe Memory Requirements*.)
- Overlay of circle, text, or logo on the video signal.
- Generates a moving picture by scrolling the active picture area of the output test signal.
- Full remote control using Ethernet interface.

Operating Procedure

After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that no error messages appear on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below.



TG700 : PRESET

4. Press the front-panel **MODULE** button until the AVG7 module main menu appears as shown below.



AVG7 [x] : STATUS : NTSC
SMPTE Color Bars

5. Select the signal format and the signal you want to output. (See page 123, *Selecting an Output Signal*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus.

Refer to *AVG7 Module Main Menu* for detailed information about the main menu items and the submenu items. (See page 129.)

Selecting an Output Signal

To output a signal from the AVG7 module, you need to select a signal format and output signal as described below.

Select the Signal Format

Perform the following steps to select the signal format:

1. If the AVG7 module menu is not displayed, press the front-panel **MODULE** button until the AVG7 module main menu appears as shown below.

```
AVG7 [x] : STATUS : NTSC
          SMPTE Color Bars
```

2. Press the **FORMAT** button. The menu display changes as follows:

```
AVG7 [x] : SELECT FORMAT
          NTSC (Current)
```

3. Use the left (◀) or right (▶) arrow button, or press the **FORMAT** button repeatedly, to select one of the signal formats, and then press the **ENTER** button to confirm the selection.

NOTE. *When you change signal format, synchronization shock occurs.*

4. If you change the signal format while a test signal is being output, the instrument starts loading all of the signal sets for the selected format and displays the following message "**Now Loading...**". When you see the message, "**Done (Press CANCEL)**", press the **CANCEL** button.

Select the Test Signal

All of the signal sets that are available in the module are already assigned to the corresponding test signal buttons. When the AVG7 module is selected and you press any of the front-panel test signal buttons, the selected signal in the signal set is output. (See Figure 54.)

For example, when you press the **COLOR BAR** test signal button, a signal in the Color Bars signal set is output. Press the left (◀) or right (▶) arrow button, or press the **COLOR BAR** test signal button repeatedly to select a different signal from the Color Bars signal set.

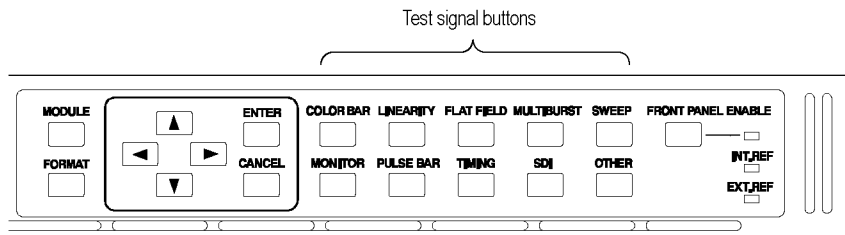


Figure 54: Front-panel test signal buttons

If your TG700 mainframe has 64 MB of memory installed, you can download a frame picture file created by the Frame Picture Generator to the mainframe and output the picture from the AVG7 module. (See page 2, *Mainframe Memory Requirements*.) Refer to the *TG700 PC Tools Technical Reference* for detailed information on how to create, download, and output a frame picture.

The following table lists the AVG7 signal sets that are assigned to the test signal buttons and shows the test signals that are available in each signal set. The list of available signals changes depending on the selected signal format.

Table 17: AVG7 signal sets assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
NTSC and NTSC No Setup formats		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, SMPTE Color Bars
LINEARITY	Linearity	10 Step, 5 Step, Modulated 5 Step, Modulated Pedestal, Modulated Ramp, Shallow Ramp, Ramp
FLAT FIELD	Flat Fields	Black Burst, Black Burst with Field ref, 0% Flat Field (NTSC only), 10% Flat Field, 40 % Flat Field, 50% Flat Field, 100% Flat Field, Field Square Wave
MULTI BURST	Multiburst	100% Multiburst, 60% Multiburst, Multipulse
SWEEP	Sweep	60% Sweep, 100% Sweep, Chroma Frequency Response
MONITOR	Monitor	Convergence Pattern, Gray Window, 100% Red Field, 2 Level Pedestal & Pluge, 4 Level Pedestal & Pluge, 75% Red Field, Monitor Setup, White Window, Safe Area
PULSE BAR	Pulse & Bar	Window 2T Pulse & Bar, Sin X/X
TIMING	—	—
SDI	—	—
OTHER	Other	FCC Composite, FCC Multiburst, Matrix 1, NTSC Combination, NTC7 Composite, SNG Color Bars

Table 17: AVG7 signal sets assigned to the test signal buttons (cont.)

Button name	Signal set	Signals in the signal set
PAL-1 format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, 100% Color Bars Over Red, 75% Color Bars Over Red
LINEARITY	Linearity	5 Step, Modulated 5 Step, Modulated Ramp, Ramp
FLAT FIELD	Flat Fields	Black Burst, 50% Flat Field, 100% Flat Field, Field Square Wave
MULTI BURST	Multiburst	60% Multiburst, Multiplus
SWEEP	Sweep	100% Sweep
MONITOR	Monitor	Convergence Pattern, Grey Window, White Window, 2 Level Pedestal & Pluge, 4 Level Pedestal & Pluge, 75% Red Field
PULSE BAR	Pulse & Bar	Window 2T Pulse & Bar, Sin X/X
TIMING	—	—
SDI	—	—
OTHER	Other	CCIR 17, CCIR 18, CCIR 330, CCIR 331, UK ITS 1, UK ITS 2
PAL-2 format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars
LINEARITY	Linearity	10 Step, 5 Step, Modulated 10 Step, Modulated 5 Step, Modulated Ramp, Shallow Ramp, Ramp, Modulated Pedestal
FLAT FIELD	Flat Fields	Black Burst, 50% Flat Field, 100% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	100% Multiburst, 60% Multiburst
SWEEP	Sweep	100% Sweep, 60% Sweep
MONITOR	Monitor	Convergence, Monitor Setup Matrix, 100% Red Field, 75% Red Field, White Window, Safe Area
PULSE BAR	Pulse & Bar	2T Pulse & Bar, Sin X/X
TIMING	—	—
SDI	—	—
OTHER	Other	ITS Matrix 1, UK 1 Line ITS

Table 17: AVG7 signal sets assigned to the test signal buttons (cont.)

Button name	Signal set	Signals in the signal set
525 Beta format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars
LINEARITY	Linearity	5 Step, Modulated Ramp, Ramp, Oversize Ramp, Shallow Ramp Matrix, Valid Ramp, Valid 5 Step
FLAT FIELD	Flat Fields	Black, 0% Flat Field, 100% Flat Field, 50% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	60% Multiburst
SWEEP	Sweep	60% Sweep
MONITOR	Monitor	Convergence Pattern, Grey Window, White Window, 2 Level Ped. & Pluge, 4 Level Ped. & Pluge, 75% Red Field, Chroma Noise
PULSE BAR	Pulse & Bar	2T Pulse & Bar, TPulses
TIMING	Timing	50% Bowtie, 100% Bowtie
SDI	—	—
OTHER	Other	Test Matrix
525 GBR format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars
LINEARITY	Linearity	5 Step, Shallow Ramp, Oversize Ramp, Shallow Ramp Matrix, Luminance Ramp
FLAT FIELD	Flat Fields	0% Flat Field, 100% Flat Field, 50% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	60% Multiburst
SWEEP	Sweep	100% Line Sweep 5.5 MHz, 100% Line Sweep 8 MHz
MONITOR	Monitor	Convergence Pattern, Grey Window, 2 Level Ped. & Pluge, White Window, 4 Level Ped. & Pluge
PULSE BAR	Pulse & Bar	2T Pulse & Bar
TIMING	Timing	Bowtie
SDI	—	—
OTHER	—	—

Table 17: AVG7 signal sets assigned to the test signal buttons (cont.)

Button name	Signal set	Signals in the signal set
525 YPbPr format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars
LINEARITY	Linearity	5 Step, Ramp, Oversize Ramp, Shallow Ramp Matrix, Valid Ramp, Valid 5 Step, Modulated Ramp
FLAT FIELD	Flat Fields	Black, 0% Flat Field, 100% Flat Field, 50% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	60% Multiburst
SWEEP	Sweep	60% Sweep
MONITOR	Monitor	Convergence Pattern, Grey Window, White Window, 2 Level Ped. & Pluge, 4 Level Ped. & Pluge, 75% Red Field, Chroma Noise
PULSE BAR	Pulse & Bar	2T Pulse & Bar, T Pulses
TIMING	Timing	50% Bowtie, 100% Bowtie
SDI	—	—
OTHER	Other	Test Matrix
625 YPbPr format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, 100% Color Bars Over Red, 75% Color Bars Over Red
LINEARITY	Linearity	5 Step, Modulated Ramp, Ramp, Oversize Ramp, Shallow Ramp Matrix, Valid 5 Step, Valid Ramp
FLAT FIELD	Flat Fields	0% Flat Field, 100% Flat Field, 50% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	60% Multiburst
SWEEP	Sweep	60% Sweep
MONITOR	Monitor	Convergence Pattern, Grey Window, White Window, 2 Level Ped. & Pluge, 4 Level Ped. & Pluge, 100% Red, 75% Red
PULSE BAR	Pulse & Bar	2T Pulse & Bar, T Pulses
TIMING	Timing	50% Bowtie, 100% Bowtie
SDI	—	—
OTHER	Other	Test Matrix

Table 17: AVG7 signal sets assigned to the test signal buttons (cont.)

Button name	Signal set	Signals in the signal set
625 GBR format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars
LINEARITY	Linearity	Oversize Ramp, Luminance Ramp, Shallow Ramp, Shallow Ramp Matrix, 5 Step
FLAT FIELD	Flat Fields	0% Flat Field, 50% Flat Field, 100% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	60% Multiburst
SWEEP	Sweep	100% Sweep
MONITOR	Monitor	Convergence Pattern, Grey Window, 2 Level Ped. & Pluge, White Window, 4 Level Ped. & Pluge
PULSE BAR	Pulse & Bar	Window 2T Pulse & Bar
TIMING	Timing	Bowtie
SDI	—	—
OTHER	—	—

AVG7 Module Main Menu

Use the AVG7 module main menu to perform the following tasks:

- Set the logo, text, or circle overlay on the output signal.
- Set the timing offset on the output signal.
- Set the APL settings on the output signal.
- Scroll the active picture area of the output signal.

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the AVG7 module main menu.

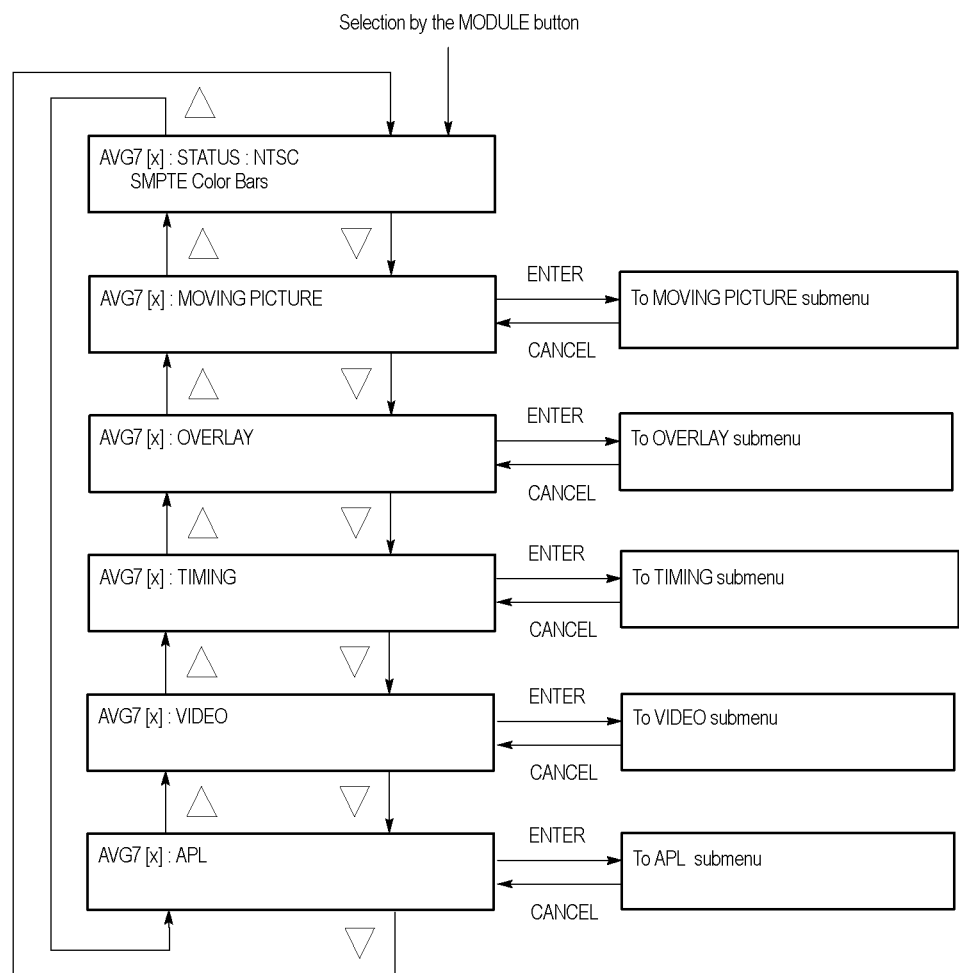


Figure 55: AVG7 module main menu

MOVING PICTURE. Scrolls the active picture area of the output test signal. Select this menu item, and then press the **ENTER** button to access the MOVING PICTURE submenu. (See page 131.)

OVERLAY. Selects an item (logo, text, or circle) to overlay on the output test signal and sets the blinking mode for the overlay. Select this menu item, and then press the **ENTER** button to access the OVERLAY submenu. (See page 132.)

TIMING. Sets the timing offset of the output signals relative to the internal reference signal (frame reset signal). Select this menu item, and then press the **ENTER** button to access the TIMING submenu. (See page 137.)

VIDEO. Sets the output channel configuration when a composite signal is being output and enables or disables the signal output from CH 1, CH 2, and CH 3. Select this menu item, and then press the **ENTER** button to access the VIDEO submenu. (See page 138.)

APL. Sets the APL and Bounce features available for the signal output. When you select this menu item and then press the **ENTER** button, you will access the APL submenu. (See page 140.)

MOVING PICTURE Submenu

Use this menu to scroll the active picture area of the output signal up/down, left/right, or randomly. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the MOVING PICTURE submenu.

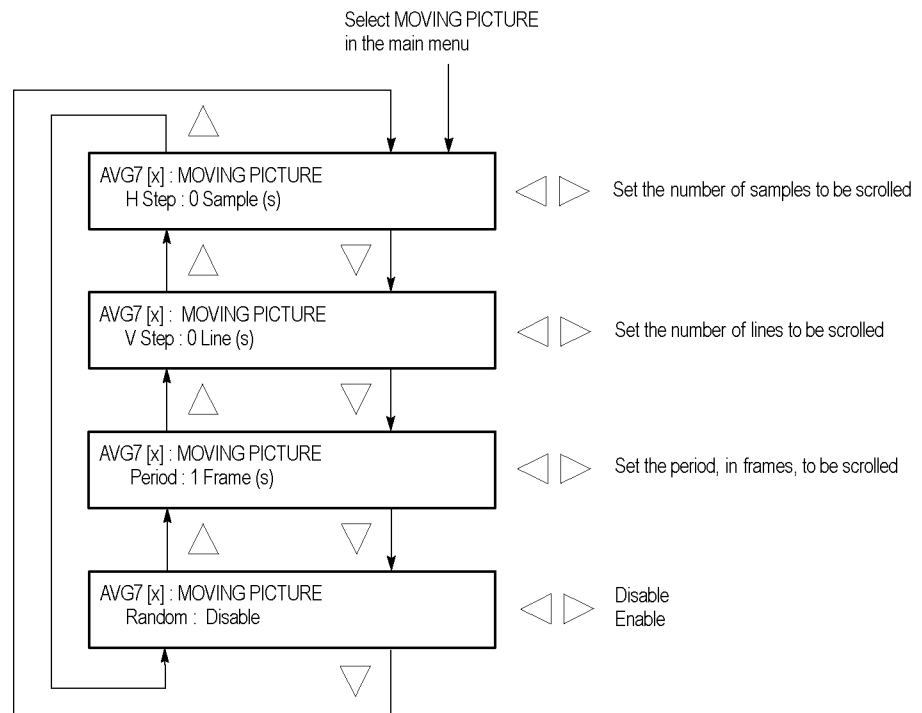


Figure 56: AVG7 module MOVING PICTURE submenu

H Step. Sets the number of samples to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -60 to +60 in 4-sample steps.

V Step. Sets the number of lines to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -15 to +15 in 1-line steps.

Period. Sets the time interval between occurrences of the scrolling. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 1 to 16 in 1-frame steps.

Random. Sets whether or not the picture scrolls randomly. Use the left (◀) or right (▶) arrow button to select between **Disable** and **Enable**. Press the **ENTER** button to confirm the selection.

OVERLAY Submenu

Use this menu to select an item (logo, ID Text, or circle) to overlay on the output test signal, and to set the blinking mode for the overlay. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the OVERLAY submenu.

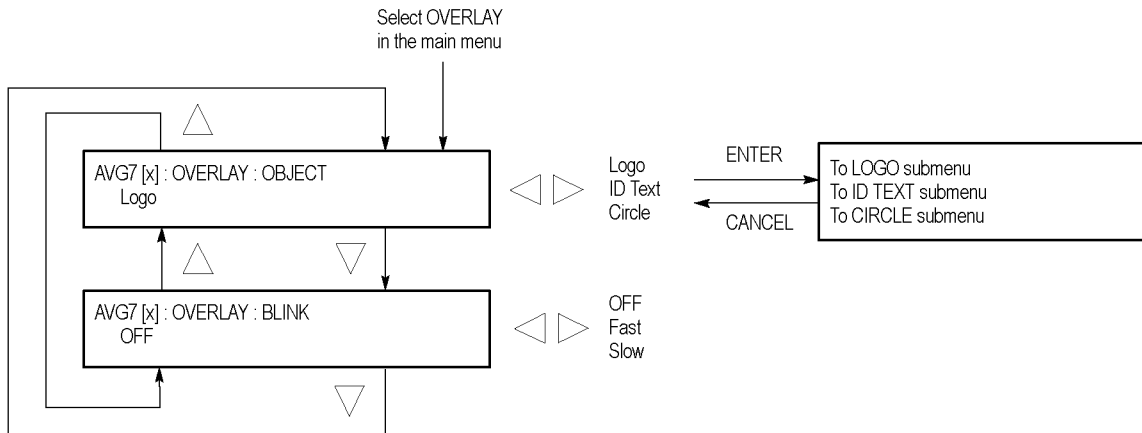


Figure 57: AVG7 module OVERLAY submenu

OBJECT. Selects an item to overlay on the output test signal. Use the left (◀) or right (▶) arrow button to select one of the following overlays, and then press the ENTER button to access the submenu for setting the parameters of that overlay.

- **Logo:** Opens the LOGO submenu where you can select a logo to overlay the output signal in a specified position. (See page 133.)
- **ID Text:** Opens the ID TEXT submenu where you can edit the text to overlay the output signal in a specified position. (See page 134.)
- **Circle:** Opens the CIRCLE submenu where you can specify a circle size and position to overlay the output signal. (See page 136.)

BLINK. Sets the blinking mode for the enabled overlay. Use the left (◀) or right (▶) arrow button to select one of the following blink modes, and then press the ENTER button to confirm the selection.

- **OFF:** Turns off the blinking function of the overlay.
- **Fast:** Sets the overlay to blink at approximately 0.5 second intervals.
- **Slow:** Sets the overlay to blink at approximately 1.0 second intervals.

LOGO Submenu

Use this menu to select a logo to overlay on the output test signal and to set the display position of the logo. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the LOGO submenu.

NOTE. To display a logo using the LOGO submenu, you need to create a logo file (.lgo) and download it to the LOGO folder of the module. Refer to the TG700 PC Tools Technical Reference for detailed information about how to create a logo file and download it to the TG700.

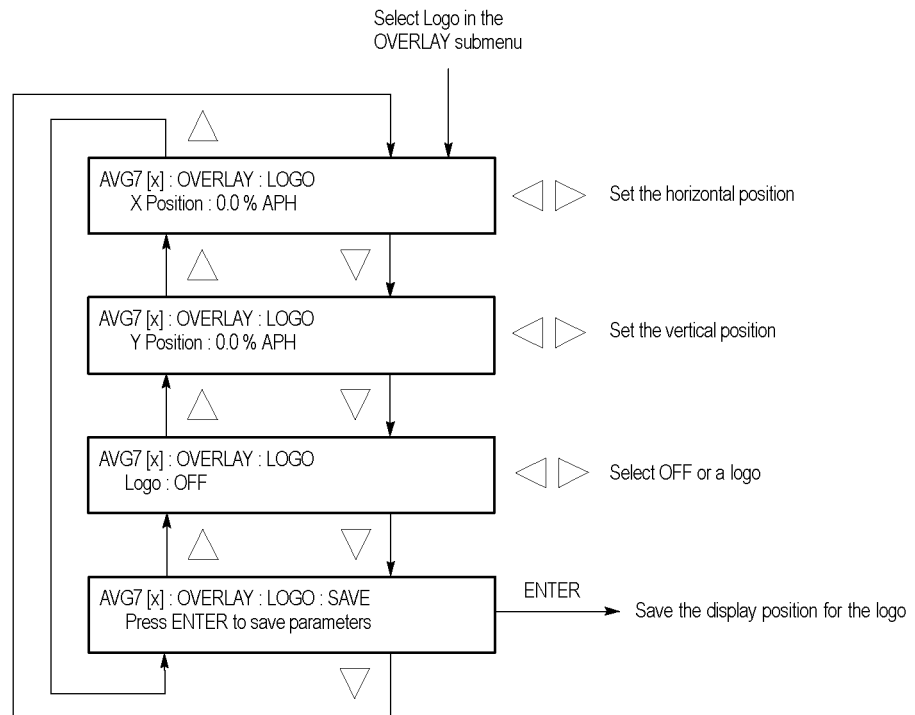


Figure 58: AVG7 module LOGO submenu

X Position. Sets the horizontal position of the logo. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

Y Position. Sets the vertical position of the logo. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

Logo. Selects the logo you want to display. Use the left (◀) or right (▶) arrow button to select **OFF** or a logo file name. Press the **ENTER** button confirm the selection. When you select **OFF**, the logo overlay is disabled.

SAVE. Saves the display position for the logo to the logo file. Press the **ENTER** button to save the current settings.

ID TEXT Submenu

Use this menu to edit the text that is overlaid on the output test signal and to set the display position of the text. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the ID TEXT submenu.

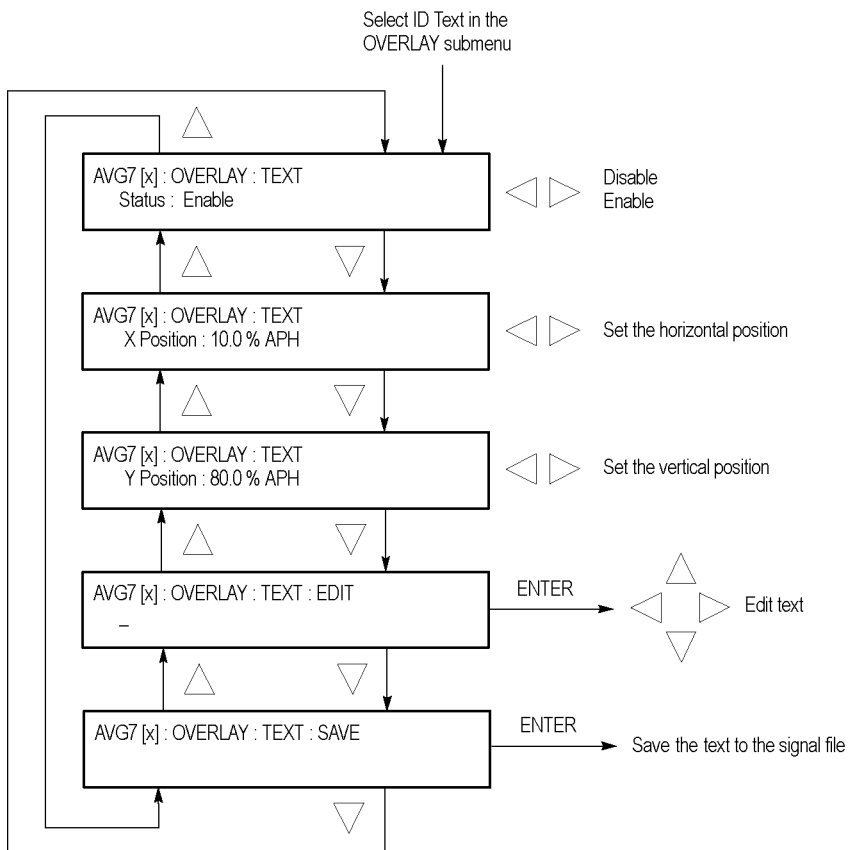


Figure 59: AVG7 module ID TEXT submenu

Status. Enables or disables the text overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**, and then press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the text. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

Y Position. Sets the vertical position of the text. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

EDIT. Edits the text you want to display on the output test signal. Perform the following steps to edit the text:

NOTE. *You can use up to 30 characters for the logo text. Use the blank character to erase unneeded character(s).*

1. Use the left (◀) or right (▶) arrow button to select **EDIT**, and then press the **ENTER** button to enable the text edit mode.
2. Use the left (◀) or right (▶) arrow button to move the underscore character (_) to the character you want to change.
3. Use the up (▲) or down (▼) arrow button to select the desired character.
4. After you enter all of the desired characters, press the **ENTER** button to exit the text editing mode.
5. Use the left (◀) or right (▶) arrow button to select **SAVE**, and then press the **ENTER** button to save the text and its position to the signal file.

SAVE. Saves the text and its position to the signal file currently being output. Press the **ENTER** button to save the text and its position to the signal file.

CIRCLE Submenu

Use this menu to overlay a circle on the output test signal and to set its position on the display. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the CIRCLE submenu.

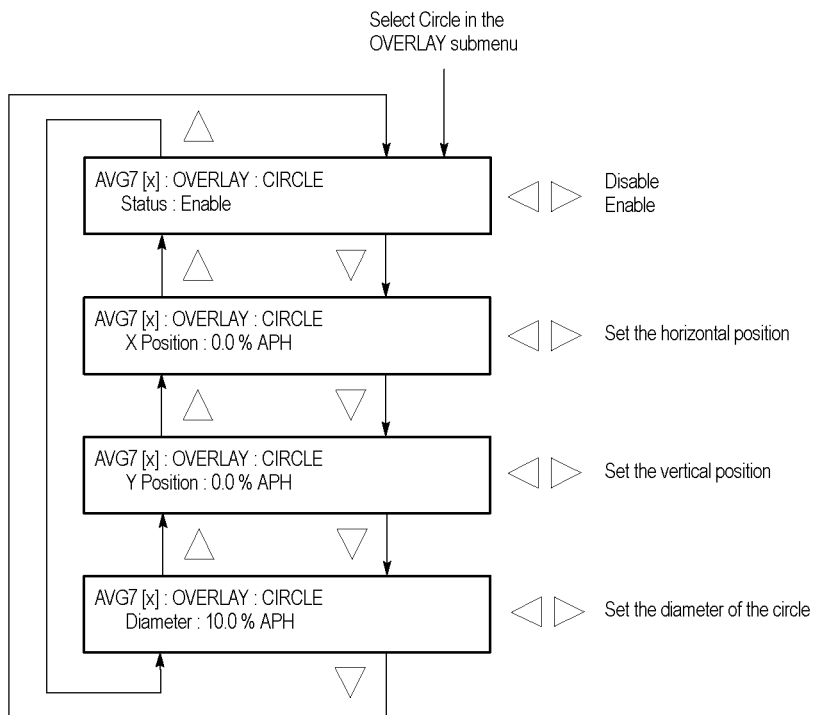


Figure 60: AVG7 module CIRCLE submenu

Status. Enables or disables the circle overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the circle. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Y Position. Sets the vertical position of the circle. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Diameter. Sets the diameter of the circle. The diameter is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 0.0% to 100.0% in 1% steps.

TIMING Submenu

Use this menu to adjust the timing offset of the output signal relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to scroll through the menu items. The following figure shows the TIMING submenu.

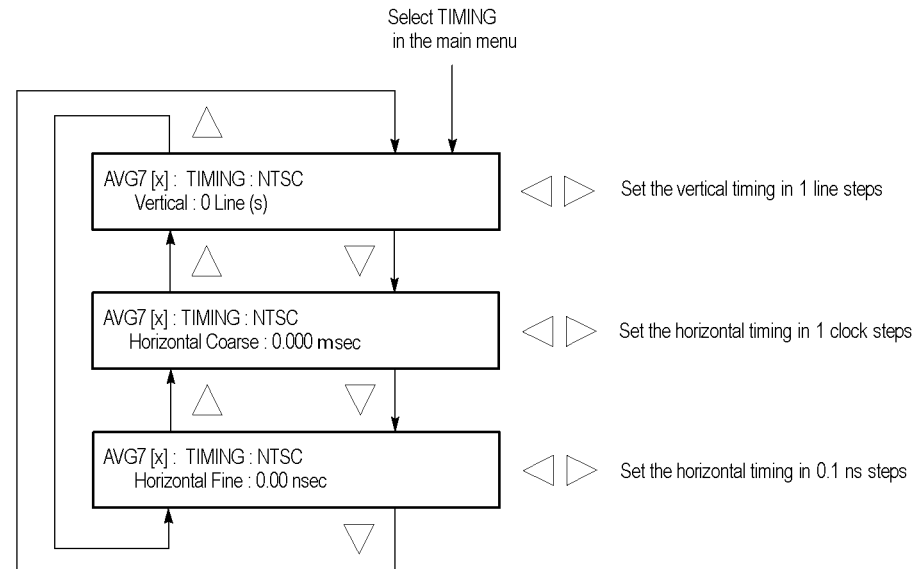


Figure 61: AVG7 module TIMING submenu

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

Vertical. Sets the vertical timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1 to +1 frame of the selected signal format in 1 line steps.

Horizontal Coarse. Use the left (◀) or right (▶) arrow button to adjust the coarse horizontal offset. You can set the value from -1 to +1 line of the selected signal format in 1 clock (18.5 ns) steps.

Horizontal Fine. Use the left (◀) or right (▶) arrow button to adjust the fine horizontal offset. You can set the value from -10 ns to +10 ns in 0.1 ns steps.

VIDEO Submenu

Use this menu to perform the following tasks:

- Set the output channel configuration when a composite signal is being output.
- Enable or disable the signal output of each channel.
- Set whether a sync signal is multiplexed with the B and R signals when a GBR signal is being output.

Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the VIDEO submenu.

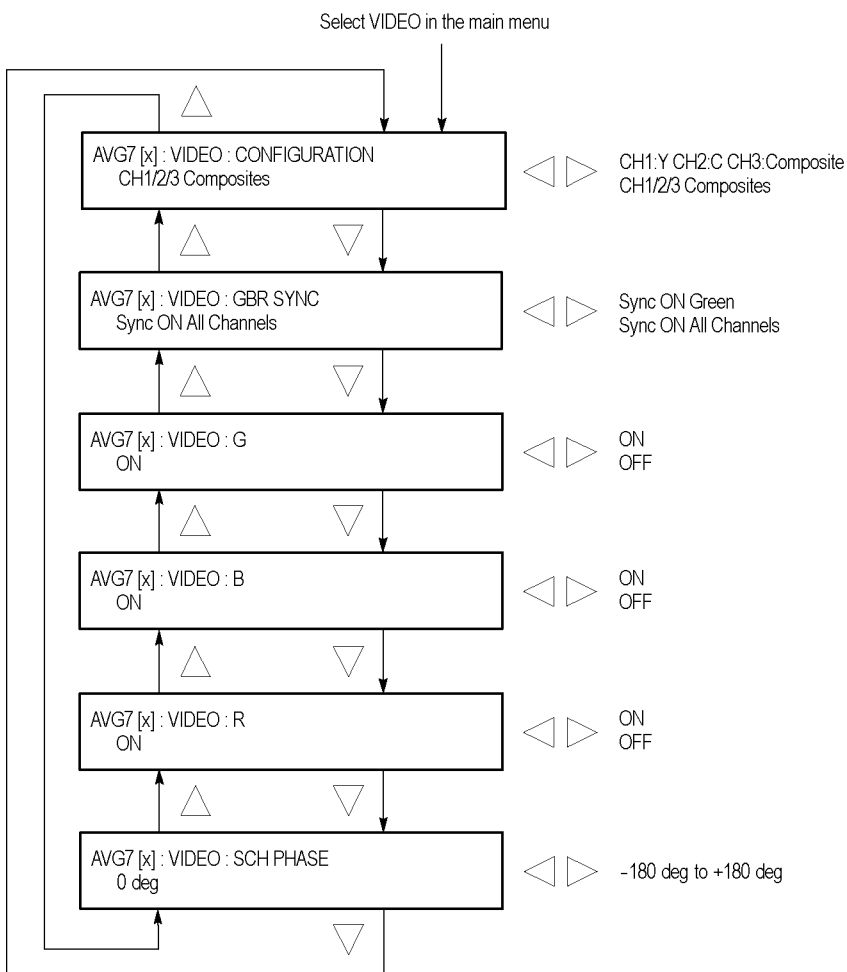


Figure 62: AVG7 module VIDEO submenu

CONFIGURATION. Sets the configuration of the output channels. Use the left (◀) or right (▶) arrow button to select between **CH1:Y CH2:C CH3:Composite** and **CH1/2/3 Composites**. When you select CH1:Y CH2:C CH3:Composite, a Y signal, C signal, and composite signal are output from the CH 1, CH 2, and CH 3 connectors respectively. When you select CH1/2/3:Composites, a composite signal is output from each output connector. Press the **ENTER** button to confirm the selection. This menu item appears only when a composite signal is being output.

GBR SYNC. Sets whether or not a sync signal is multiplexed with the B signal and R signal when a GBR signal is being output. Use the left (◀) or right (▶) arrow button to select between **Sync ON Green** and **Sync ON All Channels**. When you select Sync ON All Channels, a sync signal is multiplexed with the G, B, and R signals. Press the **ENTER** button to confirm the selection. This menu item appears only when a GBR signal is being output.

G/Y. Turns the CH 1 signal output on or off for a component signal, or turns the Y signal on or off for a composite signal. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection. The signal name displayed depends on the video format of the currently selected signal (YPbPr component, GBR component, or composite) and the output channel configuration.

B/Pb/B-Y. Turns the CH 2 signal output on or off for a component signal, or turns the B-Y signal on or off for a composite signal. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection. The signal name displayed depends on the video format of the currently selected signal (YPbPr component, GBR component, or composite) and the output channel configuration.

R/Pr/R-Y. Turns the CH 3 signal output on or off for a component signal, or turns the R-Y signal on or off for a composite signal. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection. The signal name displayed depends on the video format of the currently selected signal (YPbPr component, GBR component, or composite) and the output channel configuration.

SCH PHASE. Use the left (◀) or right (▶) arrow button to adjust the SCH phase for a composite signal. You can set the value from -180 degrees to +180 degrees in 1 degree steps. This setting is not saved as a preset.

NOTE. *If you try to set the SCH phase over +180 degrees, the value jumps to -179 degrees. Also, if you try to set the SCH phase under -180 degrees, the value jumps to +179 degrees.*

APL Submenu

Use this menu to set the APL and Bounce parameters for the test signal outputs. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the APL submenu.

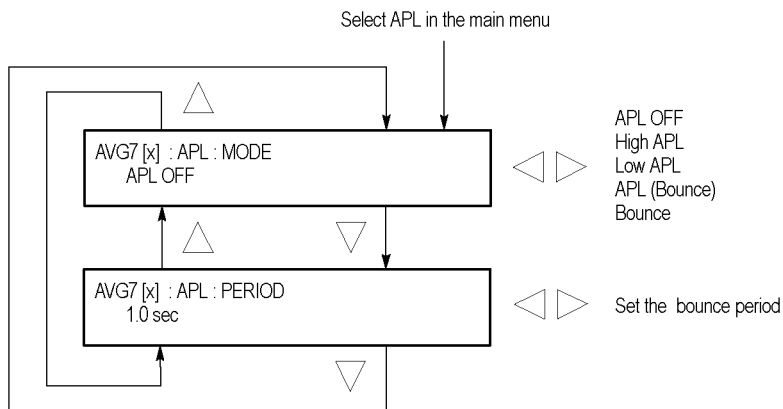


Figure 63: AVG7 module APL submenu

MODE. Sets the output mode of the APL signal. Use the left (◀) or right (▶) arrow button to select the mode, and then press the **ENTER** button to confirm the selection. The choices are:

- **APL OFF:** Outputs the selected signal without making any changes.
- **High APL:** Divides the video lines of the selected signal into 5 lines (for NTSC) or 4 lines (for PAL) and changes the lines except the last line to the 100% flat field signal, and then outputs them.
- **Low APL:** Divides the video lines of the selected signal into 5 lines (for NTSC) or 4 lines (for PAL) and changes the lines except the last line to the 0% flat field signal, and then outputs them.
- **APL (Bounce):** Outputs the High APL signal and Low APL signal alternately for the period set in the PERIOD menu item.
- **Bounce:** Outputs the 100% flat field signal and 0% flat field signal alternately (regardless of the selected signal) for the period set in the PERIOD menu item.

PERIOD. Sets the time interval between two signals when they are output in APL (Bounce) or Bounce mode. Use the left (◀) or right (▶) arrow button to change the interval. You can set the value from 0.5 seconds to 2.0 seconds in 0.5 second steps.

Factory Default Settings

The following table shows the factory default settings for the AVG7 Generator module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 18: AVG7 module factory default settings

Menu item name	Settings
STATUS	NTSC SMPTE Color Bars
MOVING PICTURE	
H Step	0 Sample(s)
V Step	0 Line(s)
Period	1 Frame(s)
Random	Disable
OVERLAY : OBJECT	Logo
OVERLAY : BLINK	OFF
OVERLAY : LOGO	
Logo	OFF
OVERLAY : ID TEXT	
Status	Disable
OVERLAY : CIRCLE	
Status	Disable
X Position	0.0% APH
Y Position	0.0% APH
Diameter	90% APH
TIMING	
Vertical	0 Line(s)
Horizontal Coarse	0.0000 ms
Horizontal Fine	0.00 ns
VIDEO	
CONFIGURATION	CH1/2/3 Composites
GBR SYNC	Sync ON All Channels
G/Y	ON
B/Pb/B-Y	ON
R/Pr/R-Y	ON
SCH PHASE	0 deg
APL	
MODE	APL OFF
PERIOD	1.0 s

AWVG7 Analog Wideband Video Generator

This section describes the module-specific functions of the AWVG7 Analog Wideband Video Generator module. Refer to the following locations for additional information about this module:

- *AWVG7 Module Connectors* for a description of the rear-panel connectors. (See page 52.)
- *AWVG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 23.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The AWVG7 Analog Wideband Video Generator module is designed to be installed in the TG700 TV Signal Generator Platform. The TG700 platform must be running version 3.1 or later software.

The module is a 30 MHz bandwidth video signal generator, which provides wideband analog component video signals for HDTV systems. The module provides the following features:

- Supports the following system formats: 1080/60i, 1080/59.94i, 1080/50i, 1080/24sF, 1080/23.98sF, 1080/30p, 1080/29.97p, 1080/25p, 1080/24p, 1080/23.98p, 720/60p, 720/59.94p, 720/50p, 720/24p, and 720/23.98p.

NOTE. Signals for the following system formats are preinstalled in the mainframe: 1080/60i, 1080/59.94i, 1080/24sF, 1080/23.98sF, 720/60p, and 720/59.94p.


Signals for additional system formats are included on the TG700 Software Library CD-ROM that is supplied as a standard accessory. Refer to the TG700 PC Tools Technical Reference for detailed information on how to download signal files from the CD-ROM to the TG700.

- Six analog component video outputs.
- Outputs a frame picture created by the Frame Picture Generator application when 64 MB of memory is installed. (See page 2, *Mainframe Memory Requirements*.)
- Overlay of circle, text, or logo on the video signal.
- Generates a moving picture by scrolling the active picture area of the output test signal.
- Full remote control using Ethernet interface.

Operating Procedure

After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into to the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that no error messages appear on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below.



TG700 : PRESET

4. Press the front-panel **MODULE** button until the AWVG7 module main menu appears as shown below.



AWVG7 [x] : STATUS : 1080 59i YPbPr
100% Color Bars

5. Select the signal format and the signal you want to output. (See page 144, *Selecting an Output Signal*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus.

Refer to *AWVG7 Module Main Menu* for detailed information about the main menu items and the submenu items. (See page 146.)

Selecting an Output Signal

To output a signal from the AWVG7 module, you need to select a signal format and output signal as described below.

Select the Signal Format

Perform the following steps to select the signal format:

1. If the AWVG7 module menu is not displayed, press the front-panel **MODULE** button until the AWVG7 module main menu appears as shown below.

```
AWVG7 [x] : STATUS : 1080 59i YPbPr
100% Color Bars
```

2. Press the **FORMAT** button. The menu display changes as follows:

```
AWVG7 [x] : SELECT FORMAT
1080 59i (Current)
```

3. Use the left (◀) or right (▶) arrow button, or press the **FORMAT** button repeatedly, to select one of the signal formats, and then press the **ENTER** button to confirm the selection.

NOTE. *When you change the signal format, synchronization shock occurs.*

4. If you change the signal format while a test signal is being output, the instrument starts loading all of the signal sets for the selected format and displays the message "**Now Loading...**". When you see the message, "**Done (Press CANCEL)**", press the **CANCEL** button.

Select the Test Signal

All of the signal sets that are available in the module are already assigned to the corresponding test signal buttons. When the AWVG7 module is selected and you press any of the front-panel test signal buttons, the selected signal in the signal set is output. (See Figure 64.)

For example, when you press the **COLOR BAR** test signal button, a signal in the Color Bars signal set is output. Use the left (◀) or right (▶) arrow button, or press the **COLOR BAR** test signal button repeatedly to select a different signal from the Color Bars signal set.

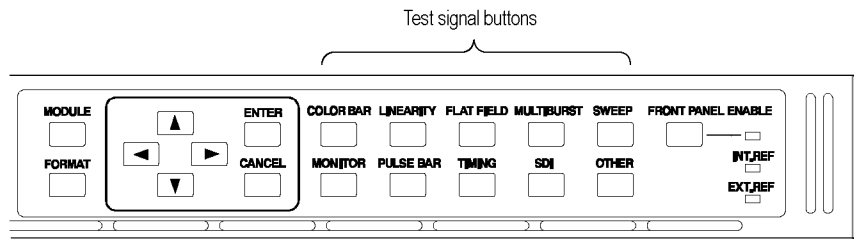


Figure 64: Front-panel test signal buttons

If your TG700 mainframe has 64 MB of memory installed, you can download a frame picture file created by the Frame Picture Generator to the mainframe and output the picture from the AWVG7 module. (See page 2, *Mainframe Memory Requirements*.) Refer to the *TG700 PC Tools Technical Reference* for detailed information on how to create, download, and output a frame picture.

The following table lists the AWVG7 signal sets that are assigned to the test signal buttons and shows the test signals that are available in each signal set.

Table 19: AWVG7 signal set assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars
LINEARITY	Linearity	10 Step, 5 Step, Ramp, Shallow Ramp, Valid Ramp ¹
FLAT FIELD	Flat Fields	0% Flat Field, 100% Flat Field, 50% Flat Field
MULTI BURST	Multi Burst	Multiburst 1-10 MHz, Multiburst 10-20 MHz, Multiburst 20-30 MHz
SWEEP	Sweep	100% Sweep 1-15 MHz, 100% Sweep 1-30 MHz
MONITOR	Monitor	75% Blue Field, Convergence, 75% Green Field, 75% Red Field
PULSE BAR	Pulse & Bar	2T30 Pulse & Bar
TIMING	Timing	Bowtie 1 ns Marker
SDI	—	—
OTHER	—	—

¹ The Valid Ramp signal is available in YPbPr format only.

AWVG7 Module Main Menu

Use the AWVG7 module main menu to perform the following tasks:

- Set the logo, text, or circle overlay on the output signal.
- Set the timing offset on the output signal.
- Scroll the active picture area of the output signal.
- Set whether a sync signal is multiplexed with the B and R signals when a GBR signal is being output.
- Enable or disable the output signal on the CH1, CH2, and CH3 connectors.

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the AWVG7 module main menu.

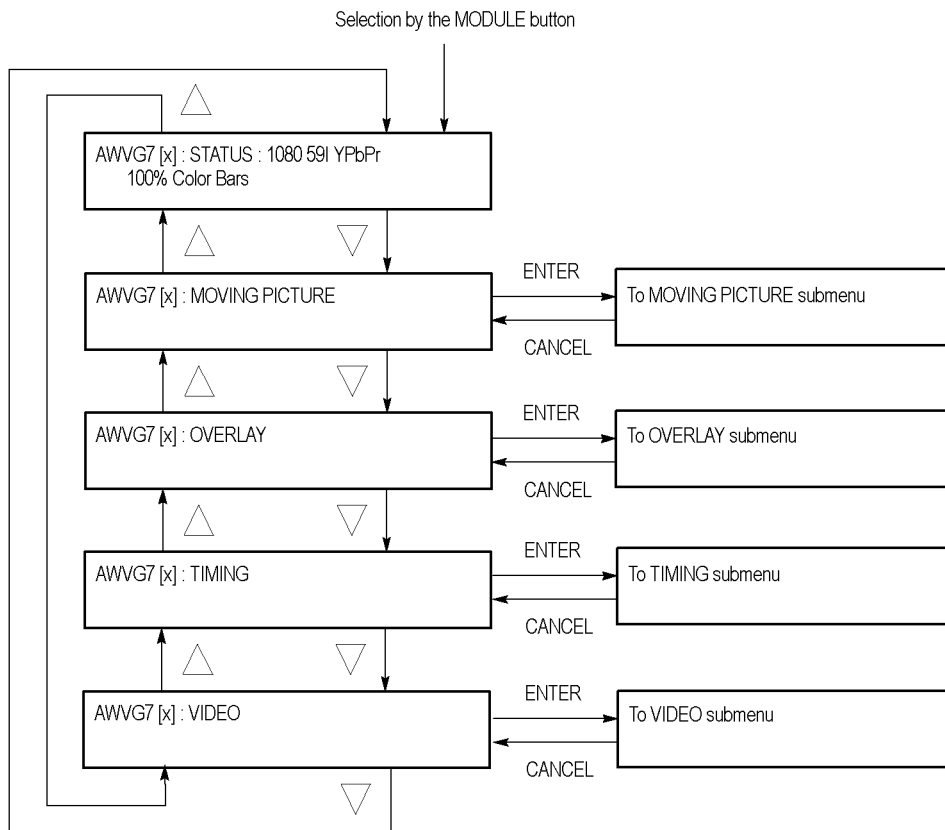


Figure 65: AWVG7 module main menu

MOVING PICTURE. Scrolls the active picture area of the output test signal. Select this menu item, and then press the **ENTER** button to access the MOVING PICTURE submenu. (See page 148.)

OVERLAY. Selects an item (logo, text, or circle) to overlay on the output test signal and sets the blinking mode for the overlay. Select this menu item, and then press the **ENTER** button to access the OVERLAY submenu. (See page 149.)

TIMING. Sets the timing offset of the output signals relative to the internal reference signal (frame reset signal). Select this menu item, and then press the **ENTER** button to access the TIMING submenu. (See page 154.)

VIDEO. Sets whether or not a sync signal is multiplexed with the B and R signal when a GBR signal is being output and enables or disables the signal output from CH 1, CH 2, and CH 3. Select this menu item, and then press the **ENTER** button to access the VIDEO submenu. (See page 156.)

MOVING PICTURE Submenu

Use this menu to scroll the active picture area of the output signal up/down, left/right, or randomly. Use the up (▲) or down (▼) arrow button to scroll the menu. The following figure shows the MOVING PICTURE submenu.

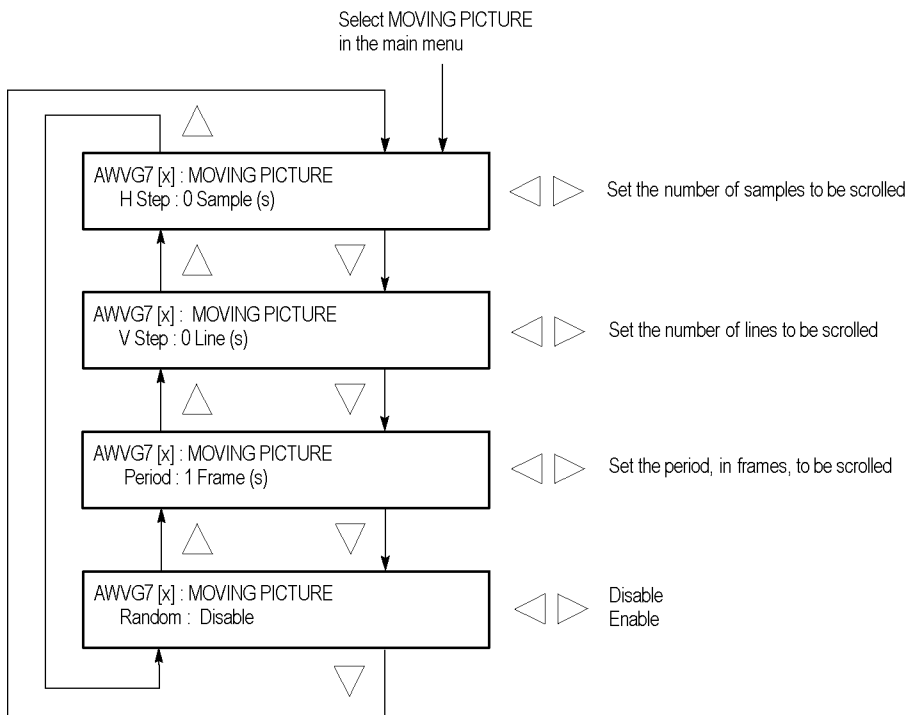


Figure 66: AWVG7 module MOVING PICTURE submenu

H Step. Sets the number of samples to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -60 to +60 in 4-sample steps.

V Step. Sets the number of lines to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -15 to +15 in 1-line steps.

Period. Sets the time interval between occurrences of the scrolling. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 1 to 16 in 1-frame steps.

Random. Sets whether or not the picture scrolls randomly. Use the left (◀) or right (▶) arrow button to select between **Disable** and **Enable**. Press the **ENTER** button to confirm the selection.

OVERLAY Submenu

Use this menu to select an item (logo, ID Text, or circle) to overlay on the output test signal and to set the blinking mode for the overlay. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the OVERLAY submenu.

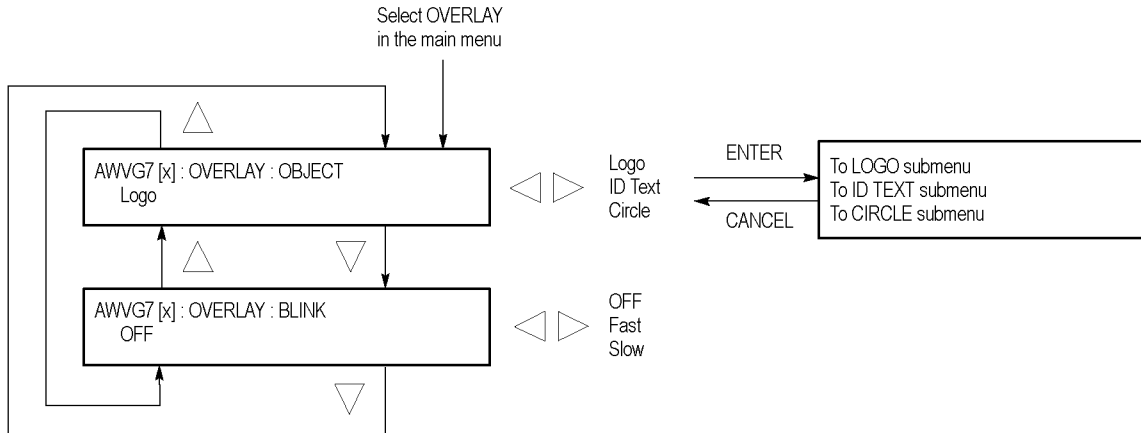


Figure 67: AWVG7 module OVERLAY submenu

OBJECT. Selects an item to overlay on the output test signal. Use the left (◀) or right (▶) arrow button to select one of the following overlays, and then press the ENTER button to access the submenu for setting the parameters of that overlay.

- **Logo:** Opens the LOGO submenu where you can select a logo to overlay the output signal in a specified position. (See page 150.)
- **ID Text:** Opens the ID TEXT submenu where you can edit the text to overlay the output signal in a specified position. (See page 151.)
- **Circle:** Opens the CIRCLE submenu where you can specify a circle size and position to overlay the output signal. (See page 153.)

BLINK. Sets the blinking mode for the enabled overlay. Use the left (◀) or right (▶) arrow button to select one of the following blink modes, and then press the ENTER button to confirm the selection.

- **OFF:** Turns off the blinking function of the overlay.
- **Fast:** Sets the overlay to blink at approximately 0.5 second intervals.
- **Slow:** Sets the overlay to blink at approximately 1.0 second intervals.

LOGO Submenu

Use this menu to select a logo to overlay on the output test signal and to set the display position of the logo. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the LOGO submenu.

NOTE. To display a logo using the LOGO submenu, you need to create a logo file (.lgo) and download it to the LOGO folder of the module. Refer to the TG700 PC Tools Technical Reference for detailed information about how to create a logo file and download it to the TG700.

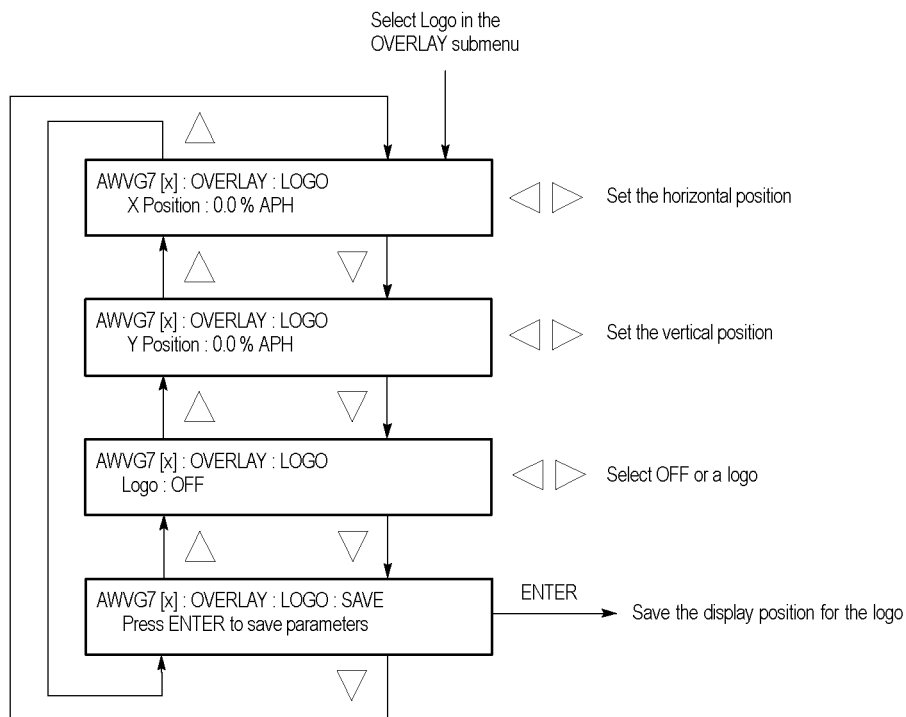


Figure 68: AWVG7 module LOGO submenu

X Position. Sets the horizontal position of the logo. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

Y Position. Sets the vertical position of the logo. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

Logo. Selects the logo you want to display. Use the left (◀) or right (▶) arrow button to select **OFF** or a logo file name. Press the **ENTER** button confirm the selection. When you select **OFF**, the logo overlay is disabled.

SAVE. Saves the display position for the logo to the logo file. Press the **ENTER** button to save the current settings.

ID TEXT Submenu

Use this menu to edit the text that is overlaid on the output test signal and to set the display position of the text. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the ID TEXT submenu.

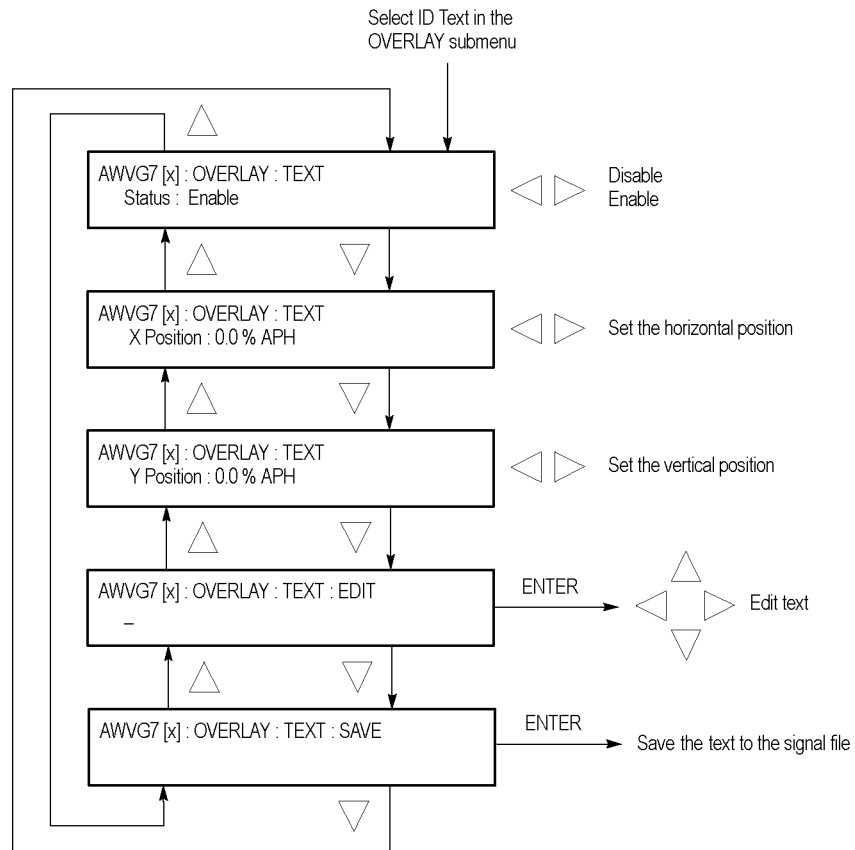


Figure 69: AWVG7 module ID TEXT submenu

Status. Enables or disables the text overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**, and then press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the text. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

Y Position. Sets the vertical position of the text. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

EDIT. Edits the text you want to display on the output test signal. Perform the following steps to edit the text:

NOTE. *You can use up to 30 characters for the logo text. Use the blank character to erase unneeded character(s).*

1. Use the left (◀) or right (▶) arrow button to select **EDIT**, and then press the **ENTER** button to enable the text edit mode.
2. Use the left (◀) or right (▶) arrow button to move the underscore character (␣) to the character you want to change.
3. Use the up (▲) or down (▼) arrow button to select the desired character.
4. After you enter all of the desired characters, press the **ENTER** button to exit the text editing mode.
5. Use the left (◀) or right (▶) arrow button to select **SAVE**, and then press the **ENTER** button to save the text and its position to the signal file.

SAVE. Saves the text and its position to the signal file currently being output. Press the **ENTER** button to save the text and its position to the signal file.

CIRCLE Submenu

Use this menu to overlay a circle on the output test signal and set its position on the display. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the CIRCLE submenu.

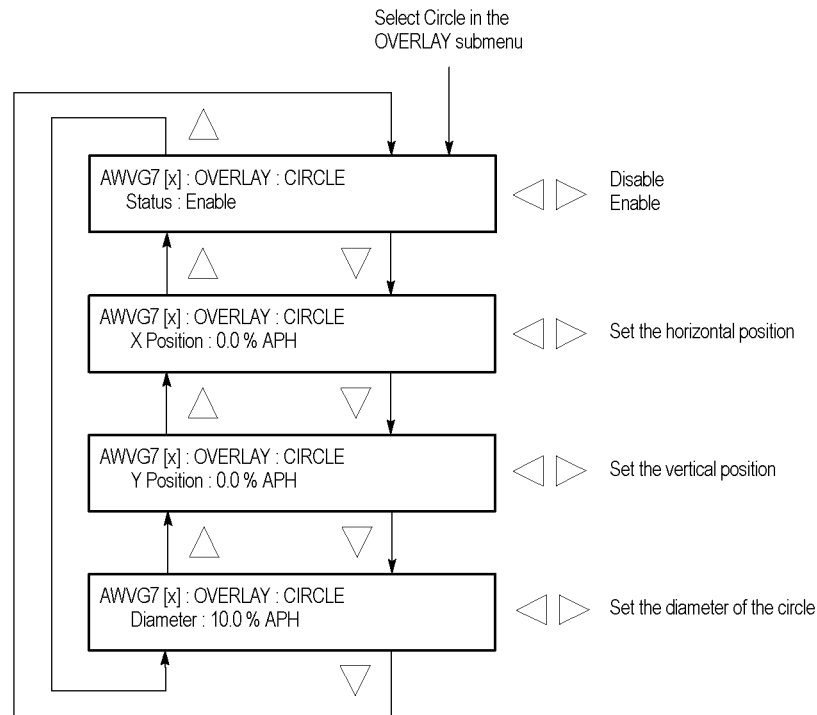


Figure 70: AWVG7 module CIRCLE submenu

Status. Enables or disables the circle overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the circle. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Y Position. Sets the vertical position of the circle. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Diameter. Sets the diameter of the circle. The diameter is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 0.0% to 100.0% in 1% steps.

TIMING Submenu

Use this menu to adjust the timing offset of the output signal relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the TIMING submenu.

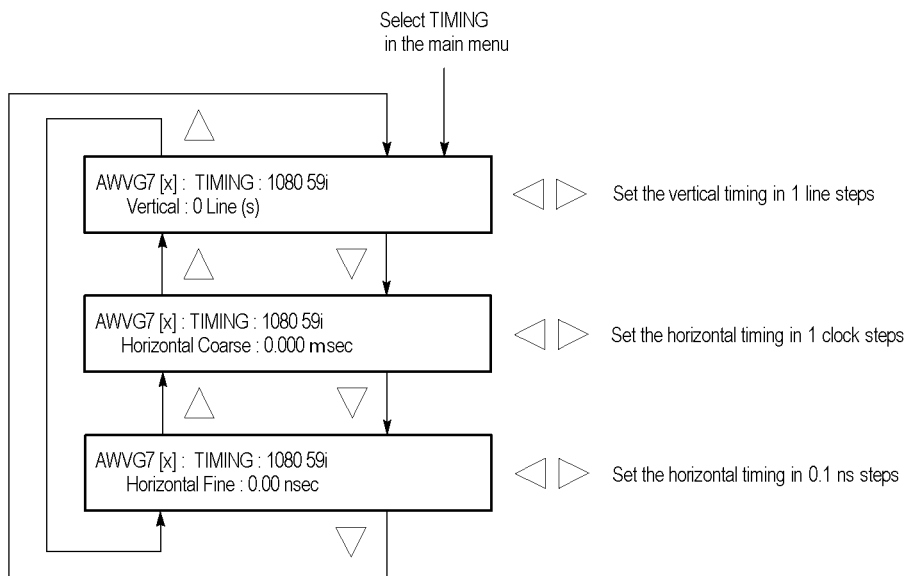


Figure 71: AWVG7 module TIMING submenu

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

The adjustment range of the timing offset settings depends on the selected signal format. (See Table 20 on page 155.)

Vertical. Sets the vertical timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1 to +1 frame of the selected signal format in 1 line steps.

Horizontal Coarse. Use the left (◀) or right (▶) arrow button to adjust the coarse horizontal offset. You can set the value from -1 to +1 line of the selected signal format in 1 clock (18.5 ns) steps.

Horizontal Fine. Use the left (◀) or right (▶) arrow button to adjust the fine horizontal offset. You can set the value from -10 ns to +10 ns in 0.1 ns steps.

Table 20: Timing adjustment ranges for AWVG7 module output signals

Signal format	Line settings	Coarse settings (μ s)	Fine settings (ns)
1080 60i YPbPr/GBR	± 562	± 29.6296	± 10.00
1080 59i YPbPr/GBR	± 562	± 29.6593	± 10.00
1080 50i YPbPr/GBR	± 562	± 35.5556	± 10.00
1080 24sF YPbPr/GBR	± 562	± 37.0370	± 10.00
1080 23sF YPbPr/GBR	± 562	± 37.0741	± 10.00
1080 30p YPbPr/GBR	± 562	± 29.6296	± 10.00
1080 29p YPbPr/GBR	± 562	± 29.6593	± 10.00
1080 25p YPbPr/GBR	± 562	± 35.5556	± 10.00
1080 24p YPbPr/GBR	± 562	± 37.0370	± 10.00
1080 23p YPbPr/GBR	± 562	± 37.0741	± 10.00
720 60p YPbPr/GBR	± 375	± 22.2222	± 10.00
720 59p YPbPr/GBR	± 375	± 22.4444	± 10.00
720 50p YPbPr/GBR	± 375	± 26.6667	± 10.00
720 30p YPbPr/GBR	± 375	± 53.3333	± 10.00
720 29p YPbPr/GBR	± 375	± 45.9770	± 10.00
720 25p YPbPr/GBR	± 375	± 44.4444	± 10.00
720 24p YPbPr/GBR	± 375	± 55.5556	± 10.00
720 23p YPbPr/GBR	± 375	± 55.6111	± 10.00

VIDEO Submenu

Use this menu to perform the following tasks:

- Enable or disable the signal output from the CH 1, CH 2, and CH 3 connectors.
- Set whether a sync signal is multiplexed with the B and R signals when a GBR signal is being output.

Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the VIDEO submenu.

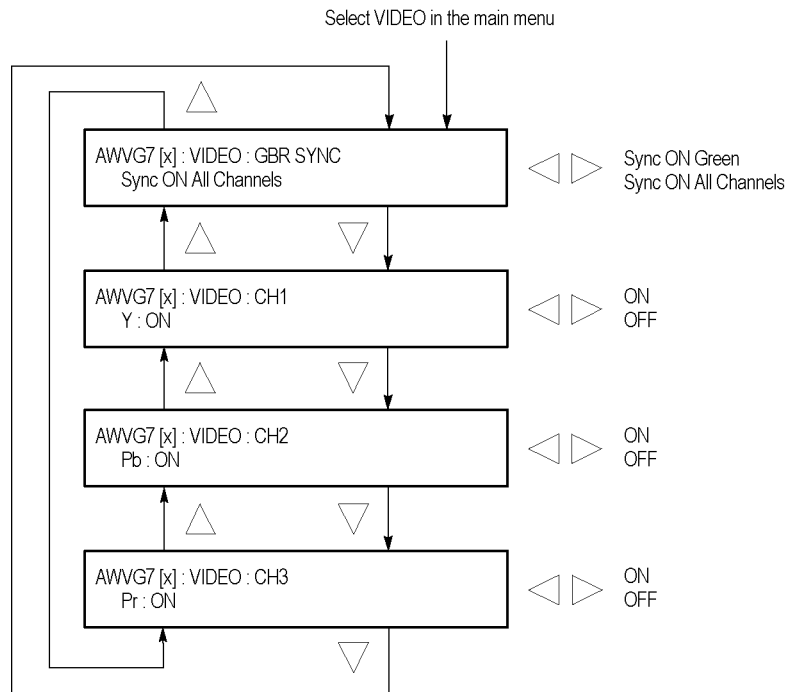


Figure 72: AWVG7 module VIDEO submenu

GBR SYNC. Sets whether a sync signal is multiplexed with the B signal and R signal when a GBR signal is being output. Use the left (◀) or right (▶) arrow button to select between **Sync ON Green** and **Sync ON All Channels**. When you select Sync ON All Channels, a sync signal is multiplexed with the G, B, and R signals. Press the **ENTER** button to confirm the selection. This menu item appears only when a GBR signal is being output.

CH 1. Turns the CH 1 signal output on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection. The signal name that is displayed before the ON/OFF status depends on the format of the currently selected signal (YPbPr component or GBR component).

CH 2. Turns the CH 2 signal output on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection. The signal name that is displayed before the ON/OFF status depends on the format of the currently selected signal (YPbPr component or GBR component).

CH 3. Turns the CH 3 signal output on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection. The signal name that is displayed before the ON/OFF status depends on the format of the currently selected signal (YPbPr component or GBR component).

Factory Default Settings

The following table shows the factory default settings for the AWVG7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 21: AWVG7 module factory default settings

Menu item name	Settings
STATUS	1080 59i YPbPr 100% Color Bars
MOVING PICTURE	
H Step	0 Sample(s)
V Step	0 Line(s)
Period	1 Frame(s)
Random	Disable
OVERLAY : OBJECT	Logo
OVERLAY : BLINK	OFF
OVERLAY : LOGO	
Logo	OFF
OVERLAY : ID TEXT	
Status	Disable
OVERLAY : CIRCLE	
Status	Disable
X Position	0.0% APH
Y Position	0.0% APH
Diameter	90.0% APH
TIMING	
Vertical	0 Line(s)
Horizontal Coarse	0.000 ms
Horizontal Fine	0.00 ns
VIDEO	
GBR SYNC	Sync ON All Channels
Y	ON
Pb	ON
Pr	ON

BG7 Black Generator

This section describes the module-specific functions of the BG7 Black Generator module. Refer to the following locations for additional information about this module:

- *BG7 Module Connectors* for a description of the rear-panel connectors. (See page 52.)
- *BG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 24.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The BG7 Black Generator module is designed to be installed in the TG700 TV Signal Generator Platform.

The module is a multiformat black generator with the following features:


- Four outputs for NTSC (with or without setup) or PAL black burst and HDTV trilevel sync signals.
- Individual format and timing control for each output.
- Black burst with field ID and NTSC/PAL color bars signals output (Option CB).
- Full remote control using Ethernet interface.
- Timecode generator with VITC when a GPS7 module is installed (The BG7 module hardware must be version 1.2 or above and the mainframe must have software version 5.1 or above installed).

NOTE. *PAL-M and PAL-N are not supported by the AGL7, ATG7 and BG7 modules.*

Operating Procedure

After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that there are no error messages on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below.



TG700 : PRESET

4. Press the front-panel **MODULE** button until the BG7 module main menu appears as shown below.



BG7 [x] : SELECT OUTPUT
BLACK 1

5. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus.

Refer to *BG7 Module Main Menu* for detailed information about the main menu items and submenu items. (See page 161.)

BG7 Module Main Menu

Use the BG7 module main menu to perform the following tasks:

- Select an output to format.
- Set the format of the selected output.
- Select the test signal for the selected output.
- Set the timing offset for the selected output.
- Set timecode parameters for the selected output when a GPS7 module is installed. The BG7 module hardware must be version 1.2 or above and the mainframe must have software version 5.1 or above installed.

The following figure shows the BG7 module main menu.

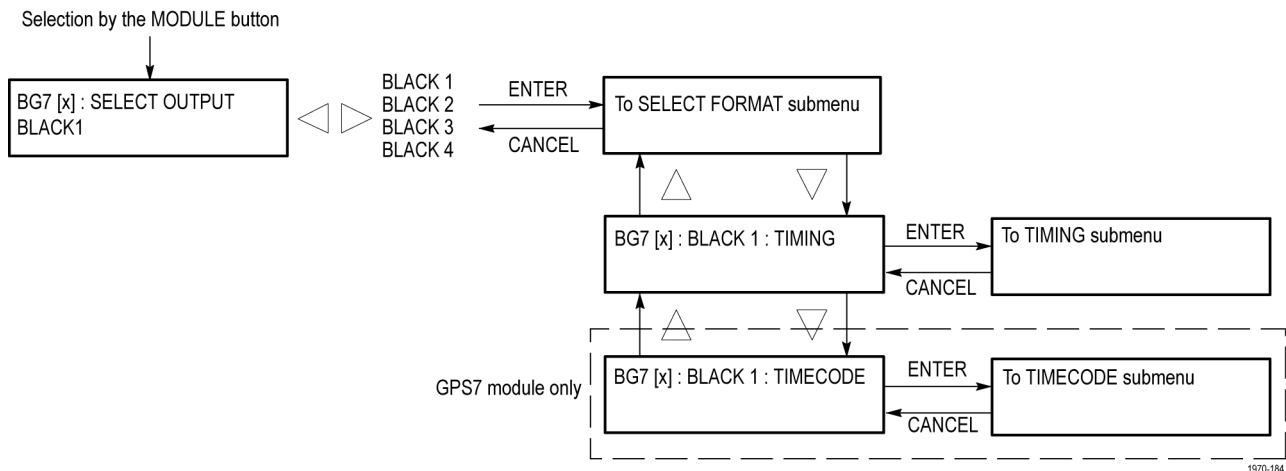


Figure 73: BG7 module main menu

SELECT OUTPUT. Selects the output for which parameters are to be set. The choices are **BLACK 1**, **BLACK 2**, **BLACK 3**, and **BLACK 4**. Use the left (◀) or right (▶) arrow button to select the desired output, and then press the **ENTER** button to access the SELECT FORMAT submenu. (See page 162.)

SELECT FORMAT Submenu

Use this menu to set the signal format for the selected output. The following figure shows the SELECT FORMAT submenu.



Figure 74: BG7 module SELECT FORMAT submenu

NOTE. *When you change the signal format, synchronization shock will occur.*

Use the left (◀) or right (▶) arrow button to select the signal format. The choices are **NTSC**, **NTSC No Setup**, **PAL**, and **HD SYNC**. Select **HD SYNC** to output an HDTV trilevel sync signal.

After you select the signal format, press the front-panel **ENTER** button to access the **SELECT SIGNAL** submenu, where you can select the output signal. (See page 163.)

After you select an output signal, press the up (▲) or down (▼) arrow button while the **SELECT FORMAT** submenu is displayed to enter one of the following submenus.

- **TIMING:** Use the **TIMING** submenu to set the timing offset for the selected black signal output. (See page 164.)
- **TIMECODE:** Use the **TIMECODE** submenu to set timecode parameters for the selected output when a **GPS7** module is installed. The **BG7** module hardware must be version 1.2 or above and the mainframe must have software version 5.1 or above installed. This submenu is not available when **HD SYNC** is the selected signal format. (See page 165.)

SELECT SIGNAL Submenu Use this menu to select a signal for the selected BLACK output. The following figure shows the SELECT SIGNAL submenu.

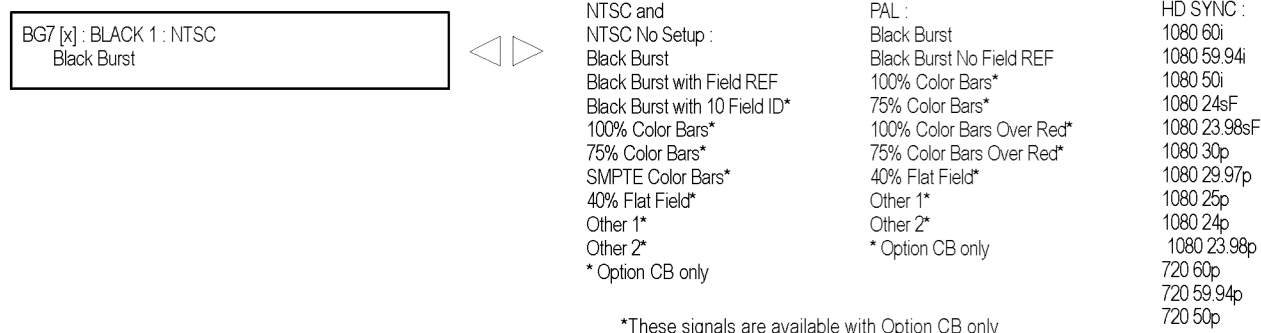


Figure 75: BG7 module SELECT SIGNAL submenu

Use the left (◀) or right (▶) arrow button to scroll through the selections, and then press the **ENTER** button to enable the selected signal.

The available signals depend on which signal format you selected in the SELECT FORMAT submenu. For **NTSC**, **NTSC No Setup**, and **PAL** signal formats, you can select a black burst signal or a color bars signal when Option CB is installed on the BG7 module. For the **HD SYNC** signal format, you can select an HDTV trilevel sync signal.

The following table lists the available signals for each signal format.

Table 22: BG7 module signals for each signal format

Format	Selectable signals	Selectable signals available with Option CB Only ¹
NTSC and NTSC No Setup	Black Burst, Black Burst with Field REF	Black Burst with 10 Field ID, 100% Color Bars, 75% Color Bars, SMPTE Color Bars, 40 % Flat Field, Other 1, Other 2
PAL	Black Burst, Black Burst No Field REF,	100% Color Bars, 75% Color Bars, 100% Color Bars Over Red, 75% Color Bars Over Red, 40% Flat Field, Other 1, Other 2
HD SYNC	1080 60i, 1080 59.94i, 1080 50i, 1080 24sF, 1080 23.98sF, 1080 30p, 1080 29.97p, 1080 25p, 1080 24p, 1080 23.98p, 720 60p, 720 59.94p, 720 50p	

¹ These signals are available only from the BLACK 3 and BLACK 4 connectors.

TIMING Submenu

Use this submenu to adjust the timing offset of the selected BLACK output relative to the genlock signal or the internal reference signal. Use the up (▲) or down (▼) arrow button to select between Vertical and Horizontal offset. The following figure shows the TIMING submenu.

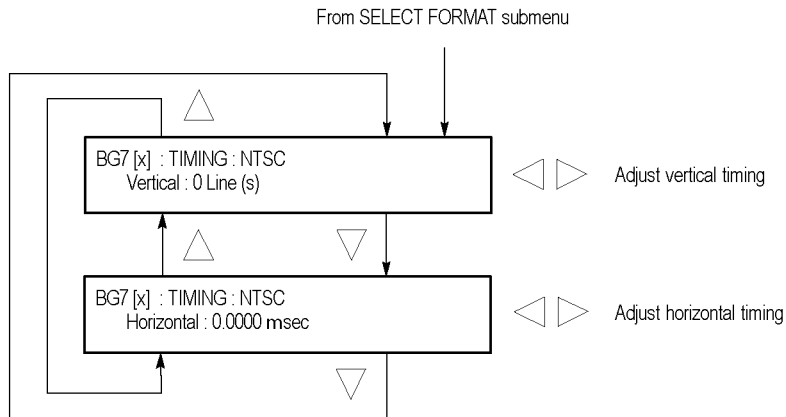


Figure 76: BG7 module TIMING submenu

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

The horizontal timing can only be adjusted in clock cycle increments. You can match the timing of the AGL7 module to the BG7 module by adjusting the fine timing controls on the AGL7 module.

Vertical. Use the left (◀) or right (▶) arrow button to adjust the vertical offset. For NTSC or PAL format signal, you can set the value from -1/2 color frame to +1/2 color frame in 1 line steps. For the HDTV trilevel sync signal, you can set the value from -1/2 frame to +1/2 frame in 1 line steps.

Horizontal. Use the left (◀) or right (▶) arrow button to adjust the horizontal offset. You can set the value from -1 line to +1 line in one clock steps (18.5 ns for NTSC or PAL, 13.5 ns for HDTV).

TIMECODE Submenu

Use this submenu to set timecode parameters for the selected output. This menu is present only if GPS7 module is installed.

NOTE. To display the TIMECODE submenu, the BG7 module hardware must be version 1.2 or above and the mainframe must have software version 5.1 or above installed.

This submenu is available only when NTSC, NTSC No Setup, or PAL is the selected signal format. This submenu is not available when the selected signal format is HD SYNC.

Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the TIMECODE submenu.

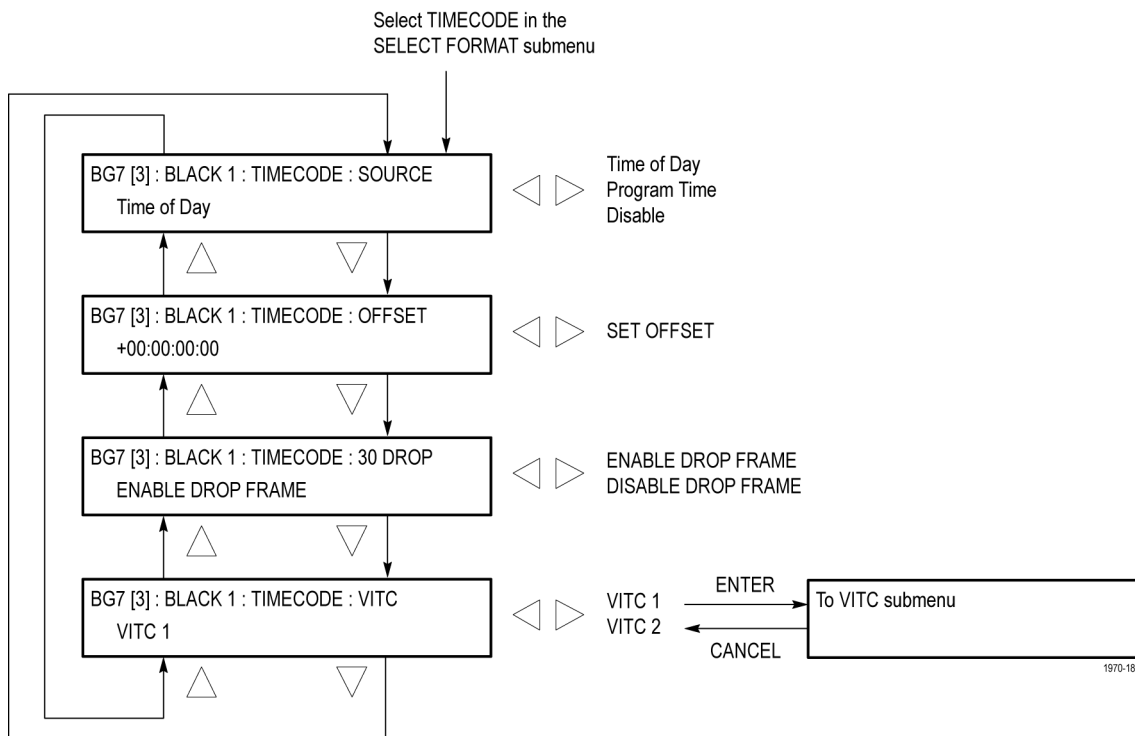


Figure 77: BG7 module TIMECODE submenu

SOURCE. Use the left (◀) or right (▶) arrow button to select the timecode source from the following choices:

- **Time of Day:** Uses the time of day as determined from the GPS antenna.
- **Program Time:** Uses the program time counter as the timecode.
- **Disable:** Disables the timecode function for the BG7 module.

OFFSET. Use this menu item to set a time offset for the BG7 module outputs from the timecode input from the GPS7 module. You can enter a time offset of up to $\pm 23:59:59:29$ (maximum frame value depends on the frame rate of the video signal) of the GPS timecode (hours : minutes: seconds : video frames). Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the offset value to change. An underline character appears under the selected offset digit.

After you select an offset digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for your offset. Press the **ENTER** to confirm the offset change.

30 DROP. Use the left (◀) or right (▶) arrow button to enable or disable the 30 Drop mode. Use this mode to correct for frame-rate error in NTSC-rate signals or to allow the timecode to run continuously and drift away from the correct time.

VITC. Allows inserting the same VITC signal on 1 or 2 lines of the vertical interval. Select VITC 1 for one line and VITC 2 for the second line. Select the VITC signal you want to configure, and then press the **ENTER** button to enter the VITC submenu for the selected signal. (See page 167.)

**VITC Submenu
(GPS7 module only)**

Use this menu to enable or disable the output of the VITC signal and to select the video line on which the VITC signal will be inserted. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the VITC submenu.

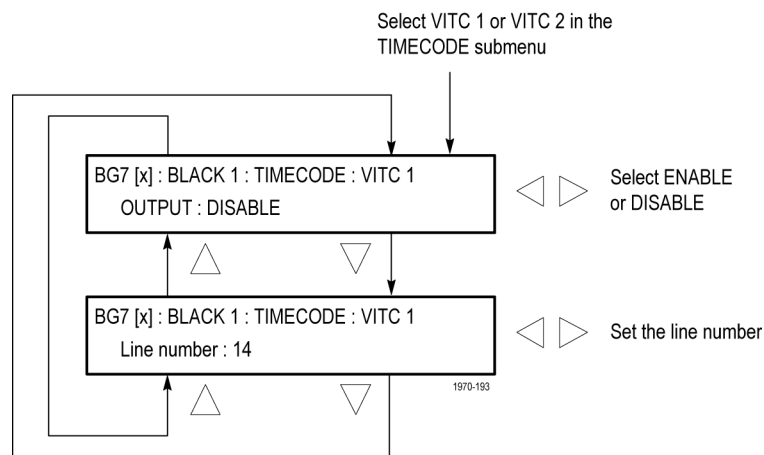


Figure 78: BG7 module VITC submenu

OUTPUT. Use this menu item to enable or disable insertion of a VITC on the selected line. Use the left (◀) or right (▶) arrow button to select **ENABLE** or **DISABLE**. Press the **ENTER** button to confirm the selection.

Line Number. Use this menu item to select the video line on which the VITC signal will be inserted. Use the left (◀) or right (▶) arrow button to select the video line number. The line number range varies by format: you can select from line 10 to line 20 for NTSC, and from line 6 through line 22 for PAL. Press the **ENTER** button to confirm the selection.

Factory Default Settings

The following table shows the factory default settings for the BG7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 23: BG7 module factory default settings

Menu item name	Settings
OUTPUT : BLACK 1 to BLACK 4	
Format	NTSC
SIGNAL	Black Burst
TIMING	
Vertical	0 Line(s)
Horizontal	0.0000 msec

Table 23: BG7 module factory default settings (cont.)

Menu item name	Settings
Below are menus present when a GPS7 module is also installed in the mainframe	
TIMECODE	
SOURCE	Disable
30 DROP	Enable Drop Frame
VITC	
OUTPUT	Disable
VITC 1	Line 14
VITC 2	Line 16

DVG7 Digital Video Generator

This section describes the module-specific functions of the DVG7 Digital Video Generator module. Refer to the following locations for additional information about this module:

- *DVG7 Module Connectors* for a description of the rear-panel connectors. (See page 53.)
- *DVG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 26.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The DVG7 Digital Video Generator module is designed to be installed in the TG700 TV Signal Generator Platform.


The module is a digital video generator that provides NTSC composite digital signals and 525/625 component digital signals. The module provides the following features:

- Two serial digital video outputs.
- Two serial digital black outputs (Option BK only).
- Overlay of circle, text, or logo on the video signal.
- Moving picture by scrolling the active picture area of the output signal.
- Up to 16 channels of 24- or 20-bit embedded digital audio with a sample rate of 48 kHz.
- Full remote control using Ethernet interface.

Operating Procedure

After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that no error messages appear on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below.



TG700 : PRESET

4. Press the front-panel **MODULE** button until the DVG7 module main menu appears as shown below.



DVG7 [x] : STATUS : 525-270
100% Color Bars

5. Select the signal format and the test signal you want to output. (See page 171, *Selecting an Output Signal*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus.

Refer to *DVG7 Module Main Menu* for detailed information about the main menu items and the submenu items. (See page 174.)

Selecting an Output Signal

To output a signal from the DVG7 module, you need to select a signal format and output signal as described below.

Select the Signal Format

Perform the following steps to select the signal format:

1. Press the front-panel **MODULE** button until the DVG7 module main menu appears as shown below.

```
DVG7 [x] : STATUS : 525-270
100% Color Bars
```

2. Press the **FORMAT** button. The menu display changes as follows:

```
DVG7 [x] : SELECT FORMAT
525-270 (Current)
```

3. Use the left (◀) or right (▶) arrow button, or press the **FORMAT** button repeatedly, to select one of the signal formats, and then press the **ENTER** button to confirm the selection.

NOTE. *When you change signal format, synchronization shock occurs.*

4. If you change the signal format while a test signal is being output, the instrument starts loading all of the signal sets for the selected format and displays the message "**Now Loading...**". When you see the message, "**Done (Press CANCEL)**", press the **CANCEL** button.

Select the Test Signal

All of the signal sets that are available in the module are already assigned to the corresponding test signal buttons. When the DVG7 module is selected and you press any of the front-panel test signal buttons, the selected signal in the signal set is output. (See Figure 79.)

For example, when you press the **COLOR BAR** test signal button, a signal in the Color Bars signal set is output. Use the left (◀) or right (▶) arrow button, or press the **COLOR BAR** test signal button repeatedly to select a different signal from the Color Bars signal set.

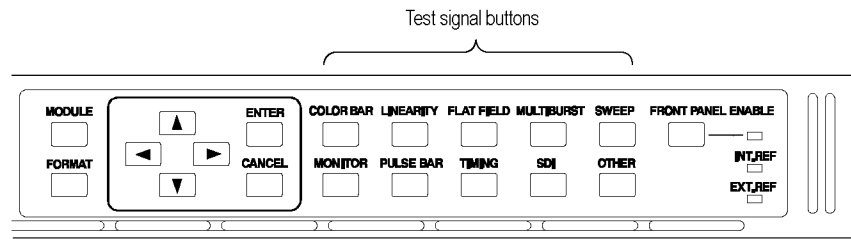


Figure 79: Front-panel test signal buttons

If your TG700 mainframe has 64 MB of memory installed, you can download a frame picture file created by the Frame Picture Generator to the mainframe and output the picture from the DVG7 module. (See page 2, *Mainframe Memory Requirements*.) Refer to the *TG700 PC Tools Technical Reference* for detailed information on how to create, download, and output a frame picture.

The following table lists the signal sets that are assigned to each test signal button and shows the test signals that are available in each signal set. The list of available signals changes depending on the selected signal format.

Table 24: DVG7 module signal set assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
525-143 format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, SMPTE Color Bars
LINEARITY	Linearity	10 Step, 5 Step, Luminance Ramp, Mod Shallow Ramp, Modulated 10 Step, Modulated 5 Step, Modulated Pedestal, Modulated Ramp, Shallow Ramp, Shallow Ramp Matrix
FLAT FIELD	Flat Fields	0% Flat Field, 100% Flat Field, 50% Flat Field, Black Burst, Field Square Wave
MULTI BURST	Multi Burst	60 IRE Multiburst, Multipulse
SWEEP	Sweep	6 MHz Sweep, SinX/X
MONITOR	Monitor	100% Red Field, 2 Level Ped. & Pluge, 4 Level Ped. & Pluge, 75% Red Field, Convergence Pattern, Grey Window, Monitor Matrix, Monitor Setup, White Window
PULSE BAR	Pulse & Bar	Window 1T Pulse & Bar, Window 2T Pulse & Bar
TIMING	—	—
SDI	SDI Test	Equalizer Test, PLL Test, SDI Matrix
OTHER	Other	FCC Composite, FCC Multiburst, NTC7 Combination, NTC7 Composite

Table 24: DVG7 module signal set assigned to the test signal buttons (cont.)

Button name	Signal set	Signals in the signal set
525-270 format		
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, SMPTE Color Bars
LINEARITY	Linearity	10 Step, 3 Channel Ramp, 5 Step, B-Y Valid Ramp, Limit Ramp, Modulated Ramp, Oversize Ramp, R-Y Valid Ramp, Shallow Ramp, Shallow Ramp Matrix, Valid Ramp, Y Valid Ramp
FLAT FIELD	Flat Fields	0% Flat Field, 100% Flat Field, 50% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	60% Multiburst, Multipulse
SWEEP	Sweep	100% Sweep, 60% Sweep, SinX/X
MONITOR	Monitor	2 Level Ped. & Pluge, 4 Level Ped. & Pluge, Convergence Pattern, Gamut Test, Grey Window, White Window
PULSE BAR	Pulse & Bar	2T Pulse and Bar, T Pulses
TIMING	Timing	2.5 MHz Bowtie, 500 kHz Bowtie, Active Picture Timing, Co-Siting Pulse
SDI	SDI Test	Equalizer Test, PLL Test, SDI Matrix
OTHER	Other	Chroma Freq. Resp., Color Palette, FCC Composite, FCC Multiburst, NTC7 Combination, NTC7 Composite
625-270 format		
COLOR BAR	Color Bars	100% Colour Bars, 75% Colour Bars, 100% Colour Bars Over Red, 75% Colour Bars Over Red
LINEARITY	Linearity	10 Step, 3 Channel Ramp, 5 Step, B-Y Valid Ramp, Limit Ramp, Modulated Ramp, Oversize Ramp, R-Y Valid Ramp, Shallow Ramp, Shallow Ramp Matrix, Y Valid Ramp
FLAT FIELD	Flat Fields	0% Flat Field, 100% Flat Field, 50% Flat Field, Field Square Wave
MULTI BURST	Multi Burst	60% Multiburst
SWEEP	Sweep	100% Sweep, 60% Sweep, SinX/X
MONITOR	Monitor	100% Red Field, 2 Level Ped. & Pluge, 4 Level Ped. & Pluge, 75% Red Field, Convergence Pattern, Gamut Test, Grey Window, White Window
PULSE BAR	Pulse & Bar	2T 4T 10T Pulse & Bar, 2T 4T 20T Pulse & Bar
TIMING	Timing	2.5 MHz Bowtie, 500 kHz Bowtie, Active Picture Timing, Co-Siting Pulse
SDI	SDI Test	Equalizer Test, PLL Test, SDI Matrix
OTHER	Other	CCIR 17, CCIR 18, CCIR 330, CCIR 331, CCIR 331 G2

DVG7 Module Main Menu

Use the DVG7 module main menu to perform the following tasks:

- Set the logo, text, or circle overlay on the output signal.
- Set the timing offset on the output signals.
- Scroll the active picture area of the output signal.
- Enable or disable the output and set parameters for each embedded audio group.
- Enable or disable the video output signal on the CH1, CH2, and CH3 connectors.

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the DVG7 module main menu.

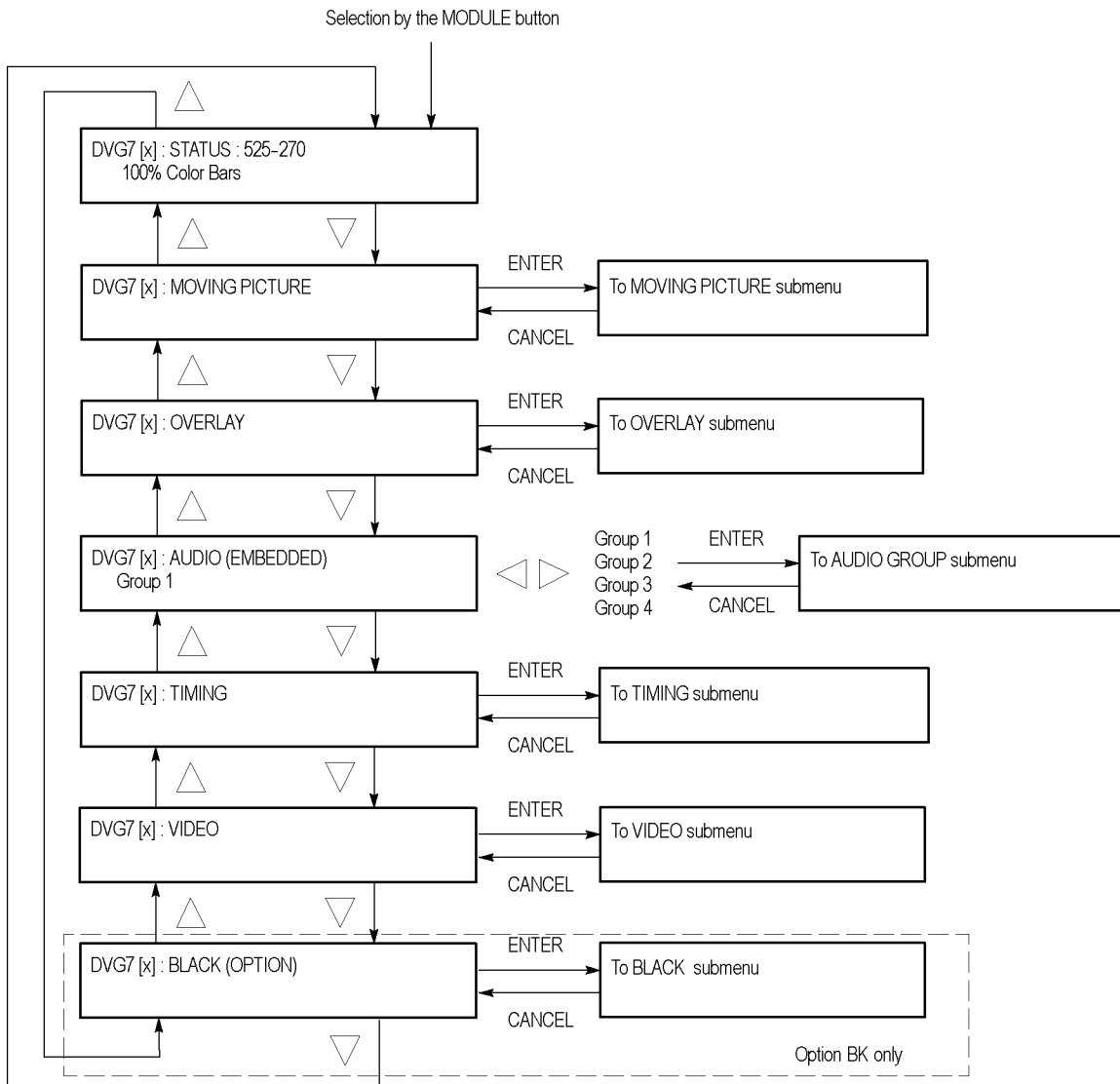


Figure 80: DVG7 module main menu

MOVING PICTURE. Scrolls the active picture area of the output test signal. Select this menu item, and then press the **ENTER** button to access the MOVING PICTURE submenu. (See page 177.)

OVERLAY. Selects an item (logo, text, or circle) to overlay on the output test signal and sets the blinking mode for the overlay. Select this menu item, and then press the **ENTER** button to access the OVERLAY submenu. (See page 178.)

AUDIO (EMBEDDED). Sets the parameters for the embedded audio on the output test signals. Use the left (◀) or right (▶) arrow button to select **Group 1**, **Group 2**, **Group 3**, or **Group 4**. Select any of the items, and then press the **ENTER** button to access the AUDIO GROUP submenu. (See page 284.)

TIMING. Sets the timing offset of the serial digital video outputs relative to the internal reference signal (frame reset signal). Select this menu item, and then press the **ENTER** button to access the TIMING submenu. (See page 186.)

VIDEO. Enables or disables the Y, Pb, or Pr component of the output serial digital video signals, the EDH (Error Detection Handling) insertion, and the output mode for an audio/video timing measurement. You can also set the resolution of the output serial digital video signals. Select this menu item, and then press the **ENTER** button to access the VIDEO submenu. (See page 187.)

BLACK (OPTION). This menu selection is available only with Option BK, and sets the parameters of the serial digital black signals output from the **BLACK 1** and **BLACK 2** connectors. Select this menu item, and then press the **ENTER** button to access the BLACK submenu. (See page 291.)

MOVING PICTURE Submenu

Use this menu to scroll the active picture area of the serial digital video signal up/down, left/right, or randomly. Use the up (▲) or down (▼) arrow button to scroll the menu. The following figure shows the MOVING PICTURE submenu.

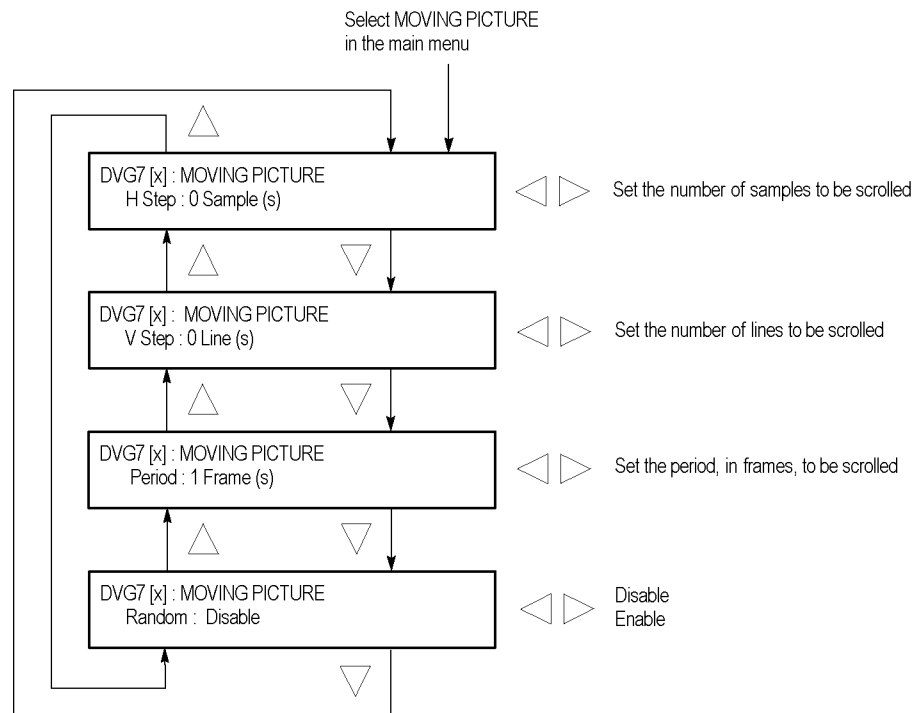


Figure 81: DVG7 module MOVING PICTURE submenu

H Step. Sets the number of samples to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 4-sample steps.

V Step. Sets the number of lines to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 1-line steps.

Period. Sets the time interval between occurrences of the scrolling. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 1 to 16 in 1-frame steps.

Random. Sets whether or not the picture scrolls randomly. Use the left (◀) or right (▶) arrow button to select between **Disable** and **Enable**. Press the **ENTER** button to confirm the selection.

OVERLAY Submenu

Use this menu to select an item (logo, ID Text, or circle) to overlay on the output test signal and to set the blinking mode for the overlay. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the OVERLAY submenu.

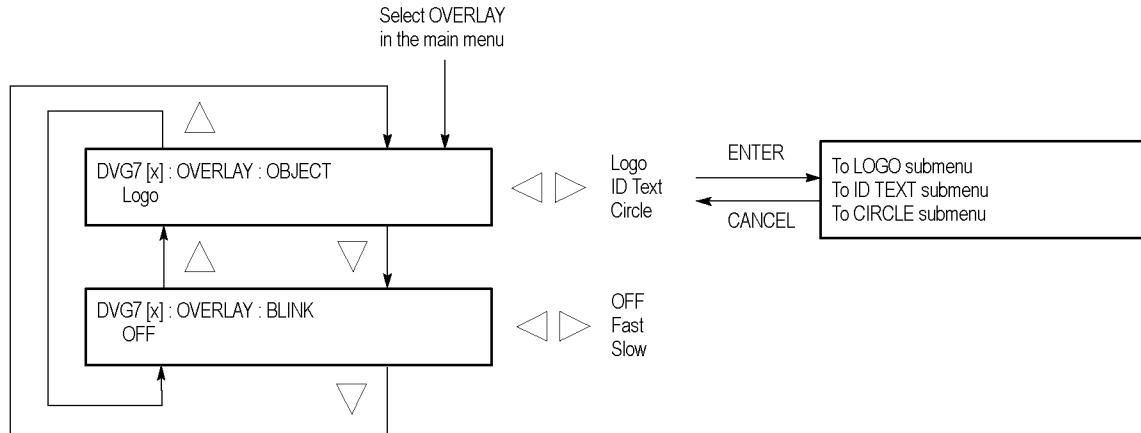


Figure 82: DVG7 module OVERLAY submenu

OBJECT. Selects an item to overlay on the output test signal. Use the left (◀) or right (▶) arrow button to select one of the following overlays, and then press the ENTER button to access the submenu for setting the parameters of that overlay.

- **Logo:** Opens the LOGO submenu where you can select a logo to overlay the output signal in a specified position. (See page 179.)
- **ID Text:** Opens the ID TEXT submenu where you can edit the text to overlay the output signal in a specified position. (See page 180.)
- **Circle:** Opens the CIRCLE submenu where you can specify a circle size and position to overlay the output signal. (See page 182.)

BLINK. Sets the blinking mode for the enabled overlay. Use the left (◀) or right (▶) arrow button to select one of the following blink modes, and then press the ENTER button to confirm the selection.

- **OFF:** Turns off the blinking function of the overlay.
- **Fast:** Sets the overlay to blink at approximately 0.5 second intervals.
- **Slow:** Sets the overlay to blink at approximately 1.0 second intervals.

LOGO Submenu

Use this menu to select a logo to overlay on the output test signal and to set the display position of the logo. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the LOGO submenu.

NOTE. To display a logo using the LOGO submenu, you need to create a logo file (.lgo) and download it to the LOGO folder of the module. Refer to the TG700 PC Tools Technical Reference for detailed information about how to create a logo file and download it to the TG700.

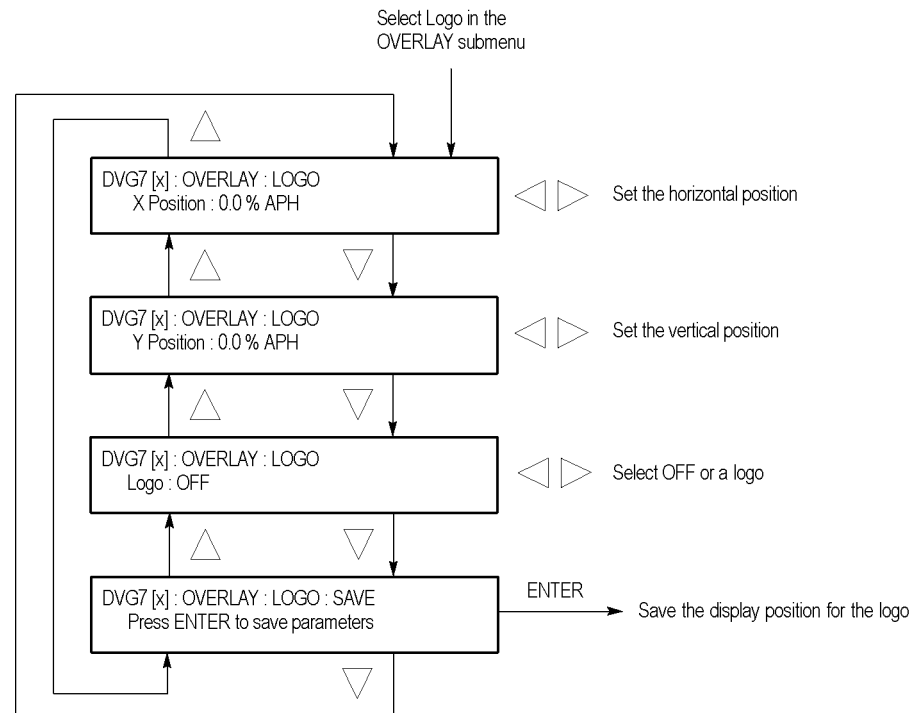


Figure 83: DVG7 module LOGO submenu

X Position. Sets the horizontal position of the logo. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

Y Position. Sets the vertical position of the logo. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

Logo. Selects the logo you want to display. Use the left (◀) or right (▶) arrow button to select **OFF** or a logo file name. Press the **ENTER** button confirm the selection. When you select **OFF**, the logo overlay is disabled.

SAVE. Saves the display position for the logo to the logo file. Press the **ENTER** button to save the current settings.

ID TEXT Submenu

Use this menu to edit the text that is overlaid on the output test signal and to set the display position of the text. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the ID TEXT submenu.

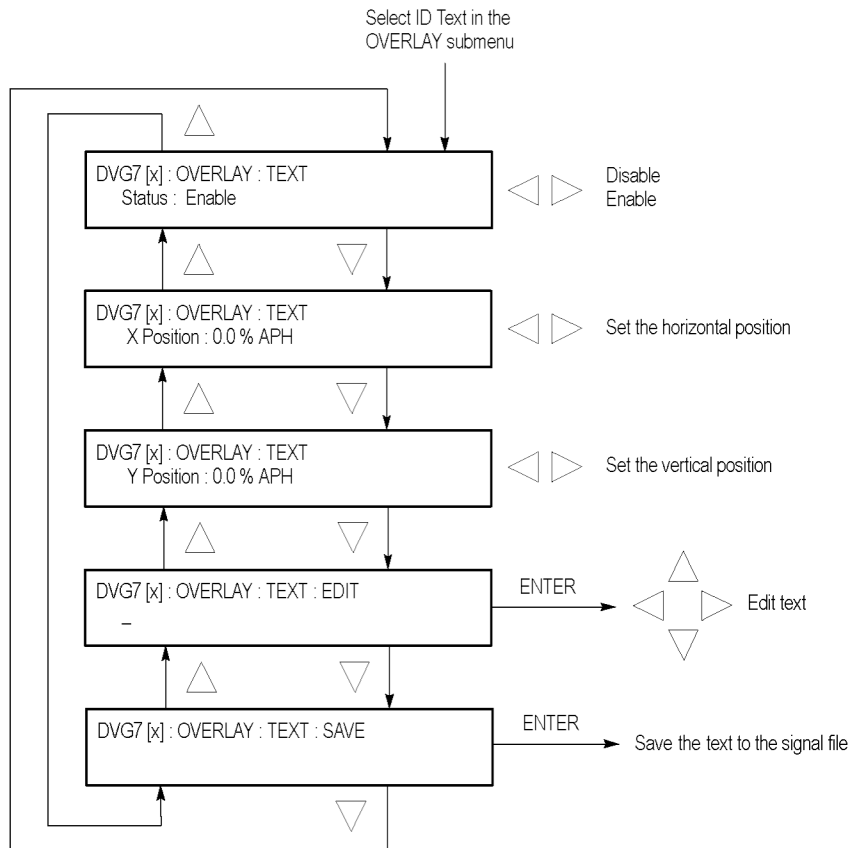


Figure 84: DVG7 module ID TEXT submenu

Status. Enables or disables the text overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**, and then press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the text. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

Y Position. Sets the vertical position of the text. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

EDIT. Edits the text you want to display on the output test signal. Perform the following steps to edit the text:

NOTE. *You can use up to 30 characters for the logo text. Use the blank character to erase unneeded character(s).*

1. Use the left (◀) or right (▶) arrow button to select **EDIT**, and then press the **ENTER** button to enable the text edit mode.
2. Use the left (◀) or right (▶) arrow button to move the underscore character () to the character you want to change.
3. Use the up (▲) or down (▼) arrow button to select the desired character.
4. After you enter all of the desired characters, press the **ENTER** button to exit the text editing mode.
5. Use the left (◀) or right (▶) arrow button to select **SAVE**, and then press the **ENTER** button to save the text and its position to the signal file.

SAVE. Saves the text and its position to the signal file currently being output. Press the **ENTER** button to save the text and its position to the signal file.

CIRCLE Submenu

Use this menu to overlay a circle on the output test signal and set its position on the display. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the CIRCLE submenu.

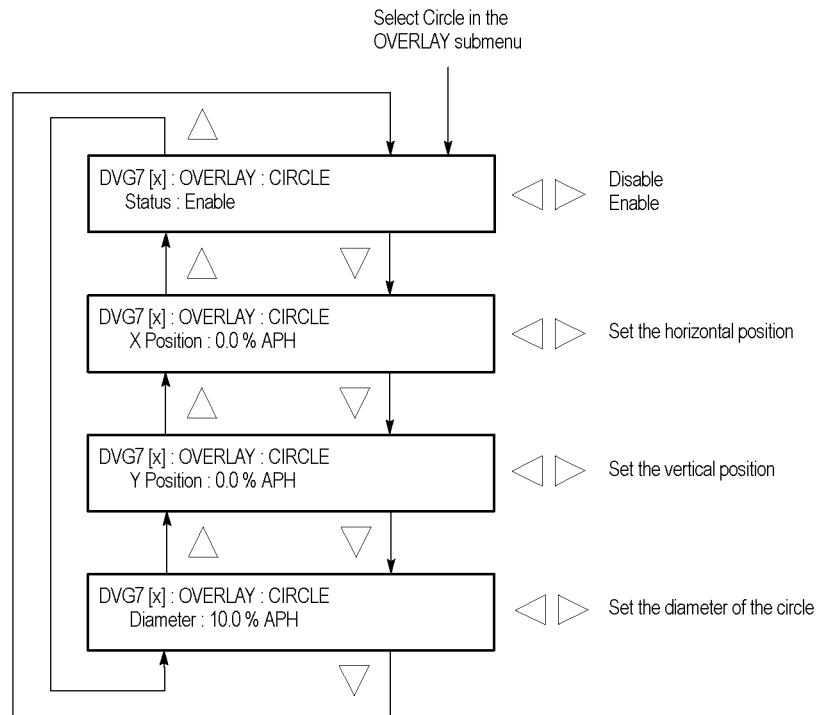


Figure 85: DVG7 module CIRCLE submenu

Status. Enables or disables the circle overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the circle. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Y Position. Sets the vertical position of the circle. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Diameter. Sets the diameter of the circle. The diameter is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 0.0% to 100.0% in 1% steps.

AUDIO GROUP Submenu

Use this menu to perform the following tasks:

- Enable or disable the embedded audio of the selected audio group.
- Select which audio channel to enable.
- Set the emphasis status bits, sampling alignment status bits, and sample bits of the selected audio group.

Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the AUDIO GROUP submenu.

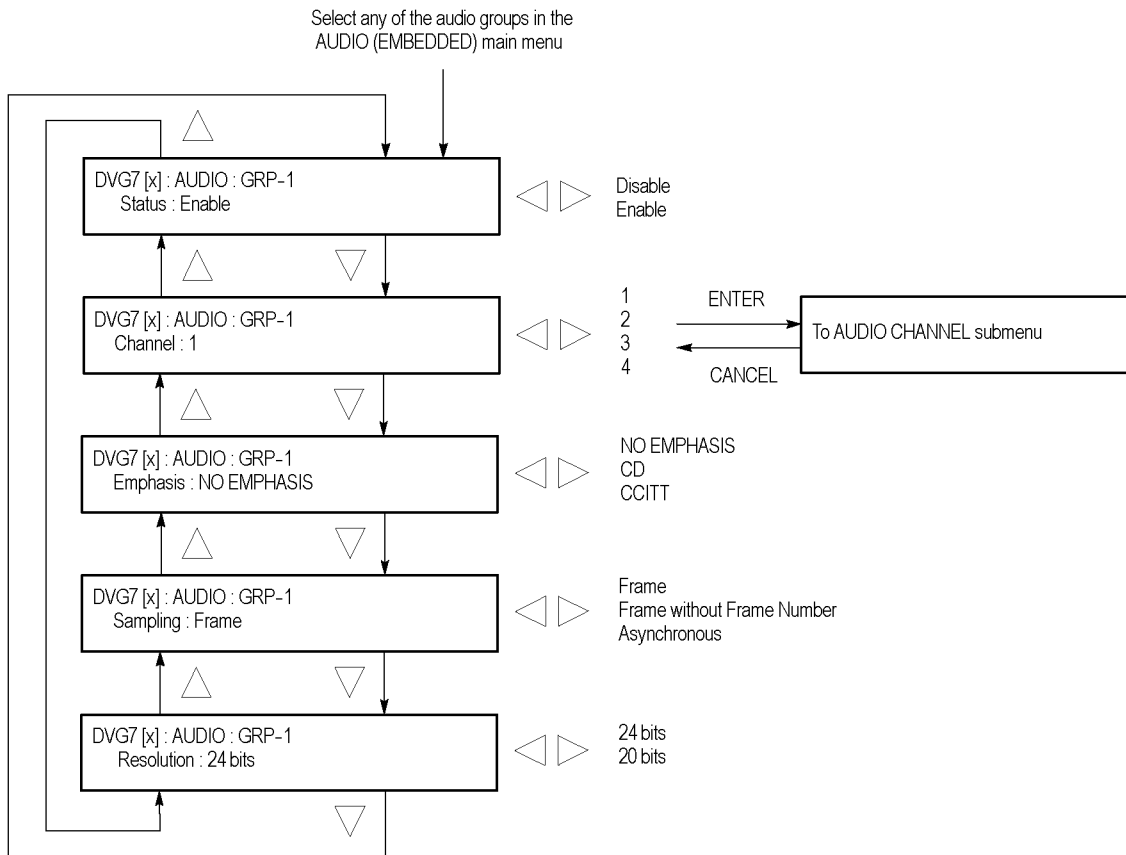


Figure 86: DVG7 module AUDIO GROUP submenu

Status. Enables or disables the generation of embedded audio for the selected audio group. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to confirm the selection.

Channel. Selects the audio channel for which you will change the parameters. Use the left (◀) or right (▶) arrow button to select **1**, **2**, **3**, or **4**. Select any audio channel, and then press the **ENTER** button to access the **AUDIO CHANNEL** submenu. (See page 184.)

Emphasis. Sets the emphasis status bits for the selected audio group. Use the left (◀) or right (▶) arrow button to select **NO EMPHASIS**, **CD**, or **CCITT**. Press the **ENTER** button to confirm the selection.

Sampling. Sets the sampling alignment status bits for the selected audio group. Use the left (◀) or right (▶) arrow button to select **Frame**, **Frame without Frame Number**, or **Asynchronous**. Press the **ENTER** button to confirm the selection.

Resolution. Sets the resolution of the audio signal data for the selected audio group. Use the left (◀) or right (▶) arrow button to select between **24 bits** and **20 bits**. Press the **ENTER** button to confirm the selection.

AUDIO CHANNEL Submenu

Use this menu to set the frequency, amplitude, and audio click of the embedded audio signal for the selected audio channel. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the AUDIO CHANNEL submenu.

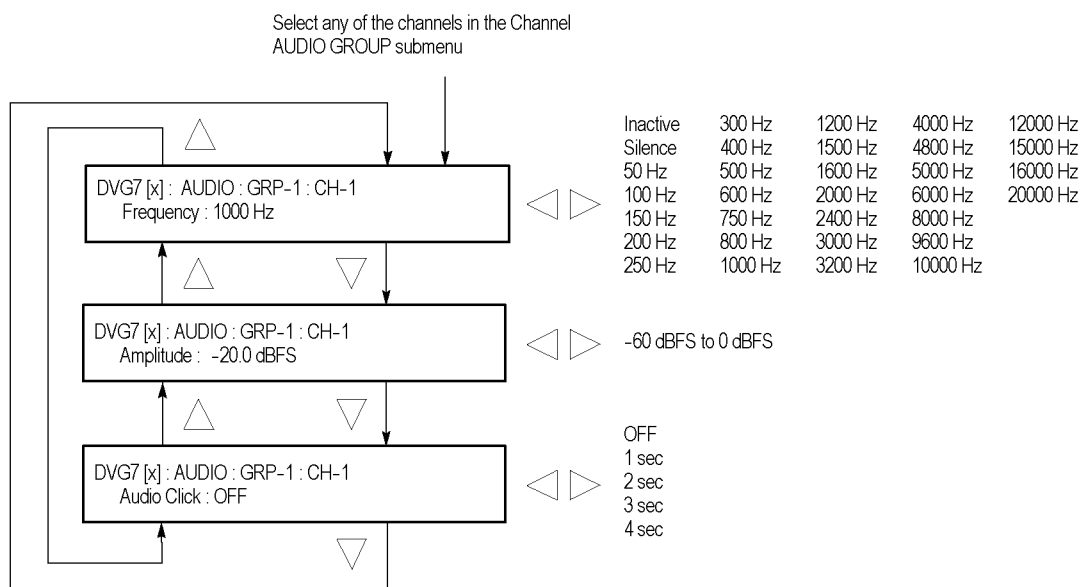


Figure 87: DVG7 module AUDIO CHANNEL submenu

Frequency. Sets the audio signal frequency of the selected audio channel. Use the left (◀) or right (▶) arrow button to select the frequency. The selection items are as follows:

Inactive	400 Hz	1600 Hz	6000 Hz
Silence	500 Hz	2000 Hz	8000 Hz
50 Hz	600 Hz	2400 Hz	9600 Hz
100 Hz	750 Hz	3000 Hz	10000 Hz
150 Hz	800 Hz	3200 Hz	12000 Hz
200 Hz	1000 Hz	4000 Hz	15000 Hz
250 Hz	1200 Hz	4800 Hz	16000 Hz
300 Hz	1500 Hz	5000 Hz	20000 Hz

When **Inactive** is selected, the audio data output is disabled. Press the **ENTER** button to confirm the selection.

Amplitude. Sets the audio signal amplitude of the selected audio channel. Use the left (◀) or right (▶) arrow button to set the amplitude. You can set the value from -60 dBFS to 0 dBFS in 1 dBFS steps.

Audio Click. Inserts audio clicks in the selected audio channel. The audio tone, if any, is turned off for an interval around the audio click. Use the left (◀) or right (▶) arrow button to make the selection. The choices are **OFF**, **1 sec**, **2 sec**, **3 sec**, and **4 sec**. Press the **ENTER** button to enable the selection.

Audio Click becomes valid when you select **1 sec** to **4 sec** for the Audio Click rate. When Audio Click is valid, Audio Tone is turned off for 0.25 second around the click. For example, if you select **3 sec** for the click rate, the audio tone will be output for 2.75 seconds, and silent for 0.25 second; the click occurs during this silence.

When Audio Click is **OFF**, the Audio Tone selected in the **FREQUENCY** menu is output continuously. Audio Click makes it easy to identify any channel(s) of the four output channels.

TIMING Submenu

Use this menu to adjust the timing offset of the serial digital video outputs relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the TIMING submenu.

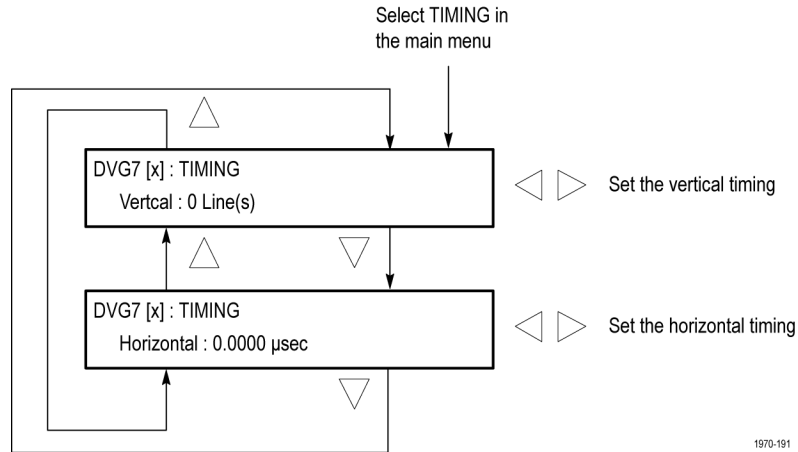


Figure 88: DVG7 module TIMING submenu

Vertical. Sets the vertical timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value within 1/2 frame for 525-270 and 625-270 formats, and from -1 to +1 frame for 525-143 format in 1-line steps.

Horizontal. Sets the horizontal timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1 to +1 line in 1-clock (37.0 ns for 525-270 and 625-270 formats, 69.8 ns for 525-143 format) steps.

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

VIDEO Submenu

Use this menu to perform the following tasks:

- Turn each serial digital video component (Y, Pb, or Pr) on or off individually.
- Turn the insertion of the EDH (Error Detection and Handling) on or off.
- Set the resolution of the serial digital video signals to 8 or 10 bits.
- Turn the output mode for an audio/video timing measurement on or off.

Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the VIDEO submenu.

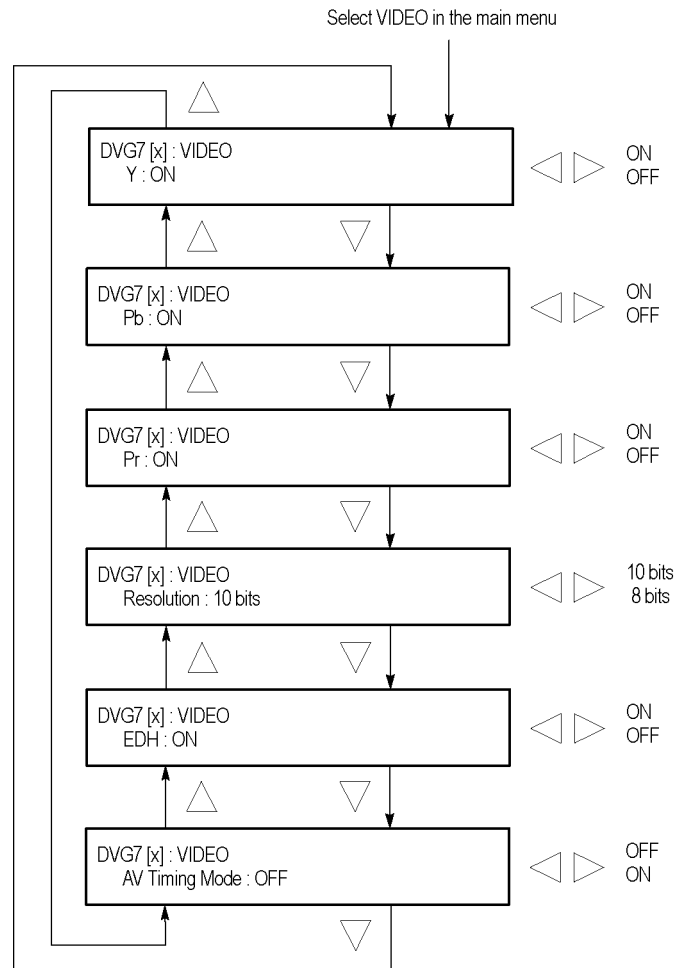


Figure 89: DVG7 module VIDEO submenu

Y. Turns the Y component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

Pb. Turns the Pb component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

Pr. Turns the Pr component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

Resolution. Sets the resolution of the serial digital video signals. Use the left (◀) or right (▶) arrow button to select between **10 bits** and **8 bits**. Press the **ENTER** button to confirm the selection.

EDH. Turns the insertion of the EDH (Error Detection and Handling) information on or off on the serial digital video signals. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

AV Timing Mode. Turns the output mode for an audio/video timing measurement on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

When you turn this mode on, the specified audio and video signals are synchronously on for 0.5 second and off for 4.5 seconds. With this signal, you can measure the time delay that accumulates between the audio and video content of the television signal during signal transport. The time delay can be measured by a video analyzer with the serial digital video signal or by an oscilloscope with the analog audio and video signals extracted from the serial digital video signal.

The following settings are recommended for the audio and video signals when you use this mode:

- Audio signal (CH1 and CH2 of Group 1): 10000 Hz, -20 dBFS
- Video signal: 100% Flat Field

NOTE. *The AV Timing Mode setting is not saved as a preset.*

**BLACK Submenu
(Option BK Only)**

Use this menu to set the output parameters of the serial digital black signals output from the BLACK 1 and BLACK 2 connectors.

Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the BLACK submenu.

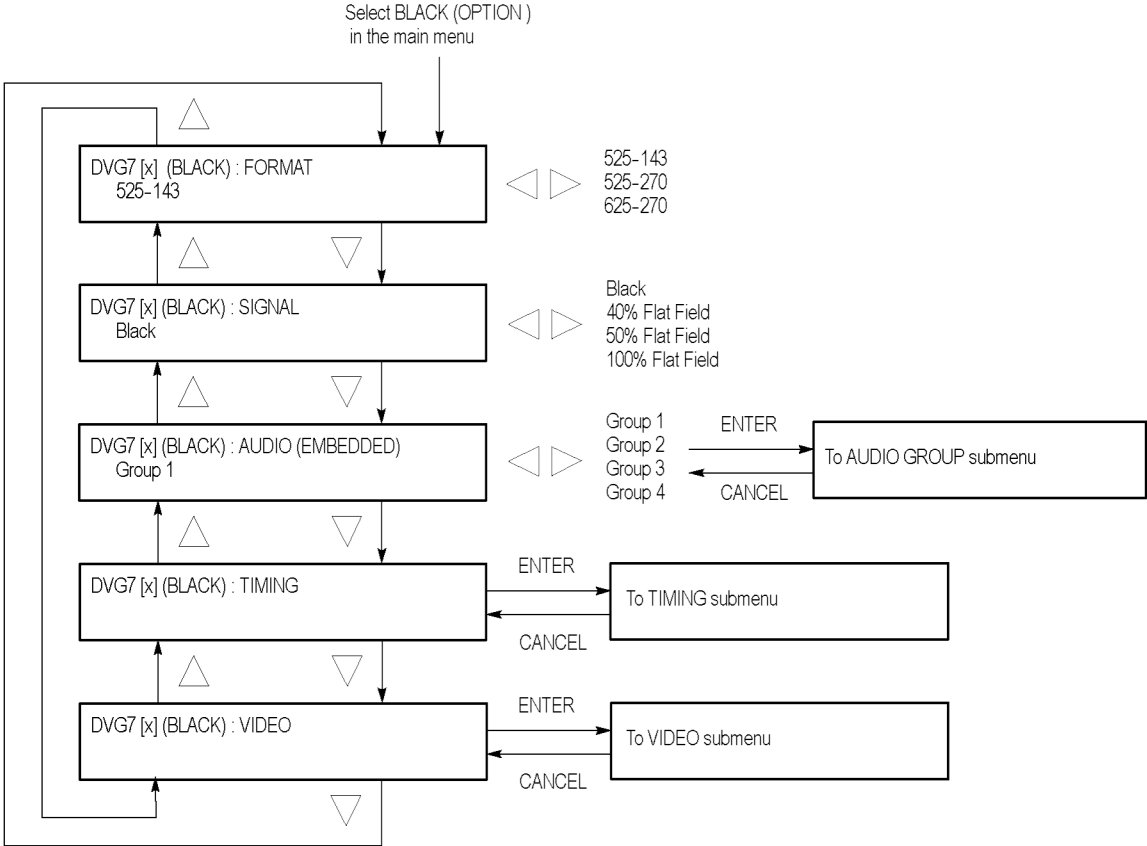


Figure 90: DVG7 module BLACK submenu (Option BK only)

FORMAT. Selects the format of the output serial digital black signals. Use the left (◀) or right (▶) arrow button to select **525-143**, **525-270**, or **625-270**. Press the **ENTER** button to confirm the selection.

SIGNAL. Selects the serial digital black signal to output. Use the left (◀) or right (▶) arrow button to select between **Black** (serial digital black), **40% Flat Field**, **50% Flat Field**, and **100% Flat Field**. Press the **ENTER** button to confirm the selection.

AUDIO (EMBEDDED). Sets the parameters for embedded audio on the serial digital black signals. Use the left (◀) or right (▶) arrow button to select **Group 1**, **Group 2**, **Group 3**, or **Group 4**. Select any of the groups, and then press the **ENTER** button to access the **AUDIO GROUP** submenu. (See page 183.)

TIMING. Sets the timing offset of the serial digital black outputs relative to the internal reference signal (frame reset signal). Select this menu item, and then press the **ENTER** button to access the **TIMING** submenu. (See page 186.)

VIDEO. Sets the resolution and EDH insertion of the serial digital black signals. Select this menu item, and then press the **ENTER** button to access the **VIDEO** submenu. (See page 187.)

Factory Default Settings

The following table shows the factory default settings for the DVG7 Generator module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 25: DVG7 module factory default settings

Menu item name	Settings
STATUS	525-270 SMPTE Color Bars
MOVING PICTURE	
H Step	0 Sample(s)
V Step	0 Line(s)
Period	1 Frame(s)
Random	Disable
OVERLAY : OBJECT	Logo
OVERLAY : BLINK	OFF
OVERLAY : LOGO	
Logo	OFF
OVERLAY : ID TEXT	
Status	Disable
OVERLAY : CIRCLE	
Status	Disable
X Position	0.0% APH
Y Position	0.0% APH
Diameter	90% APH
AUDIO : GRP-1 to GRP-4	
Status	Disable
Emphasis	No Emphasis
Sampling	Frame
Resolution	20 bits
AUDIO : GRP-1 : Ch-1 to CH-4	
Frequency	1000 Hz
Amplitude	-20.0 dBFS
Audio Click	OFF
TIMING	
Vertical	0 Line(s)
Horizontal	0.0000 μ s

Table 25: DVG7 module factory default settings (cont.)

Menu item name	Settings
VIDEO	
Y	ON
Pb	ON
Pr	ON
Resolution	10 bits
EDH	ON
AV Timing Mode	OFF
Option BK	
(BLACK) FORMAT	525-270
(BLACK) SIGNAL	Black
(BLACK) AUDIO : GRP-1 to GRP-4	
Status	Disable
Emphasis	No Emphasis
Sampling	Frame
Resolution	20 bits
(BLACK) AUDIO : CH-1 to CH-4	
Frequency	1000 Hz
Amplitude	-20.0 dBFS
Audio Click	OFF
(BLACK)TIMING	
Vertical	0 Line(s)
Horizontal	0.0000 μ s
(BLACK)VIDEO	
Resolution	10 bits
EDH	ON

GPS7 GPS Synchronization and Timecode Module

This section describes the module-specific functions of the GPS7 GPS Synchronization and Timecode module. Refer to the following locations for additional information about this module:

- *GPS7 Module Connectors* for a description of the rear-panel connectors. (See page 54.)
- *GPS7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 27.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description


The GPS7 GPS Synchronization and Timecode module is designed to be installed in the TG700 TV Signal Generator Platform. The module provides the following features:

- Integrated GPS receiver that can serve as the system timing reference
- Three analog black video outputs for NTSC, PAL, or trilevel HD sync signals
- Timecode output available as VITC on the black outputs and from four independent LTC outputs
- Timecode reference to time-of-day from the GPS receiver or the internal source or to a program time counter for elapsed-time timecode
- Simple Network Time Protocol (SNTP version 3.0) Server functionality to respond to time requests over the Ethernet interface
- 3.3 V or 5 V DC power output available for the GPS antenna
- One General Purpose Interface (GPI) input that allows you to remotely reset the program time, reacquire the GPS position, or to force a jam sync
- Two General Purpose Interface (GPI) outputs that allow you to send an alarm signal when the GPS signal quality falls below a user selectable level, when there is a loss of lock on the GPS signal, or at a user selected time
- Ability to schedule GPS clock changes for Daylight Savings Time (DST) and for leap seconds
- Ability to configure how the instrument responds when there is a loss of lock to the GPS signal, and how the instrument responds when the signal is recovered

Operating Procedure

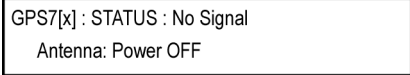
After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Watch the display for messages during the boot process. Messages are displayed for a few seconds. If a serious error is detected during boot, the module menus will not be displayed.
3. After the initialization process is complete, the mainframe main menu appears as shown below:



TG700 : PRESET

4. Press the front-panel **MODULE** button until the GPS7 module main menu appears. It will look similar to what is shown below:



GPS7[x] : STATUS : No Signal
Antenna: Power OFF

1970-200

5. Configure the GPS7 module as required for your installation. (See page 195, *Configure the GPS7 Module*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus.

Refer to *GPS7 Module Main Menu* for detailed information about the main menu items and the submenu items. (See page 206.)

NOTE. *Configure your GPS7 for your installation before putting it into service. (See page 195, Configure the GPS7 Module.) After you have configured the module, save the configuration as the power-on preset so that if power is lost, the GPS7 will power-on in the correct configuration. (See page 63, PRESET Submenu.)*

Configure the GPS7 Module

When you first receive your GPS7 module, there are a few things you need to do, and a few things you should know, before putting it into service. This section includes information about the following:

- Performing an internal frequency calibration
- Performing a gain calibration
- Understanding the GPS antenna system
- Understanding signal quality
- Understanding time flow
- Configuring module settings

Oven Calibration Procedures

If you are installing a module into an existing mainframe, you need to set the internal frequency of the mainframe internal oscillator and characterize the oscillator frequency as a function of voltage before putting it into service. This latter calibration can only be performed in factory mode when the instrument is out of service.

If you have received your GPS7 module already installed in a mainframe, you can set the internal frequency after putting the module in its operating environment and allowing it to reach a stable operating condition.

Information about the Oven Calibration menu is available in the *CAL OVEN Submenu* section. (See page 74.)

NOTE. *Perform the mainframe internal frequency calibration at least once a year to compensate for oscillator drift. With software version 5.1 or greater and a GPS7 module installed, this calibration can be done while the instrument is in service.*



WARNING. *Dangerous electric shock hazards exist inside the TG700 mainframe. Only qualified service personnel should perform these procedures. Failure to use appropriate precautions can result in injury or death.*

Internal frequency calibration. Perform the following procedure to set the internal frequency of the mainframe internal oscillator. This adjustment stores the current frequency of the oscillator while it is locked to a GPS signal. It is stored for use when the instrument is set to **Internal** mode. This procedure can be done without any disruption to operation and is best performed in the operating environment of the instrument.

1. Connect the power cord to the TG700 mainframe.
2. Check for error messages as the instrument starts.
3. Connect a GPS signal to the rear of the module.
4. Allow the instrument to warm up for a minimum of 20 minutes.
5. Press the **MODULE** button until **GPS7 : STATUS** appears.
6. Check that the signal status shows **Locked**.
7. Check that signal lock indicator displays **Fine**:
 - a. Press the up (▲) arrow button to select **DIAGNOSTICS**.
 - b. Press the **ENTER** button.
 - c. Press the right (▶) arrow button to select **TUNE**.
 - d. Check that **Fine** is showing on the right side of the LCD display.
8. Press the **MODULE** button until **TG700** appears.
9. Press the up (▲) arrow button to select **UTILITY**.
10. Press the **ENTER** button.
11. Press the up (▲) arrow button to select **CAL OVEN : SELECT**.
12. Press the **ENTER** button to access the **Internal Frequency Calibration** submenu.
13. Press the **ENTER** button to start the calibration. The instrument will display the stored calibration value.
14. Press the **ENTER** button.
15. Press the **CANCEL** button to exit the calibration menu when the calibration is complete.

Gain calibration. Perform the following procedure to characterize the oscillator frequency as a function of voltage. This adjustment needs to be performed in factory mode and is only needed once to characterize the oscillator.



CAUTION. *To avoid signal errors, perform the Gain Calibration only when the instrument is out of service. This calibration temporarily disrupts the frequency of all signals in the box.*

1. Connect a GPS signal to the antenna input on the rear of the module.
2. Cycle the mainframe power by unplugging the power cord from the rear of the instrument and then holding the **FRONT PANEL ENABLE** button while plugging the power back into the instrument. Continue to hold the button during start up until **TG700 Start up with factory mode** shows on the LCD display.
3. Allow the instrument to warm up for a minimum of 20 minutes.
4. Press the **MODULE** button until **GPS7 : STATUS** appears.
5. Check that the signal status shows **Locked**.
6. Check that signal lock indicator displays **Fine**:
 - a. Press the up (▲) arrow button to select **DIAGNOSTICS**.
 - b. Press the **ENTER** button.
 - c. Press the right (▶) arrow button to select **TUNE**.
 - d. Check that **Fine** is showing on the right side of the LCD display.
7. Press the **MODULE** button until **TG700** appears.
8. Press the up (▲) arrow button to select **UTILITY**.
9. Press the **ENTER** button.
10. Press the up (▲) arrow button to select **CAL OVEN : SELECT**.
11. Press the right (▶) arrow button to access the **Gain Calibration** submenu.
12. Press the **ENTER** button to calculate the gain value.
13. Wait approximately 20 seconds for the process to end. The result will be displayed.
14. Press the **ENTER** button to return to the Gain Calibration menu.
15. Press the **CANCEL** button to exit the Gain Calibration menu.
16. Wait approximately two minutes for the GPS control loop to recover before cycling the instrument power and putting the instrument back in service.

GPS Antenna Requirements

The GPS7 module requires an external antenna to receive signals from satellites. You must set up an antenna system to provide the GPS signal as an input to the module. You can configure the instrument to provide 3.3 V or 5 V DC power for the antenna.



WARNING. Prevent risk of shock or fire by ensuring that the GPS antenna is protected from lightning strikes when it is mounted outside a building or facility. The GPS7 module and TG700 mainframe do not have isolation protection from lightning, so the facility installation must provide suitable protection for the GPS antenna external to the TG700 mainframe. Failure to use appropriate precautions can result in injury or death.



CAUTION. To avoid antenna damage, do not turn on the DC antenna power until you know that the antenna is designed to handle the selected voltage. Antenna damage can occur if the antenna is not designed to handle the voltage you select.

When a GPS feed is first connected to the antenna input on the module, it can take several minutes for the signal quality to reach its nominal potential. How long that takes depends on such things as antenna site, cable plant design, and available satellites. Excluding those variables, the typical time to acquire satellites and achieve specified stability with a good satellite signal, known position, and a warmed up instrument, is two minutes.

GPS Antenna System

Antenna systems vary depending on the operating environment and on safety and regulatory requirements. A simplified typical system is shown in the following figure to help you with planning and understanding the trade-offs of one set up versus another. (See Figure 91.)

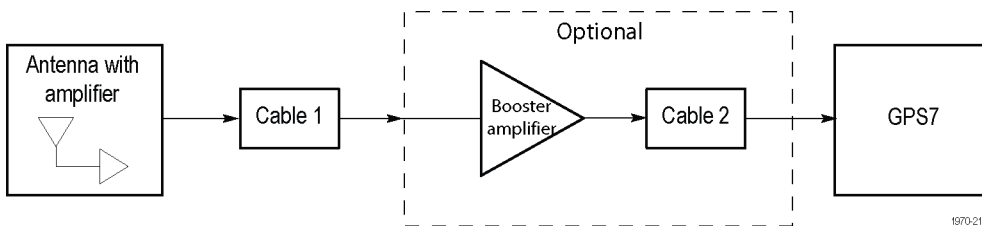


Figure 91: Simplified antenna system

A GPS specific antenna with amplifier provides sufficient gain to drive a reasonable length of cable, and provides filtering to reject signals at other frequencies. A typical example of this is the Trimble Bullet III, 35 dB, 5 V, antenna.

In a simple system without the optional booster, Cable 1 connects the antenna to the GPS7. The length of this cable is limited by its attenuation at the GPS carrier frequency of 1575 MHz. The GPS7 should have a signal that is 18 dB or greater

above the ambient level. For example, for a 35 dB antenna, the allowed cable loss is $35 - 18 = 17$ dB. (See Figure 91.)

Cables. Attenuation varies significantly depending on cable type. Cable loss is about 13 dB/100 ft for a miniature coaxial cable like the Belden 1855, while for a RG11 style like the Belden 7731, the loss is only 5.5 dB/100 ft. This correlates to an allowable length of 130 ft for the small cable, to over 300 ft for the larger cable.

A booster amplifier can be added if more length is needed, as shown in the optional block in the signal path system. (See Figure 91.)

If a 20 dB amplifier is added, then 20 dB more cable loss can be accommodated. This equates to another 150 ft of small coax, or 360 ft of large coax.

Although the GPS7 input and most of the other components are 50Ω , either 50Ω or 75Ω cable can be used in most installations. The reflections from the impedance mismatch will not cause significant changes in the system because the signal is narrow band and the cable loss is usually many dBs. However, you should not mix short cable lengths of different impedances, as this might create reflections with the potential to cause signal degradation.

Amplification. The GPS7 provides either 3.3 V or 5 V DC power to drive the amplified antenna and booster amplifier. The power is carried on the same coax as the GPS signal, and can be turned off if the antenna is powered by a separate supply. When you are designing the antenna system, check the voltage and current requirements of the components to insure compatibility.

The location of the booster amplifier is important. It needs to be before the second length of cable shown in the simplified antenna system diagram. If the booster amplifier is placed just *before* the GPS7, then the signal will have been attenuated too far and the output may be noisy. If you cannot put the optional booster amplifier in the middle of a long run of cable, then put it near the antenna rather than near the GPS7 end.

For more complex systems, a variety of booster amplifiers, powered and passive splitters, DC blocks, and filters are available from a number of vendors.

Antenna location. It is important that the GPS antenna location has a clear view of a large part of the sky. Since GPS satellites are constantly orbiting the earth, they may be in any direction at a given time. If part of the sky is blocked by buildings, trees, mountains, etc., then fewer satellites will be visible. It is also possible to get reflected signals that will have come by a longer path than expected and thus may degrade timing accuracy and stability. When evaluating a site, it is important to monitor it over several days and with a variety of weather conditions present.

This antenna information is not intended to cover all aspects of the antenna system design. Important topics that were not covered include items like lightning protection and drip loops. For information about the cable plant design in your system, contact the appropriate person or group in your organization, or contract with a qualified installer.

Figures of merit (FOM)

These numbers are a compendium of the GPS signal quality and the processes that occur as the instrument progresses through the states needed to lock on to the GPS signal. The FOM provides a simple scale to evaluate the state of the GPS lock.

The FOM drives the external reference indicator (LED) on the front panel of the mainframe. When in internal mode, the external LED is off. When in external mode and the FOM is ≥ 6 , the LED is steady green. When the FOM is < 6 , the LED is flashing green.

The FOM provides the scale by which you can set the signal warning threshold. (See page 231, *GPO Submenu*.)

You can see the description of the FOM in the GPS7 **STATUS** menu. The following table lists the figures of merit and their descriptions.

Table 26: Figures of merit for signal quality

Figure of merit (FOM)	Indicator	Description
0	No signal	This means that no usable satellite signals are detected. This is normal for a short time after the signal is applied, but if it lasts more than a minute or so, then it usually means one of the following: that there is a problem in the antenna or cable, the antenna is blocked from direct line of sight to the satellites, or the power is not getting to the antenna.
1	Low signal	This means that some signal is detected, but that the signal quality is too low for extraction of useful timing or position information. This is a normal situation for a short duration, but if it persists, the causes are likely to be similar to those for FOM state 0.
2	Acquire satellites	This means that the instrument is receiving data from the satellites and is determining which signals to use.
3	Bad position	This means that the instrument detects that the stored position is different from the current position. In this case, the instrument will automatically go to FOM state 4 and reacquire the position.
4	Acquire position	This means that the instrument is acquiring multiple fixes of the satellite position and averaging this into a new position to store in flash. This state will also be displayed if you manually perform a new position acquisition. This state normally lasts 60 seconds with good GPS signal quality.

Table 26: Figures of merit for signal quality (cont.)

Figure of merit (FOM)	Indicator	Description
5	Adjust phase	This means that the instrument is adjusting the time base or frame timing to correctly line up with the GPS signal.
6	Locked > Signal quality is ≤ 16	These states indicate that the phase of the frame signals is within 150 ns of the GPS signal. The number of arrows indicates the signal quality. It is normal for this to vary with the time of day as the different satellites move through their orbits, as well as with changes in weather and other conditions.
7	Locked >> Signal quality is > 16	
8	Locked >>> Signal quality is > 26	
9	Locked >>>> Signal quality is > 42	
10	Locked >>>>> Signal quality is > 68	
11	Locked >>>>>> Signal quality is > 110	

NOTE. The duration of some states depends on the strength of the received GPS signal. If the antenna only has access to part of the sky, or if the cable loss between the antenna and the receiver is too large, then it may take significantly longer to progress up to the higher entries in the FOM table.

Time Flow Block Diagram

The following time flow diagram shows time information is used at different points in the system. In particular, it illustrates how the different user inputs and configuration settings combine with the time base to create the timecode. An asterisk (*) denotes points of possible user input.

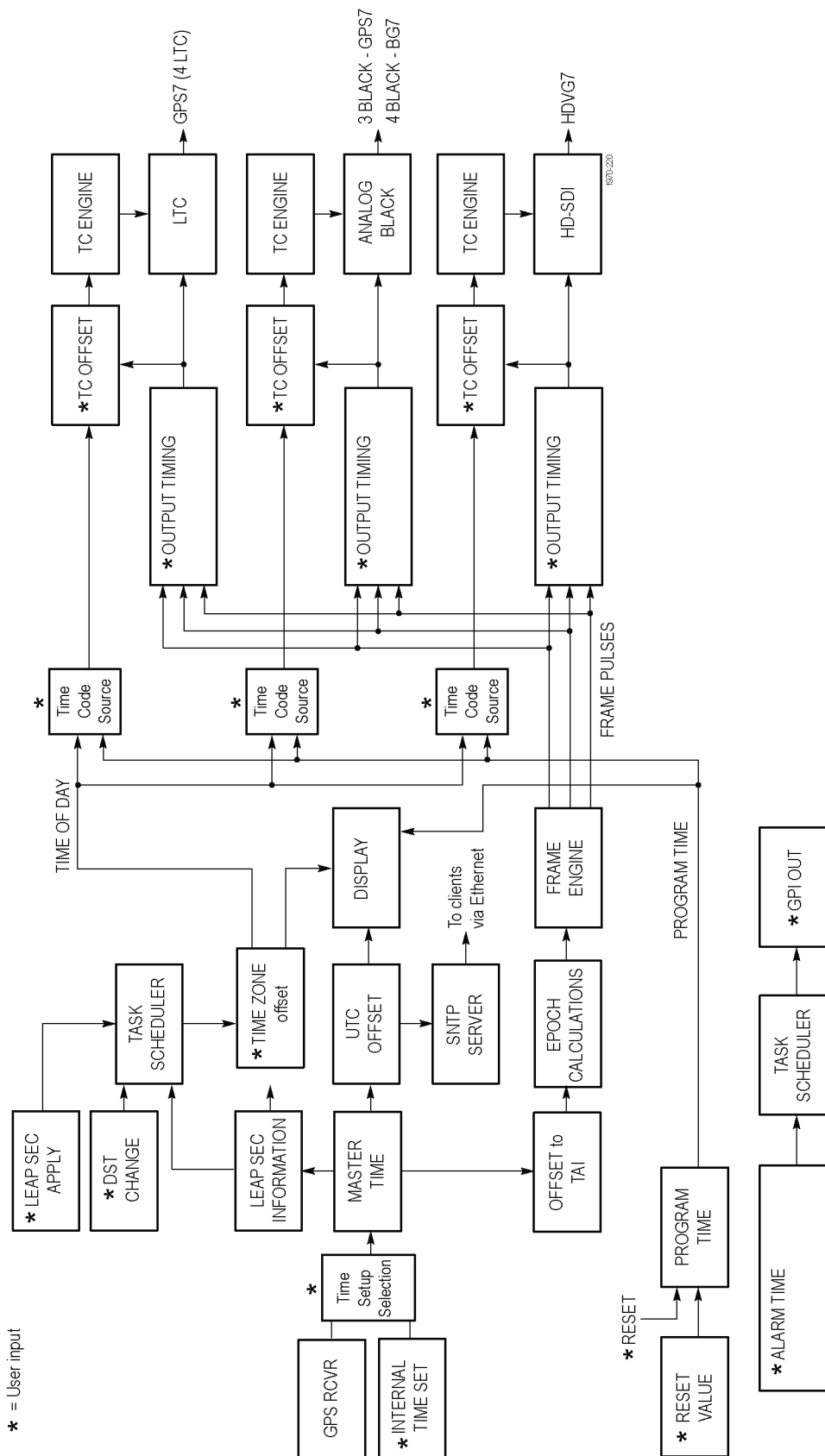


Figure 92: Time flow block diagram

GPS RCVR. The GPS signal can be selected as the source for a time of day clock used for timecode outputs, and as a phase reference for video outputs. The GPS signal carries the time represented as the number of weeks and number of seconds since the GPS Epoch (0:00:00 UTC, January 6 1980). For example, 12:00:00 UTC on November 5, 2008 is represented as 1504 weeks plus 302,400 seconds. An additional 14 leap seconds that have passed between January 1980 and November 2008 are also signalled in messages from the GPS satellite system.

Internal Time Set *. If you want to set Time Setup to internal mode, enter the current date and time and then set the Time Setup to Internal in order to transfer that time to the Master Time. The time zone offset and leap second information is used to convert local time to a master time that is equivalent to GPS time. This allows the Epoch and SNTP processes to work the same for both internal and GPS time modes. Set the local time zone offset before setting the internal time.

Time Setup Selection. Time Setup allows you to select the source of time to the Master Time counter. Normally, this should be set to GPS time. However, it may be set to Internal if the GPS signal is unavailable. For optimal performance, do the following before selecting Internal Time mode: set the local time zone offset and correct the internal time and date.

Master Time. The Master Time is the basis for all timecode outputs and for the phase reference of all video outputs.

Leap Seconds. Leap second information is stored and then updated by satellite every 20 to 30 minutes

Offset to TAI. TAI is the International Atomic Time, represented as the number of seconds since the epoch of 0:00:00 January 1, 1958. Proposed standard SMPTE 404M defines the SMPTE Epoch at that same moment. There are exactly 8040 days and 19 leap seconds between the SMPTE Epoch (TAI) and the GPS Epoch.

Epoch Calculations. The number of seconds since the SMPTE Epoch is used to precisely align video frames with the Master Time clock. For example, an NTSC system operates at 29.97 frames per second (30 fps/1.001), so there are precisely 30,000 frames every 1001 seconds. By knowing the total number of seconds since the SMPTE Epoch, when all video frames were perfectly aligned, the GPS7 module can determine "where" the GPS pulse-per-second signal is located with respect to video framing.

Frame Engine. The frame engine supplies frame pulse signals based on the SMPTE Epoch to each video output. This ensures that they are properly aligned with respect to the calculated phase for the selected video format of each output.

Output Timing. Each video output has an independent offset that can be specified to shift that output in order to align the video and LTC signals in the studio. This time adjustment does not effect the timecode that is applied to that output: the signal and timecode stay together as the timing is changed. The timing offset range and resolution depend on the signal. See the specific output menu for details.

Leap Second Information. The GPS signal indicates the number of leap seconds between GPS time and UTC. As of December 31, 2008, a total of 34 leap seconds are required for the adjustment between TAI and UTC. This information only stays current when a GPS signal is connected. On instrument boot up, stored leap second information is used, and an asterisk appears next to the time in the status screen until the leap second information from the GPS signal is received.

Time Zone Offset *. The GPS7 has a selectable offset between UTC and the local time, usually representing the local time zone. This offset can be specified in hours+minutes+seconds, allowing specification of time zones that do not align with the usual hours-only offset, or for other applications not related to time zones. You can also use this setting to set the internal time to calculate “backwards” to the Master Time.

Leap Second Apply *. Leap seconds, when required, are added on June 30, and/or December 31, at 23:59:60 UTC. That is, the minute preceding midnight has 61 seconds instead of 60, numbered 0..60 instead of 0..59. This might be an inconvenient time to make a local clock adjustment. For example, this is during prime time for the North American Eastern Time Zone. Therefore, the GPS7 gives the option of deferring the leap second adjustment (if any) on these dates for up to 24 hours.

DST Change *. Daylight savings changes happen twice a year in many time zones, but some locations do not observe daylight savings time. The GPS7 has a user programmable DST adjustment to the time zone offset that is made by adding or subtracting a specified amount from the current value. The scheduled date and time of the change must be programmed into the GPS7. For example, to change to daylight savings time, schedule the system to add one hour to the time zone offset at 02:00:00 (local time) on March 8, 2009. To return to standard time, schedule the system to subtract one hour from the time of day offset at 02:00:00 on November 1, 2009. At the scheduled time and date, the DST change will be added to the time zone offset as seen from the instrument display. You can then program the next scheduled DST change.

Task Scheduler. The task scheduler is responsible for triggering scheduled events at the appropriate time. This includes DST changes, deferred leap second adjustments, and triggered alarm outputs.

SNTP Server. The GPS7 includes an implementation of the Simple Network Time Protocol (version 3.0), using the network interface of the TG700 mainframe. The SNTP server is automatic; when the Master time is set to GPS and the GPS7 acquires a valid time, the server will respond with valid SNTP packets to time requests from NTP clients. When the Master time is set to GPS, the server always responds with UTC time only. It is the responsibility of the NTP client (PC workstation, file server, etc.) to be configured with the correct time zone offset. The SNTP Server will also respond with valid SNTP packets when the Master time is set to Internal mode.

TC Offset *. Every timecode output has an independent offset (hours, minutes, seconds, frames) that can be added to the value of the selected timecode source.

TC Engine. The timecode engine runs at the rate specified through the user interface and generates the actual timecode bits needed for each output.

LTC. The GPS7 module has four independent linear timecode outputs. Each output can be set independently with regard to timecode format, module timing, and timecode delay.

Analog Black. The GPS7 module has three analog sync outputs. Each output can be configured as NTSC or PAL black burst (with optional VITC insertion) or HD trilevel sync. The BG7 module has four analog sync outputs which can be similarly configured.

HD-SDI. The standard HDVG7 module has one HD-SDI test signal generator (with two outputs), for which ancillary timecode (ATC) can be added. If Option BK is available, then there are two independent HD-SDI test signal generators available.

Program Time. As an alternate to the local time of day, a program time counter can be used as a timecode source for any output. This counter can represent elapsed time, such as the timecode associated with program content during the editing process, for example.

Reset Value. The program time counter will start counting from the specified reset value. Program time can be reset to this value at any time using either the user interface or a general purpose interface (GPI) input.

Alarm Time. An alarm can be set to generate when the program time counter matches a predefined value. For example, you can specify the start timecode of your program content at 01:00:00:00. The program time can be initialized to 00:59:00:00 to start a one minute leader before the program. The alarm time could be set at 00:59:55:00 to signal a five second countdown before the program start, perhaps to signal a change from color bars to black within the pre-program leader.

GPI Out. The GPS7 module has two General Purpose Interface (GPI) outputs, either of which may be configured to begin when the program time matches a specified alarm time.

Configuring Module Settings

Understanding the capabilities, operating environment, antenna system, and other requirements of the GPS7 module can help you decide how to configure it to best meet the needs of your specific applications. The GPS7 menu trees and menu descriptions can help you configure the module. (See page 206, *GPS7 Module Main Menu*.)

GPS7 Module Main Menu

Use the GPS7 module main menu to perform the following tasks:

- View the status of the module and signal
- View diagnostics results for the module
- Select the LTC output or GPI input and output
- Set the antenna voltage, time of day, and other time related parameters
- Generate a Black 1, Black 2, or Black 3 signal
- Set the timing reference source to Internal or GPS signal

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the GPS7 module main menu.

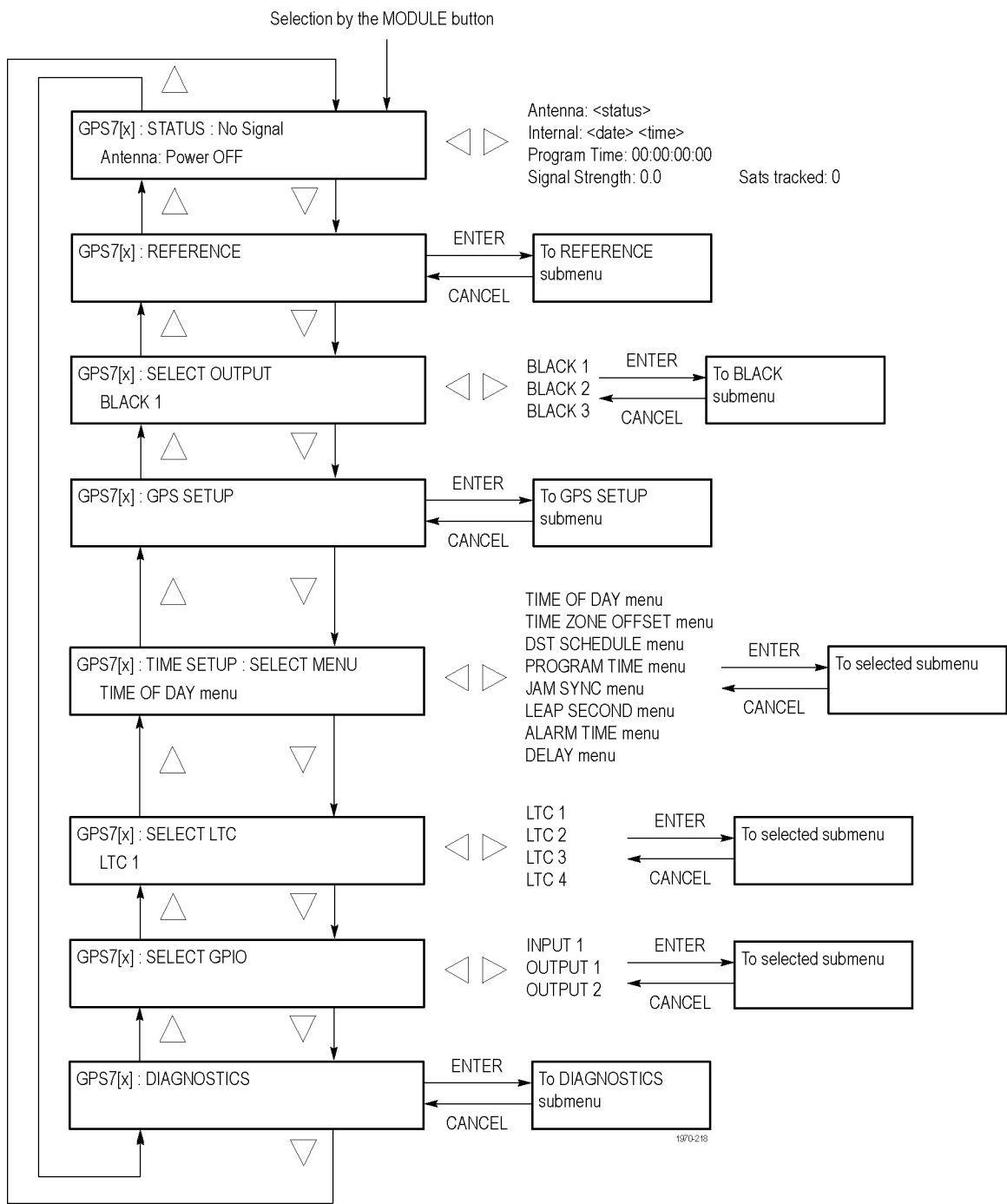


Figure 93: GPS7 module main menu

STATUS Submenu

Displays the status of the GPS7 module. The top line of the display changes depending on whether the module is using the GPS signal or the internal reference frequency as the timecode reference.

When GPS is set as the timecode reference, the top line displays the Figure of Merit rating for the relative strength of the GPS signal. (See page 200, *Figures of merit (FOM)*.) When the internal reference frequency is used as the timecode reference, the top line displays **Internal**.

Use the left (◀) or right (▶) arrow button to view the following status displays on the bottom line of the display:

- Date and time of the currently used timecode reference (GPS or internal)
- UTC time display
- Program time counter
- GPS signal quality and the number of satellites being tracked.

NOTE. *Signal quality is an indicator of how well the GPS signal is being received. It is a sum of the correlation for each of the satellites. It can be used to evaluate the antenna and connecting cable, but it can take a while for the receivers to recognize which satellites are available and stabilize at the final level.*

- Antenna power status: **Power OFF, Open, Short, or Nominal.**

NOTE. *A shorted GPS antenna will not damage the GPS7 module. If a splitter is used on the antenna, it may appear as a short at DC but will still pass through the RF signal, which will allow the GPS to function.*

The status will read Open if no antenna is connected or if the current load is less than expected because a splitter or DC block is being used.

REFERENCE. Selects the timing reference and the response for a loss of lock to the timing reference. Select this menu item, and then press the **ENTER** button to access the REFERENCE submenu. (See page 210.)

SELECT OUTPUT. Selects which output to configure for signal format, timing, and timecode parameters. Use the left (◀) or right (▶) arrow button to select the output you want to configure (BLACK 1, BLACK 2, or BLACK 3), and then press the **ENTER** button to access the BLACK submenu. (See page 212.)

GPS SETUP. Sets GPS signal parameters and sets the level at which a warning message will be generated if the GPS signal quality deteriorates. Select this menu item, and then press the **ENTER** button to access the GPS SETUP submenu. (See page 216.)

TIME SETUP. Provides access to several submenus for setting timing parameters for the module. Use the left (◀) or right (▶) arrow button to select one of the following submenus, and then press the **ENTER** button to access the selected submenu.

- **TIME OF DAY menu:** Use this submenu to set the module time of day reference. (See page 220.)
- **TIME ZONE OFFSET menu:** Use this submenu to set the time zone offset for your location. (See page 221.)
- **DST SCHEDULE menu:** Use this submenu to configure how the module handles Daylight Saving Time. (See page 222.)
- **PROGRAM TIME menu:** Use this submenu to configure the program time parameters. (See page 223.)
- **JAM SYNC menu:** Use this submenu to set parameters for the Jam Sync function. (See page 224.)
- **LEAP SECOND menu:** Use this submenu to configure how the module handles leap seconds. (See page 225.)
- **ALARM TIME menu:** Use this submenu to configure a time-based alarm. (See page 226.)
- **DELAY menu:** Use this submenu to configure a time to defer reporting errors so that brief errors are ignored. (See page 227.)

SELECT LTC. Selects which LTC output to configure for timecode parameters. Use the left (◀) or right (▶) arrow button to select the output you want to configure (LTC 1, LTC 2, LTC 3, or LTC 4), and then press the **ENTER** button to access the LTC submenu for the selected output. (See page 228.)

SELECT GPIO. Sets how the GPS7 General Purpose Interface (GPI) is configured. Use the left (◀) or right (▶) arrow button to select the GPI input or output you want to configure (INPUT 1, OUTPUT 1, or OUTPUT 2), and then press the **ENTER** button to access the GPI submenu for the selected input or output.

When you select INPUT 1, you will access the GPI submenu. (See page 230.)
When you select OUTPUT 1 or OUTPUT 2, you will access the GPO submenu for the selected output. (See page 231.)

DIAGNOSTICS. Allows access to the outputs of several diagnostics. Select this menu item, and then press the **ENTER** button to enter the **DIAGNOSTICS** submenu. (See page 232.)

REFERENCE Submenu

Use this submenu to select the timing reference and the response for a loss of lock to the timing reference. The following figure shows the REFERENCE submenu.

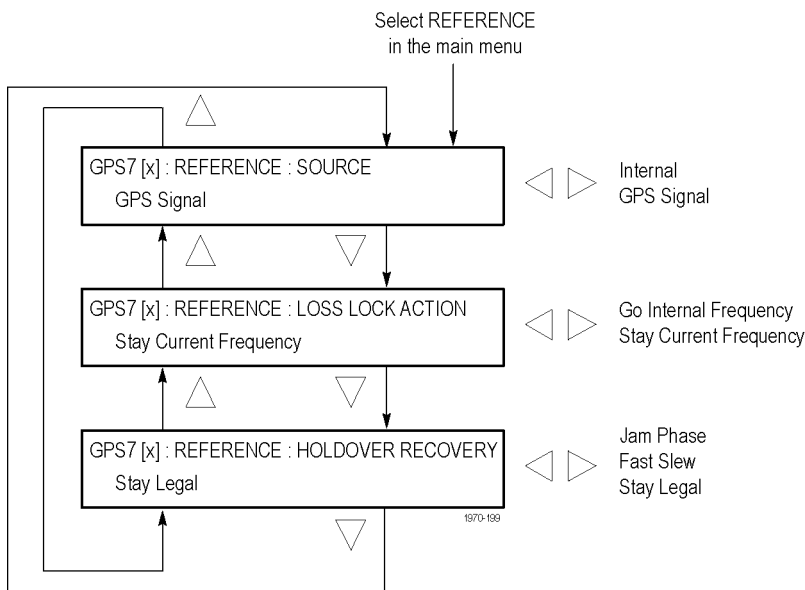


Figure 94: GPS7 module REFERENCE submenu

SOURCE. Use the left (◀) or right (▶) arrow button to set the reference source for the module timing. Select one of the following references, and then press the **ENTER** button to confirm the selection.

- **GPS Signal:** Uses the GPS signal input as the timing reference.
- **Internal:** Uses the internal clock frequency setting as the timing reference.

NOTE. The time of day selection can also be set to GPS or Internal. (See page 220, *TIME OF DAY Submenu.*)

LOSS LOCK ACTION. Use the left (◀) or right (▶) arrow button to select the action that the module will make when a loss of lock condition is detected. This can happen for example, if the GPS antenna signal is lost. Select one of the following actions, and then press the **ENTER** button to confirm the selection.

- **Stay Current Frequency:** Sets the module timing to keep operating at the current frequency until the GPS signal is recovered.
- **Go Internal Frequency:** Sets the module timing to switch to the internal frequency setting until the GPS signal is recovered.

HOLDOVER RECOVERY. Use the left (◀) or right (▶) arrow button to select how the module timing responds when the GPS signal is recovered after a loss of lock. Select one of the following recovery modes, and then press the **ENTER** button to confirm the selection.

NOTE. *If the module timing is off by more than 20 ms when the GPS signal is recovered, the module will force a jam phase timing recovery.*

- **Stay Legal:** Adjusts the module timing to match the recovered GPS signal while staying within the specified frequency offset and frequency rate of change specifications for NTSC and PAL reference signals.

NOTE. *It can take a long time for the module to recover in this mode since it takes about 300 seconds to correct each 64 μ s line of timing error.*

- **Jam Phase:** Adjusts the module timing to match the recovered GPS signal immediately but will typically cause a sync “shock” to the system.
- **Fast Slew:** Adjusts the module timing to match the recovered GPS signal at a rate 25 times faster than the legal rate without jumping.

BLACK Submenu

Use this submenu to configure the selected black output for signal format, timing, and timecode parameters. The following figure shows the BLACK submenu.

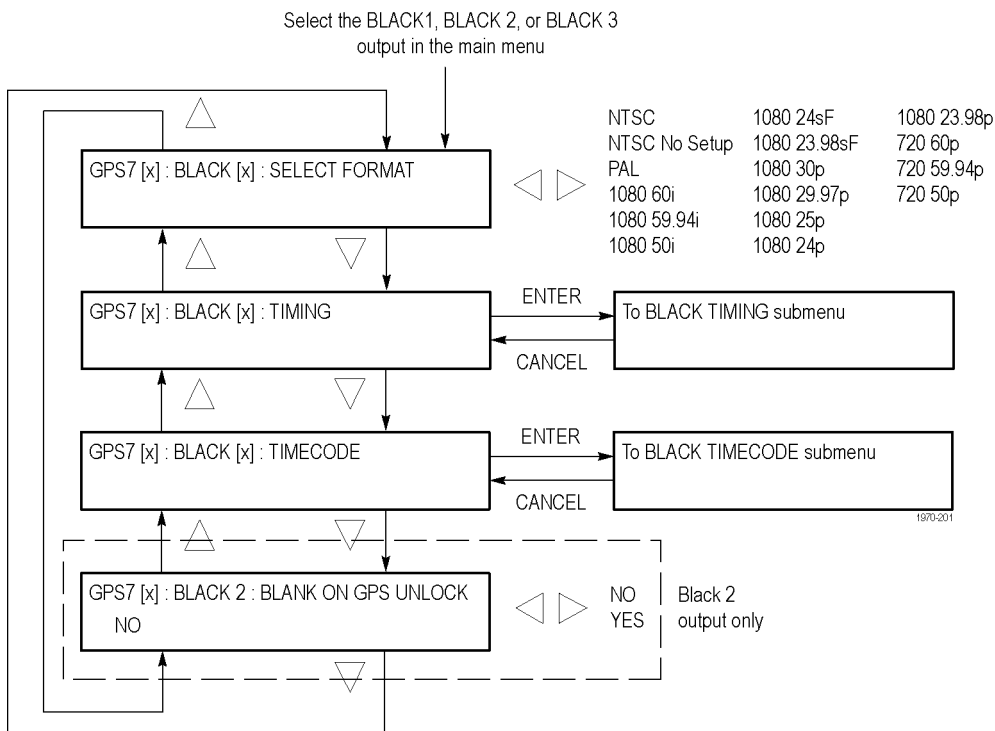


Figure 95: GPS7 module BLACK submenu

SELECT FORMAT. Use the left (◀) or right (▶) arrow button to select from the signal formats in the following table. Press the **ENTER** button to confirm the selection.

Table 27: GPS7 module output signal formats

NTSC	NTSC No Setup	PAL	1080 60i
1080 59.94i	1080 50i	1080 24sf	1080 23.98sf
1080 30p	1080 29.97p	1080 25p	1080 24p
1080 23.98p	720 60p	720 59.94p	720 50p
CW 10 MHz ¹			

¹ The CW 10 MHz format is available on the BLACK 3 output only.

When you select the NTSC, NTSC No Setup, or PAL formats, you access submenus where you can select the type of black burst signal. Use the left (◀) or right (▶) arrow button to select either **Black Burst** or **Black Burst with Field REF** as the output signal type. Press the **ENTER** button to confirm the selection.

BLACK TIMING. Press the **ENTER** button to access the BLACK TIMING submenu shown below.

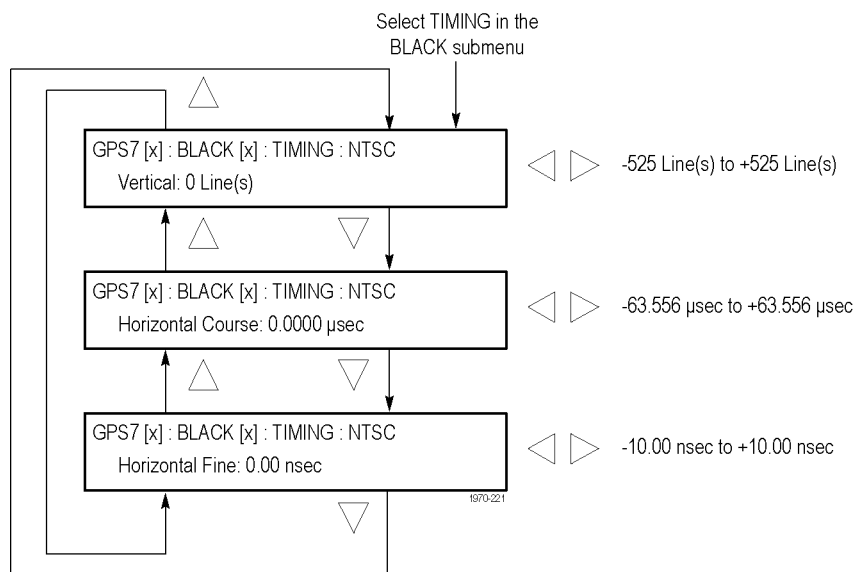


Figure 96: GPS7 module TIMING submenu

Use the up (▲) or down (▼) arrow button to select a timing parameter, and then use the left (◀) or right (▶) arrow button to adjust the parameter.

- **Vertical:** Use the left (◀) or right (▶) arrow button to adjust the vertical timing. For NTSC and PAL, you can adjust the timing by $\pm \frac{1}{2}$ a color frame. For HDTV trilevel sync signals, you can adjust the timing by $\pm \frac{1}{2}$ a field or frame (progressive or interlaced signals, respectively).
- **Horizontal Coarse:** Use the left (◀) or right (▶) arrow button to set the horizontal coarse timing. For NTSC, PAL, and HDTV trilevel sync signals, you can adjust the timing by $\pm 1 \mu\text{s}$.
- **Horizontal Fine:** Use the left (◀) or right (▶) arrow button to set the horizontal fine timing. For NTSC and PAL signals, you can adjust the timing by $\pm 10.00 \text{ ns}$. For HD trilevel sync signals, you can adjust the timing by $\pm 7.00 \text{ ns}$.

TIMECODE. Use this menu to set timecode parameters for the selected BLACK output. Press the **ENTER** button to access the TIMECODE submenu. (See page 214.)

NOTE. This submenu is available only when NTSC, NTSC No Setup, or PAL is the selected signal format.

BLANK ON GPS UNLOCK. Use the left (◀) or right (▶) arrow button to turn **ON** or **OFF** the blanking function on the BLACK 2 output when a loss of lock to the GPS signal is detected. When turned on, the BLACK 2 output will be blanked as long as the loss of lock condition occurs. This purpose of this function is to trigger a change-over. If configured to blank on loss of lock, this output should not be used for normal reference applications.

NOTE. This submenu is available only when BLACK 2 is the selected output.

TIMECODE Submenu Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the TIMECODE submenu.

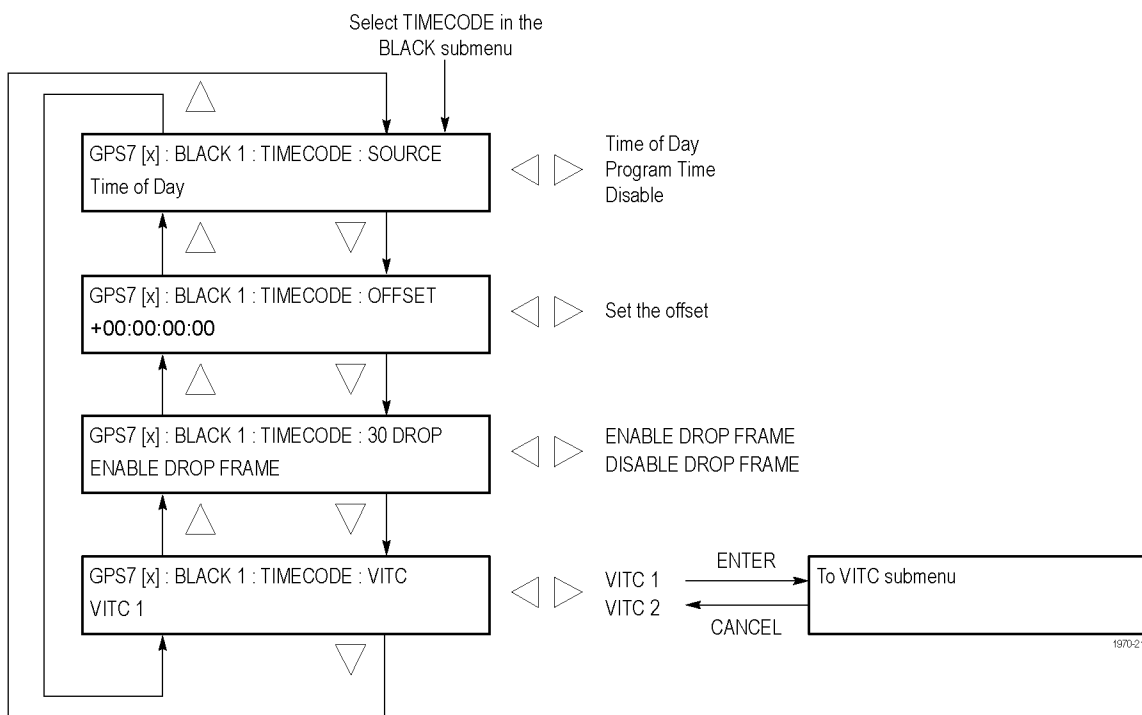


Figure 97: GPS7 module TIMECODE submenu

NOTE. This submenu is available only when NTSC, NTSC No Setup, or PAL is the selected signal format.

SOURCE. Use the left (◀) or right (▶) arrow button to select the timecode source from the following choices:

- **Time of Day:** Uses the time of day as determined by the time of day menu.
- **Program Time:** Uses the program time counter as the timecode.
- **Disable:** Disables the timecode function for the selected Black output.

NOTE. *In addition to enabling the timecode source, at least one line must be specified and enabled to carry VITC using the VITC submenu below.*

OFFSET. Use this menu item to set an offset for the selected black output, relative to the selected timecode source. You can enter a time offset of up to $\pm 23:59:59:29$ (maximum frame value depends on the frame rate of the video signal). Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the offset value to change. An underline character appears under the selected offset digit.

After you select an offset digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for your offset. Press the **ENTER** to confirm the offset change.

30 DROP. Use the left (◀) or right (▶) arrow button to enable or disable the 30 Drop mode. Most applications will prefer drop-frame compensation VITC on NTSC, but if needed, it can be disabled by this menu.

VITC. Use this menu item to insert the same VITC signal on 1 or 2 lines of the vertical interval. Select VITC 1 for one line and VITC 2 for the second line. Select the VITC output you want to configure, and then press the **ENTER** button to enter the VITC submenu for the selected output. (See page 215.)

VITC Submenu

Use this menu to enable or disable the output of a VITC on the selected line. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the VITC submenu.

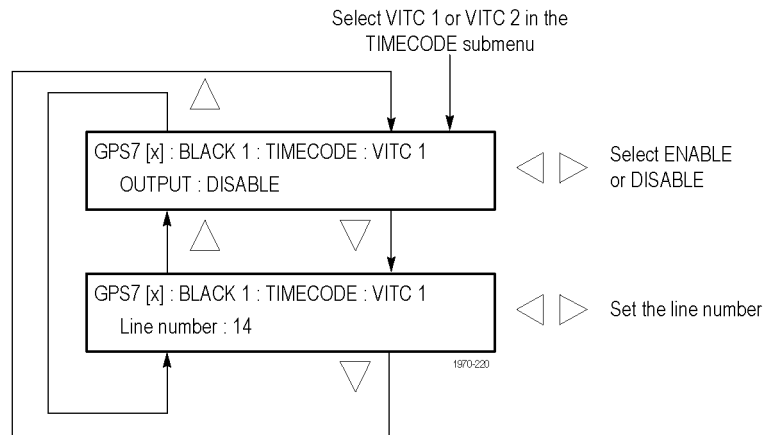


Figure 98: GPS7 module VITC submenu

OUTPUT. Use this menu item to enable or disable insertion of a VITC on the selected line. Use the left (◀) or right (▶) arrow button to select **ENABLE** or **DISABLE**. Press the **ENTER** button to confirm the selection.

Line Number. Use this menu item to select the video line on which the selected VITC signal will be inserted. Use the left (◀) or right (▶) arrow button to select the video line number. For NTSC, you can select lines from line 10 to 20 (lines 14 and 16 are recommended). For PAL, you can select lines between 6 and 22 (lines 19 and 21 are recommended). Press the **ENTER** button to confirm the selection.

GPS SETUP Submenu

Use this menu to set the GPS operating parameters and set the level at which a warning message will be generated if the GPS signal quality deteriorates. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the GPS SETUP submenu.

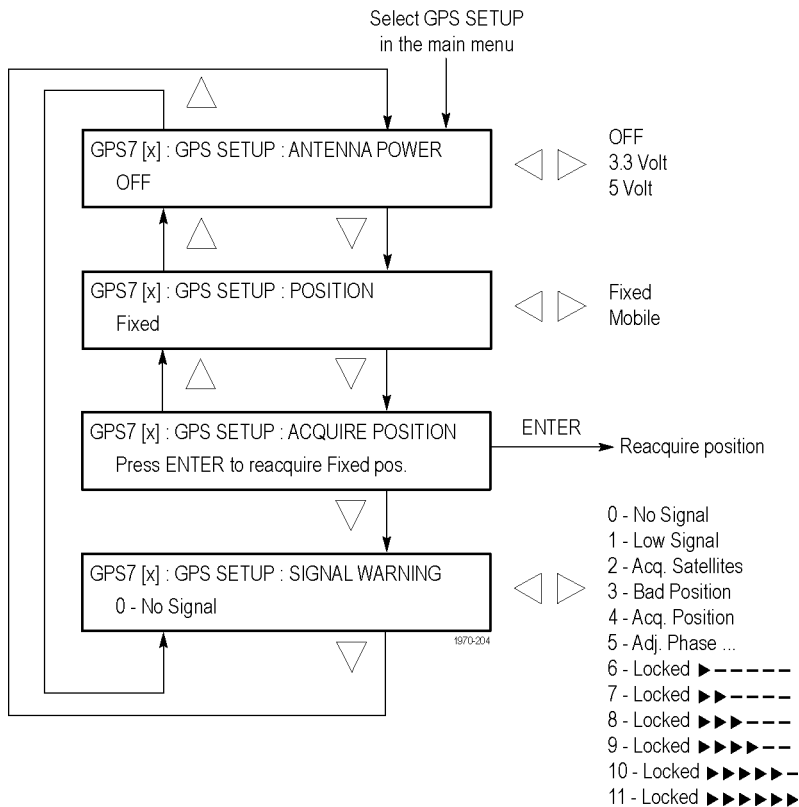


Figure 99: GPS7 module GPS SETUP submenu

ANTENNA POWER. The ANTENNA connector on the rear panel can supply DC power for a connected GPS antenna. Use the left (◀) or right (▶) arrow button to select from the following antenna power settings:



CAUTION. *To avoid antenna damage, do not turn on the DC antenna power until you know that the antenna is designed to handle the selected voltage. Antenna damage can occur if the antenna is not designed to handle the voltage you select.*

- **OFF:** No power is supplied to the GPS antenna.
- **3.3 V:** Supplies 3.3 V DC to power the GPS antenna.
- **5 V:** Supplies 5 V DC to power the GPS antenna.

When the ANTENNA connector is configured to provide power to the antenna, the rear-panel POWER indicator lights as follows:

- Blinks green to indicate an open circuit. This occurs if no antenna is connected or if the current load is less than expected because a splitter or DC block is being used.
- Displays solid red if the connected antenna is shorted. A shorted antenna will not damage the GPS7 module. If a splitter is used on the antenna, it may appear as a short at DC but still pass through the RF signal, which would allow the GPS to function.
- Displays solid green if the current load of the antenna is within the nominal range.

POSITION. Use the left (◀) or right (▶) arrow button to select **Fixed** or **Mobile**. The Fixed and Mobile settings define how the GPS receiver calculates the time and position information.

In fixed mode, an averaged position is stored in flash memory, and only the time is calculated each second. This provides greater stability of the time information, and allows operation with fewer satellites. This mode is well suited to broadcast-type installations where the antenna and mainframe do not move.

Mobile mode recalculates both the position and time each second. This allows for compensation of velocity and acceleration, so the frequency and timing information stay correct while moving, at the expense of some stability. This mode is required if the antenna and mainframe are moving.

For applications where the position changes occasionally, but where the antenna and unit are not moving, then either mode may be applicable. Mobile mode may boot up faster since it does not need to average 60 fixes to establish a fixed location. However, fixed mode can run with fewer satellites once the position is stored.

ACQUIRE POSITION. Press the **ENTER** button to erase the saved position, and then acquire and save a new averaged position. Note that the signal quality might indicate low or no signal during this process.

NOTE. *The module must make 60, 1 second GPS readings with at least four satellites to acquire the position. How long this takes depends on various conditions. If there are less than four satellites, a reading cannot be taken.*

SIGNAL WARNING. This function provides a warning that the antenna signal has degraded. Set this level below the normal range experienced as a function of time of day, weather, or other variables. To configure the output warning, see the GPO submenu. (See page 231, *GPO Submenu*.) Use the left (◀) or right (▶) arrow button to select the FOM (quality of the GPS signal) value that will trigger warning indicators. (See page 200, *Figures of merit (FOM)*.)

TIME OF DAY Submenu

Use this menu to set the source for the time of day setting and to set the date and time that will be used when the GPS reference is set to internal. The following figure shows the TIME OF DAY submenu.

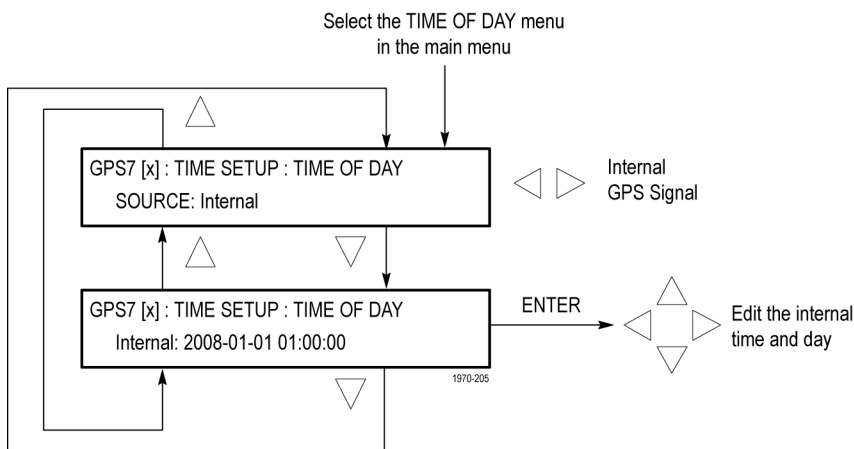


Figure 100: GPS7 module TIME OF DAY submenu

SOURCE. Use the left (◀) or right (▶) arrow button to select **GPS Signal** or **Internal** as the Time of Day setting. If GPS Signal is selected, the time from the GPS receiver is used to derive the time of day. If Internal is selected, then the time can be set manually like setting any clock. For both modes, the time zone offset must be set to maintain the correct relationship between UTC and local time.

NOTE. For internal time mode, the time zone offset must be set before setting the time of day.

NOTE. Selecting Internal will apply the start time and date. Typically, this causes a disruption to the syncs, so care should be taken to verify the date and time are correct before selecting Internal mode.

INTERNAL. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the offset value to change. An underline character appears under the selected offset digit. The date and time digits take the following form: YYYY-MM-DD HH:MM:SS.

After you select an offset digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for your date and time. Press the **ENTER** to confirm the change and set the time. Typically, this causes a disruption to the syncs, so care should be taken to verify the date and time are correct before selecting Internal mode.

TIME ZONE OFFSET Submenu

Use this menu to set the time zone offset for your location in reference to UTC. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the offset value to change. An underline character appears under the selected offset digit. The date and time digits take the following form: HH:MM.

After you select an offset digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for your offset. Press the **ENTER** to confirm the offset change. The following figure shows the TIME ZONE OFFSET submenu.

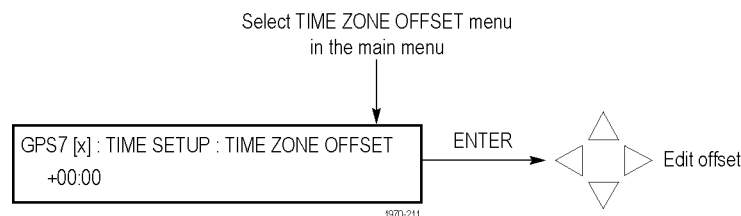


Figure 101: GPS7 module TIME ZONE OFFSET submenu

NOTE. *When the DST event occurs, the scheduled offset will be added to the time zone offset, and the DST schedule will be cleared. This allows for a new schedule to be set up for any time in the future.*

DST SCHEDULE Submenu

Use this menu to schedule when Daylight Savings Time changes are implemented. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the DST SCHEDULE submenu.

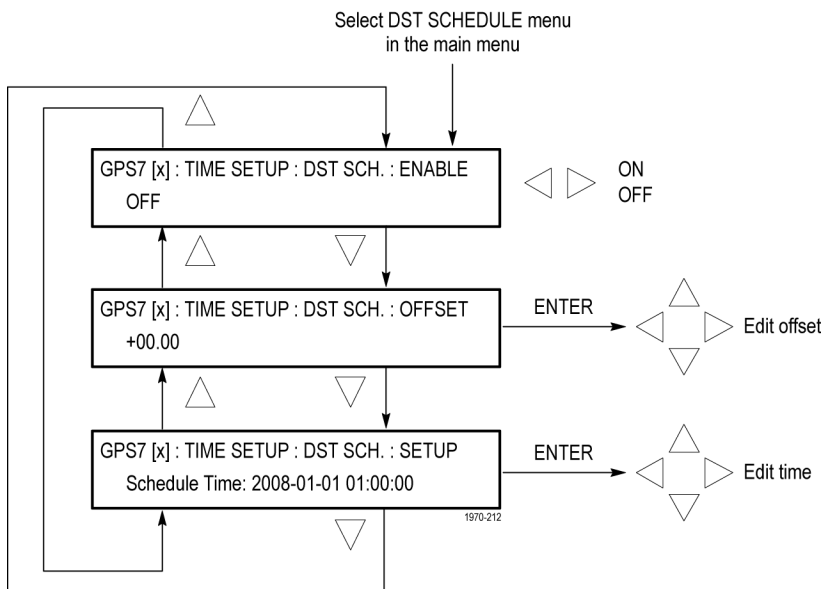


Figure 102: GPS7 module DST SCHEDULE submenu

ENABLE. Use the left (◀) or right (▶) arrow button to turn **ON** or **OFF** the DST schedule function.

OFFSET. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the DST offset value to change. An underline character appears under the selected offset digit. The date and time digits take the following form: HH:MM.

After you select an offset digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for your offset. Press the **ENTER** to confirm the offset change.

SETUP. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the DST setup value to change. An underline character appears under the selected digit. The date and time digits take the following form: YYYY-MM-DD HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for your date and time. Press the **ENTER** to confirm the change.

NOTE. When the DST event occurs, the scheduled offset will be added to the time zone offset, and the DST schedule will be cleared. This allows for a new schedule to be set up for any time in the future.

PROGRAM TIME Submenu

Use this menu to set the initial value for the Program Time counter. The following figure shows the PROGRAM TIME submenu.

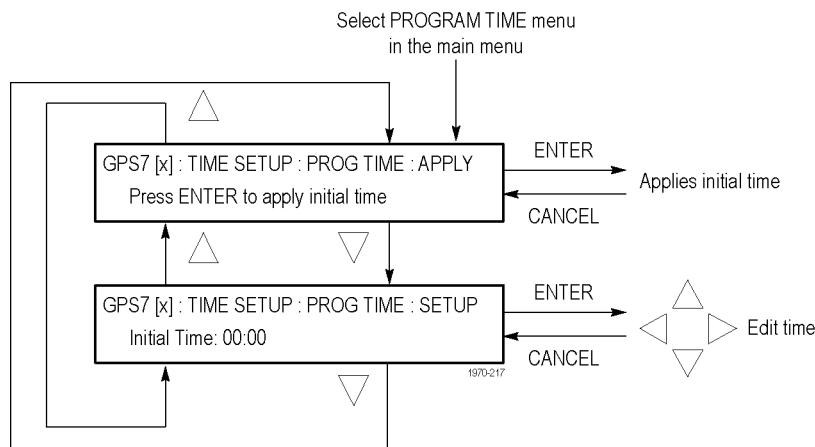


Figure 103: GPS7 module PROGRAM TIME submenu

APPLY. Press the **ENTER** button to immediately apply the initial program time entered in the **SETUP** parameter below.

SETUP. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the Program Time counter to change. An underline character appears under the selected digit. The date and time digits take the following form: HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required. Press the **ENTER** to confirm the change.

JAM SYNC Submenu

Use this menu to set parameters for the Jam Sync function. Use the function to immediately synchronize the module timecode with the selected time source for each output or to regularly schedule a synchronization. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the JAM SYNC submenu.

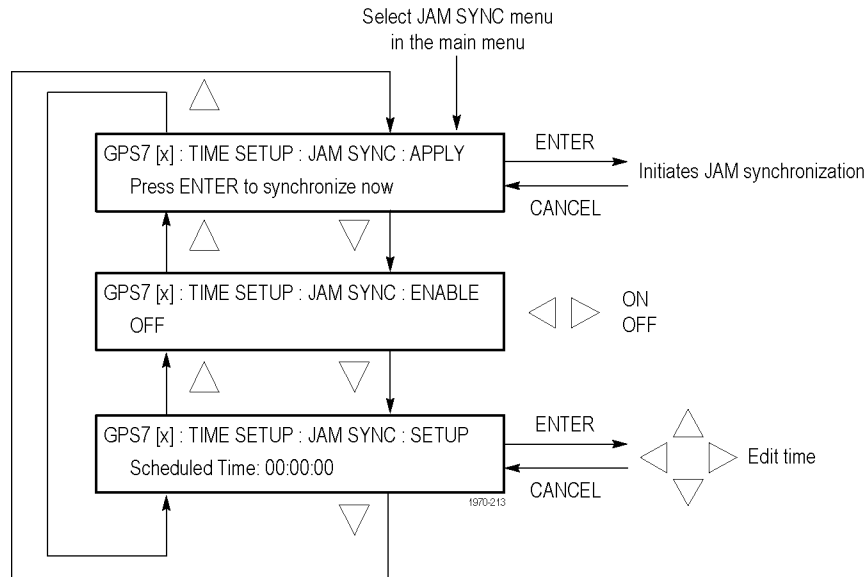


Figure 104: GPS7 module JAM SYNC submenu

APPLY. Press the **ENTER** button to immediately synchronize the module timecode with the GPS signal timecode.

ENABLE. Use the left (◀) or right (▶) arrow button to turn **ON** or **OFF** the Jam Sync function.

SETUP. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the Jam Sync schedule to change. An underline character appears under the selected digit. The date and time digits take the following form: HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required. Press the **ENTER** to confirm the change.

NOTE. A daily Jam Sync should be performed, especially on systems running at non-integer frame rates.

LEAP SECOND Submenu

Use this menu to schedule when leap seconds are implemented. For many applications, it might be fine to apply the leap second at midnight UTC, but for some time zones this might cause a disruption, so the leap second menu allows the leap second to be deferred up to 24 hours. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the LEAP SECOND submenu.

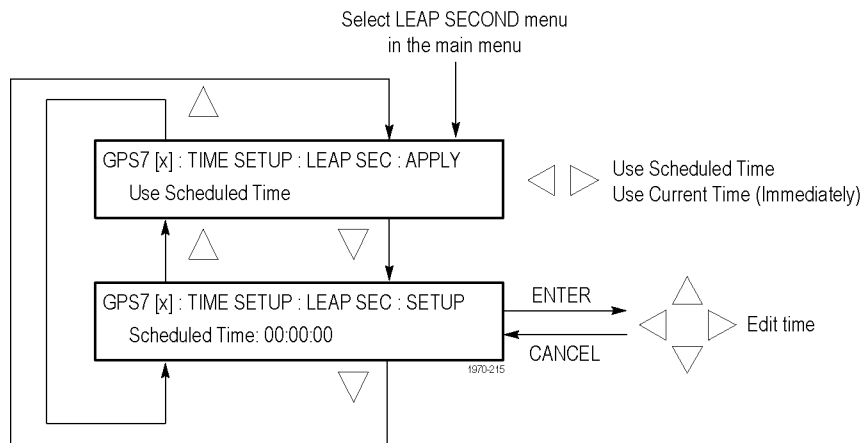


Figure 105: GPS7 module LEAP SECOND submenu

APPLY. Use the left (◀) or right (▶) arrow button to select when a leap second will be scheduled. Select **Use Current Time (Immediately)** to apply the leap second adjustment immediately when signalled by the GPS system at 23:59:60 UTC on July 30 or December 31 (as appropriate), regardless of the local time. Select **Use Scheduled Time** to apply the leap second adjustment at a deferred time, as entered in the SETUP menu below.

SETUP. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the schedule time to change. An underline character appears under the selected digit. The date and time digits take the following form: HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required. Press the **ENTER** to confirm the change.

ALARM TIME Submenu

Use this menu to schedule alarm times relative to program time. Using the GPI connector, this feature can be used to drive a light or similar indicator of alarm occurrences at a specific time in a program. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the ALARM TIME submenu.

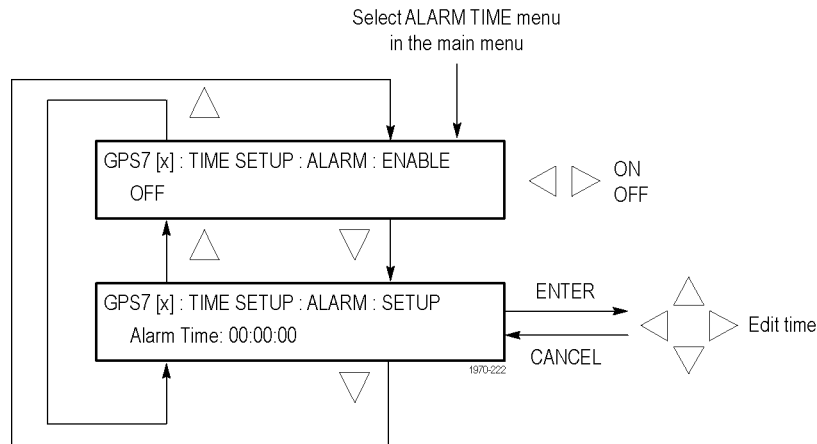


Figure 106: GPS7 module ALARM TIME submenu

ENABLE. Use the left (◀) or right (▶) arrow button to turn **ON** or **OFF** the Alarm Time function.

SETUP. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the Alarm Time schedule to change. An underline character appears under the selected digit. The date and time digits take the following form: HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required. Press the **ENTER** to confirm the change.

DELAY Submenu

Use this menu to set delays for warning messages. Setting a delay allows short errors and warnings to be ignored. For example, with the holdover capability, a short GPS unlock will not cause any disruption in the syncs, so there is no reason to immediately register an error and trigger an ECO to change. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the DELAY submenu.

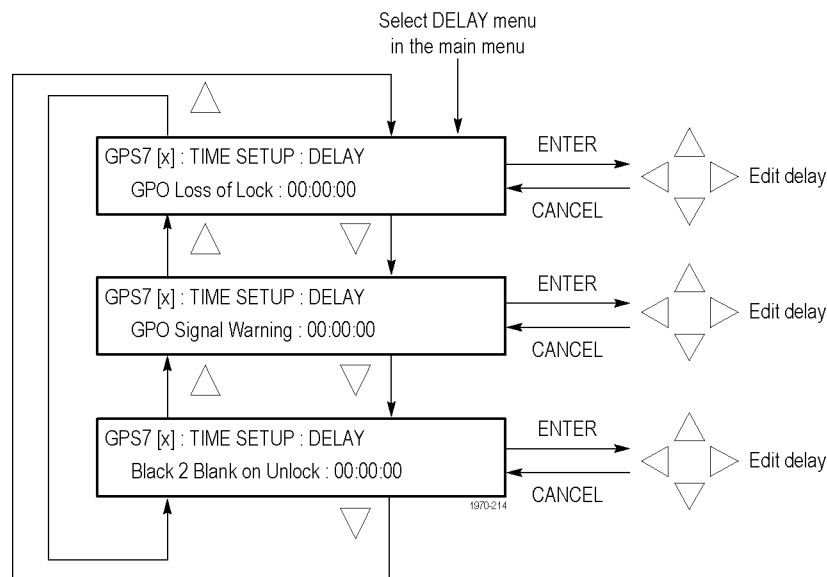


Figure 107: GPS7 module DELAY submenu

GPO Loss of Lock. Use this feature to set a delay between the time when loss of lock is detected and when it is reported on the GPI output. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the delay time before a GPO loss of lock warning message is displayed. An underline character appears under the selected digit. The date and time digits take the following form: HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required. Press the **ENTER** to confirm the change.

GPO Signal Warning. Use this feature to set a delay between the time when a signal warning is detected and when it is reported on the GPI output. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the delay time before a GPO signal warning message is displayed. An underline character appears under the selected digit. The date and time digits take the following form: HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required. Press the **ENTER** to confirm the change.

Black 2 Blank on Unlock. Use this feature to set a delay between the time when an unlock is detected and when Black 2 is blanked. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the delay time before the BLACK 2 output is blanked for a loss of GPS signal lock. An underline character appears under the selected digit. The date and time digits take the following form: HH:MM:SS.

After you select a digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required. Press the **ENTER** to confirm the change.

NOTE. The BLACK 2 output must be configured to be blanked before this delay will be used. (See page 212, BLACK Submenu.)

LTC Submenu

Use this menu to configure the LTC outputs. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the LTC submenu.

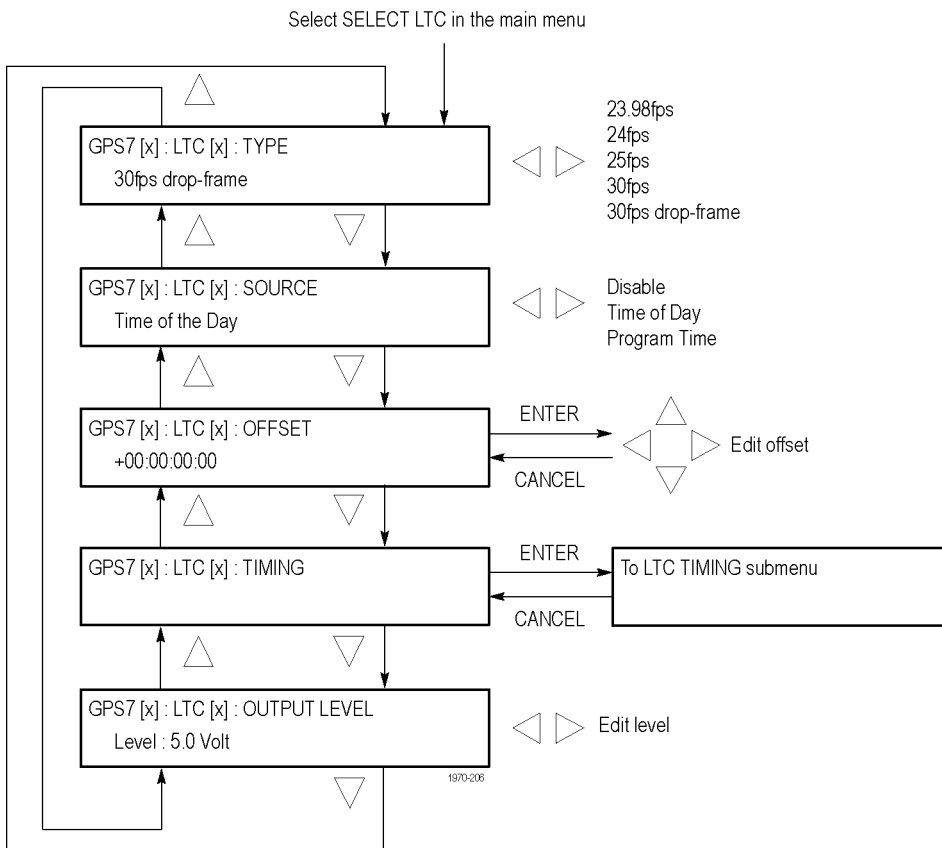


Figure 108: GPS7 module LTC submenu

TYPE. Use the left (◀) or right (▶) arrow button to select from the following LTC output signal formats:

Table 28: LTC output signal formats

Format	Rate	Delay range
23.98	24 fps at 23.98 Hz rate	±20.85 ms
24	24 fps at 24 Hz rate	±20.83 ms
25	25 fps at 25 Hz rate	±20.00 ms
30	30 fps at 30 Hz rate	±16.67 ms
30 DF	30 fps drop frame at 29.97 Hz rate	±16.68 ms

SOURCE. Use the left (◀) or right (▶) arrow button to select from the following LTC signal sources:

- **Disable:** Disables the LTC outputs.
- **Time of Day:** Uses the Time of Day counter as the timecode.
- **Program Time:** Uses the Program Time counter as the timecode.

OFFSET. Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the LTC offset value to change. An underline character appears under the selected offset digit. The time digits take the following form: HH:MM:SS:FF.

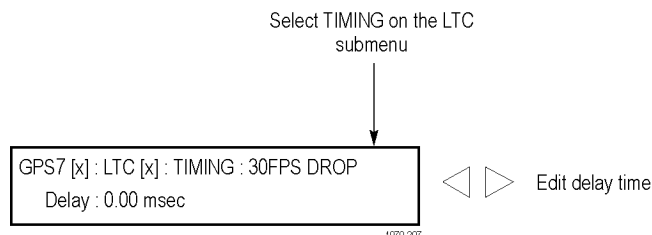
After you select an offset digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for your offset. Press the **ENTER** to confirm the offset change.

TIMING. Press the **ENTER** button to access the LTC TIMING submenu for the selected LTC output. (See page 229.)

OUTPUT LEVEL. Use the left (◀) or right (▶) arrow button to set the signal level of the selected LTC output between 0.5 V and 5.0 V.

LTC TIMING Submenu

Use this menu to set the delay used for all the signal formats. Use the left (◀) or right (▶) arrow button to set the delay. (See Table 28.) Press the **ENTER** button to confirm the selection. The following figure shows the LTC TIMING submenu.

**Figure 109: GPS7 module LTC TIMING submenu**

GPI Submenu Use this menu to select the function that will be performed when a signal is received on the GPI input. The signal is normally pulled high by an internal resistor, and will trigger the selected function when pulled low. The following figure shows the GPI submenu.

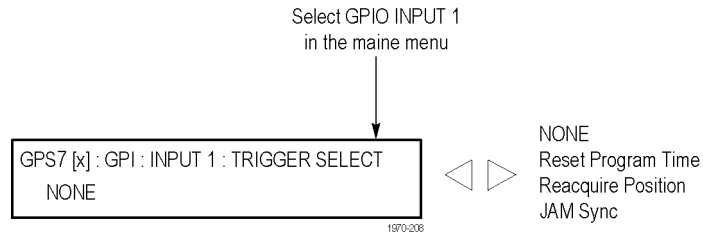


Figure 110: GPS7 module GPI submenu

Use the left (◀) or right (▶) arrow button to select from the following settings:

- **NONE:** Disables the GPI input.
- **Reset Program Time:** Resets the Program Time counter.
- **Reacquire Position:** Reacquires the GPS signal. At least 60 readings from four satellites are required to establish and save a new averaged position.
- **Jam Sync:** Performs an immediate Jam Sync (which can also be done in the JAM SYNC submenu).(See page 224.)

GPO Submenu

Use this menu to select which alarm will trigger a signal output on the selected GPI output. The output is an open collector with a weak pull up, so when it is asserted, the output will be low. The following figure shows the GPO submenu.

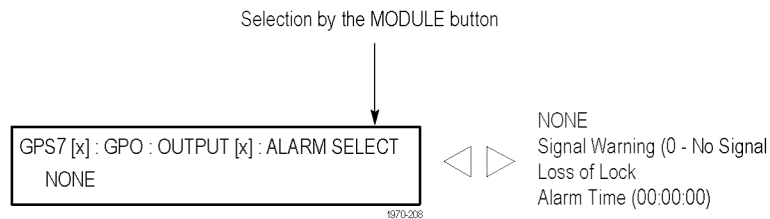


Figure 111: GPS7 module GPO submenu

Use the left (◀) or right (▶) arrow button to select from the following settings:

- **NONE:** Disables the selected GPI output.
- **Signal Warning (<Figure of Merit level>):** Output goes high when the GPS signal quality reaches the warning level set in the GPS SETUP submenu. (See page 216.) Refer to *GPS Signal Quality (Figure of Merit)* for more information about GPS signal quality levels. (See page 200.)
- **Loss of Lock:** Output goes high when a GPS loss of lock occurs. A loss of lock alarm is triggered when the GPS signal falls below the user defined threshold after the delay time has been exceeded.
- **Alarm Time:** A time of day or counter alarm is triggered for one second when the specified time is reached on the specified counter.

DIAGNOSTICS Submenu

Use this menu to view operation parameters for the GPS7 module. Because many sync sources are never turned off, it makes sense to check them periodically. These menus allow access to some internal nodes to forewarn of impending problems. Module diagnostics provide status information only and do not affect operating behavior. The following figure shows the DIAGNOSTICS submenu.

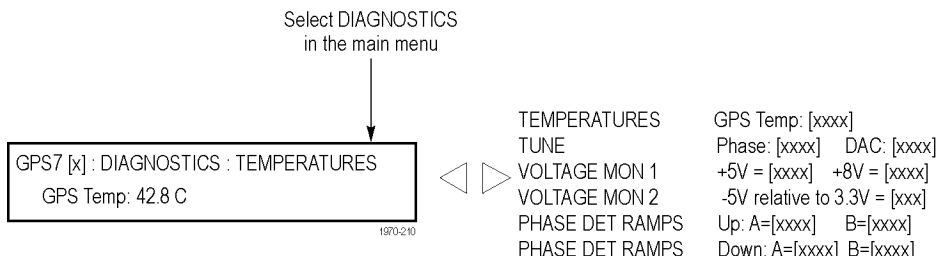


Figure 112: GPS7 module DIAGNOSTICS submenu

TEMPERATURES. This diagnostic displays the temperature of the GPS7 module.

TUNE. This diagnostic displays the following:

- **Phase** — The phase between the GPS pulse per second and the internal master time. A Tektronix Customer Service Representative may request these values for troubleshooting installation issues, should they occur.
- **DAC** — The DAC code that is tuning the oscillator. Useful for checking if a unit is getting close to the end of the oven oscillator tune range.
- **GPS lock indicator** — Displays the GPS lock state. When **Boot** is displayed, it means the function is still in special modes needed to get started. When **Coarse** is displayed, it means the function is still tracking significant changes in the timing. When **Fine** is displayed, it means the function has stabilized to the point that the loop only needs to make small changes.

VOLTAGE MON 1. This diagnostic measures internal voltage supplies. If these supplies are outside the nominal range, **Warning** appears, which means that the instrument should be serviced.

VOLTAGE MON 2. This diagnostic measures a voltage divider between a positive and negative supply. If this diagnostic result is outside the nominal range, **Warning** appears, which means that the instrument should be serviced.

PHASE DET RAMPS. This diagnostic monitors voltage ramps used in the phase detector. If these voltage ramps are outside the nominal range, **Warning** appears, which means that the instrument should be serviced.

Factory Default Settings

The following table shows the factory default settings for the GPS7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 29: GPS7 module factory default settings

Menu item name	Submenu item name	Settings
REFERENCE		
	SOURCE	GPS Signal
	LOSS LOCK ACTION	Stay current frequency
	HOLDOVER RECOVERY	Stay legal
SELECT OUTPUT		
Black 1	SELECT	NTSC
Black 2	FORMAT	Black Burst
Black 3	(signal)	
	TIMING	Vertical: 0 lines
	(offset)	Horizontal Coarse: 0 μ s
		Horizontal Fine: 0 ns
	TIMECODE	Source: Disable
		Offset: + 00:00:00:00
		30 Drop: Enable 30 Drop Frame
		VITC
		VITC 1
		Output: Disable
		Line Number: 14
		VITC 2
		Output: Disable
		Line Number: 16
	BLANK ON GPS UNLOCK (Black 2 only)	No
GPS SETUP		
		Antenna Power: Off
		Position: Fixed
		Acquire Position: Press Enter to reacquire Fixed Position
		Signal Warning (threshold) :
		6 – Locked >- - - -
TIME SETUP		

Table 29: GPS7 module factory default settings (cont.)

Menu item name	Submenu item name	Settings
	SELECT MENU	TIME OF DAY menu Source: GPS Internal: 2008-01-01 00:00:00
		TIME ZONE OFFSET menu + 00:00
		DST SCHEDULE menu Enable: Off
		LEAP SECOND menu Apply: Use current time (Immediately) Scheduled Time: 00:00:00
		ALARM TIME menu Enable: Off Alarm Time: 00:00:00
		DELAY menu GPO Loss of Lock: 00:00:10 GPO Signal Warning: 00:00:10 Black 2 Blank On Unlock: 00:00:10
SELECT LTC		
LTC 1	TYPE	30 fps drop frame
LTC 2	SOURCE	Time of Day
LTC 3	OFFSET	+ 00:00:00:00
LTC 4	TIMING	Delay: 0.00 ms
	OUTPUT LEVEL	Level: 2.0 Volt
SELECT GPIO		
	INPUT 1	Trigger Select: None
	OUTPUT	Alarm Select: None

HD3G7 HD 3 Gb/s SDI Video Generator

This section describes the module-specific functions of the HD 3 Gb/s SDI Video Generator module. Refer to the following locations for additional information about this module:

- *HD3G7 Module Connectors* for a description of the rear-panel connectors. (See page 56.)
- *HD3G7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 38.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The HD3G7 HD 3 Gb/s SDI Video Generator module is designed to be installed in the TG700 TV Signal Generator Platform. The module can be operated in either of the following two modes:

- **Generator.** The module can output 3 Gb/s SDI video test signals in 1080p 50 Hz, 1080p 59.94 Hz, or 1080p 60 Hz formats, in either Level A or Level B mapping structures.
- **Converter.** The module can convert an input 1080i signal to output a 1080p signal, with up to 16 channels embedded digital audio and ancillary data copied from input signal to output signal.


The module provides the following features:

- Two serial digital video outputs that include SMPTE 352M payload.
- One HD SDI input for use as the converter input.
- One clock/frame/line trigger output.
- Generates 1080p 50 Hz, 1080p 59.94 Hz, and 1080p 60 Hz signals (SMPTE 424M and 425), with both Level A and Level B supported.
- Standard test signals, including SMPTE color bars and SDI pathological test patterns.
- Generates a moving picture by scrolling the active picture area of the output test signal.
- Timing adjustment anywhere in the frame for the output. Clock resolution: 6.75 ns (1/148.5 MHz).
- Full remote control using Ethernet interface.

Operating Procedure

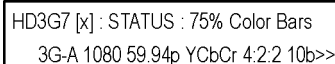
After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that no error messages appear on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below:



TG700 : PRESET

4. Press the front-panel **MODULE** button until the HD3G7 module main menu appears as shown below:



HD3G7 [x] : STATUS : 75% Color Bars
3G-A 1080 59.94p YCbCr 4:2:2 10b>>

5. You can select the frame rate using the **FORMAT** button, or the test signal using the test signal front panel buttons, like **COLOR BARS** or **LINEARITY**. To learn how to set the instrument to convertor mode, refer to the following page. (See page 238, *Selecting an Output Signal*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus. For example, when the **OUTPUT MODE** menu is displayed, pressing the left (◀) or right (▶) arrow button allows you to select Level A or Level B multiplexing mode.

Refer to *HD3G7 Module Main Menu* for detailed information about the main menu items and the submenu items. (See page 241.)

Selecting an Output Signal

The HD3G7 module has two modes of operation: converter or generator. To select an output signal, perform the appropriate procedure below for your selected mode of operation.

Selecting the Generator Mode

Use this mode to generate either 3 Gb/s SDI video test signals.

1. Select the signal format for the output signal. (See page 238, *Select the Signal Format*.)
2. Select the test signal that you want to generate. (See page 239, *Select the Test Signal*.)
3. Press the front-panel arrow buttons to select the desired main menu item or submenu.

Selecting the Converter Mode

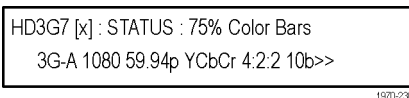
Use this mode to convert a 1080i signal to a 1080p signal.

1. Connect an HD SDI signal to the **HD SDI IN** connector.
2. Select the signal format for the output signal. (See page 238, *Select the Signal Format*.)
3. Select the converter mode to output a 1080p signal. (See page 238, *Selecting an Output Signal*.)
4. Press the front-panel arrow buttons to select the desired main menu item or submenu.

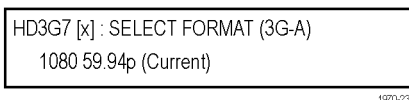
Select the Signal Format

Perform the following steps to select the signal format:

1. Press the front-panel **MODULE** button until the HD3G7 module main menu appears as shown below.



2. Press the **FORMAT** button. The menu display changes as follows:



3. Use the left (◀) or right (▶) arrow button, or press the **FORMAT** button repeatedly, to select one of the signal formats, and then press the **ENTER** button to confirm the selection.

Select Level A or Level B

You can select how the generated 3 Gb/s serial data stream is constructed: Level A or Level B. This selection is available in the HD3G7 **OUTPUT MODE** submenu. When this submenu is displayed, press the left (◀) or right (▶) arrow buttons and then the **ENTER** button to select **3G-A** (Level A) or **3G-B** (Level B).

Select the Test Signal

All of the signal sets that are available in the module are already assigned to the corresponding test signal buttons. When the HD3G7 module is selected and you press any of the front-panel test signal buttons, the selected signal in the signal set is output. (See Figure 113.)

For example, when you press the **COLOR BAR** test signal button, a signal in the Color Bars signal set is output. Use the left (◀) or right (▶) arrow button, or press the **COLOR BAR** test signal button repeatedly to select a different signal from the Color Bars signal set.

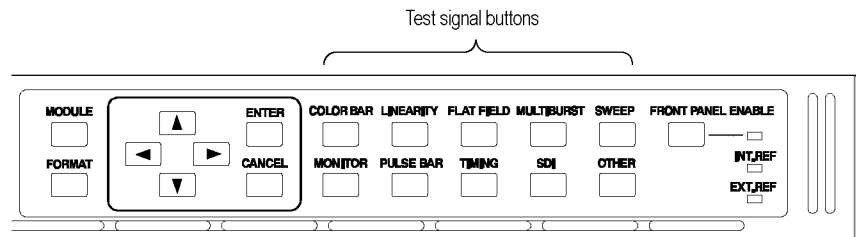


Figure 113: Front-panel test signal buttons

The following table lists the signal set assigned to each test signal button and the signals that can be selected in the signal set when the module is in generator mode.

Table 30: HD3G7 module test signal set assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, Matrix Color Bars (SMPTE RP219)
LINEARITY	Linearity	5 Step Staircase, Ramp, Valid Ramp
FLAT FIELD	Flat Fields	0% Flat Field, 10% Flat Field, 20% Flat Field, 30% Flat Field, 40% Flat Field, 50% Flat Field, 60% Flat Field, 70% Flat Field, 80% Flat Field, 90% Flat Field, 100% Flat Field
MULTI BURST	—	—
SWEEP	—	—
MONITOR	Monitor	100% Red Field, 75% Red Field, 100% Green Field, 75% Green Field, 100% Blue Field, 75% Blue Field, Convergence
PULSE BAR	Pulse & Bar	2T60 Pulse and Bar
TIMING	—	—
SDI	SDI Test	Equalizer Test, PLL Test, SDI Matrix For Level B operation, the SDI pathological signals will look different on a picture monitor than they do in HD or 3Gb/s Level A. This difference is due to the difference in interleaving. In order to have the correct pattern to create the pathological conditions, the data bytes have been distributed differently on the Y and Cb/Cr streams. The same data values are used, just in different parts of the signal.
OTHER	—	Use this button to select the converter mode of operation(See page 238, <i>Selecting the Converter Mode.</i>)

HD3G7 Module Main Menu

Use the HD3G7 module main menu to perform the following tasks:

- Set the video signal output mode to Level A or Level B.
- Scroll the active picture area of the output signal.
- Set the timing offset of the outputs relative to an internal reference signal or an external reference signal.
- Enable or disable the Y, Cb, and/or Cr components on the video output signal.
- Set the line, frame, or clock rate as a trigger for an external instrument, such as an oscilloscope.
- View diagnostics, operation parameters, and CRC error counts from the video input.
- Access output calibration (only available when in factory mode).

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the HD3G7 module main menu.

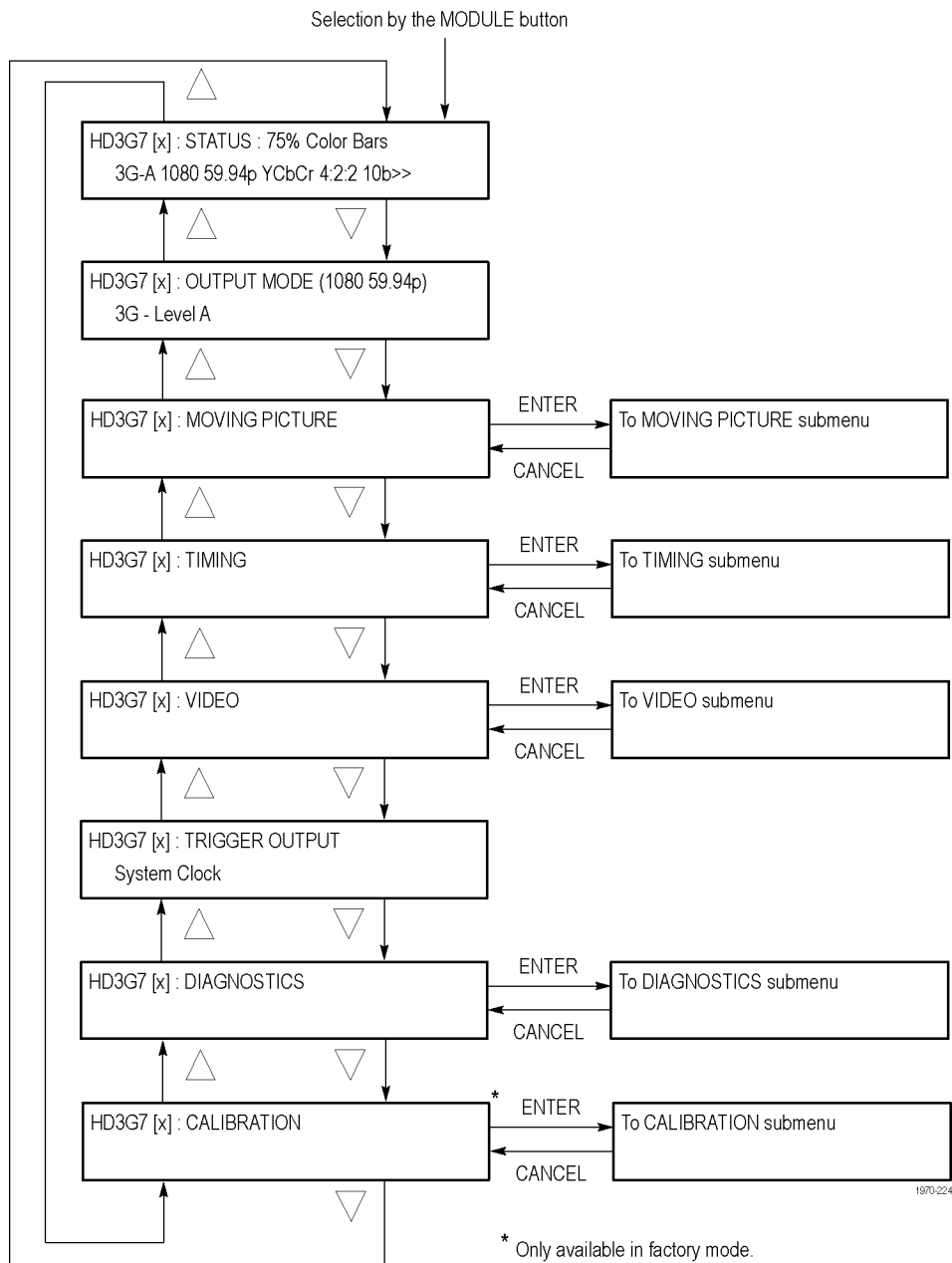


Figure 114: HD3G7 module main menu

STATUS. Displays the instrument operating mode, output signal format, and output sample structure. (See page 244, *STATUS*.)

OUTPUT MODE. Allows you to select the mapping format of the output signal to Level A (direct image format mapping) or Level B (SMPTE 372M dual link mapping), as described by SMPTE 425. (See page 245, *OUTPUT MODE Submenu*.)

MOVING PICTURE. Scrolls the active picture area of the output test signal. Select this menu item, and then press the **ENTER** button to access the **MOVING PICTURE** submenu. (See page 246, *MOVING PICTURE Submenu*.)

TIMING. Sets the timing offset of the serial digital video outputs relative to the internal reference signal (frame reset signal). This allows you to adjust the timing of this module relative to another module or to an external reference (such as Genlock or GPS). Select this menu item, and then press the **ENTER** button to access the **TIMING** submenu. (See page 247, *TIMING Submenu*.)

VIDEO. Enables or disables the components of the output serial stream, such as YCbCr. Select this menu item, and then press the **ENTER** button to access the **VIDEO** submenu. (See page 248, *VIDEO Submenu*.)

TRIGGER OUTPUT. Allows you to select the line rate, frame rate, or system clock of the module to trigger an external instrument, such as an oscilloscope. (See page 249, *TRIGGER OUTPUT Submenu*.)

DIAGNOSTICS. Allows access to the outputs of several diagnostics, shows operation parameters for the module, and allows you to clear the counts of CRC errors that are detected in the input signal. This menu provides status information only and does not affect operating behavior. Select this menu item, and then press the **ENTER** button to enter the **DIAGNOSTICS** submenu. (See page 249, *DIAGNOSTICS Submenu*.)

CALIBRATION. Provides a variety of special signals to help measure amplitude and rise time and allows you to adjust serial output amplitude. This menu is accessible in factory mode only. (See page 252, *CALIBRATION Submenu*.)

STATUS Displays the instrument operating mode, output signal format, and output sample structure. Examples of the STATUS display are shown below for each of the operating modes (generator and converter).

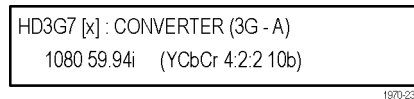
Generator Mode: The figure below shows an example STATUS display when the module is in generator mode.



Figure 115: HD3G7 module STATUS menu in generator mode

- **75% Color Bars:** Indicates the name of the signal currently being generated. When a different generator signal is selected, its name will be displayed.
- **3G-A:** Indicates the 3 Gb/s signal and the level currently being generated. When a different level is selected, its name will be displayed.
- **1080 59.94p:** Indicates the output format.
- **YCbCr 4:2:2 10 bits:** Indicates the output sampling structure.

Converter Mode: The figure below shows an example STATUS display when the module is in the converter mode.



- **Converter (3G-A):** Indicates that the incoming HD SDI video stream is being converted.
- **1080 59.94i:** Indicates the incoming signal format. If there is no input or the format is not the correct rate, the following messages will appear on the second line of the LCD: “No Input Signal” or “Input Signal Error (Check FORMAT)”.
- **YCbCr 4:2:2 10b:** Indicates the output sampling structure.

OUTPUT MODE Submenu

Select Level A or Level B as the serial link multiplexing method. Use the left (◀) or right (▶) arrow button to select Level A or Level B. Press the ENTER button to confirm the selection. The following figure shows the OUTPUT MODE submenu.

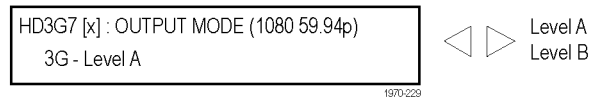


Figure 116: HD3G7 module OUTPUT MODE submenu

Level A. This is one way of constructing the 3 Gb/s serial data stream, as described in SMPTE 425. For the mapping structure 1 signals (1080p50, 1080p59.94 and 1080p60), a Level A stream looks similar to HD video (as defined in SMPTE 292), except the data rate is twice as fast and the lines are sent in order, consecutively. For other mapping structures, the video is at a lower frame rate, but has more bits and/or includes more channels. Refer to the SMPTE 425 standard for details on the Level A mapping method.

Level B. This is an alternate way of constructing the 3 Gb/s serial data stream, as described in SMPTE 425. For the mapping structure 1 signals (1080p50, 1080p59.94 and 1080p60), a Level B stream looks similar to dual link (as defined in SMPTE 372M). The serial data is constructed by interleaving two lines of video. As a result, the serial data takes two lines worth of time to propagate. This has implications for the effects of the pathological signals, and can confuse the definition of timing adjustments. Refer to the SMPTE 425 standard for information on other mapping structures.

**MOVING PICTURE
Submenu**

Use this menu to scroll the active picture area of the serial digital video signal up/down or left/right (or randomly). Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the MOVING PICTURE submenu.

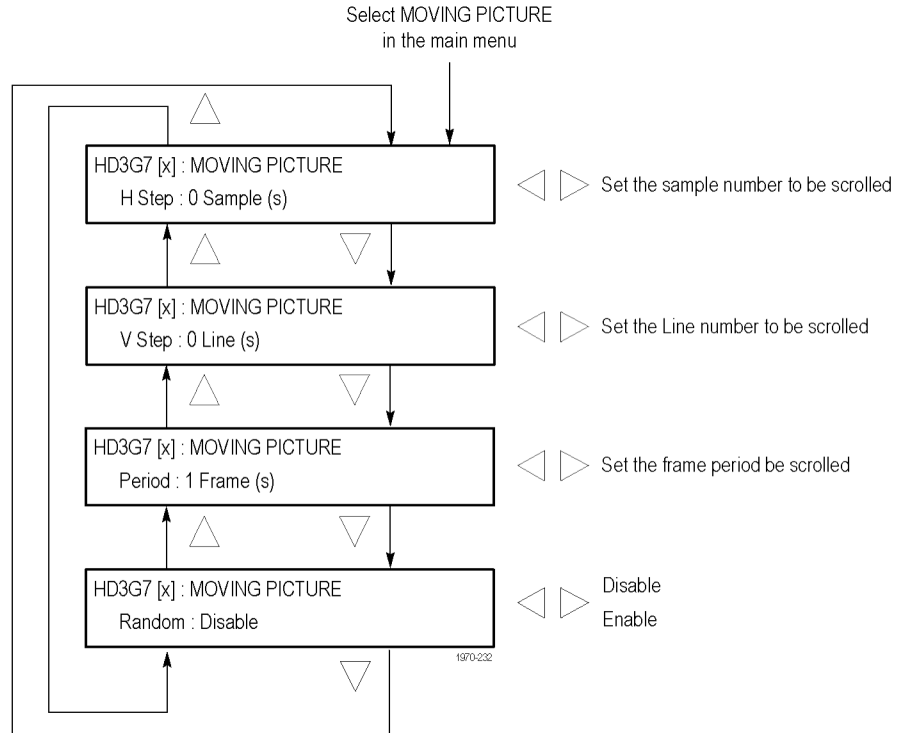


Figure 117: HD3G7 module MOVING PICTURE submenu

H Step. Sets the number of samples to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 4-sample steps.

V Step. Sets the number of lines to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 1-line steps.

Period. Sets the time interval between occurrences of the scrolling. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 1 to 16 in 1-frame steps.

Random. Sets whether or not the picture scrolls randomly. Use the left (◀) or right (▶) arrow button to select between **Disable** and **Enable**. Press the **ENTER** button to confirm the selection.

TIMING Submenu

Use this menu to adjust the timing offset of the serial digital video outputs relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the TIMING submenu.

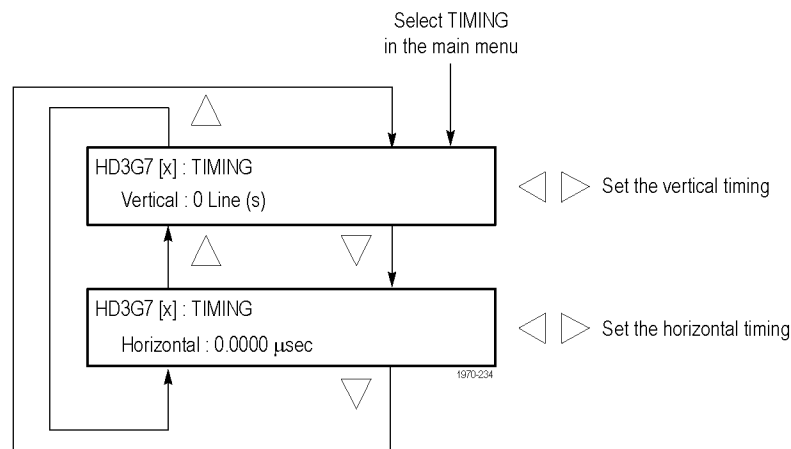


Figure 118: HD3G7 module TIMING submenu

Vertical. Sets the vertical timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1/2 to +1/2 frame in 1-line steps.

NOTE. A "line" of timing refers to the timing as if it were a raster scanning a CRT. This may not be the same as the time that a line of data is present on the serial link because of the way that Level B signals are interleaved.

Horizontal. Sets the horizontal timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1 to +1 line in 1-clock steps.

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

VIDEO Submenu

Use this menu to turn each serial digital video component (Y, Cb, or Cr) on or off individually (generator mode only). Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the VIDEO submenu.

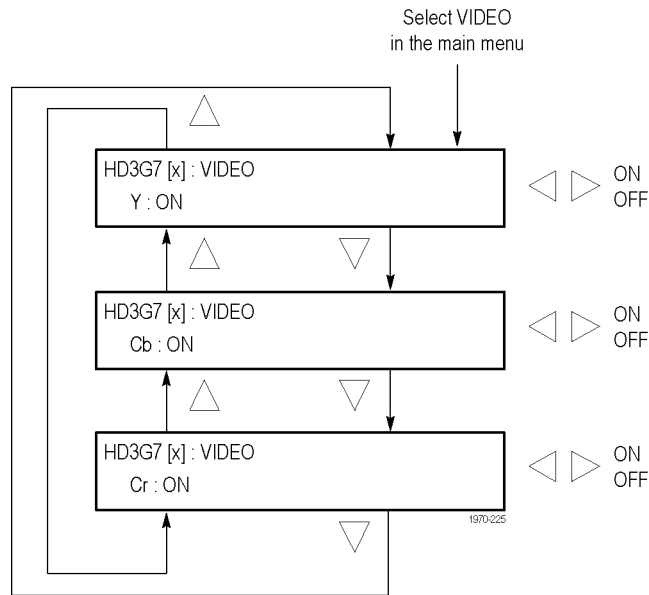


Figure 119: HD3G7 module VIDEO submenu

Y. Turns the Y component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

Cb. Turns the Cb component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

Cr. Turns the Cr component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

**TRIGGER OUTPUT
Submenu**

Use this menu to select line rate, frame rate, or the system clock of the module to trigger an external instrument. The following figure shows the TRIGGER OUTPUT submenu.

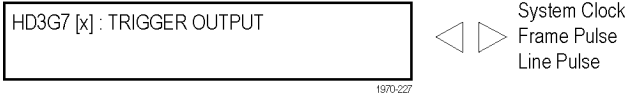


Figure 120: HD3G7 module TRIGGER OUTPUT submenu

System Clock. The system clock is an internal parallel rate clock (a low frequency clock related to the pixel rate of the video signal).

Frame Pulse. The trigger pulse comes out at the field or frame rate of the video signal.

Line Pulse. The trigger pulse comes out at the horizontal rate of the video signal.

DIAGNOSTICS Submenu

Use this menu to view operation parameters for the HD3G7 module. Module diagnostics provide status information only and do not affect operating behavior. The following figure shows the DIAGNOSTICS submenu.

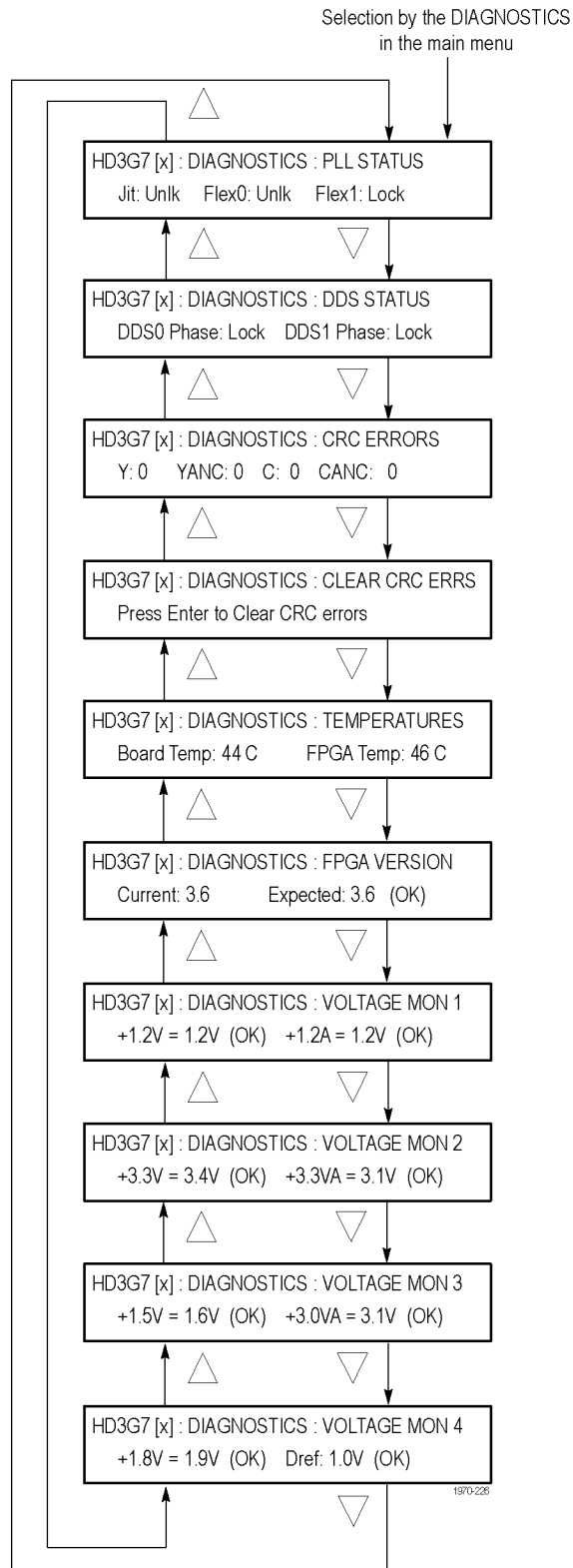


Figure 121: HD3G7 module DIAGNOSTICS submenu

PLL STATUS. This diagnostic displays the following:

- **Jit** — Indicates the condition of the jitter attenuator used to clean up the clock recovered from the input signal. The condition can be reported as **Lock** (locked) or **Unlk** (unlocked). This diagnostic readout is only valid and significant when in converter mode. If in converter mode it should read "locked" If not then there may be a problem with the input signal or the module.
- **Flex0** — This circuit is not used, so the readout may show locked or unlocked. The state has no bearing on instrument operation.
- **Flex1** — Indicates the state of the flexible clock generator. This readout should show **Lock** (locked) and is only valid and significant when the instrument is in generator mode. An **Unlk** (unlocked) reading might indicate a problem with the module or mainframe.

DDS STATUS. This diagnostic displays the following:

- **DDS0 Phase** — This circuit is not used, so the readout may show locked or unlocked. The state has no bearing on instrument operation.
- **DDS1 Phase** — Indicates that the flex clock circuit is correctly aligned with the internal frame pulse. This readout should show **Lock** (locked) and is only valid and significant when the instrument is in generator mode. An **Unlk** (unlocked) reading might indicate a problem with the module or mainframe. If the instrument is in converter mode, this readout is not active and may show locked or unlocked.

CRC ERRORS. This diagnostic shows how many CRC errors are detected from the input signal. If the output signal of the conversion process is not what you expect, or the jitter attenuator is having trouble locking, then you should check this readout for errors on the input.

It is normal to see errors when you are connecting or disconnecting the input, or when no input is present. When this occurs, clear the errors after the connections are made by using the **Diagnostics > Clear CRC Errors** submenu. After clearing the errors, monitor this readout if you have concerns about the input signal.

This diagnostic displays the following:

- **Y** — The number of errors detected on the Y portion of the active picture area of the input signal.
- **YANC** — The number of errors detected on the Y portion of the ancillary data space in the input signal.
- **C** — The number of errors detected on the C portion of the active picture area of the input signal.
- **CANC** — The number of errors detected on the C portion of the ancillary data space in the input signal.

CLEAR CRC ERRORS. Press the **ENTER** button to clear the CRC error counters.

TEMPERATURES. This diagnostic displays the temperature of the HD3G7 module board and FPGA.

FPGA VERSION. This diagnostic displays the current and expected FPGA versions. If there is a discrepancy between the two, Warning appears, which means that the FPGA firmware might need to be upgraded.

VOLTAGE MON 1. This diagnostic measures internal voltage supplies. If these supplies are outside the nominal range, Warning appears, which means that the instrument should be serviced.

VOLTAGE MON 2. This diagnostic measures internal voltage supplies. If these supplies are outside the nominal range, Warning appears, which means that the instrument should be serviced.

VOLTAGE MON 3. This diagnostic measures internal voltage supplies. If these supplies are outside the nominal range, Warning appears, which means that the instrument should be serviced.

VOLTAGE MON 4. This diagnostic measures internal voltage supplies. If these supplies are outside the nominal range, Warning appears, which means that the instrument should be serviced.

CALIBRATION Submenu

This menu is only accessible when the instrument is in factory mode. From this menu, you can access several special output signals and adjust the serial output levels. The special signals are unscrambled and are synchronous with the clock out of the trigger BNC. They are used to check performance or used when adjusting serial levels. See the *TG700 TV Signal Generator Platform Service Manual* for information on adjustments and using factory mode.

Factory Default Settings

The following table shows the factory default settings for the HD3G7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 31: HD3G7 module factory default settings

Menu item name	Settings
STATUS	1080 59.94p SMPTE Color Bars 3 Gb/s Level A YCbCr 4:2:2 10b
OUTPUT MODE	Level A
MOVING PICTURE	
H Step	0 Sample(s)
V Step	0 Line(s)
Period	1 Frame(s)
Random	Disable
TIMING	
Vertical	0 Line(s)
Horizontal	0.0000 μ s
VIDEO	
Y	ON
Cb	ON
Cr	ON
TRIGGER OUTPUT	System Clock

HDLG7 HD Dual Link Video Generator

This section describes the module-specific functions of the HDLG7 HD Dual Link Video Generator module. Refer to the following locations for additional information about this module:

- *HDLG7 Module Connectors* for a description of the rear-panel connectors. (See page 57.)
- *HDLG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 41.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The HDLG7 HD Dual Link Video Generator module is designed to be installed in the TG700 TV Signal Generator Platform.

The module can be operated in either of the following two modes:

- Dual link converter. The module can convert a SMPTE 292M serial digital video stream carrying a SMPTE 274M signal to a SMPTE 372M serial digital dual link video signal.
- Dual link generator. The module can output either HD SDI video test signals or projector test patterns (digital cinema 2K formats only).

Refer to the *TG700 Specifications and Performance Verification Technical Reference* for information about which dual link outputs can be converted from each input signal format.

Refer to *Selecting the Converter Mode* for information about the available types of conversions. (See page 263.)


The module provides the following features:

- Two pairs of dual link outputs that include SMPTE 352 payload.
- Supports a wide variety of output formats:
1920 x 1080i, 1920 x 1080p, 1920 x 1080PsF, 2K x 1080p, 2K x 1080PsF,
and 2K x 1556PsF
- Supports the following sampling structures:
4:4:4 GBR, 4:4:4 GBR+A, 4:4:4 YCbCr, 4:4:4 YCbCr+A, 4:2:2 YCbCr,
4:2:2:4 YCbCr+A, 4:4:4 XYZ
- Test signal buttons have two modes of operation: native YCbCr or RGB
HD video test signals, and native XYZ digital cinema projector test patterns
(only in 2K formats).
- Generates a moving picture by scrolling the active picture area of the output
test signal.
- Adjustable timing offset between link A and link B outputs.
- Full remote control using the Ethernet interface.

Operating Procedure

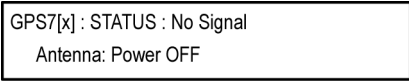
After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that no error messages appear on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below:



TG700 : PRESET

4. Press the front-panel **MODULE** button until the HDLG7 module main menu appears as shown below:



GPS7[x] : STATUS : No Signal
Antenna: Power OFF

1970-200

5. Configure the module to the desired operational mode (converter or generator), select the signal format, and if necessary, select the test signal. (See page 273, *Selecting an Output Signal*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus.

Refer to *HDLG7 Module Main Menu* for detailed information about the main menu items and the submenu items. (See page 265.)

Selecting an Output Signal

The HDLG7 module has two modes of operation: converter or generator. To select an output signal, perform the appropriate procedure below for your selected mode of operation.

Converter Mode Procedure

Use this mode to convert a SMPTE 292M serial digital video stream carrying a SMPTE 274M signal to a SMPTE 372M serial digital dual link video signal.

1. Connect an HD SDI signal to the **HD SDI IN** connector.
2. Select the signal format for the output signal. (See page 258, *Select the Signal Format.*)

NOTE. To avoid an input signal error, select the output signal format that matches the input signal. If the input signal format does not match the selected output format, the following message appears: *Input Format mismatch (Check FORMAT) on the STATUS menu.*

Refer to the TG700 Specifications and Performance Verification Technical Reference for a listing of the supported input and output format combinations for the HDLG7 module.

3. Select the converter mode to provide a dual link signal.
4. Press the front-panel arrow buttons to select the desired main menu item or submenu.

Generator Mode Procedure

Use this mode to generate either HD SDI video test signals or projector test patterns (digital cinema 2K formats only).

1. Select the signal format for the output signal. (See page 258, *Select the Signal Format.*)
2. Select the test signal that you want to generate. (See page 260, *Select the Test Signal.*)
3. Press the front-panel arrow buttons to select the desired main menu item or submenu.

Select the Signal Format

The following table lists the available signal formats.

NOTE. *Framing resynchronization occurs when the signal format is changed.*

Selecting the 1080 50p, 1080 59.94p, or 1080 60p format forces the sampling structure to be set to YCbCr 4:2:2 10 bits. Selecting a 2K 1080 or 2K 1556 format will limit the sampling structure to either RGB or XYZ 4:4:4 12 bits.

Refer to SAMPLE STRUCTURE/DEPTH for more information. (See page 267.)

Table 32: HDLG7 module signal formats

1980 x 1080 format

1080 23.98sF	1080 24sF	1080 23.98p	1080 24p
1080 25p	1080 29.97p	1080 30p	1080 50i
1080 59.94i	1080 60i	1080 50p	1080 59.94p
1080 60p			

2048x 1556 format ¹

2K 1556 14.99sF	2K 1556 15sF	2K 1556 17.98sF	2K 1556 18sF
-----------------	--------------	-----------------	--------------

2048x 1080 format

2K 1080 23.98sF	2K 1080 24sF	2K 1080 25sF	2K 1080 29.97sF
2K 1080 30sF	2K 1080 23.98p	2K 1080 24p	2K 1080 25p
2K 1080 29.97p	2K 1080 30p		

¹ No SMPTE 352M identification payload is added to the output of 2048 x 1556 format signals.

Perform the following steps to select the signal format:



CAUTION. *The HDLG7 module does not generate a Clock Select warning message when a signal format change creates a clock conflict with the output(s) of other modules using the HD clock. If you change the signal format of the HDLG7 output, you may create a clock conflict that will cause the output of another module to no longer conform to its selected signal format. (See page 60, Clock Conflict Messages.)*

1. Press the front-panel **MODULE** button until the HDLG7 module main menu appears as shown below.

```
HDLG7 [x]: STATUS : 100% Color Bars
1080 59.94i GBR 4:4:4 12 bits
```

2. Press the **FORMAT** button. The menu display changes to show the currently selected signal format as shown below.

```
HDLG7 [x]: SELECT FORMAT
1080 59.94i (Current)
```

3. Press the left (◀) or right (▶) arrow button to select one of the signal formats, and then press the **ENTER** button to confirm the selection.

Select the Test Signal

The test signals in the HDLG7 module are divided into the following two groups:

- HD SDI video test signals
- Projector test patterns (digital cinema 2K formats only)

NOTE. Use the HDLG7 module Main menu to configure the module to output HD test signals or projector test patterns. (See page 265, HDLG7 Module Main Menu.)

All of the signal sets that are available in the module are already assigned to the corresponding test signal buttons. When the HDLG7 module is selected and you press any of the front-panel test signal buttons, the selected signal in the signal set is output. (See Figure 122.)

For example, when you press the **COLOR BAR** test signal button, a signal in the Color Bars signal set is output. Use the left (◀) or right (▶) arrow button, or press the COLOR BAR test signal button repeatedly to select a different signal from the Color Bars signal set. Press the **CANCEL** button to return to the main menu.

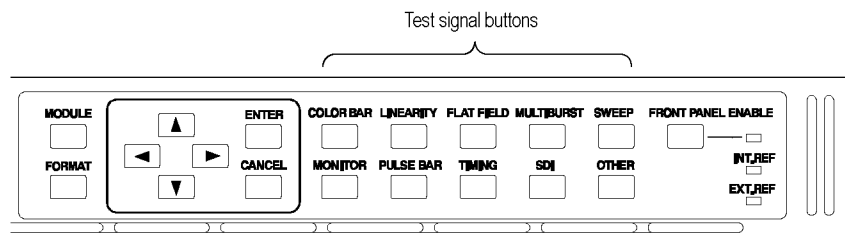


Figure 122: Front-panel test signal buttons

If your TG700 mainframe has 64 MB of memory installed, you can download a frame picture file created by the Frame Picture Generator to the mainframe and output the picture from the DVG7 module. (See page 2, *Mainframe Memory Requirements*.) Refer to the *TG700 PC Tools Technical Reference* for detailed information on how to create, download, and output a frame picture.

The following table lists the signal set assigned to each test signal button and the signals that can be selected in the signal set when the module is configured to output HD test signals. The table also lists the native YCbCr or RGB test signals that correspond to HD SDI video test signals.

Table 33: HDLG7 module HD test signal set assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, SMPTE RP219 Color Bars ^{1 2}
LINEARITY	Linearity	5 Step Staircase, Ramp, Valid Ramp ²
FLAT FIELD	Flat Fields	0% Flat Field, 10% Flat Field, 20% Flat Field, 30% Flat Field, 40% Flat Field, 50% Flat Field, 60% Flat Field, 70% Flat Field, 80% Flat Field, 90% Flat Field, 100% Flat Field
MULTI BURST	—	—
SWEEP	—	—
MONITOR	Monitor	100% Red Field, 75% Red Field, 100% Green Field, 75% Green Field 100% Blue Field, 75% Blue Field, Convergence
PULSE BAR	Pulse & Bar	2T30 Pulse and Bar
TIMING	—	—
SDI	—	Equalizer Test, PLL Test, SDI Matrix
OTHER	—	Use this button to select the converter mode of operation and Embedded audio selection menu. (See page 263, <i>Selecting the Converter Mode.</i>)

¹ SMPTE RP219 Color Bars refers to SMPTE RP219 Color Bar (I/Q Even).

² Not available in 2K-format mode of operation.

The following table lists the signal set assigned to each test signal button and the signals that can be selected in the signal set when the module is configured to output projector test patterns. The table also lists the native XYZ projector test patterns that correspond to digital cinema.

Table 34: HDLG7 module projector test pattern set assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
COLOR BAR	Color Bars	Color Bar Patch-1, Color Bar Patch-2
LINEARITY	Linearity	Step Black-White, Step Black-Dark Gray, Horizontal Gradient, Vertical Gradient
FLAT FIELD	Flat Fields	Black Flat Field, White Flat Field, Black to White Step-1, Black to White Step-2, Black to White Step-3, Black to White Step-4, Black to White Step-5, Black to White Step-6, Black to White Step-7, Black to White Step-8, Black to White Step-9, Black to White Step-10, Black to Gray Step-1, Black to Gray Step-2, Black to Gray Step-3, Black to Gray Step-4, Black to Gray Step-5, Black to Gray Step-6, Black to Gray Step-7, Black to Gray Step-8, Black to Gray Step-9, Black to Gray Step-10
MULTI BURST	—	—
SWEEP	—	—
MONITOR	Monitor	Red-1 Field, Red-2 Field, Green-1 Field, Green-2 Field, Blue-1 Field, Blue-2 Field, Cyan-1 Field, , Cyan-2 Field, Magenta-1 Field, Magenta-2 Field, Yellow-1 Field, Yellow-2 Field, Grid, Checkerboard, Aspect Ratio
PULSE BAR	Pulse & Bar	Window
TIMING	—	—
SDI	SDI	Equalizer Test, PLL Test, SDI Matrix
OTHER	—	Use this button to select the converter mode of operation and Embedded audio selection menu. (See page 263, <i>Selecting the Converter Mode.</i>)

Setting the Gradient Starting Point. When you select Horizontal Gradient or Vertical Gradient in the Linearity projector test pattern set, use the up (▲) or down (▼) arrow button to set the starting point of the gradient. The available values are as follows:

- **Horizontal Gradient:** 16 to 1913 in 1 level steps.
- **Vertical Gradient:** 16 to 2880 in 1 level steps (2048 x 1080 format); 16 to 2404 in 1 level steps (2048 x 1556 format).

Selecting the Converter Mode

Select from the following converter modes when you want to convert the SMPTE 292M 4:2:2 serial digital signal applied to the HD SDI IN connector into a dual link output format:

60, 59.94, or 50 Hz Progressive Formats. The HDLG7 module converts the input interlace signal (60i, 59.94i, or 50i) to a progressive signal by doubling the frame rate. The input signal is copied to both Link A and Link B, but the payload identifier is modified to indicate a dual-link signal. The results are a 4:2:2 YCbCr 10-bit signal at the faster progressive rate (60p, 59.94p, or 50p).

4:4:4 YCbCr Formats. The HDLG7 module converts the input 4:2:2 YCbCr signal to 4:4:4 YCbCr signal by up-interpolating the chroma channel data samples. This is accomplished by using several incoming data samples before and after the data samples to derive the extra sample point. If 10-bit sample structure is selected, the alpha channel is set to blanking levels or is controlled by the ALPHA CHANNEL DATA menu. If 12 bit is chosen, the addition 2 LSB bits are set to zero on the Y and co-sited Cb and Cr samples. The derived Cb and Cr samples will contain derived LSB bits.

4:4:4 RGB Formats. The HDLG7 module converts the input 4:2:2 YCbCr signal to 4:4:4 YCbCr as described above. Then the signal is color-space converted using the inverse linear transform defined in SMPTE 274M. If 10-bit sample structure is selected, the alpha channel is set to blanking levels or is controlled by the ALPHA CHANNEL DATA menu. If 12 bit is chosen, the addition 2 bits (LSB) are computed from the linear transform calculations.

4:2:2 YCbCr 12 Bit Formats. The HDLG7 module converts the input 4:2:2 YCbCr signal to 4:2:2 YCbCr 12 bits by setting zeros for the additional 2 bits (LSB). The alpha channel is set to blanking levels or is controlled by the ALPHA CHANNEL DATA menu.

4:4:4 XYZ Formats. The HDLG7 module converts the input 4:2:2 YCbCr signal to 4:4:4 YCbCr and 4:4:4 RGB as described in the preceding paragraphs. Then the RGB signal is converted to XYZ by normalizing the gamma corrected RGB signal and applying the results to a RGB to XYZ color-space converter. The output of the converter is gamma corrected for digital cinema. The XYZ mode can be selected only in the 2K format mode.

Perform the following steps to select the converter mode:

1. Press the front-panel **OTHER** button. The menu display changes as follows:

HDLG7 [x]: CONVERTER Normal (GBR 4:4:4 12 bits)
--

2. Press the left (◀) or right (▶) arrow button, or press the **OTHER** button repeatedly to select between **Normal** and **Y to GBR**.
 - **Normal:** The incoming YCbCr signal is converted to a normal dual-link output.
 - **Y to GBR:** The incoming Y data is applied to the G, B, and R outputs. This allows higher bandwidth data, such as multiburst or sweep to be placed on all three channels. If the sampling structure is for a YCbCr or XYZ output, the Y to GBR selection is not available.
3. Press the up (▲) or down (▼) arrow button to select Embedded Audio selection menu. Then use the left (◀) or right (▶) arrow button to select the following:

Link A Only: Places the incoming embedded audio on the converter mode Dual Link A output. Conforms to the SMPTE 372M standard. In the case of converting 1920x1080p/PsF 29.97/30 Hz to 2048x1080p/PsF 29.97/30 Hz with 16 channels (four groups) of embedded audio, 8 channels (two groups) will be placed on the Link A output and the other 8 channels (two groups) will be placed on the Link B output.

Link B Only: Places the incoming embedded audio on the converted mode Dual Link B output. In the case of converting 1920x1080p/PsF 29.97/30 Hz to 2048x1080p/PsF 29.97/30 Hz with 16 channels (four groups) of embedded audio, the two lowest number embedded audio groups (groups 1 and 2) will be allowed on Link B. Groups 3 and 4 would be deleted.

Link A & B: Places the incoming embedded audio on the converted mode Dual Link A and B outputs. In the case of converting 1920x1080p/PsF 29.97/30 Hz to 2048x1080p/PsF 29.97/30 Hz with 16 channels (four groups) of embedded audio, the two lowest number embedded audio groups (groups 1 and 2) will be allowed on both Link A and B. Groups 3 and 4 would be deleted.

4. Press the **CANCEL** button to return to the main menu.

NOTE. When you select the converter mode, the 2K TEST SIGNAL KEY ASSIGN setting will automatically switch to HD Test Signal.

HDLG7 Module Main Menu

Use the HDLG7 module main menu to perform the following tasks:

- Set the sampling structure/pixel depth.
- Select the signal of the alpha channel.
- Set the timing offset between the Link A and Link B outputs.
- Generate a moving picture.

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the HDLG7 module main menu.

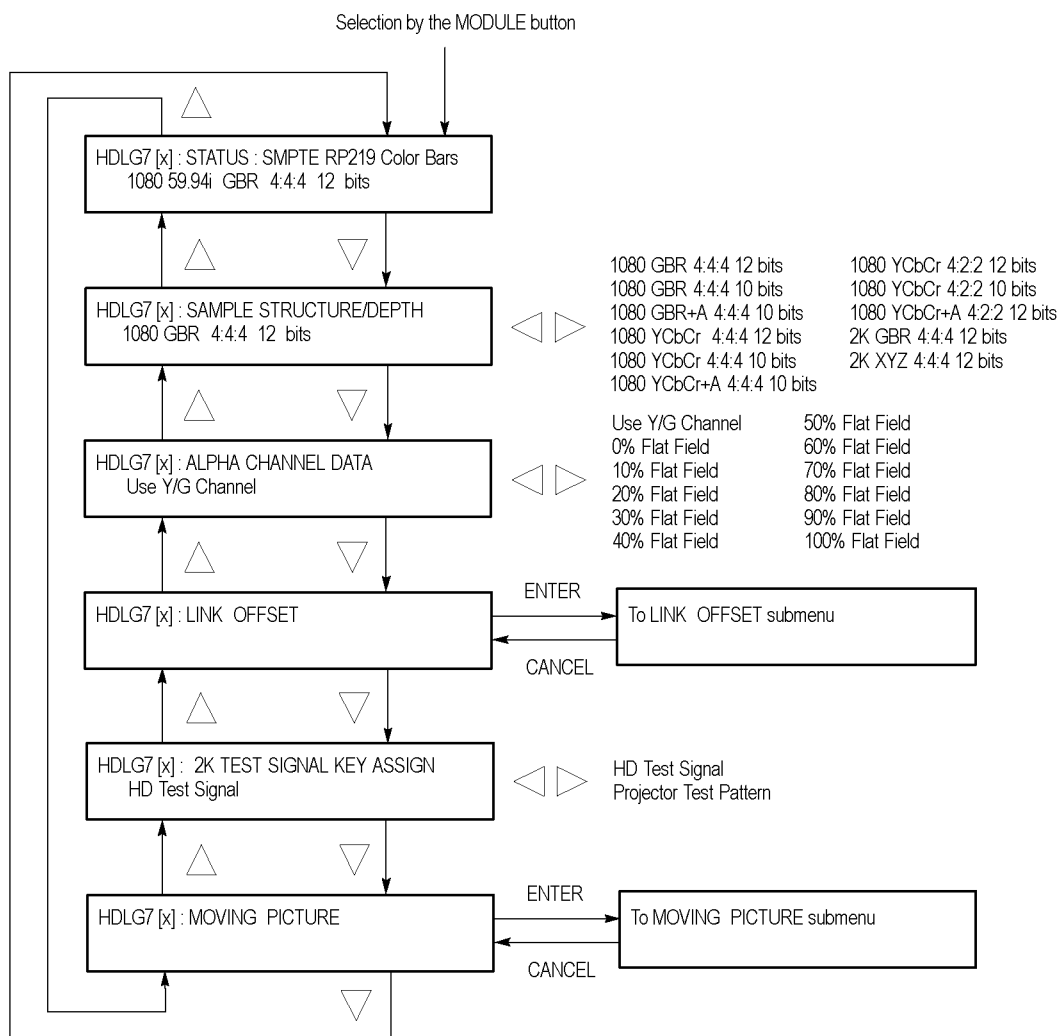


Figure 123: HDLG7 module main menu

STATUS. Displays the instrument operating mode, output signal format, and output sample structure. Examples of the STATUS display are shown below for each of the operating modes (converter and generator).

Converter Mode: The figure below shows an example STATUS display when the module is in the converter mode.

```
HDLG7 [x]: STATUS : CONVERTER (Normal)
1080 60i GBR+A 4:4:4 10 bits
```

- **CONVERTER (Normal):** Indicates that the incoming HD-SDI video stream is being converted in a normal mode. The other choice is (Y to GBR) where the incoming Y data is placed on the G, B, and R channels on the output. Y to GBR is only selectable in the GBR sampling structure.
- **1080 60i:** Indicates the incoming signal format. If there is no input or the format is not the correct rate, the following messages will appear on the second line of the LCD; "No Input Signal" or "Input Signal Error (Check FORMAT)"
- **GBR+A 4:4:4 10 bits:** Indicates the output sampling structure.

Generator Mode: The figure below shows an example STATUS display when the module is in the generator mode.

```
HDLG7 [x]: STATUS : 100% Color Bars
1080 24sF GBR+A 4:4:4 10 bits
```

- **100% Color Bars:** Indicates the name of the signal currently being generated. As different generator signal is selected, its name will be displayed.
- **1080 24sF:** Indicates the output format.
- **GBR+A 4:4:4 10 bits:** Indicates the output sampling structure.

SAMPLE STRUCTURE/DEPTH. Selects the sampling structure and pixel depth of the output signal. Use the left (◀) or right (▶) arrow button to select from the formats listed in the table below. Press the **ENTER** button to confirm the selection.

Table 35: HDLG7 module sample structure/depth signal formats

1920 x 1080 formats		
1080 GBR 4:4:4 12 bits	1080 GBR 4:4:4 10 bits	1080 GBR+A 4:4:4 10 bits
1080 YCbCr 4:4:4 12 bits	1080 YCbCr 4:4:4 10 bits	1080 YCbCr+A 4:4:4 10 bits
1080 YCbCr 4:2:2 12 bits	1080 YCbCr 4:2:2 10 bits	1080 YCbCr+A 4:2:2 12 bits
2K 1080 and 2K 1556 formats		
2K GBR 4:4:4 12 bits	2K XYZ 4:4:4 12 bits	

NOTE. When the 1080 50p, 1080 59.94p, or 1080 60p format is selected, the HDLG7 module forces the sampling structure to 1080 YCbCr 4:2:2 10 bits, and no other sampling structure is allowed.

Selecting Projector Test Pattern while the format is 2K 1080 or 2K 1556 will limit the sampling structure/depth to 2K XYZ 4:4:4 12 bits.

If the current output format is 1080 23.98sF, 1080 24sF, 1080 23.98p, 1080 24p, 1080 25p, 1080 29.97p, 1080 30p, 1080 50i, 1080 59.94i, or 1080 60i, you may select 1080 YCbCr 4:2:2 10 bits as the sampling structure. However, the output signals produced on Link A and Link B are not dual-link signals. The HDLG7 module will produce two single-link outputs, with incoming ancillary and embedded audio being placed on Link A and none on Link B.

ALPHA CHANNEL DATA. Sets the alpha channel signal. Use the left (◀) or right (▶) arrow button to select **Use Y/G Channel, 0% Flat Field, 10% Flat Field, 20% Flat Field, 30% Flat Field, 40% Flat Field, 50% Flat Field, 60% Flat Field, 70% Flat Field, 80% Flat Field, 90% Flat Field, or 100% Flat Field.**

The alpha channel data are used only with the following sampling structures: 1080 GBR+A 4:4:4 10 bits, 1080 YCbCr+A 4:4:4 10 bits, and 1080 YCbCr+A 4:2:2 12 bits.

LINK OFFSET. Sets the timing offset of the Link B output relative to the Link A output. Select this menu item, and then press the **ENTER** button to access the **LINK OFFSET** submenu. (See page 268.)

2K TEST SIGNAL KEY ASSIGN. Selects the signal sets to be assigned to the test signal button. Use the left (◀) or right (▶) arrow button to select one of the following two signal sets:

- **HD Test Signal:** Assigns standard HD video test signals to the test signal buttons. (See Table 33 on page 261.)
- **Projector Test Pattern:** Assigns digital cinema projector test patterns to the test signal buttons. These signal sets are only selectable in the 2K format. (See Table 34 on page 262.)

MOVING PICTURE. Scrolls the active picture area of the output test signal. Select this menu item, and then press the **ENTER** button to access the MOVING PICTURE submenu. (See page 269.)

LINK OFFSET Submenu

Use this menu to adjust the timing offset of the Link B output relative to the Link A output. The following figure shows the LINK OFFSET submenu.

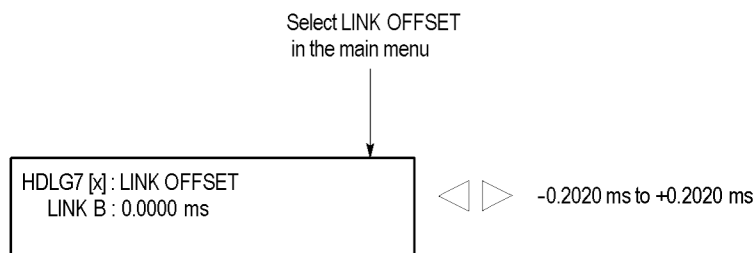


Figure 124: HDLG7 module LINK OFFSET submenu

Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -0.2020 μs to +0.2020 μs in 0.0135 μs steps.

NOTE. You can reset the offset value to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

MOVING PICTURE Submenu

Use this menu to scroll the active picture area of the serial digital video signal up/down or left/right (or randomly). Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the MOVING PICTURE submenu.

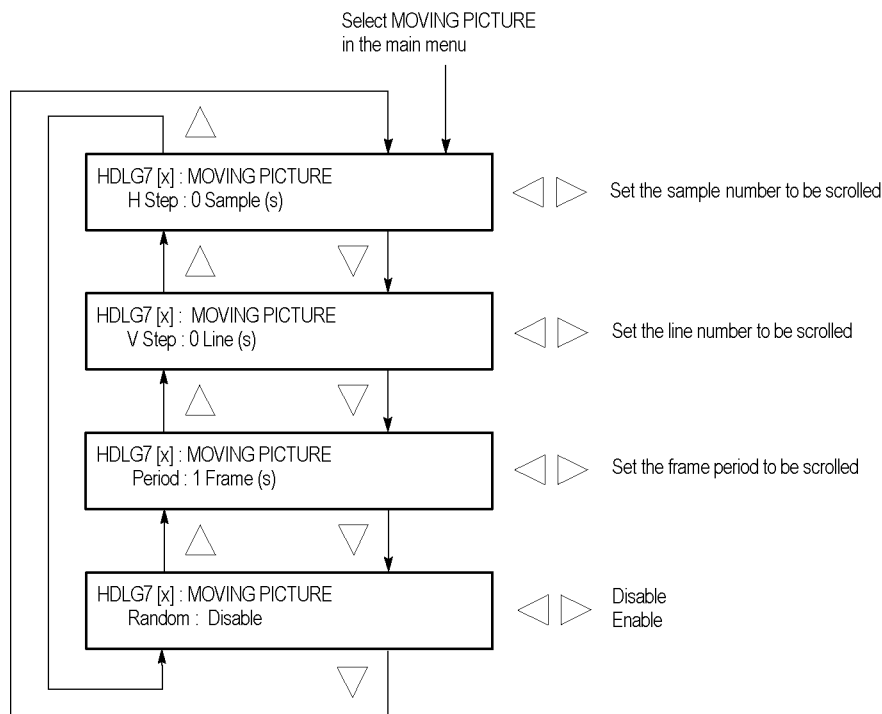


Figure 125: HDLG7 module MOVING PICTURE submenu

H Step. Sets the number of samples to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 4-sample steps.

V Step. Sets the number of lines to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 1-line steps.

Period. Sets the time interval between occurrences of the scrolling. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 1 to 16 in 1-frame steps.

Random. Sets whether or not the picture scrolls randomly. Use the left (◀) or right (▶) arrow button to select between **Disable** and **Enable**. Press the **ENTER** button to confirm the selection.

Factory Default Settings

The following table shows the factory default settings for the HDLG7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

NOTE. *The factory default settings put the HDLG7 module in the Generator mode.*

Table 36: HDLG7 module factory default settings

Menu item name	Settings
STATUS	SMPTE RP219 Color Bars 1080 59.94i GBR 4:4:4 12 bits
SAMPLE STRUCTURE/DEPTH	1080 GBR 4:4:4 12 bits
ALPHA CHANNEL DATA	Use Y/G Channel
LINK OFFSET	0.0000 ms
2K TEST SIGNAL KEY ASSIGN	HD Test Signal
MOVING PICTURE	
H Step	0 Sample(s)
V Step	0 Line(s)
Period	1 Frame(s)
Random	Disable
Converter mode	Normal
Converter embedded audio	LINK A
2K Horizontal/Vertical Gradient offset	
Horizontal Gradient offset	16
Vertical Gradient offset	16

HDVG7 HDTV Digital Video Generator

This section describes the module-specific functions of the HDVG7 HDTV Digital Video Generator module. Refer to the following locations for additional information about this module:

- *HDVG7 Module Connectors* for a description of the rear-panel connectors. (See page 58.)
- *HDVG7 Module Functional Check* for a basic procedure to check that the module is functional. (See page 44.)
- *TG700 Specifications and Performance Verification Technical Reference* for module specifications and for a detailed procedure to verify that the module is functioning as specified.
- *TG700 Programmer Manual* for information about the commands to remotely control the module.

Product Description

The HDVG7 HDTV Digital Video Generator module is designed to be installed in the TG700 TV Signal Generator Platform.

The module is an HDTV test signal generator that provides 1.485 Gb/s serial digital video signals in various formats. The module provides the following features:

- Two serial digital video outputs
- Two serial digital black outputs (Option BK)
- Supports SMPTE 274M (1080), SMPTE 240M (1035), and SMPTE 296M (720)
- Overlay of circle, text, or logo on the video signal
- Generates a moving picture by scrolling the active picture area of the output test signal
- Generates timecode with ATC when a GPS7 module is installed
- Up to 16 channels of Embedded Audio
- Full remote control using Ethernet interface

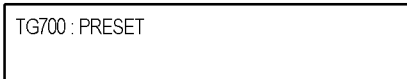
- Generates video signals with 24 (or 20) bit embedded digital audio with a sample rate of 48 kHz. The module supports the following audio frequencies.

Silence	500 Hz	2000 Hz	8000 Hz
50 Hz	600 Hz	2400 Hz	9600 Hz
100 Hz	750 Hz	3000 Hz	10000 Hz
150 Hz	800 Hz	3200 Hz	12000 Hz
200 Hz	1000 Hz	4000 Hz	15000 Hz
250 Hz	1200 Hz	4800 Hz	16000 Hz
300 Hz	1500 Hz	5000 Hz	20000 Hz
400 Hz	1600 Hz	6000 Hz	

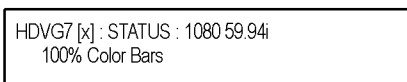
Operating Procedure

After the module is installed in the mainframe, and the mainframe is installed in the rack or other location where it will be used, use the following procedure to access each function of the module:

1. Connect the power cord to the power connector on the rear panel, and then plug the cord into the AC electric power source. Electric power is supplied to the mainframe.
2. Wait until the power-on initialization process is complete, and then check that no error messages appear on the display.
3. After the initialization process is complete, the mainframe main menu appears as shown below.



4. Press the front-panel **MODULE** button until the HDVG7 module main menu appears as shown below.



5. Select the signal format and the test signal you want to output. (See page 273, *Selecting an Output Signal*.)
6. Use the front-panel arrow buttons to navigate and select items in the main menu and submenus.

Refer to *HDVG7 Module Main Menu* for detailed information about the main menu items and the submenu items. (See page 275.)

Selecting an Output Signal

To output a signal from the HDVG7 module, you need to select a signal format and output signal as described below.

Select the Signal Format

Perform the following steps to select the signal format:

1. Press the front-panel **MODULE** button until the HDVG7 module main menu appears as shown below.

```
HDVG7 [x] : STATUS : 1080 59.94i
100% Color Bars
```

2. Press the **FORMAT** button. The menu display changes as follows:

```
HDVG7 [x] : SELECT FORMAT
1080 59.94i (Current)
```

3. Use the left (◀) or right (▶) arrow button, or press the **FORMAT** button repeatedly, to select one of the signal formats, and then press the **ENTER** button to confirm the selection.

NOTE. *When you change signal format, synchronization shock occurs.*

4. If you change the signal format while a test signal is being output, the instrument starts loading all of the signal sets for the selected format and displays the message "**Now Loading...**". When you see the message, "**Done (Press CANCEL)**", press the **CANCEL** button.

Select the Test Signal

All of the signal sets that are available in the module are already assigned to the corresponding test signal buttons. When the HDVG7 module is selected and you press any of the front-panel test signal buttons, the selected signal in the signal set is output. (See Figure 126.)

For example, when you press the **COLOR BAR** test signal button, a signal in the Color Bars signal set is output. Use the left (◀) or right (▶) arrow button, or press the **COLOR BAR** test signal button repeatedly to select a different signal from the Color Bars signal set.

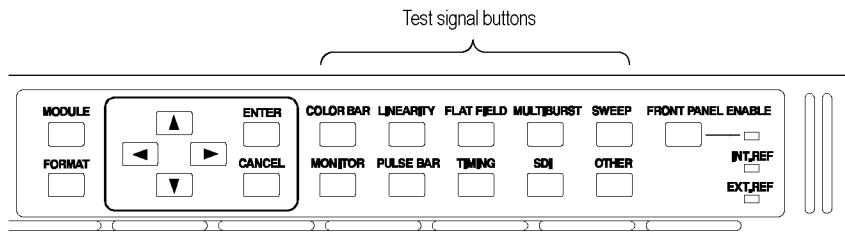


Figure 126: Front-panel test signal buttons

If your TG700 mainframe has 64 MB of memory installed, you can download a frame picture file created by the Frame Picture Generator to the mainframe and output the picture from the HDVG7 module. (See page 2, *Mainframe Memory Requirements*.) Refer to the *TG700 PC Tools Technical Reference* for detailed information on how to create, download, and output a frame picture.

The following table lists the signal set assigned to each test signal button and shows the test signals that are available in each signal set.

Table 37: HDVG7 module signal set assigned to the test signal buttons

Button name	Signal set	Signals in the signal set
COLOR BAR	Color Bars	100% Color Bars, 75% Color Bars, SMPTE Color Bars
LINEARITY	Linearity	5 Step Staircase, Limit Ramp, Ramp, Shallow Ramp Matrix, Shallow Ramp Valid Ramp
FLAT FIELD	Flat Fields	0% Flat Field, 50% Flat Field, 100% Flat Field
MULTI BURST	Multiburst	Multiburst 1-10 MHz, Multiburst 10-20 MHz, Multiburst 20-30 MHz
SWEEP	Sweep	100% Sweep 1-15 MHz, 100% Sweep 1-30 MHz
MONITOR	Monitor	75% Blue Field, 75% Green Field, 75% Red Field, Convergence
PULSE BAR	Pulse & Bar	2T30 Pulse and Bar
TIMING	Timing	Bowtie 1ns Markers, Co-site Pulse
SDI	SDI Test	Equalizer Test, PLL Test, SDI Matrix
OTHER	—	—

HDVG7 Module Main Menu

Use the HDVG7 module main menu to perform the following tasks:

- Set the logo, text, or circle overlay on the output signal.
- Set the timing offset on the output signals.
- Scroll the active picture area of the output signal.
- Enable or disable the output and set parameters for each embedded audio group.
- Enable or disable the Y, Pb, and/or Pr components on the video output signal.

Use the up (▲) or down (▼) arrow button to scroll through the main menu. The following figure shows the HDVG7 module main menu.

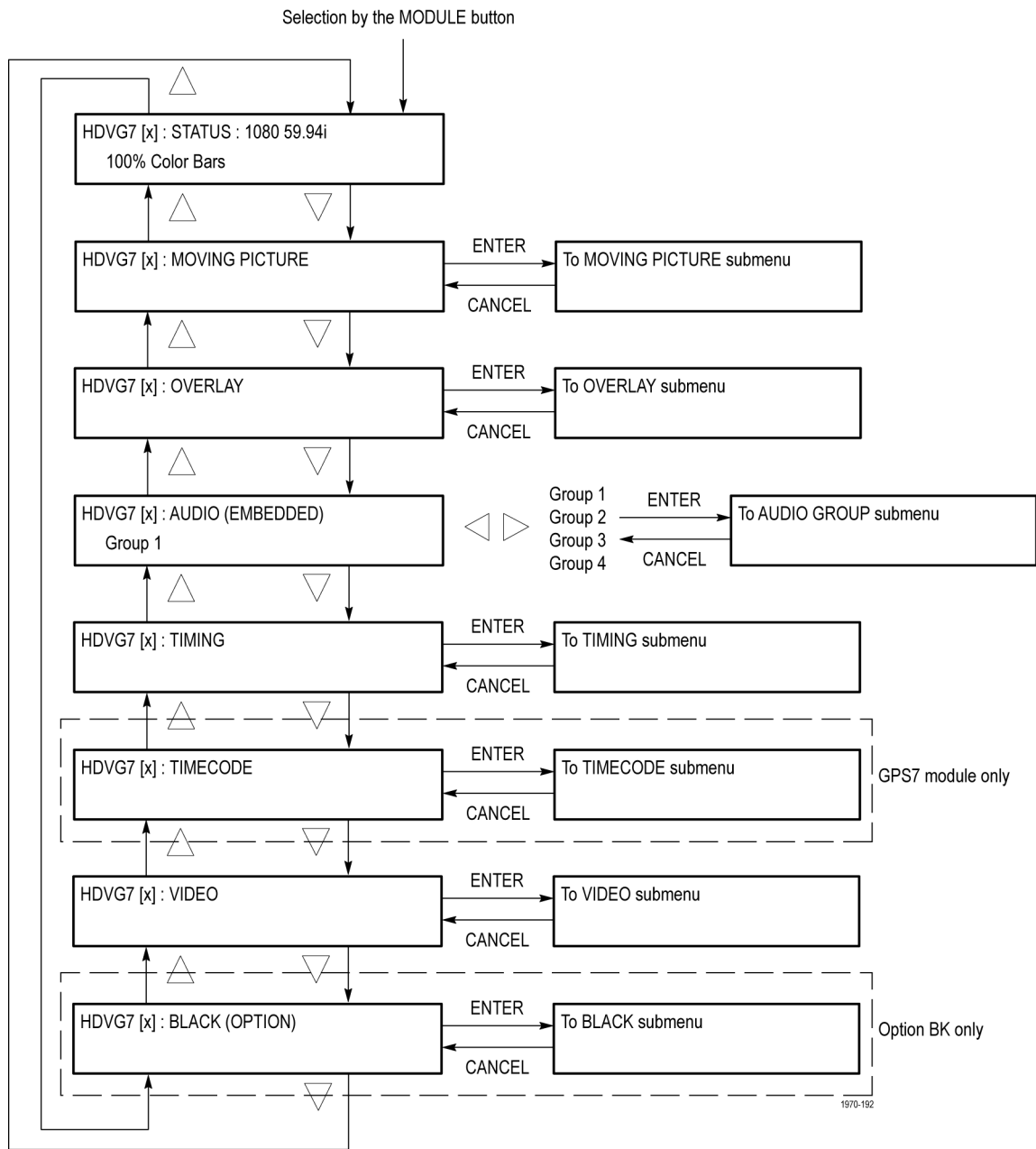


Figure 127: HDVG7 module main menu

MOVING PICTURE. Scrolls the active picture area of the output test signal. Select this menu item, and then press the **ENTER** button to access the MOVING PICTURE submenu. (See page 278.)

OVERLAY. Selects an item (logo, text, or circle) that is overlaid on the output test signal and sets the blinking mode for the overlay. Select this menu item, and then press the **ENTER** button to access the OVERLAY submenu. (See page 279.)

AUDIO (EMBEDDED). Sets the parameters for embedded audio on the output test signals. Use the left (◀) or right (▶) arrow button to select **Group 1**, **Group 2**, **Group 3**, or **Group 4**. Select any of the items, and then press the **ENTER** button to access the AUDIO GROUP submenu. (See page 284.)

TIMING. Sets the timing offset of the serial digital video outputs relative to the internal reference signal (frame reset signal). Select this menu item, and then press the **ENTER** button to access the TIMING submenu. (See page 287.)

TIMECODE. Sets the timecode parameters for the module outputs when a GPS7 module is installed. To support this capability, the module hardware must be version 2.0 or above. The TG700 mainframe must have software version 5.1 or above installed. Select this menu item, and then press the **ENTER** button to access the TIMECODE submenu. (See page 288.)

VIDEO. Enables or disables the Y, Pb, or Pr component of the output serial digital video signals and the output mode for audio/video timing measurement. Select this menu item, and then press the **ENTER** button to access the VIDEO submenu. (See page 289.)

BLACK (OPTION). This menu is only available with Option BK, and sets the parameters of the serial digital black signals output from the **BLACK 1** and **BLACK 2** connectors. Select this menu item, and then press the **ENTER** button to access the BLACK submenu. (See page 291.)

MOVING PICTURE Submenu

Use this menu to scroll the active picture area of the serial digital video signal up/down or left/right (or randomly). Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the MOVING PICTURE submenu.

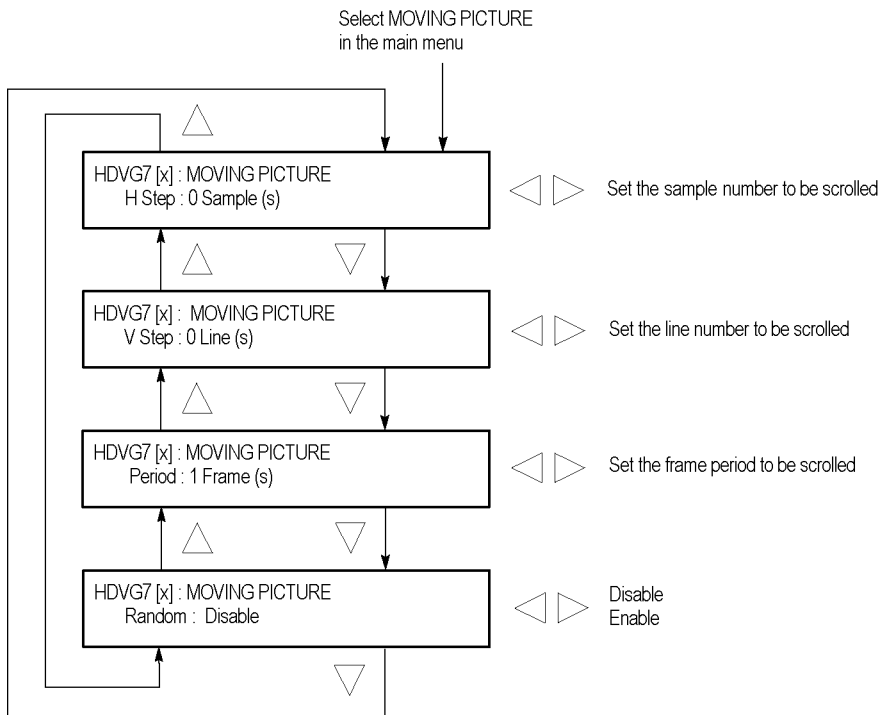


Figure 128: HDVG7 module MOVING PICTURE submenu

H Step. Sets the number of samples to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 4-sample steps.

V Step. Sets the number of lines to be scrolled per frame set in the **Period** menu item. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from -252 to +252 in 1-line steps.

Period. Sets the time interval between occurrences of the scrolling. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 1 to 16 in 1-frame steps.

Random. Sets whether or not the picture scrolls randomly. Use the left (◀) or right (▶) arrow button to select between **Disable** and **Enable**. Press the **ENTER** button to confirm the selection.

OVERLAY Submenu

Use this menu to select an item (logo, ID Text, or circle) to overlay on the output test signal, and to set the blinking mode for the overlay. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the OVERLAY submenu.

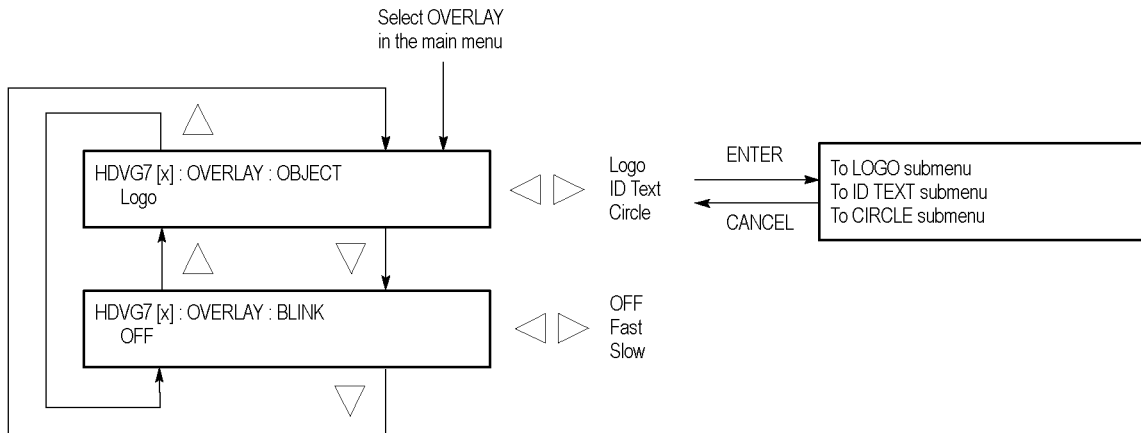


Figure 129: HDVG7 module OVERLAY submenu

OBJECT. Selects an item to overlay on the output test signal. Use the left (◀) or right (▶) arrow button to select one of the following overlays, and then press the **ENTER** button to access the submenu for setting the parameters of that overlay.

- **Logo:** Opens the LOGO submenu where you can select a logo to overlay the output signal in a specified position. (See page 280.)
- **ID Text:** Opens the ID TEXT submenu where you can edit the text to overlay the output signal in a specified position. (See page 281.)
- **Circle:** Opens the CIRCLE submenu where you can specify a circle size and position to overlay the output signal. (See page 283.)

BLINK. Sets the blinking mode for the enabled overlay. Use the left (◀) or right (▶) arrow button to select one of the following blink modes, and then press the **ENTER** button to confirm the selection.

- **OFF:** Turns off the blinking function of the overlay.
- **Fast:** Sets the overlay to blink at approximately 0.5 second intervals.
- **Slow:** Sets the overlay to blink at approximately 1.0 second intervals.

LOGO Submenu

Use this menu to select a logo to overlay on the output test signal and to set the display position of the logo. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the LOGO submenu.

NOTE. To display a logo using the LOGO submenu, you need to create a logo file (.lgo) and download it to the LOGO folder of the module. Refer to the TG700 PC Tools Technical Reference for detailed information about how to create a logo file and download it to the TG700.

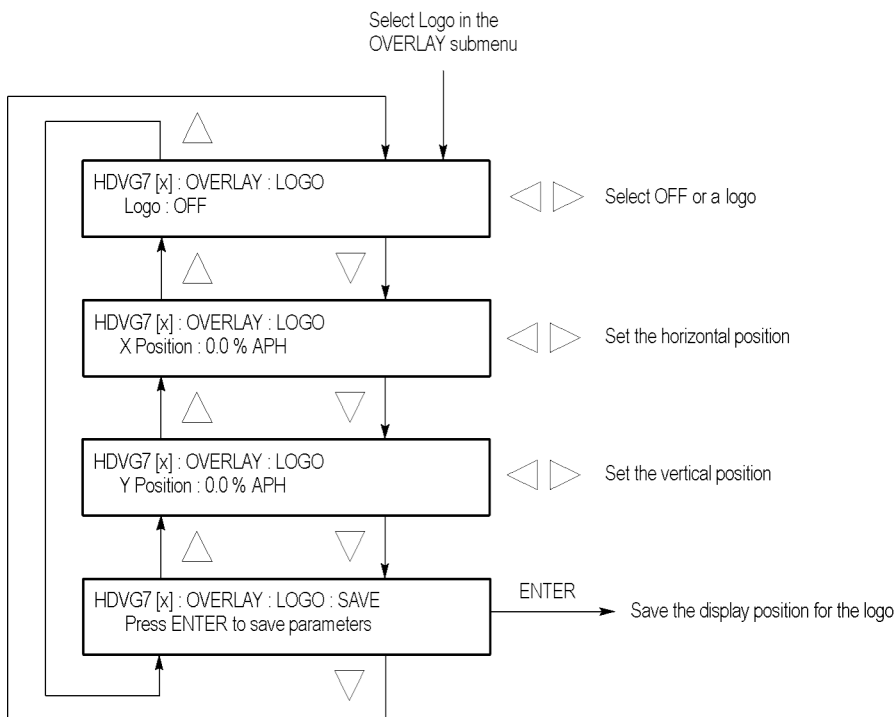


Figure 130: HDVG7 module LOGO submenu

Logo. Selects the logo you want to display. Use the left (◀) or right (▶) arrow button to select **OFF** or a logo file name. Press the **ENTER** button confirm the selection. When you select **OFF**, the logo overlay is disabled.

X Position. Sets the horizontal position of the logo. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

Y Position. Sets the vertical position of the logo. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -100.0% to 0.0% in 0.1% steps.

SAVE. Saves the display position for the logo to the logo file. Press the **ENTER** button to save the current settings.

ID TEXT Submenu

Use this menu to edit a text overlaid on the output test signal, and to set the display position of the text. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the ID TEXT submenu.

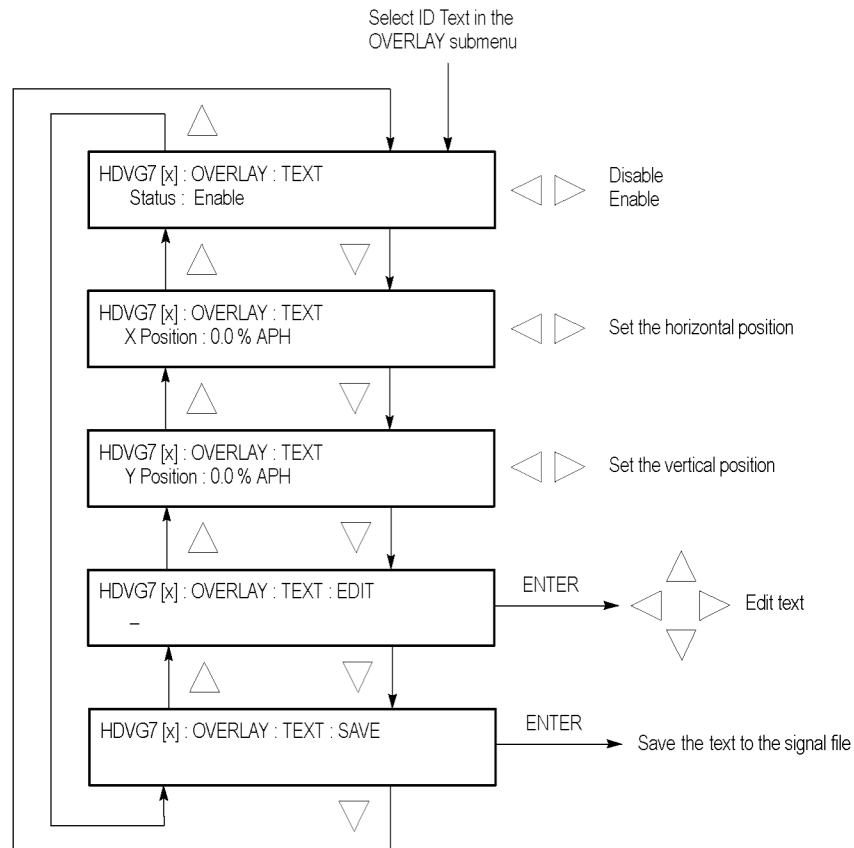


Figure 131: HDVG7 module ID TEXT submenu

Status. Enables or disables the text overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**, and then press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the text. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

Y Position. Sets the vertical position of the text. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from 0.0% to 100.0% in 1% steps.

EDIT. Edits the text you want to display on the output test signal. Perform the following steps to edit the text:

NOTE. *You can use up to 30 characters for the logo text. Use the blank character to erase unneeded character(s).*

1. Use the left (◀) or right (▶) arrow button to select **EDIT**, and then press the **ENTER** button to enable the text edit mode.
2. Use the left (◀) or right (▶) arrow button to move the underscore character (_) to the character you want to change.
3. Use the up (▲) or down (▼) arrow button to select the desired character.
4. After you enter all of the desired characters, press the **ENTER** button to exit the text editing mode.
5. Use the left (◀) or right (▶) arrow button to select **SAVE**, and then press the **ENTER** button to save the text and its position to the signal file.

SAVE. Saves the text and its position to the signal file currently being output. Press the **ENTER** button to save the text and its position to the signal file.

CIRCLE Submenu

Use this menu to overlay a circle on the output test signal and set the display position of the circle. Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the CIRCLE submenu.

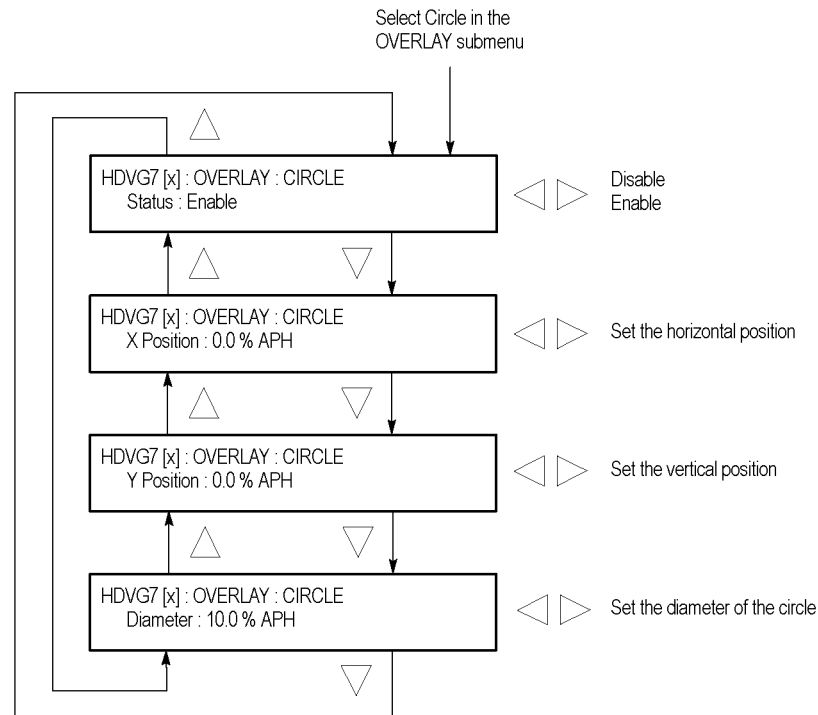


Figure 132: HDVG7 module CIRCLE submenu

Status. Enables or disables the circle overlay. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to confirm the selection.

X Position. Sets the horizontal position of the circle. The position is set as a percentage of active picture width. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Y Position. Sets the vertical position of the circle. The position is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the position. You can set the value from -50.0% to 50.0% in 1% steps.

Diameter. Sets the diameter of the circle. The diameter is set as a percentage of active picture height. Use the left (◀) or right (▶) arrow button to change the value. You can set the value from 0.0% to 100.0% in 1% steps.

AUDIO GROUP Submenu

Use this menu to perform the following tasks:

- Enable or disable the embedded audio of the selected audio group.
- Select which audio channel to enable.
- Set the emphasis status bits, sampling alignment status bits, and sample bits of the selected audio group.

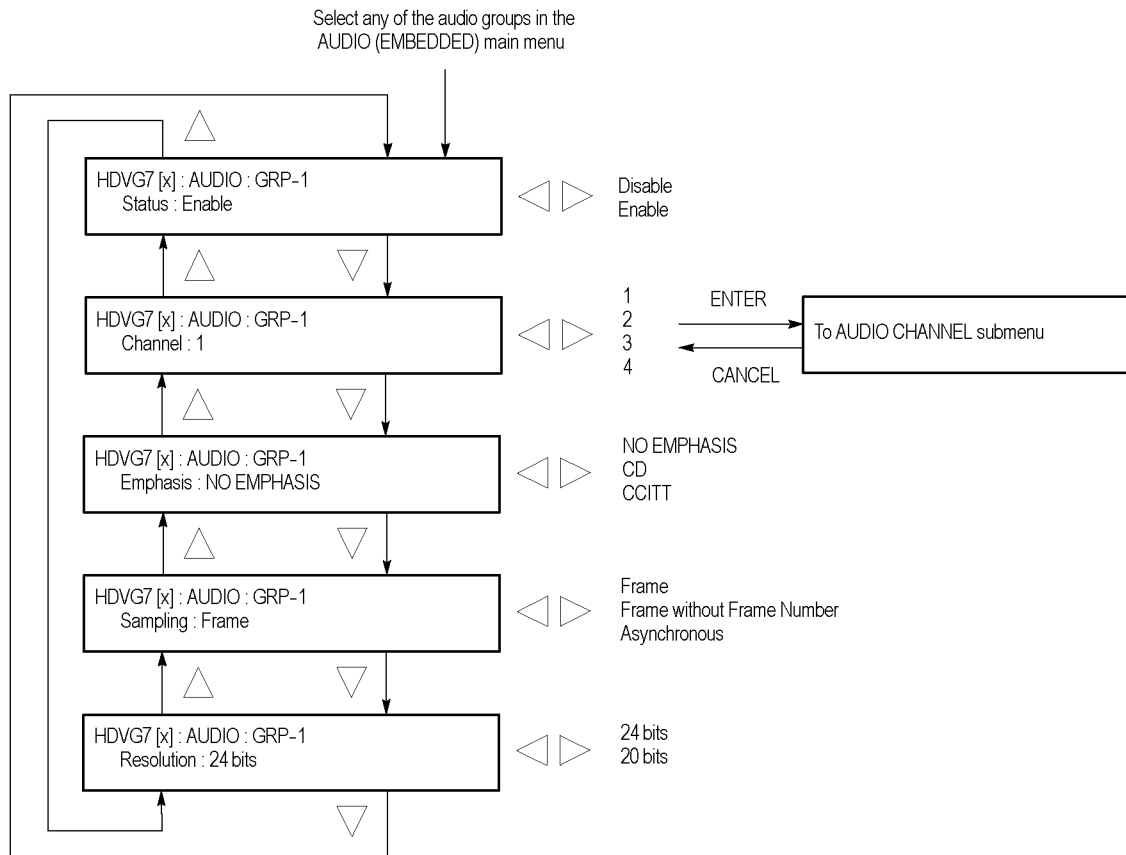


Figure 133: HDVG7 module AUDIO GROUP submenu

Status. Enables or disables the generation of embedded audio for the selected audio group. Use the left (◀) or right (▶) arrow button to select between **Enable** and **Disable**. Press the **ENTER** button to confirm the selection.

Channel. Selects the audio channel for which you will change the parameters. Use the left (◀) or right (▶) arrow button to select **1**, **2**, **3**, or **4**. Select any audio channel, and then press the **ENTER** button to access the **AUDIO CHANNEL** submenu. (See page 285.)

Emphasis. Sets the emphasis status bits for the selected audio group. Use the left (◀) or right (▶) arrow button to select **NO EMPHASIS**, **CD**, or **CCITT**. Press the **ENTER** button to confirm the selection.

Sampling. Sets the sampling alignment status bits for the selected audio group. Use the left (◀) or right (▶) arrow button to select **Frame**, **Frame without Frame Number**, or **Asynchronous**. Press the **ENTER** button to confirm the selection.

Resolution. Sets the resolution of the audio signal data for the selected audio group. Use the left (◀) or right (▶) arrow button to select between **24 bits** and **20 bits**. Press the **ENTER** button to confirm the selection.

AUDIO CHANNEL Submenu

Use this menu to set the frequency, amplitude, and audio click of the embedded audio signal for the selected audio channel. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the AUDIO CHANNEL submenu.

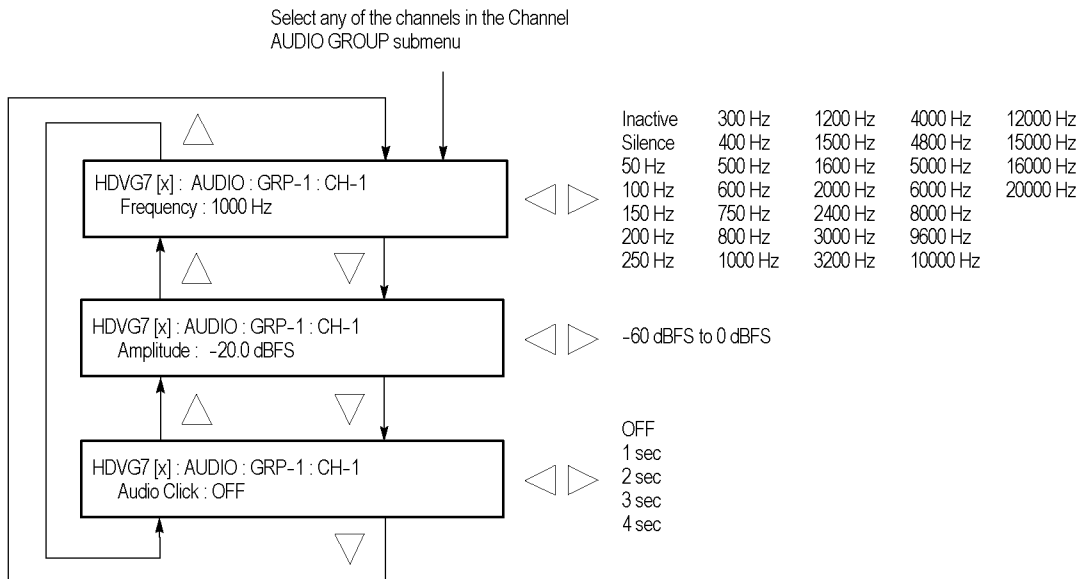


Figure 134: HDVG7 module AUDIO CHANNEL submenu

Frequency. Sets the audio signal frequency of the selected audio channel. Use the left (◀) or right (▶) arrow button to select the frequency. The selection items are as follows:

Inactive	400 Hz	1600 Hz	6000 Hz
Silence	500 Hz	2000 Hz	8000 Hz
50 Hz	600 Hz	2400 Hz	9600 Hz
100 Hz	750 Hz	3000 Hz	10000 Hz
150 Hz	800 Hz	3200 Hz	12000 Hz
200 Hz	1000 Hz	4000 Hz	15000 Hz
250 Hz	1200 Hz	4800 Hz	16000 Hz
300 Hz	1500 Hz	5000 Hz	20000 Hz

When **Inactive** is selected, the audio data output is disabled. Press the **ENTER** button to confirm the selection.

Amplitude. Sets the audio signal amplitude of the selected audio channel. Use the left (◀) or right (▶) arrow button to set the amplitude. You can set the value from -60 dBFS to 0 dBFS in 1 dBFS steps.

Audio Click. Inserts audio clicks in the selected audio channel. The audio tone, if any, is turned off for an interval around the audio click. Use the left (◀) or right (▶) arrow button to make the selection. The choices are **OFF**, **1 sec**, **2 sec**, **3 sec**, and **4 sec**. Press the **ENTER** button to enable the selection.

Audio Click becomes valid when you select **1 sec** to **4 sec** for the Audio Click rate. When Audio Click is valid, Audio Tone is turned off for 0.25 second around the click. For example, if you select **3 sec** for the click rate, the audio tone will be output for 2.75 seconds, and silent for 0.25 second; the click occurs during this silence.

When Audio Click is **OFF**, the Audio Tone selected in the **FREQUENCY** menu is output continuously. Audio Click makes it easy to identify any channel(s) of the four output channels.

TIMING Submenu

Use this menu to adjust the timing offset of the serial digital video outputs relative to the internal reference signal (frame reset signal). Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the TIMING submenu.

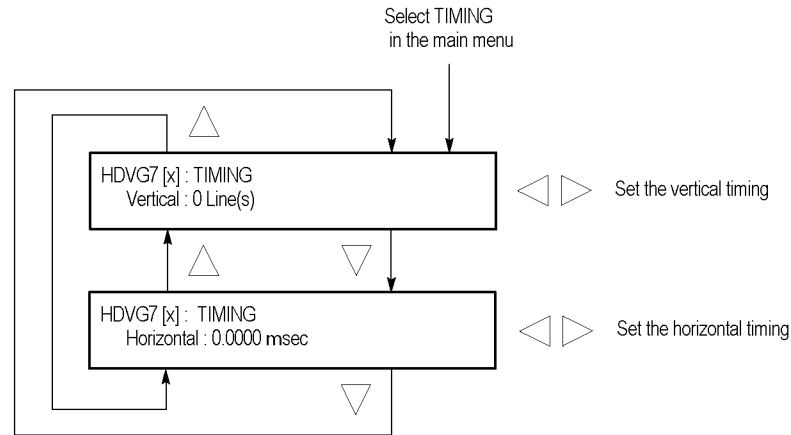


Figure 135: HDVG7 module TIMING submenu

Vertical. Sets the vertical timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1/2 to +1/2 frame in 1-line steps.

Horizontal. Sets the horizontal timing offset. Use the left (◀) or right (▶) arrow button to change the timing offset. You can set the value from -1 to +1 line in 1-clock (13.5 ns) steps.

NOTE. You can reset the timing offset to zero by pressing the left (◀) or right (▶) arrow buttons simultaneously.

TIMECODE Submenu

Use this menu to set timecode parameters for the module outputs. This menu is only available when a GPS7 module is also installed in the instrument.

NOTE. To display the TIMECODE submenu, the mainframe must have software version 5.1 or above installed and the hardware must be version 2.0 or above.

Use the up (▲) or down (▼) arrow button to change the menu items. The following figure shows the TIMECODE submenu.

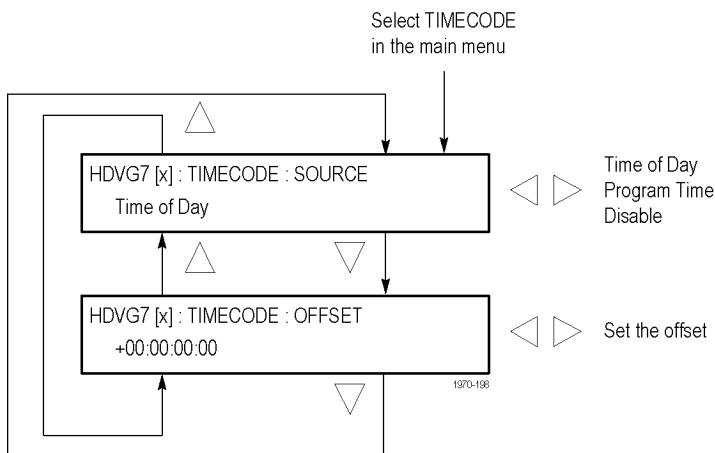


Figure 136: HDVG7 module TIMECODE submenu

SOURCE. Use the left (◀) or right (▶) arrow button to select the timecode source from the following choices:

- **Time of Day:** Uses the time of day as determined by the time of day menu selection. (See page 220.)
- **Program Time:** Uses the program time counter as the timecode.
- **Disable:** Disables the timecode function for the HDVG7 module.

OFFSET. Use this menu item to set a time offset for the HDVG7 module outputs from the timecode input from the GPS7 module. You can enter a time offset of up to ±23:59:59:29 from the selected time source (hours : minutes: seconds : video frames). Press the **ENTER** button, and then use the left (◀) or right (▶) arrow button to select a digit in the offset value to change. An underline character appears under the selected offset digit.

After you select an offset digit, use the up (▲) or down (▼) arrow button to change the value of the digit. Repeat for each digit as required for you offset. Press the **ENTER** to confirm the offset change.

VIDEO Submenu

Use this menu to turn each serial digital video component (Y, Pb, or Pr) on or off individually, and to turn the output mode for an audio/video timing measurement on or off. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the VIDEO submenu.

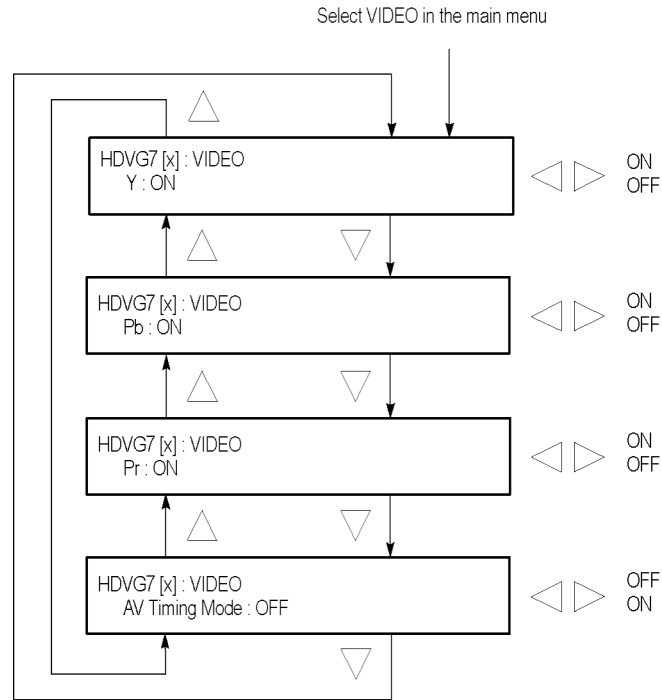


Figure 137: HDVG7 module VIDEO submenu

Y. Turns the Y component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

Pb. Turns the Pb component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

Pr. Turns the Pr component of the serial digital video signals on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

AV Timing Mode. Turns the output mode for an audio/video timing measurement on or off. Use the left (◀) or right (▶) arrow button to select between **ON** and **OFF**. Press the **ENTER** button to confirm the selection.

When you turn this mode on, the specified audio and video signals are synchronously on for 0.5 second and off for 4.5 seconds. With this signal, you can measure the time delay that accumulates between the audio and video content of the television signal during signal transport. The time delay can be measured by a video analyzer with the serial digital video signal or by an oscilloscope with the analog audio and video signals extracted from the serial digital video signal.

The following settings are recommended for the audio and video signals when you use this mode:

- Audio signal (CH1 and CH2 of Group 1): 10000 Hz, -20 dBFS
- Video signal: 100% Flat Field

NOTE. *The AV Timing Mode setting is not saved as a preset.*

**BLACK Submenu
(Option BK Only)**

Use this menu to set the output parameters of the serial digital black signals output from the BLACK1 and BLACK 2 connectors. Use the up (▲) or down (▼) arrow button to scroll through the menu. The following figure shows the BLACK submenu.

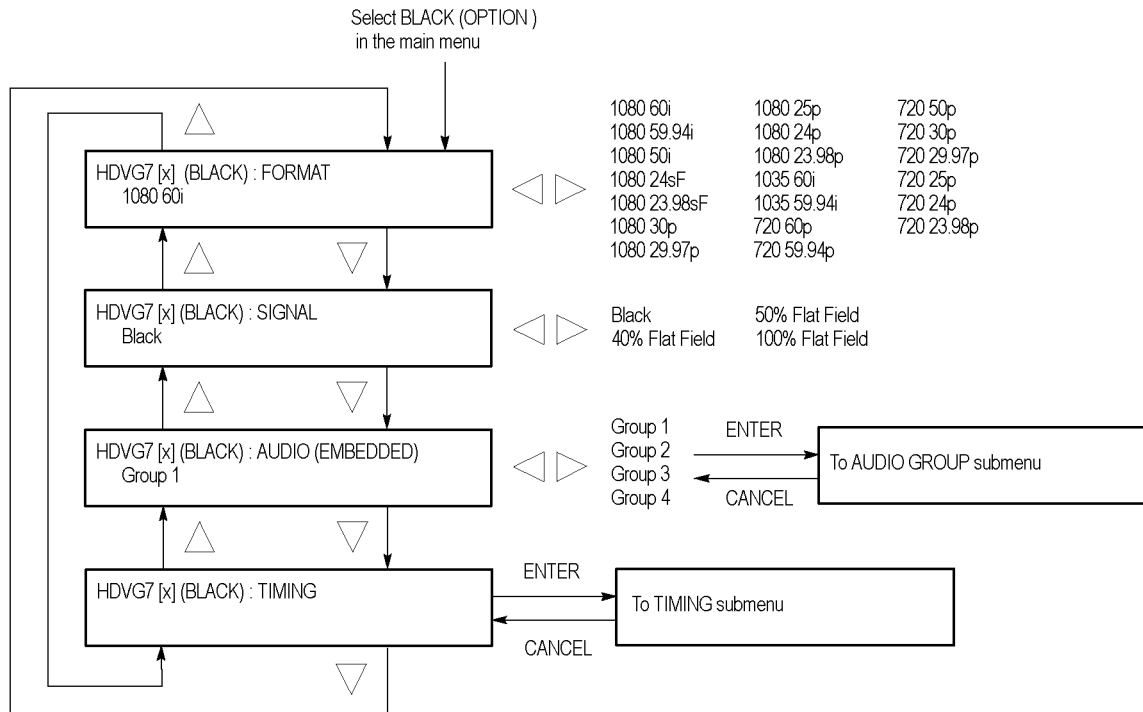


Figure 138: HDVG7 module BLACK submenu (Option BK only)

FORMAT. Selects the format of the output serial digital black signals. Use the left (◀) or right (▶) arrow button to select **1080 60i**, **1080 59.94i**, **1080 50i**, **1080 24sF**, **1080 30p**, **1080 29.97p**, **1080 25p**, **1080 24p**, **1080 23.98p**, **1035 60i**, **1035 59.94i**, **720 60p**, **720 59.94p**, **720 50p**, **720 30p**, **720 29.97p**, **720 25p**, **720 24p**, or **720 23.98p**. Press the **ENTER** button to confirm the selection.

SIGNAL. Selects the serial digital black signal to output. Use the left (◀) or right (▶) arrow button to select between **Black** (serial digital black), **40% Flat Field**, **50% Flat Field**, and **100% Flat Field**. Press the **ENTER** button to confirm the selection.

AUDIO (EMBEDDED). Sets the parameters for embedded audio on the serial digital black signals. Use the left (◀) or right (▶) arrow button to select **Group 1**, **Group 2**, **Group 3**, or **Group 4**. Select any of the groups, and then press the **ENTER** button to access the AUDIO GROUP submenu. (See page 284.)

TIMING. Sets the timing offset of the serial digital black outputs relative to the internal reference signal (frame reset signal). Select this menu item, and then press the **ENTER** button to access the TIMING submenu. (See page 287.)

Factory Default Settings

The following table shows the factory default settings for the HDVG7 module. These settings are recalled when you select **Factory Default** from the **PRESET : RECALL** menu item in the mainframe main menu.

Table 38: HDVG7 module factory default settings

Menu item name	Settings
STATUS	1080 59.94i SMPTE Color Bars
MOVING PICTURE	
H Step	0 Sample(s)
V Step	0 Line(s)
Period	1 Frame(s)
Random	Disable
OVERLAY : OBJECT	Logo
OVERLAY : BLINK	OFF
OVERLAY : LOGO	
Logo	OFF
OVERLAY : ID TEXT	
Status	Disable
OVERLAY : CIRCLE	
Status	Disable
X Position	0.0% APH
Y Position	0.0% APH
Diameter	90% APH
AUDIO : GRP-1 to GRP-4	
Status	Disable
Emphasis	No Emphasis
Sampling	Frame
Resolution	24 bits
AUDIO : GRP-1 : CH-1 to CH-4	
Frequency	1000 Hz
Amplitude	-20.0 dBFS
Audio Click	OFF
TIMING	
Vertical	0 Line(s)
Horizontal	0.0000 ms
VIDEO	
Y	ON
Pb	ON

Table 38: HDVG7 module factory default settings (cont.)

Menu item name	Settings
Pr	ON
AV Timing Mode	OFF
TIMECODE (requires GPS7 module be installed in mainframe)	
SOURCE	Disable
Option BK	
(BLACK) FORMAT	1080 59.94i
(BLACK) SIGNAL	Black
(BLACK) AUDIO : GRP-1 to GRP-4	
Status	Disable
Emphasis	No Emphasis
Sampling	Frame
Resolution	24 bits
(BLACK) AUDIO : CH-1 to CH-4	
Frequency	1000 Hz
Amplitude	-20.0 dBFS
Audio Click	OFF
(BLACK)TIMING	
Vertical	0 Line(s)
Horizontal	0.0000 ms

Index

Symbols and Numbers

10 BASE-T port, 47

A

AC line voltage requirements, 10

Accessories

optional, 3

standard, 3

AG7

1+2 connector, 48

3+4 connector, 48

48 kHz CLOCK
connector, 48

5+6 connector, 48

7+8 connector, 48

AUDIO TIMING

submenu, 94, 96

AUDIO-VIDEO SYNC

submenu, 94

CHANNEL PARAMETERS

submenu, 94, 95

Factory default settings, 96

Functional checks, 16

Main menu, 93

operating procedure, 92

Product description, 91

Rear-panel connectors, 48

RESOLUTION submenu, 94

SILENCE connector, 48

AGL7

BLACK 1 connector, 49

BLACK 2 connector, 49

BLACK 3 connector, 49

CW connector, 49

Factory default settings, 107

Functional checks, 17

GENLOCK submenu, 99,
100

Main menu, 99

Operating procedure, 98

OUTPUT submenu, 102

Product description, 97

Rear-panel connectors, 49

REF connector, 49

SELECT OUTPUT

submenu, 99

SIGNAL submenu, 104

STATUS submenu, 99

TIMING submenu, 105

ALARM menu, 84

Analog Genlock *See* AGL7

Analog Test Generator *See* ATG7

Analog Video Generator *See*
AVG7

Analog Wideband Video

Generator *See* AWVG7

Antenna

amplification, 199

cabling, 199

location, 199

requirements for GPS7, 198

system for GPS7, 198

ATG7

APL submenu, 113, 119

BARS connector, 51

BLACK 1 connector, 51

BLACK 2 connector, 51

Bounce submenu, 119

Factory default settings, 120

Functional checks, 19

ID TEXT submenu, 113, 114,
116

Main menu, 112

Operating procedure, 109

Product description, 108

Rear-panel connectors, 51

SELECT OUTPUT

submenu, 113, 114

SELECT SIGNAL

submenu, 115

SIGNAL connector, 51

STATUS submenu, 113

TIMING submenu, 113, 118

Audio Generator *See* AG7

AVG7

Adjusting the SCH phase, 139

APL submenu, 130, 140

Bounce submenu, 140

CH 1 connector, 51

CH 2 connector, 51

CH 3 connector, 51

CIRCLE submenu, 136

Factory default settings, 141

Functional checks, 22

ID TEXT submenu, 134

LOGO submenu, 133

Main menu, 129

MOVING PICTURE

submenu, 130, 131

Operating procedure, 122

OVERLAY submenu, 130,
132

Product description, 121

Rear-panel connectors, 51

TIMING submenu, 130, 137

VIDEO submenu, 130, 138

AWVG7

- CH 1 connector, 52
- CH 2 connector, 52
- CH 3 connector, 52
- CIRCLE submenu, 153
- Factory default settings, 158
- Functional checks, 23
- ID TEXT submenu, 151
- LOGO submenu, 150
- Main menu, 146
- MOVING PICTURE submenu, 147, 148
- Operating procedure, 143
- OVERLAY submenu, 147, 149
- Product description, 142
- Rear-panel connectors, 52
- TIMING submenu, 147, 154
- VIDEO submenu, 147, 156

B**BG7**

- BLACK 1 connector, 52
- BLACK 2 connector, 52
- BLACK 3 connector, 52
- BLACK 4 connector, 52
- Factory default settings, 167
- Functional checks, 24
- Main menu, 161
- Operating procedure, 160
- Product description, 159
- Rear-panel connectors, 52
- SELECT FORMAT submenu, 162
- SELECT OUTPUT submenu, 161
- SELECT SIGNAL submenu, 163
- TIMECODE submenu, 165
- TIMING submenu, 164

Black Generator *See* BG7

C

CAL OVEN submenu, 74

Calibration

- Gain, 195
- Internal oscillator frequency, 74, 195
- Cleaning, 89
 - exterior, 90
- Clock Select conflict messages, 60
- Configuration
 - GPS7 module, 195
 - hardware installation, 5
- Connectors
 - Rear-panel, 47
- Crossover Ethernet cable, 76

D

- Description
 - product overview, 1
- Diagnostic routines, 73
- DIAGNOSTICS submenu, 73
- Digital Video Generator *See* DVG7

DVG7

- AUDIO CHANNEL submenu, 184
- Audio click, 185, 286
- AUDIO GROUP submenu, 183
- BLACK 1 connector, 53
- BLACK 2 connector, 53
- BLACK submenu (Option BK only), 189
- CIRCLE submenu, 182
- EDH insertion, 188
- Embedded audio, 169, 183
- Factory default settings, 191
- Functional checks, 26
- ID TEXT submenu, 180
- LOGO submenu, 179
- Main menu, 174
- MOVING PICTURE submenu, 177
- Operating procedure, 170
- OVERLAY submenu, 178
- Product description, 169
- Rear-panel connectors, 53
- SIGNAL 1 connector, 53
- SIGNAL 2 connector, 53
- TIMING submenu, 186
- VIDEO submenu, 187

E

- Environmental operating requirements, 8
- External reference indicator, 200

F

- Fan failure, 61
- Features, 1
- Figures of merit (FOM), 199
- FORMAT button, 46
- FRAME RESET 1, 59
- FRAME RESET 2, 59
- FRAME RESET 3, 59
- Frame reset signals, 59
- FRAME RESET STATUS submenu, 66

- Front panel
 - operation, 45
- FRONT PANEL ENABLE
 - button, 46
- Functional checks, 16
 - AG7, 16
 - AGL7, 17
 - ATG7, 19
 - AVG7, 22
 - AWVG7, 23
 - BG7, 24
 - DVG7, 26
 - GPS7, 27
 - HD3G7, 38
 - HDLG7, 41
 - HDVG7, 44
- G**
- General Purpose Interface
 - Mainframe *See* GPI
- GPI
 - Mainframe, 79
 - Setting, 79
- GPS Synchronization and
 - Timecode module *See* GPS7
- GPS7
 - 10 MHz/BLACK 3
 - connector, 55
 - ANTENNA connector, 54
 - antenna system, 198
 - BLACK 1 connector, 55
 - BLACK 2 connector, 55
 - Functional checks, 27
 - LTC/GPI connector, 54
 - Main menu, 206
 - Operating procedure, 194
 - oven calibration, 195
 - POWER indicator, 54, 218
 - Product description, 193
 - Rear-panel connectors, 54
 - TIMECODE submenu, 214
- H**
- Hardware installation, 5
- HD clock conflicts, 61
- HD Dual Link Video
 - Generator *See* HDLG7
- HD3G7
 - Functional checks, 38
 - HD SDI IN connector, 56
 - Rear-panel connectors, 56
 - SIGNAL 1 connector, 56
 - SIGNAL 2 connector, 56
 - TRIG OUT connector, 56
- HDLG7
 - Embedded audio
 - selection, 264
 - Factory default settings, 270
 - Functional checks, 41
 - HD SDI IN connector, 57
 - LINK A connectors, 57
 - LINK B connectors, 57
 - LINK OFFSET
 - submenu, 268
 - Main menu, 265
 - MOVING PICTURE
 - submenu, 269
 - Operating procedure, 256
 - Product description, 254
 - Rear-panel connectors, 57
 - Selecting the converter
 - mode, 263
 - Setting the gradient starting
 - point, 262
- HDTV Digital Video
 - Generator *See* HDVG7
- HDVG7
 - AUDIO CHANNEL
 - submenu, 285
 - AUDIO GROUP
 - submenu, 284
 - BLACK 1 connector, 58
 - BLACK 2 connector, 58
 - BLACK submenu (Option BK
 - only), 291
 - CIRCLE submenu, 283
 - Embedded audio, 272, 284
 - Factory default settings, 292
 - Functional checks, 44
 - ID TEXT submenu, 281
 - LOGO submenu, 280
 - Main menu, 275
 - MOVING PICTURE
 - submenu, 278
 - Operating procedure, 272
 - OVERLAY submenu, 279
 - Product description, 271
 - Rear-panel connectors, 58
 - SIGNAL 1 connector, 58
 - SIGNAL 2 connector, 58
 - TIMECODE submenu, 288
 - TIMING submenu, 287
 - VIDEO submenu, 289
- I**
- Initial product inspection, 5
- Inspection, 89
 - exterior, 89
- installation
 - rackmount instructions, 6
- Installation, 5
 - hardware, 5
 - module, 11
- K**
- Key features, 1
- L**
- LCD display, 45

M

- Mainframe main menu, 62
- Mainframe memory
 - requirements, 2
- Manual description, xvii
- Manuals
 - related, xviii
- Memory requirements, 2
- Menu control buttons, 46
- Module
 - installation, 11
 - removal, 11
- MODULE button, 45
- Modules
 - AG7 Audio Generator, 91
 - AGL7 Analog Genlock, 97
 - ATG7 Analog Test Generator, 108
 - AVG7 Analog Video Generator, 121
 - AWVG7 Analog Wideband Video Generator, 142
 - BG7 Black Generator, 159
 - DVG7 Digital Video Generator, 169
 - GPS7 GPS Synchronization and Timecode module, 193
 - HDLG7 HD Dual Link Video Generator, 254
 - HDVG7 HDTV Digital Video Generator, 271

N

- NETWORK INFORMATION
 - submenu, 70
- NETWORK SETUP
 - submenu, 71, 77

O

- Operating basics, 45
- Optional accessories, 3
- Options
 - International power cords, 4
 - Option BK (Serial Digital Black Output for HDVG7 module), 4
 - Option CB (NTSC/PAL Color Bars signals for BG7 module), 4
 - Option D1 (Calibration Test Data Report), 4
 - Option FP (Frame Picture Generator), 4
 - Product documentation, 5

P

- Power connector, 47
- Preface, xvii
- PRESET submenu, 63
- Product Description, 1

R

- Rackmount
 - installation instructions, 6
- Reference indicator, 46
- Related Manuals, xviii
- Removal
 - module, 11

S

- Safety Summary, ix
- SD clock conflicts, 60
- Select clock messages, 60
- SEQUENCE submenu, 65
- Service
 - manual, xviii
- Setting Ethernet parameters, 77
- SIGNAL KEY ASSIGN
 - submenu, 69
- Signal quality
 - figures of merit (FOM), 199
- Standard accessories, 3

T

- Test signal buttons, 46
- Time flow block diagram, 201
- Timecode
 - as related to time flow, 201

U

- UTILITY submenu, 67