trilogy

Mentor Plus

DIGITAL SPG/TSG

USER GUIDE

ISSUE 7

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Comments or correspondence concerning this manual should be addressed to The Design Manager at the address given at the front of this User Guide.

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Issue	Date	Reason for Change	Approved
1	28/5/95	First Issue	
2	22/9/95	Descriptions for 525 operation added	
3	11/4/96	Spec change (video failure level) due to revision 4 PCB	
4	6/8/96	350-26 Composite/Component TSG board added	
5	25/8/99	350-28 Pulse board added and Addresses Updated	
6	28/1/00	Layout errors corrected. 350-24-01 Added	
7	14/5/02	Updated option board references, replaced front panel pictures with new style, removed references to legacy options, updated waveform lists, several minor corrections	

ERRATA SHEET

This sheet contains information regarding errors in this user guide.

Date	Description

CONTENTS

1. APPLICATION

The Trilogy 350 Mentor Plus Synchronising Pulse Generator is one of the most flexible units available on the market today.

It is suitable for any digital or mixed format environment where a high quality Digital SPG is required. As standard, the unit is provided with five analogue black and burst outputs. Optional modules allow high quality PAL and/or component waveforms to be generated.

The digital television environment is catered for with a standard output of an AES/EBU digital audio reference and "SDI" digital serial test pattern generator. Optionally, additional SDI test pattern generator modules, a second AES/EBU digital audio reference generator (with SDI reference black generator) may be fitted.

Mentor is fitted, as standard, with an oven-controlled reference oscillator allowing the unit to be used either a station master or as a slave.

The main black/burst generator provides 3 co-timed outputs, whereas two further outputs provide independent timing relative to the main output. This gives total timing freedom with adjustment of ±4 fields (±2 fields NTSC) relative to the main output in 0.5ns steps.

This User Guide concentrates on the operational aspects of the unit and includes a full technical specification. A maintenance handbook is also available.

We hope you are pleased with this equipment. If you have any problems or wish to suggest improvements to this product or for future products, please contact Trilogy Broadcast Limited where our staff will be available to assist you.

1.1 Summary of Mentor Plus Features

The Mentor Plus SPG/TSG provides the following features and facilities.

- Full Broadcast Master Digital SPG/TSG - Genlock or Free running
- Black/burst and 10MHz genlock inputs
- Precision "master" oscillator as standard fitment
- Switchable 525/625 operation
- 3 independently timed black and burst outputs
- Timing range of ±4 fields (±2 fields NTSC)
- Digital video test signal output
- Digital AES/EBU Audio Tones/Silence output and Analogue Audio Tone output
- Embedded Audio on SDI available from some models, or as option.
- Mixed sync and 10MHz/27MHz outputs
- Meets EU EMC requirements
- Timing resolution Accuracy of 0.5ns
- Multiple optional test signal outputs

1.2 Available Options

Part Number	Description
350-24-00	SDI Test Pattern Generator
350-24-01	SDI Generator with Embedded Audio
350-25-00	AES/EBU Digital Audio and SDI black reference generator
350-26-00	Analogue Composite/Component Test Signal Board
350-28-00	Pulse Output Board
350-29-00	Dual Black/Burst option board
350-30-00	HDTV tri-level sync board.
350-88-00	SDI Black/Embedded VITC Translator
330-00-00	Changeover Unit
350-90-00	Service Manual

2. SPECIFICATION

Note. All measurements are made assuming, where appropriate, that the Mentor various offsets controlled from the front panel are set to zero unless otherwise stated. All signal measurements are made with inputs and outputs terminated in 75Ω unless otherwise stated.

2.1 General

Width	19" rack mounting
Height	44 mm (1U)
Depth	433 mm (excluding connectors)
Weight	4kg, no option boards
	5kg max. with option boards
Operating temperature range	0 to 50°C
Storage temperature range	-45 to 80°C

2.2 EMC

Emissions	
Radiated	EN55022, Class B, 30-1000MHz
AC Mains Conducted	EN55022 Class B, 0.15-30MHz
Immunity	
Radiated	IEC801 Part 3, 27-500MHz
ESD	IEC801 Part 2
Fast Transients on connected leads	IEC801 Part 4, common mode
AC Power port	IEC801 Part4, common mode

NOTE: Immunity is specified to criterion B - the unit's outputs may suffer some degradation during the disturbance, but the unit recovers on removal of the disturbance source and continues to operate as intended.

2.3 Power

Mains input	83-135/170-265 VAC, 45-60Hz auto select
Power consumption	75VA max. (depending on number of option boards fitted)
Fuse	2A (T)

2.4 Internal Reference Oscillator Stability

Values quoted are with respect to outgoing subcarrier frequency noting that all output timings are derived from the same oscillator. The outputs of the unit will be referenced to the internal oscillator if the genlock lock mode is set to 'INT' or the genlock mode is set to EXT1, 2, 3, 4 or 5 and the appropriate genlock input is missing and the failsafe is set to 'Oven'.

Nominal error	< ±0.5Hz (0.1ppm)
Temperature drift	< 0.2Hz/10°C
Ageing rate	< 0.05Hz/day
Warm up settling time to 0.2Hz	< 10 minutes

2.5 Genlock Video Input Performance

The unit's lock mode is assumed set to EXT1, 2, or 3 unless otherwise stated. Measurements (for example jitter) are taken by observing the main black burst with respect to the genlock video input. Other composite outputs will meet the same specification.

Video input type	2 BNC high impedance loop through
Return loss @ subcarrier	< -40dB
Video D.C. range	< ±12V
Video signal amplitude (to keep unit within specification)	300mV sync/burst ±6 dB (285mV 525 operation)
Sync attenuation below which signal will be indicated as missing.	-8dB (with respect to 300mV/625 or 285mV/525)
Burst attenuation below which signal will be indicated as monochrome.	-8dB (with respect to 300mV/625 or 285mV/525))
Sync frequency lock range	15.625kHz ± 1.5Hz (±100 ppm) - 625 15.734kHz ± 1.5Hz (±100 ppm) - 525
Subcarrier lock range	4.43361875MHz (625) 3.579545MHz (525) ± 200Hz (±50 ppm) (see note 1)
Genlock video lock up time	< 7 seconds
Output sync jitter with respect to 'clean' genlock video input	< ± 3ns
Output subcarrier jitter with respect to 'clean' genlock video input, lock mode = EXT1/2/3	< ±0.25°
Output subcarrier jitter with respect to 'clean' genlock video input, lock mode = EXT 4	< ±2°
Input video Sc.H. phase over which an Sc.H. error is indicated.	+90±15°, -90±15° (approx.)
Genlock video sync to output sync timing accuracy, over full operating temperature range	< 5ns
Genlock video subcarrier to output subcarrier phase accuracy over full operating temperature range	< 5°
Vertical lock up rate, genlock video to output, when unit set to FIELD LOCK = SLOW	1 line / 5 field

Note1: Assumes 15625Hz (15734.268Hz NTSC) line frequency and subcarrier varied about nominal Fsc.

2.6 10 MHz Input Performance

The unit's lock mode is assumed set to EXT5. Measurements (jitter for example) are taken by observing an output of the unit, normally the main black burst output.

10MHz input type	1 BNC, 75Ω terminated
10MHz input return loss @ 10 MHz	< -35dB
10MHz D.C. range	< ±3V
10MHz signal amplitude (to keep unit within specification)	0.5V to 3V p to p (terminated)
Signal amplitude below which signal will be indicated as missing.	0.4V
10MHz frequency lock range	10MHz ±200 Hz (±20 ppm)
Lock up time	< 0.1 seconds
Output sync jitter with respect to 'clean' 10MHz input	< ±2 ns
Output subcarrier jitter with respect to 'clean' 10MHz input	< ±0.2°

2.7 Genlock Operational Control

Horizontal offset adjustment range	±30 µS
Horizontal offset resolution	0.5ns
Horizontal offset accuracy	±5ns over full range
Subcarrier phase adjustment range	0 to 360°
Subcarrier phase resolution	0.1°
Line offset adjustment range	±15 lines in 1 line steps

2.8 Black Burst Performance

Signal source	Digital, converted using 10 bit DAC
Output impedance	75Ω ±0.2%
Sync amplitude	300mV ± 3mV (625) 285mV ± 3mV (525)
Burst amplitude	300mV ± 9mV (625) 285mV ±9mV (525)
Black level D.C.	0V ± 20mV
Noise to 20MHz	< -60dB (with respect to 700mV)
Noise above 20MHz	< -40dB (with respect to 700mV)
Sc.H. accuracy, all controls set to zero	± 5°
Sync edge risetime	250ns, gaussian (625) 140ns, gaussian (525)
Burst edge risetime	350ns, gaussian (625) 300ns, gaussian (525)
Difference in time between any black/burst output and any other (all controls set to zero)	±10 ns
Difference in time between any black/burst output and the genlock video input (all controls set to zero). Genlock lock mode set to EXT1, 2, 3, or 4.	±10 ns
Sc.H. change throughout offset adjustment range (Black/burst 2 and 3 outputs only)	< ±1°

2.9 Black Burst Outputs 2 and 3, Operational Control

Offset adjustment range * see note 1	±4 fields (±2 fields, NTSC)
Offset resolution	0.5ns
Offset accuracy	±5ns over full range
Subcarrier phase adjustment range	0 to 360°
Subcarrier phase resolution	0.1°

Note 1 . The ±4 field (±2 field, NTSC) offset range is complete - there are no discontinuities. It is possible to offset the signal by any value within this range to a resolution of 0.5ns. To aid adjustment, the offset may be altered in 0.5ns, line or field increments.

2.10 Mixed Sync/8 Field Ident Pulse Output Performance

Output impedance	75Ω ±0.2%
Sync amplitude	2V ± 200mV (625) 4V ± 200mV (525) 0V ± 200mV
Noise to 20MHz	< -60dB (with respect to 700mV)
Noise above 20MHz	< -40dB (with respect to 700mV)
Edge risetime	140ns±25ns, approx. gaussian
Difference in time between the mixed sync output to the Main black burst signal	< ±25 ns

2.11 10MHz/27MHz Output Performance

Output impedance	75Ω ±0.2%
Amplitude	1.2V ±100mV (10MHz) 1V ± 100mV (27MHz) 0V ± 100mV
Synchronism	The signal is derived from the clock source, whether it be the internal oven oscillator or derived from the genlock feed.
Noise to 20MHz	< -60dB (with respect to 700mV)
Noise above 20MHz	< -40dB (with respect to 700mV)

2.12 SDI Test Output Performance

Format	270MHz serial SDI, conforms to EBU Tech 3267E (625 line) and relevant sections of CCIR601, CCIR656 or SMPTE RP125M.
Resolution	10 bits, selectable to 8 bits.
Output impedance	approx. 75Ω
Return loss to 270MHz	≈ -14dB
Time offset with respect to Main black burst signal	< ±100 ns
Noise to 20MHz	< -60dB (with respect to 700mV)
Noise above 20MHz	< -40dB (with respect to 700mV)

2.13 SDI Test Output, Operational Control

Vertical Offset	± 3 lines in line steps
APL	Controls signal Average Picture Level, selectable on/off/bounce.
Moving	Adds moving bars to top and bottom of most test patterns, selectable on/off.
Resolution	10 bits, can be rounded for 8 bit systems

2.14 AES/EBU Output Performance

Format	Conforms to EBU Tech 3250E
Synchronism	The signal timing is derived from the video clock source, Either the internal oven oscillator or the genlock feed 48kHz signal is related to video frame as per SMPTE/EBU recommendations.
Grade * see note 1	Meets grade 1 when genlock lock mode = **INT**ernal.
Clock jitter * see note 1	< 1ns
Tone resolution	24 bit
Tone linearity error	< 1ppm
Noise to 20MHz	< -60dB (with respect to 700mV)
Noise above 20MHz	< -40dB (with respect to 700mV)

Note 1. When the unit is locked to a genlock feed, the frequency stability of the AES signal will be dependant on the quality of that feed.

2.15 AES/EBU Output Operational Control

Sample frequency control	Selectable, 32kHz, 44.1kHz, 48kHz
Tone frequency adjustment	100Hz to 10kHz in 100Hz steps. Left/right channel independent adjustment.
Tone amplitude adjustment	-40dB to 0dB in 1dB steps. 0dB = full scale digital signal. Left/right channel independent adjustment.
Tone identification	Left/right channels can pulse according to EBU/CCIR recommendations.
Grade	Grade bit manually adjustable between grade 1 and grade 2.
User data	Set to zero.
Other	Both channels may be set to silence.

2.16 Analogue Audio Output Performance

Note - this output was not available on early units.

The outputs provide an analogue conversion of the AES left and right channels - all adjustments to the AES data stream will be reflected in the analogue output.

Signal source	Digital, converted to analogue using 18 bit DAC, connected to top 18 bits of AES signal.
Output type	Differential, electronically balanced, intended for driving 600Ω lines only.
Output impedance	Low impedance, < 10Ω.
Amplitude	0dBU ±0.1dB (when AES tone amplitudes are set to -20dB).
Noise to 20MHz	< -60dB (with respect to 700mV)
Noise above 20MHz	< -40dB (with respect to 700mV)

2.17 Performance of Optional Outputs

2.17.1 Digital Reference Black Outputs

Format	Serial
Vertical Offset	±3 lines
Horizontal Offset	±14µs

2.17.2 Digital Test Signal Outputs

Generation Accuracy	Selectable 8/10 bit
Format	Serial
Vertical Offset	±3 lines

2.17.3 AES/EBU Digital Audio Reference Output

General	To EBU Tech 3250E
Grade	1 (2 when genlocked)
Sample Frequencies	32, 44.1, 48kHz
Tone, Left channel	800Hz, 1kHz, silence
Tone, Right channel	800Hz, 1kHz, silence
Tone types	EBU, CCIR, continuous
Tone resolution	23 bit
Peak Tone codes	0CCD0/F3330 Hex (-20dBm.)
	-18dBm available to special order
User Data	Set to 0
Video Locking	Selectable for 48kHz
Clock Jitter	<±1ns
Generation Accuracy	12bit
Quantisation level	0.3mV/bit

2.17.4 Analogue Composite/Component Test Signal Outputs

Note: non-factory fitted Modules may require the frequency response to be set once installed in the metalwork. Please refer to the Maintenance Handbook or to Trilogy. The module will otherwise not meet this specification.

Generation Accuracy	10bit
Quantisation level	1.333mV/bit
Output impedance	75Ω
Timing Accuracy YUV Relative	<±5ns
Single PAL output to Black/Burst	<±5ns
Level, 0dB:pk-pk:	1V±1%
Level, +3dB pk-pk:	1.41V ±1.5%
Black level DC:	0V ±25mV
Chrom/Lum gain:	<1%
Chrom/Lum delay:	<5ns
Chrom phase accuracy:	<±5°
Linearity:	<0.25%
Frequency Response to 6MHz	±0.2dB
Diff. Gain:	< 0.5%
Diff. Phase:	< 0.5°
2T K rating:	< 0.5%K
Sc.H accuracy:	±5°
Line tilt:	<0.5%
Field tilt:	<0.5%
Triple channel crosstalk 0-5.8MHz	<-60dB

2.17.5 VITC Board

Input	Analogue VITC to EBU tech 3097 B
Input type	Looping, hi Z
Input Return loss	>40dB @4.43MHz:
Input allowable D.C. range:	±6V
Input signal range (75_ term), to keep unit within specification:	+6 to -12dB
Input VITC lines	Variable, lines 6-22 (319-335)
Output	Serial SDI to CCIR 601/656
Generation Accuracy	10 bit
Output VITC lines	Variable, lines 6-22 (319-335)

2.17.6 Pulse Board

Output impedance	75Ω
Pulse Levels (Not PAL Ident)	2V ± 0.2V (PAL) 4V ± 0.2V (NTSC)
Pulse levels, PAL Ident	1V ± 0.1V
Pulse black level	0V ± 0.1V
Pulse rise fall times, 10 % to 90 %	150nS ± 10nS
Subcarrier amplitude	1V ± 0.1V (PAL) 2V ± 0.2V (NTSC)
Subcarrier D.C. level	0V ± 0.1V
Subcarrier phase (relative to main black burst output)	0° ± 5°

2.17.6.1 PAL Pulse timings

Burst Gate timing	Starts 5.5µS after sync falling edge, duration of 2.3µS
Mixed Blanking	Starts 1.5µS before sync falling edge, duration of 11.9µS
Line Drive	Early - Starts 1.5µS before sync falling edge, duration of 6.5µS Normal - Starts coincident with sync falling edge, duration of 6.5µS
PAL Ident	Transition is coincident with sync falling edge
Field 1 marker	Starts 10.4µS after sync falling edge, duration of 52µS (active picture width). Occurs on line seven only
Field Drive	The start is coincident with the last mixed blanking edge prior to the field interval, duration 7½ lines

2.17.6.2 NTSC Pulse timings

Burst Gate timing	Starts 5.3µS after sync falling edge, duration of 2.5µS
Mixed Blanking	Starts 1.5µS before sync falling edge, duration of 10.7µS
Line Drive	Early - Starts 1.5µS before sync falling edge, duration of 6.5µS Normal - Starts coincident with sync falling edge, duration of 6.5µS
Field 1 marker	Starts 9.2µS after sync falling edge, duration of 53µS (active picture width). Occurs on line seven only
Field Drive	The start is coincident with the last mixed blanking edge prior to the field interval, duration 9 lines

2.17.7 Outputs - General

SNR unweighted:	-60dB
SNR weighted:	-75dB
H.F. noise 6MHz to 100MHz	<-40dB
SDI digital outputs	conform to EBU Tech. 3267E and SMPTE 125M as appropriate
Analogue outputs	Conform to EBU N14 and SMPTE RP154 as appropriate

2.18 Miscellaneous

Setup data retention when unit not powered	>1000 hours. Unit must have been powered for >24 hours prior to this.
Serial communication type	Balanced RS422
Power fail indication	Relay normally open/ normally closed provided on Remote D-type.
Fan fail indication	Open collector output provided on D-type connector. 45V/500mA maximum
Remote Inputs	Two grounding inputs provided on D-type connector. See section 3.5 for further details.
Remote Output	One output provided on D-type connector. See section 3.5 for further details. Open collector outputs rated at 45V/500mA maximum.
Option interfaces	Up to three single width option boards may be fitted to the unit.

3. INSTALLATION

3.1 Unpacking

Carefully unpack the unit from its transit material and carefully check the unit for signs of damage.
Check the contents of the box against our despatch note and your original order to ensure that you have received the correct parts.
In the event that the unit has been damaged or does not match your order, contact Trilogy Broadcast Ltd. at the address given at the front of this guide immediately.

3.2 Rack Mounting

The 1U rack frame has integral 19" mounting ears for direct mounting in a standard 19" rack. Carefully place the unit in your rack and firmly attach it to the rack using 4 bolts.
IMPORTANT This unit has air intakes on one side of the unit and fan assisted exhaust vents on the other side and the back of the unit. Ensure that these have an unobstructed air flow, otherwise the unit will overheat. Pay particular attention to ensure that any rack wiring or cable trays do not obstruct the vent. Approximately 60mm of clear space should be allowed between the vents and any potential obstruction.

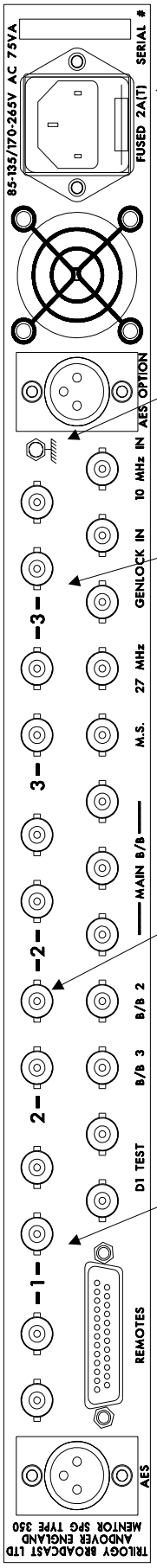
3.3 Mains Connection and Fusing

The power supply within the unit is a switch mode unit and will cope automatically with an input voltage of between 98-135 and 200-260 Volts AC
A standard IEC mains plug is provided on the rear of the unit complete with a retaining strap to suit a BULGIN mains socket.
This should be wired according to the instructions provided with a mating mains socket using suitable cable. See below for earthing details.
The mains plug has an integral fuse tray fitted with a 20mm glass cartridge 2 Amp (T) slow blow/anti-surge fuse.

3.4 Earthing Requirements

The unit is provided with a single 4mm earthing stud on the rear panel. Incoming mains earth from the IEC connector is internally bonded to both the chassis and technical 0V to meet safety requirements and performance specifications. The stud allows the addition of an earth strap in rack installations.

3.5 Signal Connections



Mains IEC Connector

Fan exhaust vent

Option Board Output of AES/EBU Digital Audio (if fitted)

4mm Earthing Stud

10 MHz Reference Input

Looping Genlock Input

Option Board 3 Outputs.

27MHz/10MHz Output

2V(625/PAL)/4V(525/NTSC) Mixed Sync Output (or 8 Field Ident Pulse - see Section 3.6).

3 co-timed outputs of "MAIN" black and burst

Option Board 2 Outputs

Second black and burst output.

Third black and burst output.

2 simultaneous outputs of SDI test signal.

Option Board 1 Outputs

Remote Interface Connector.

Fixed AES/EBU Digital Audio Output

3.5.1 Remote Connector Pinout

The following gives the pinout of the 25 way D-type socket of the remote interface connector.

Pin	Description	Pin	Description
1	Fan Fail Output	14	Power Fail Common
2	RS422 CTS-	15	Power Fail Normally Closed
3	RS422 RXD+	16	Power Fail Normally Open
4	RS422 TXD+	17	Genlock Status Out
5	RS422 RTS-	18	Step Option Board 1 Test Signals
6	RS422 TXD-	19	Step Through Setup Memories
7	GND	20	RS422 CTS+
8	RS422 RXD-	21	-
9	-	22	RS422 RTS+
10	-	23	Analogue Audio Out 1-
11	Analogue Audio Out 1+	24	Analogue Audio Out 2-
12	Analogue Audio Out 2 +	25	GND
13	GND		

3.5.2 Remote Connector - Use.

3.5.2.1 RS422 Port

The RS422 port is used during manufacturing test and alignment. As from software revision 'G', limited control is provided. Please contact Trilogy for details.

3.5.2.2 Step Through Set-Up Memories

The remote "Step Setup Memories" input may be used to step between the Mentor's 4 setup memories -see Section 9.1 for a full description of these memories. A step may be accomplished by a momentary ground applied to this pin.

3.5.2.3 Step Through Option Board 1 Test Signals.

The remote "Step Option 1 Test Signals" input may be used to cycle through the available test signals on the option board fitted in slot 1. A step may be accomplished by a momentary ground applied to this pin.

3.5.2.4 Genlock Status Output.

The remote "Genlock Status" output is used to indicate that the unit is correctly genlocked as follows:

- the genlock signal is present (as indicated by the EXT PRES lamp - see section 6)
- the horizontal lock has been achieved (as indicated by the HORIZontal Lock lamp - see section 6) - unless the genlock mode is set to "EX5" (locked to the 10MHz input)
- the subcarrier lock has been achieved (as indicated by the S/C Lock lamp - see section 6)
- that the incoming genlock feed has an unambiguous Sc.H. phase (as indicated by the Sc.H error lamp not being lit - see section 6.)

3.5.2.5 Analogue Audio Outputs

The analogue audio output is a direct digital to analogue conversion of the fixed AES/EBU digital audio output.
Therefore any tones etc. configured on the fixed AES/EBU output (see7.2) will also cause the analogue audio output to change.

3.5.2.6 Power Fail Output

This is a status output provided by relay contacts. Both normally closed and normally open contacts are provided.
The relay itself is placed across the internal voltage rails; should one of these fail the relay will change state.

3.5.2.7 Fan Fail Output

This open collector output senses the current drawn by the cooling fans fitted to the enclosure. The detector indicates a fail if the pulsing fan current drops below a preset threshold (i.e. a stuck fan and/or an open circuit/broken fan will give an indication of failure).

3.6 Configuring the Mixed Sync/Eight Field Pulse Output.

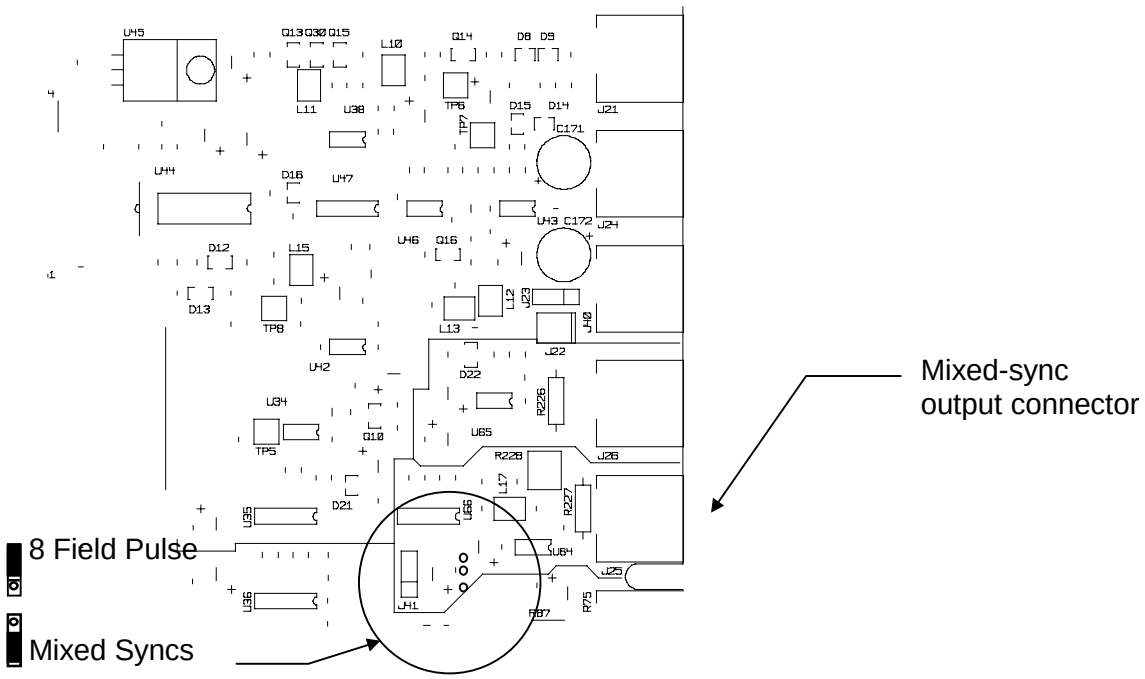
The standard output from this connector, as supplied, is a 2V(625/PAL) or 4V(525/NTSC) mixed sync pulse.

Alternatively, this output may be configured to give an eight field pulse output. To accomplish this, a jumper link must be moved on the main Mentor circuit board.

This requires that the unit is part dismantled, and must only be performed by competent personnel.

First, the top cover must be removed by unscrewing the M2.5 screws around its perimeter. If an option board is fitted in slot 3 (above the Mixed Sync output connector), this must also be removed by unscrewing 4 M3 screws, unplugging two ribbon cables, and undoing the 14mm nuts securing the output connectors to the rear panel.

The jumper link may be located on the main circuit board approximately 50mm from the mixed sync output connector. This is labelled J41 and should be set as follows.



3.7 Configuring the 10MHz/27MHz Outputs

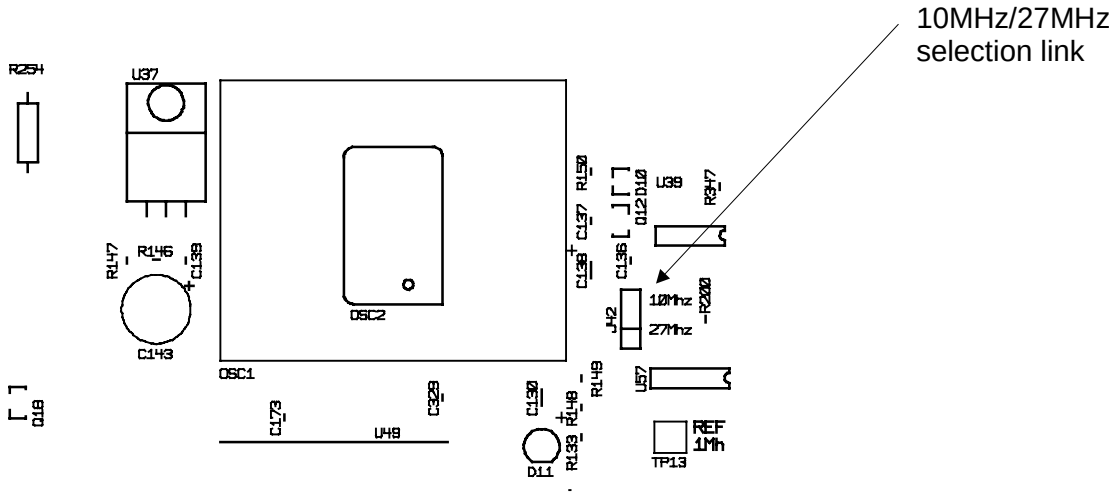
The standard output from this connector, as supplied, is a 10MHz clock signal.

Alternatively, this output may be configured to give a 27MHz clock signal. To accomplish this, a jumper link must be moved on the main Mentor circuit board.

This requires that the unit is part dismantled, and must only be performed by competent personnel.

First, the top cover must be removed by unscrewing the M2.5 screws around its perimeter. If an option board is fitted in slot 3 (above the Mixed Sync output connector), this must also be removed by unscrewing 4 M3 screws, unplugging two ribbon cables, and undoing the 14mm nuts securing the output connectors to the rear panel.

The jumper link may be located on the main circuit next to the large oven oscillator on the side of the main PCB adjacent to the power supply. This is labelled J42 and should be set as indicated on the PCB.



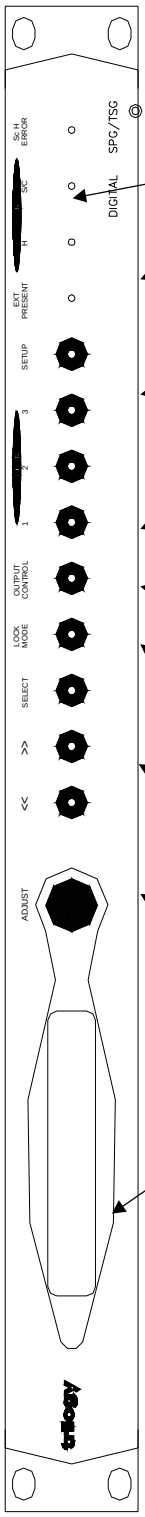
3.8 Configuring the SDI with Embedded Audio Options.

Some models of Mentor are fitted with this module (350-24-01) as standard. It has a number of DIP switch settings, detailed in section 13.3.3. Menu operations are as per the units "fixed" SDI output, as described in section 7.1

4. OPERATION

This section describes the basic operation of the unit.

4.1 The Front Panel



Genlock Status lamps.

"SETUP" used to store/recall memories, change the video standard and adjust the LCD brightness.

"OPTION 1, 2 AND 3" used to adjust settings of optionally fitted modules.

"OUTPUT CONTROL" used to change settings of standard Black/burst, SDI and AES/EBU audio outputs.

"LOCK MODE" used to access menus for Genlock settings.

"SELECT" button, used to confirm other button presses and/or menu selections.

<< and **>>** (left and right) buttons used for value adjustment, selection of menu entries and cursor movement when entering text or values

"ADJUST" control, used for fine value adjustments and selection of alphanumeric values.

LCD, used to display information during unit set-up

4.2 Power On Display

When the unit is powered up, the LCD will display initialisation messages, as it configures the internal hardware of the unit. A count down from 5 to 1 indicates the various stages of initialisation, shown below.

```
      Initialising
Please Wait..   <6>
```

Once initialisation is complete, a message indicating a normal operational status is displayed, as shown below.

```
MENTOR PLUS (625 +)
<Press<<>> For Status>
```

The top line gives the name of this unit (i.e. Mentor) and the current format (i.e. 625 or 525). The bottom line invites the user to use the adjustment controls to display the current settings of the unit. This is described in detail in section 10.2.

4.3 Front Panel Controls

The panel has four functional areas.

A Liquid Crystal Display (LCD) used to show information to guide the user through operating the various functions and show status information

An adjustment knob and "<< " and ">> " control buttons. These allow the user to alter the settings of the SPG/TSG as directed by the LCD. The knob allows fine adjustments to be made for any chosen function, while the buttons generally allow for coarser settings.

Function Buttons that allow the user to select the various functions that may be set via the adjustment controls. These have indicator lamps above them that show valid key presses for any given mode.

Indicator lamps used to show the state of the SPG when genlocked.

A detailed description of the buttons and lamps is given in the following sections.

LOCK MODE	Section 5
GENLOCK INDICATOR LAMPS	Section 6
OUTPUT CONTROL	Section 7
OPTION BUTTONS	Section 8
SETUP	Section 9

4.4 Basic Operational Technique

There are a number of basic concepts that once appreciated will simplify the use of the unit.

Valid button pushes are indicated by a lamp alight in a button. In most cases, buttons without a lamp lit will not be prohibited, allowing rapid changes between functions grouped on each button.

Genuinely invalid button pushes will always result in an informative message on the LCD.

4.5 Selecting a Function

To change any parameter the appropriate function button must first be pushed.

Once a function button is pushed, the lamp above it will flash to provide a reminder of which function is active.

Pushing a function button that has sub-functions under the first menu will cause the top row of the LCD to show abbreviations of the lower level functions.

To choose which of these sub-functions is required either the knob or **<<** or **>>** buttons may be used to step between the sub-functions. Each sub-function will be underlined in turn as the adjust controls are utilised.

The bottom row of the LCD will provide a fuller explanation of the particular function.

Once the required sub-function is underlined, the **SELECT** button is used to choose it. Depending on the sub-function chosen, either a further set of sub-functions or the current value of that function will be displayed.

4.6 Changing Values

To actually change the value of the function, the **ADJUST** knob or << or >> buttons are used.

In the case of numerical values (for example line phase, in microseconds) the adjustment knob always alters the value by the smallest possible amount.

The **LEFT** and **RIGHT** buttons provide a choice of two adjustment rates. Pressing a button will cause the value to change by the smallest increment, either to increase or decrease the value depending on whether the **<<** or **>>** button was pressed. If this button is kept pressed, and the second button is then pressed, the rate of adjustment will increase.

Releasing the second button will cause the rate to drop back to the slowest rate.

The combined use of the knob and **<<** or **>>** buttons, combined with the two rates available on the buttons allows rapid setting of numerical values.

As the parameter is changed, the new value will be shown on the LCD, and the unit responds by actually altering that value immediately - it is not necessary to confirm, **SELECT** or otherwise activate the change.

4.6.1 Leaving the Selected Function

Once the parameter has been set the unit can be returned to its normal operating mode, or another function chosen by one of three methods.

Pressing the current (flashing) function button will step up through the menu structure until either the top (normal) state is reached, or until another menu level of the button is reached, at which point another menu can be accessed by pressing the **SELECT** button. Thus another parameter related to that function button may be changed.

The **SELECT** button allows you to descend the menu structure and the current Function key allows you to ascend the menu structure.

At any time any other function key may be pressed causing the menu structure to be traversed sideways. For example, having set an **OUTPUT CONTROL** function, the SETUP key may be pushed without having to step back up through the menus first.

In addition, there is an in-built time-out mechanism that will automatically step back up through the menu structure until the top level is reached if a key is not pressed within a preset time period. In any event, once the top level is reached, the lamp in the function key will stop flashing.

5. LOCK MODE

The Genlock settings of the unit (for example, the current genlock mode and timing offsets) may be changed as follows. Press the **LOCK MODE** button .

Use the arrow keys or the knob to select one of the four sub-menu options. The options are as follows.

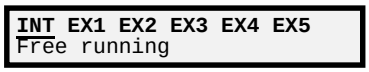
MODE OFFSETS CONTROL FLD Change genlock mode	Changes the basic genlock mode i.e. internal (free run), lock to video etc..
MODE **OFFSETS** CONTROL FLD Change genlock mode	Adjusts the offset between all the outputs of the unit and the genlock video input.
MODE OFFSETS **CONTROL** FLD Change genlock mode	Alter the way the unit will respond when the genlock video input is removed
MODE OFFSETS CONTROL **FLD** Change genlock mode	Alter the field lock action - instantaneous or slow lock.

To enter any of these sub-menus, press **SELECT**. To return to the top level display press **LOCK MODE**. To go to another menu, press either **OUTPUT CONTROL** / **OPTION 1** / **OPTION 2** / **OPTION 3** / **SETUP** as required.

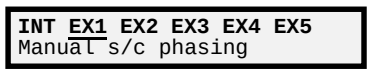
The sub-menus are described below.

5.1 Genlock, Mode

Select the mode required using the knob or **<<** or **>>** buttons. Please be aware that the mode will change immediately each option is selected.

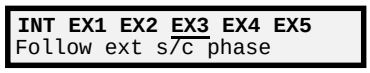


Sets the unit to be free running, relying on the internal oven oscillator for stability. The Sc.H. of the unit will be set to zero.

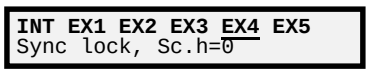


Sets the unit to genlock to the video input. The subcarrier phase offset may be adjusted as required.

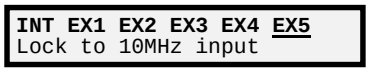
Sets the unit to genlock to the video input. The Sc.H. of the outputs of the unit is forced to be zero regardless of the genlock video Sc.H. This is achieved by moving the line timing with respect to the genlock input until the correct Sc.H. phase results.



Sets the unit to genlock to the video input. The subcarrier output phase is set to be the same as the input genlock video.



Sets the unit to genlock to the video input. The system is genlocked using only the sync information of the genlock video input. The Sc.H. phase of the output is forced to be zero - i.e. "correct".



Sets the unit to genlock to the 10MHz input. There will no fixed phase relationship with any other units locked to this signal. The Sc.H. of the unit will be set to zero.

5.2 Genlock, Offsets

Use the arrow keys or the knob to select one of the three sub-menu options. Note that these options will not be available if the genlock mode is set to internal. The options are as follows.

Change the horizontal offset between the genlock video input and all the outputs.

Change the vertical offset between the genlock video input and all the outputs.

Change the subcarrier phase between the genlock video input and all the appropriate outputs.

Allows all previously set line, field and subcarrier offsets to be cleared ("zeroed").

To enter any of these sub-menus, press **SELECT**. To return to the previous level display press **LOCK MODE**. To go to another menu, press either **OUTPUT CONTROL / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

The sub-menus are described below.

5.2.1 Genlock, Offsets, Line

Use the knob or << or >> buttons to change the horizontal offset between the genlock video input and all the outputs. The offset can be adjusted between -30µS and +30µS to a resolution of 0.5ns.

5.2.2 Genlock, Offsets, Field

Use the knob or << or >> buttons to change the field offset between the genlock video input and all the outputs. The offset can be adjusted between -15 lines and +15 lines in 1 line steps.

5.2.3 Genlock, Offsets, S/C

Use the knob or << or >> buttons to change the horizontal offset between the genlock video input and all the outputs. The phase can be adjusted over 360° to a resolution of 0.1°.

5.2.4 Genlock, Offsets, Clear Offsets

Press the **SELECT** button to reset all line, field and subcarrier offsets to zero.

5.3 Genlock, Control

Select the required mode using the knob or << or >> buttons.

If the genlock video input is removed, the unit will continue to operate - "flywheel" - at the same frequency as the genlock input just removed. Note that if the unit is powered up in this mode with no genlock input applied, the Mentor outputs may not be within specification.

If the genlock video input is removed, the unit will use the 10MHz input as its master oscillator. If the 10MHz input is removed, the unit will use the internal oven oscillator as its master oscillator.

If the genlock video input is removed, the unit will use the internal oven oscillator as its master oscillator.

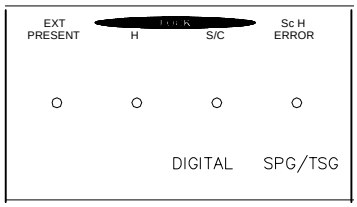
5.4 Genlock, Field

Select the mode required using knob or << or >> buttons

Sets the unit to lock near instantaneously to the field information of an applied genlock video input. This is the normal mode of operation.

Sets the unit to lock to the field information of an applied genlock video input by moving the outputs one line nearer to the genlock video input every 5 fields until the unit is locked. This mode is useful if the instant locking of the crash mode is found to upset any subsequent equipment.

6. FRONT PANEL STATUS INDICATOR LAMPS



The status indicator lamps are used to inform the user about the condition of the genlock video and 10MHz inputs and whether the Mentor has successfully locked to them.

6.1 EXT Present Lamp

EXT PRESENT

The EXT PRESENT lamp will indicate when the genlock video signal or the 10MHz signal is applied to the unit, depending upon the current lock mode setting as follows.

If the lock mode is set to EX1, EX2, EX3 or EX4 (i.e. the unit is locking to the genlock video input) and the Genlock control mode is set to OVEN or FLYWHEEL, the lamp will light if the genlock video input is present.

If the lock mode is set to EX1, EX2, EX3 or EX4 (i.e. the unit is locking to the genlock video input) and the Genlock control mode is set to 10MHz, the lamp will light if the genlock video input AND the 10MHz input is present, flash if either is missing and be off if both are missing.

If the lock mode is set to EX5 (i.e. the unit is locking to the 10MHz input) then the lamp will light when the 10MHz signal is present.

If the lock is set to INT (i.e. the unit is free running) then if the Genlock control mode is set to OVEN or FLYWHEEL, the lamp will light if the genlock video input is present, otherwise if the Genlock control mode is set to 10MHz, the lamp will light if the genlock video input AND the 10MHz input is present, flash if either is missing and be off if both are missing.

6.1.1 Summary, EXT Lamp, Genlock Control "Use" is FLYWHEEL or OVEN

The following table summarises the various states of the "External Present" lamp, when the genlock control mode is set to either flywheel mode, or revert to the internal oven oscillator.

	GENLOCK MODE		
LED	**INTERNAL**	**EXT 1 to 4**	**EXT 5**
ON	Genlock video detected	Genlock video detected	10MHz detected
FLASHING	-	-	-
OFF	Genlock Video Missing	Genlock Video Missing	10MHz input missing

6.1.2 Summary, EXT Lamp, Genlock Control "Use" is 10MHz

The following table shows the various states of the "External Present" lamp, when the genlock control mode is set to use the external 10MHz reference input.

	GENLOCK MODE		
LED	**INTERNAL**	**EXT 1 to 4**	**EXT 5**
ON	Genlock video and 10MHz input detected	Genlock video and 10MHz input detected	10MHz input detected
FLASHING	Genlock Video or 10MHz input missing	Genlock video or 10MHz input missing	-
OFF	Genlock Video and 10MHz input missing	Genlock Video and 10MHz input missing	10MHz input missing

6.2 Horizontal Lock Lamp

HORIZ ○

The HORIZ lamp will be lit when the unit is correctly line locked to the applied genlock video signal. It will flash if the unit is correctly line locked but has not locked to the applied genlock video field information. It will be off if the unit is not correctly locked to the applied genlock video signal.
The lamp will only operate when the unit is set to the lock modes EX1, EX2, EX3 or EX4, otherwise it will be permanently off.

6.3 Subcarrier Lock Lamp

S/C ○

The S/C lamp will be lit when the unit is correctly subcarrier locked to the applied genlock video signal. It will flash if it detects the applied genlock video signal has no burst - i.e. it is a luminance only signal. It will be off if the unit is not correctly locked to the subcarrier of the applied genlock video signal.
The lamp will only operate when the unit is set to the lock modes EX1, EX2 or EX3, otherwise it will be permanently off. It will also be off if the HORIZ lamp is not lit.

6.4 Sc.H. Error Lamp

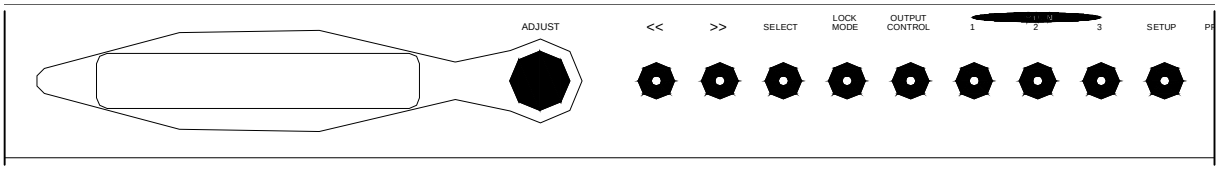
Sc.H. ERROR ○

The Sc.H. lamp will be on when the applied genlock video has an ambiguous value of Sc.H. This is the case when the Sc.H. phase of the applied genlock signal is outside of the range -80° to +80°. The lamp will be off if the genlock signal is not ambiguous. The lamp will flash if the applied signal has non mathematical subcarrier - i.e. it is not in the correct mathematical relationship to the line frequency.
The lamp will only operate when the unit is set to the lock modes EX1, EX2 or EX3, otherwise it will be permanently off. It will also be off if the HORIZ or S/C lamps are off.

7. OUTPUT CONTROL

The Output Control button is used to change the settings of the standard outputs of the Mentor Plus. These outputs are black/burst output 2, black/burst output 3, the AES/EBU digital audio output and the SDI test signal output.

Output settings may be changed as follows. Press the **OUTPUT CONTROL** button.



Use the knob or << or >> buttons to select one of the four sub-menu options. The options are as follows.

OUTPUT: SDI AES BB2 BB3 Adjust SDI signal	Adjusts the SDI test signal parameters, including the test signal, moving, APL, 8/10 bit selection, Vertical Offset adjustment and the character Ident to be set.
OUTPUT: SDI AES BB2 BB3 Adjust AES signal	Adjusts the AES/EBU output, including sample frequency, tone on/off/mode and grade to be set.
OUTPUT: SDI AES BB2 BB3 Adjust B/B 2 signal	Adjusts the black/burst output 2 timings in line, field, 8 field and/or subcarrier.
OUTPUT: SDI AES BB2 BB3 Adjust B/B 3 signal	Adjusts the black/burst output 3 timings in line, field, 8 field and/or subcarrier.

To enter any of these sub-menus, press **SELECT**. To return to the top level display press **OUTPUT CONTROL**. To go to another menu, press either **LOCK MODE / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

The sub-menus are described below.

7.1 SDI Output

Select the mode required using the knob or << or >> buttons.

FIXED SDI: SIG OPTS ID Change test signal	Allows the test signal to be changed, from a list of 47 PAL or 45 NTSC currently available.
FIXED SDI: SIG OPTS ID Test signal options	Allows test signal options to be changed (moving, APL, 8/10 bit selection and Vertical Offset adjustment).
FIXED SDI: SIG OPTS ID Change bars ID text	Allows the 13 character Ident that may be displayed on certain outputs to be changed.

To enter any of these sub-menus, press **SELECT**. To return to the previous menu level display press **OUTPUT CONTROL**. To go to another menu, press either **LOCK MODE / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

The sub-menus are described below.

7.1.1 SDI Output, Change Test Signal

Select the test signal required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

TEST SIGNAL OUTPUT FULL FIELD RED	Allows the test signal to be changed, from a maximum of 47 currently available.

Note that as test signals are selected they will appear immediately at the output.

7.1.2 SDI Output, Options

A further set of menu selections are displayed. Select the option required using the knob or left/right buttons, followed by the **SELECT** button.

OPTS: MOV APL BIT VOFF Control moving mode	Allows a moving pattern to be displayed on test signals, allowing signals freeze-framed via a frame buffer to be noticed.
OPTS: MOV APL BIT VOFF Set signal apl	Allows the APL (average picture level) mode to be set. This option is only available on certain waveforms.
OPTS: MOV APL BIT VOFF Select data word format	Allows the test signal output to be set to 10 bit, or rounded to 8 bit precision.
OPTS: MOV APL BIT VOFF Adjust vert. offset	Allows the test signal output to be offset in the vertical (field) direction with respect to the main black/burst output by ±3 lines

7.1.2.1 SDI Output, Options, Moving

Select the option required using the knob or << or >> buttons.

MOVEMENT: OFF ON Moving pattern off	Turns the moving pattern off.
MOVEMENT: OFF ON Moving pattern on	Turns the moving pattern on.

7.1.2.2 SDI Output, Options, APL

Select the option required using the knob or << or >> buttons.

APL: OFF HI LO BOUNCE Signal APL off	Turns APL off.
APL: OFF HI LO BOUNCE Signal APL off	Turns APL High on. This will select a repeating pattern of 9 lines of white and 3 lines of the selected test signal.
APL: OFF HI LO BOUNCE Signal APL off	Turns APL Low on. This will select a repeating pattern of 9 lines of black and 3 lines of the selected test signal.
APL: OFF HI LO BOUNCE Signal APL off	Turns APL bounce on. This will alternate between APL High and APL Low every 3 seconds.

7.1.2.3 SDI Output, Options, BIT (word format)

Select the option required using the knob or << or >> buttons.

BITS: 8-BIT 10-BIT Test Signal 8 bits	Selects 8 bit data format. This data is arithmetically rounded from the internal 10 bit data format.
BITS: 8-BIT 10-BIT Test Signal 10 bits	Selects 10 bit data format.

7.1.2.4 SDI Output, Options, VOFF (vertical offset)

Select the offset required using the knob or << or >> buttons. Note that the offset will change at the test signal output immediately a new value is chosen.

Allows the SDI test signal output to be offset by ±3 lines with respect to the main black/burst output.

7.1.3 SDI Output, Colour Bar Ident

Select the character to be changed using the **<<** or **>>** buttons, and the required character using the knob, followed by **SELECT** to return to the previous menu.

Allows the 13 character Ident that appears on (some) colour bar outputs to be changed.

Note that the new Ident. will not appear on the test signal output until the **SELECT** button is pressed.

7.2 AES Output

Select the mode required using the knob or << or >> buttons.

Allows the AES sample frequency to be set to 32kHz, 44.1kHz or 48kHz.

Allows the AES channel 1 and 2 output tone frequency and level to be individually set.

Allows the AES output tones to be turned on or off, or set to EBU or CCIR pulsing modes.

Allows the AES grade to be specified as grade 1 or grade 2.

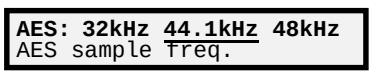
To enter any of these sub-menus, press SELECT. To return to the previous menu level display press OUTPUT CONTROL. To go to another menu, press either LOCK MODE / OPTION 1 / OPTION 2 / OPTION 3 / SETUP as required.

The sub-menus are described below.

7.2.1 AES Output, Frequency

Select the sample frequency required using the knob or << or >> buttons.

Sets the AES sample frequency to 32kHz.



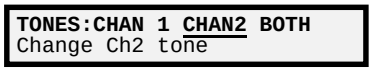
Sets the AES sample frequency to 44.1kHz.

Sets the AES sample frequency to 48kHz.

7.2.2 AES Output, Tone

A further menu is displayed. Select the option required using the **<<** or **>>** buttons, followed by the **SELECT** button.

Allows the AES channel 1 output tone frequency and amplitude to be set.

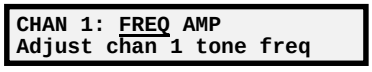


Allows the AES channel 2 output tone frequency and amplitude to be set.

Allows both AES channel 1 and channel 2 output tone frequency and amplitude to be set simultaneously

7.2.2.1 AES Output, Tone, Channel 1

A further menu is displayed. Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.



Allows the AES channel 1 output tone frequency to be set.

Allows the AES channel 1 output tone amplitude to be set.

7.2.2.1.1 AES Output, Tone, Channel 1, Frequency

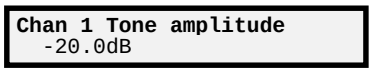
Select the required tone frequency using the knob or << or >> buttons, followed by the **SELECT** button.

Allows the AES channel 1 output tone frequency to be set between 100Hz and 10kHz in 100Hz steps.

Note that there will be a small delay as the frequency is changed whilst the new values are calculated and loaded before the change is reflected at the output, and before a further change may be made.

7.2.2.1.2 AES Output, Tone, Channel 1, Amplitude

Select the required tone amplitude using the knob or << or >> buttons, followed by the **SELECT** button.

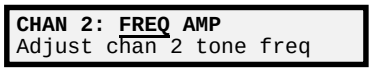


Allows the AES channel 1 output tone amplitude to be set between 0dB to -40dB in 1dB steps, with respect to peak code value.

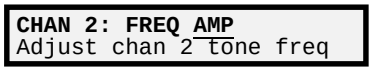
A further menu is displayed. Select the option required using the knob or left/right buttons, followed by the **SELECT** button.

Note that there will be a small delay as the amplitude is changed whilst the new values are calculated and loaded before the change is reflected at the output, and before a further change may be made.

7.2.2.2 AES Output, Tone, Channel 2



Allows the AES channel 2 output tone frequency to be set.



Allows the AES channel 2 output tone amplitude to be set.

7.2.2.2.1 AES Output, Tone, Channel 2, Frequency

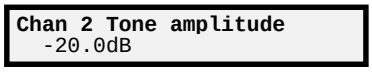
Select the required tone frequency using the knob or << or >> buttons, followed by the **SELECT** button.

Allows the AES channel 2 output tone frequency to be set between 100Hz and 10kHz in 100Hz steps.

Note that there will be a small delay as the frequency is changed whilst the new values are calculated and loaded before the change is reflected at the output, and before a further change may be made.

7.2.2.2.2 AES Output, Tone, Channel 2, Amplitude

Select the required tone amplitude using the knob or << or >> buttons, followed by the **SELECT** button.



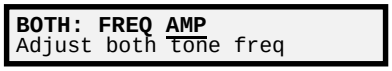
Allows the AES channel 2 output tone amplitude to be set between 0dB to -40dB in 1dB steps, with respect to peak code value.

Note that there will be a small delay as the amplitude is changed whilst the new values are calculated and loaded before the change is reflected at the output, and before a further change may be made.

7.2.2.3 AES Output, Tone, Both

A further menu is displayed. Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.

Allows both AES channel 1 and channel 2 output tone frequency to be set together.



Allows both AES channel 1 and channel 2 output tone amplitude to be set together.

Please note that when the AES output is changed in "both" mode, the current values for channel 1 are copied to output 2 when the BOTH selection is made. Thereafter, changes made to amplitude and/or frequency will only be made to channel 1, until leaving the menus when the new values are once again copied from channel 1 to channel 2.

7.2.2.3.1 AES Output, Tone, Both, Frequency

Select the required tone frequency using the knob or << or >> buttons, followed by the **SELECT** button.

Allows both AES channel 1 and channel 2 output tone frequency to be set together, between 100Hz and 10kHz in 100Hz steps.

Note that there will be a small delay as the frequency is changed whilst the new values are calculated and loaded before the change is reflected at the output, and before a further change may be made.

7.2.2.3.2 AES Output, Tone, Both, Amplitude

Select the required tone amplitude using the knob or << or >> buttons, followed by the **SELECT** button.

Allows both AES channel 1 and channel 2 output tone amplitude to be set together between 0dB to -40dB in 1dB steps, with respect to peak code

Note that there will be a small delay as the amplitude is changed whilst the new values are calculated and loaded before the change is reflected at the output, and before a further change may be made.

7.3 Black/Burst 2 Output

Select the mode required using knob or << or >> buttons.

LINE FLD 8-FLD S/C CLR B/B 2 Line Offset

Allows the black/burst 2 output timing relative to the main black/burst output to be set ±32µs, in 0.5ns steps.

LINE **FLD** 8-FLD S/C CLR B/B 2 Field Offset

Allows the black/burst 2 output timing relative to the main black/burst output to be set ±155 lines in 1 line steps.

LINE FLD **8-FLD** S/C CLR B/B 2 8 field Offset

Allows the black/burst 2 output timing relative to the main black/burst output to be set ±4 fields, in 1 field steps.

LINE FLD 8-FLD **S/C** CLR B/B 2 S/C Phase

Allows the black/burst 2 output subcarrier phase, relative to the main black/burst output to be set 0-360°, in 0.05° steps.

LINE FLD 8-FLD S/C **CLR** B/B2 Clear All

Clears all black/burst two line, field, 8-field and subcarrier offsets to zero.

Note that these settings are interactive. Changing line phase, for example, by >+31.9995µs will automatically increment the field setting by 1 line, and change the displayed line offset to -32.0µs.

To enter any of these sub-menus, press **SELECT**. To return to the previous menu level display press **OUTPUT CONTROL**. To go to another menu, press either **LOCK MODE / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

The sub-menus are described below.

7.3.1 Black/Burst 2 Output, Line Offset

Select the offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

+1 lines +1 fields OFFSET = +16.3950us

Allows the black/burst 2 timing offset with respect to the main black/burst output to be changed in 0.5ns steps.

Note that the offset will change at the black/burst outputs as the value is changed.

7.3.2 Black/Burst 2 Output, Field Offset

Select the line offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

+16.3950us +1 fields OFFSET = +1 LINES

Allows the black/burst 2 timing offset with respect to the main black/burst output to be changed in 1 line steps.

Note that the line offset will change at the black/burst outputs as the value is changed.

7.3.3 Black/Burst 2 Output, Eight Field Offset

Select the field offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

+16.3950us +1 Lines OFFSET = +1 FIELDS

Allows the black/burst 2 timing offset with respect to the main black/burst output to be changed in 1 field steps.

Note that the field offset will change at the black/burst outputs as the value is changed.

7.3.4 Black/Burst 2 Output, Subcarrier Phase Offset

Select the subcarrier phase offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

B/B 2 S/C PHASE = +0.15deg	Allows the black/burst 2 subcarrier phase to be set in 0.05º steps.

Note that the subcarrier phase will change at the black/burst outputs as the value is changed.

7.3.5 Black/Burst 2 Output, Clear Offsets

To zero all black/burst two output offsets to zero, press the **SELECT** button.

SET BB2 OFFSETS TO ZERO <SELECT> TO CLEAR	Allows all black/burst 2 output offsets to be set to zero.

7.4 Black/Burst 3 Output

Select the mode required using knob or << or >> buttons.

LINE FLD 8-FLD S/C CLR B/B 3 Line Offset	Allows the black/burst 3 output timing relative to the main black/burst output to be set ±32µs, in 0.5ns steps.
LINE FLD 8-FLD S/C CLR B/B 3 Field Offset	Allows the black/burst 3 output timing relative to the main black/burst output to be set ±155 lines in 1 line steps.
LINE FLD 8-FLD S/C CLR **B/B 3 8 field Offset**	Allows the black/burst 3 output timing relative to the main black/burst output to be set ±4 fields, in 1 field steps.
LINE FLD 8-FLD S/C CLR B/B 3 S/C Phase	Allows the black/burst 3 output subcarrier phase, relative to the main black/burst output to be set 0-360°, in 0.05° steps.
LINE FLD 8-FLD S/C CLR B/B3 Clear All	Clears all black/burst three line, field, 8-field and subcarrier offsets to zero.

Note that these settings are interactive. Changing line phase, for example, by >+31.9995µs will automatically increment the field setting by 1 line, and change the displayed line offset to -32.0µs.

To enter any of these sub-menus, press **SELECT**. To return to the previous menu level display press **OUTPUT CONTROL**. To go to another menu, press either **LOCK MODE / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

The sub-menus are described below.

7.4.1 Black/Burst 3 Output, Line Offset

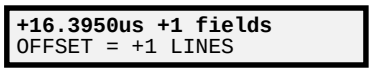
Select the offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

+1 lines +1 fields OFFSET = +16.3950us	Allows the black/burst 3 timing offset with respect to the main black/burst output to be changed in 0.5ns steps.

Note the offset will change at the black/burst outputs as the value is changed.

7.4.2 Black/Burst 3 Output, Field Offset

Select the line offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.



Allows the black/burst 3 timing offset with respect to the main black/burst output to be changed in 1 line steps.

Note the line offset will change at the black/burst outputs as the value is changed.

7.4.3 Black/Burst 3 Output, Eight Field Offset

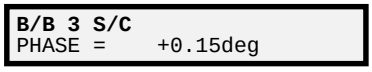
Select the field offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

Allows the black/burst 3 timing offset with respect to the main black/burst output to be changed in 1 field steps.

Note the field offset will change at the black/burst outputs as the value is changed.

7.4.4 Black/Burst 3 Output, Subcarrier Phase Offset

Select the subcarrier phase offset required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.



Allows the black/burst 3 subcarrier phase to be set in 0.05º steps.

Note the subcarrier phase will change at the black/burst outputs as the value is changed.

7.4.5 Black/Burst 3 Output, Clear Offsets

To zero all black/burst three output offsets to zero, press the **SELECT** button.

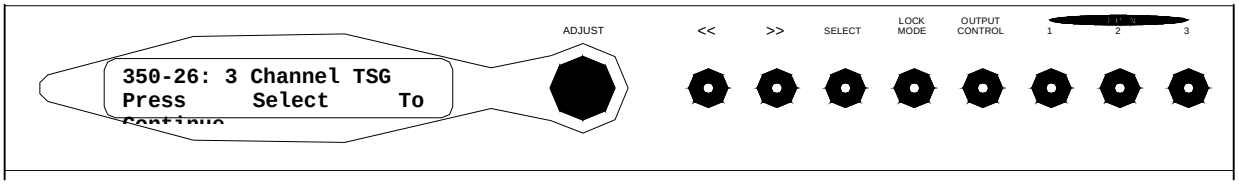
Allows all black/burst 3 output offsets to be set to zero.

8. OPTION BUTTONS

The Option buttons (1, 2 and 3) are used to setup the various features of any option boards fitted to the Mentor Plus. The exact functionality of each option button will depend on the exact option module fitted. These are described separately below.

If option boards are fitted in any slot, the lamp in the appropriate option button will be lit to indicate that a board is present.

To change an Option setting, press the appropriate illuminated **OPTION** button .



8.1 Option Button, Option Board Not Present.

If there is not an option board fitted in the appropriate internal position, the following message will be displayed if an **OPTION** button is pressed.

ERROR ! No board Fitted Press Select To Continue	Indicates that there is no option board fitted to the option output chosen.

8.2 Option Button, Option Board Present.

Pressing the option button will display one of the following messages, depending on the option board fitted in that option slot.

350-20: Composite Board Press Select To Continue	350-20 Composite test signal generator module present.
350-22: Triple Board Press Select To Continue	350-22 YUV/RGB test signal generator module present. Note that this module must occupy both option slots 2 and 3. Only the option 2 button may be used to set up this module. Note that at present, the 350-22 option board will only work if the unit is operating in the PAL/625 standard.
350-24: SDI Board Press Select To Continue	350-24 SDI test signal generator module present.
350-24-01: Embedded AES Press Select To Continue	350-24-01 SDI test signal with embedded AES generator module present.
350-25: AES/SDI Board Press Select To Continue	350-25 AES/EBU digital audio and SDI serial digital video black reference generator module present.
350-26: 3 Channel TSG Press Select To Continue	350-26 3 Channel Composite / Component Test signal generator module present.
350-29: Dual B&B Press Select To Continue	350-29 Dual Black/burst module present.

N.B. If a 350-30-00 Tri-level HDTV sync pulse generator is fitted it will **not** be indicated on the front panel, as the only settings that can be changed are controlled by DIP switches on the option module itself.

To continue setting up one of these modules, press the **SELECT** button to continue. Details of the setup options for each module type are given below.

8.3 Option Button, 350-24 SDI TSG

Select the mode required using knob or << or >> buttons.

TEST SDI: SIG OPTS ID Change test signal	Allows the test signal to be changed, from a list of 38 currently available.
TEST SDI: SIG OPTS ID Test signal options	Allows test signal options to be changed (moving, APL, 8/10 bit selection and Vertical Offset adjustment).
TEST SDI: SIG OPTS ID Change bars ID text	Allows the 12 character Ident that may be displayed on colour bar outputs to be changed.

To enter any of these sub-menus, press **SELECT**. To return to the previous menu level display press the **OPTION** button. To go to another menu, press either **LOCK MODE / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

The sub-menus are described below.

8.3.1 Option Button, 350-24 SDI TSG, Change Test Signal

Select the test signal required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

TEST SIGNAL OUTPUT FULL FIELD RED	Allows the test signal to be changed, from a list of 38 currently available.

Note that as test signals are selected they will appear immediately at the output.

8.3.2 Option Button, 350-24 SDI TSG, Options

A further menu is displayed. Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.

OPTS: MOV APL BIT VOFF Control moving mode	Allows a moving cursor to be displayed on test signals, allowing signals freeze-framed via a frame buffer to be noticed.
OPTS: MOV APL BIT VOFF Set signal apl	Allows the APL (average picture level) mode to be set. This option is only available on certain waveforms.
OPTS: MOV APL BIT VOFF Select data word format	Allows the test signal output to be set to 10 bit, or rounded to 8 bit precision.
OPTS: MOV APL BIT VOFF Adjust vert. offset	Allows the test signal output to be offset in the vertical (field) direction with respect to the main black/burst output by ±3 lines

8.3.2.1 Option Button, 350-24 SDI TSG, Options, Moving

Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.

MOVEMENT: OFF ON Moving pattern off	Turns the moving pattern off.
MOVEMENT: OFF ON Moving pattern on	Turns the moving pattern on.

8.3.2.2 Option Button, 350-24 SDI TSG, Options, APL

Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.

Turns APL off.

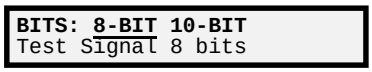
Turns APL HI on. This will select a repeating pattern of 9 lines of white and 3 lines of the selected test signal.

Turns APL LO on. This will select a repeating pattern of 9 lines of black and 3 lines of the selected test signal.

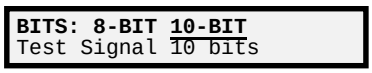
Turns APL bounce on. This will alternate between APL HI and APL LO every 3 seconds.

8.3.2.3 Option Button, 350-24 SDI TSG, Options, BIT (word format)

Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.



Selects 8 bit data format. This data is arithmetically rounded from the internal 10 bit data format.



Selects 10 bit data format.

8.3.2.4 Option Button, 350-24 SDI TSG, Options, VOFF (vertical offset)

Select the offset required using the knob or << or >> buttons, followed by the **SELECT** button. Note that the offset will change at the test signal output immediately a new value is chosen.

Allows the SDI test signal output to be offset by ±3 lines with respect to the main black/burst output.

8.3.3 Option Button, 350-24 SDI TSG, Colour Bar Ident

Select the character to be changed using the left/right buttons, and the required character using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

Allows the 13 character Ident that may be selected on colour bar outputs to be changed.

Note that the new Ident will not appear on the test signal output until the **SELECT** button is pressed.

8.4 Option Button, 350-24-01 SDI generator with Embedded AES

The operation of this board from the front panel is identical to the 350-24 module described above. For additional settings, refer to section 13.3.3 in this document.

8.5 Option Button, 350-25 AES/SDI Reference Generator

Select the output to be configured using the knob or << or >> buttons.

Allows the AES/EBU digital audio reference output to be configured.

Allows the SDI digital video reference black output to be configured.

To enter any of these sub-menus, press **SELECT**. To return to the previous menu level display press the **OPTION** button. To go to another menu, press either **LOCK MODE** / **OPTION 1** / **OPTION 2** / **OPTION 3** / **SETUP** as required.

The sub-menus are described below.

8.5.1 Option Button, 350-25 AES/SDI, Configure AES

Select the mode required using knob or << or >> buttons.

AES:FREQ TONE MODE MISC Set AES sample freq	Allows the AES sample frequency to be set to 32kHz, 44.1kHz or 48kHz.
AES:FREQ TONE MODE MISC Set AES channels tone	Allows the AES channel 1 and 2 output tone frequency and level to be individually set.
AES:FREQ TONE MODE MISC Set AES tone mode	Allows the AES output tones to be turned on or off, or set to EBU or CCIR pulsing modes.
AES:FREQ TONE MODE MISC Set Miscellaneous	Allows the AES grade to be specified (grade 1 or grade 2) and locking to video turned on or off.

To enter any of these sub-menus, press **SELECT**. To return to the previous menu level display press **OPTION**. To go to another menu, press either **LOCK MODE** / **OPTION 1** / **OPTION 2** / **OPTION 3** / **SETUP** as required.

The sub-menus are described below.

8.5.1.1 Option Button, 350-25 AES/SDI, Configure AES, frequency

Select the sample frequency required using knob or << or >> buttons.

AES: 32kHz 44.1kHz 48kHz AES sample freq.	Sets the AES sample frequency to 32kHz.
AES:32kHz 44.1kHz 48kHz AES sample freq.	Sets the AES sample frequency to 44.1kHz.
AES:32kHz 44.1kHz 48kHz AES sample freq.	Sets the AES sample frequency to 48kHz.

8.5.1.2 Option Button, 350-25 AES/SDI, Configure AES, tone

Select the required tone frequencies using the knob or << or >> buttons, followed by the **SELECT** button.

AES TONES:1 2 3 4 CH1. 1kHz CH2. 1kHz	Sets AES channel 1 and channel 2 outputs both to 1kHz.
AES TONES:1 2 3 4 CH1. 800Hz CH2. 1kHz	Sets AES channel 1 output to 800Hz and the channel 2 output to 1kHz.
AES TONES:1 2 3 4 CH1. 1kHz CH2. 800Hz	Sets AES channel 1 output to 1kHz and the channel 2 output to 800Hz.
AES TONES:1 2 3 4 CH1. 800Hz CH2. 800Hz	Sets AES channel 1 and channel 2 outputs both to 800Hz.

8.5.1.3 Option Button, 350-25 AES/SDI, Configure AES, Mode

Select the required tone mode using the knob or << or >> buttons, followed by the **SELECT** button.

AES MODE:OFF CCIR EBU ON No test tone	Turns the tones off for both channels, giving silence.
AES MODE:OFF CCIR EBU ON CCIR audio test tone	Turns the tone on for both channels in CCIR mode (channel 1 off for ¼ second in every 4 seconds, channel 2 off for ¼ second twice in every 4 seconds).
AES MODE:OFF CCIR EBU ON EBU test tone	Turns the tones on for both channels in EBU mode (channel 1 off for ¼ seconds in every 3 seconds, channel 2 continuous).
AES MODE:OFF CCIR EBU ON Continuous test tone	Turns the tones on continuously for both channels.

8.5.1.4 Option Button, 350-25 AES/SDI, Configure AES, Misc

Select the function to be changed using knob or << or >> buttons.

MISC: GRADE LOCK Select AES grade	Allows the AES output to be set to Grade 1 or Grade 2.
MISC: GRADE LOCK Sel. AES/video lock	Allows the AES output to be locked to the video output.

To enter either of these sub-menus, press **SELECT**. The sub-menus are described below.

8.5.1.4.1 Option Button, 350-25 AES/SDI, Configure AES, Misc, Grade

Select the mode required using the knob or << or >> buttons.

AES GRADE: 1 2 AES grade 1 selected	Sets the AES grade bit to indicate Grade 1.
AES GRADE: 1 2 AES grade 2 selected	Sets the AES grade bit to indicate Grade 2.

N.B. This is a manual setting. Trilogy Broadcast can only guarantee that the AES conforms to grade 1 when the Mentor unit is free-running.

8.5.1.4.2 Option Button, 350-25 AES/SDI, Configure AES, Misc, Lock

Select the mode required using the knob or << or >> buttons.

VIDEO LOCK: ON OFF AES/video lock on	AES output is locked to video.
VIDEO LOCK: ON OFF AES/video lock off	AES output is not locked to video.

8.5.2 Option Button, 350-25 AES/SDI, Configure SDI

Select the mode required using knob or << or >> buttons.

SDI: V TIMING H TIMING SDI Vertical offset	Allows the SDI output vertical timing to be offset relative to the main black/burst output by ±3 lines.
SDI: V TIMING H TIMING SDI Horiz. offset	Allows the SDI output horizontal timing to be offset relative to the main black/burst output by ±14µs in 27MHz clock steps (i.e. approximately 37nS).

The sub-menus are described below.

8.5.2.1 Option Button, 350-25 AES/SDI, Configure SDI, V timing

Select the vertical offset required using the knob or << or >> buttons.

SDI VERTICAL OFFSET Offset= +1 Lines	Sets the SDI output vertical timing in 1 line increments.

8.5.2.2 Option Button, 350-25 AES/SDI, Configure SDI, H timing

Select the horizontal offset required using the knob or << or >> buttons.

SDI HORIZ. OFFSET OFFSET= -0.0370us	Sets the SDI output horizontal timing relative to the main black/burst output by ±14µs in 27MHz clock steps (i.e. approximately 37nS).

8.6 Option Button, 350-26 Composite/Component Board

Use the knob or << or >> buttons to select one of the three sub-menu options. The options are as follows.

COMPOSITE: SIG OPTS ID Change Test Signal	Allows the composite or component (RGB/YUV) test pattern to be changed.
COMPOSITE: SIG OPTS ID Test Signal options	Allows the test signal options to be changed (output gain or APL settings).
COMPOSITE: SIG OPTS ID Change Bars ID Text	Allows the 12 character Ident displayed on some outputs to be changed.

To enter any of these sub-menus, press **SELECT**. To return to the top level display press the **OPTION** button. To go to another menu, press either **LOCK MODE / OUTPUT CONTROL / ANOTHER OPTION BUTTON / SETUP** as required.

The sub-menus are described below.

8.6.1 Option Button, 350-26, Change Test Signal Ch.1, 2, 3

This menu will only appear if the unit is set to operate in separate mode, otherwise the menu in the following section will appear.

Use the knob or << or >> buttons to select one of the three sub-menu options. The options are as follows.

SIGNAL: Ch.1 Ch.2 Ch.3 Change Test Signal Ch1	Allows the test pattern to be changed for channel 1 - the full Composite channel.
SIGNAL: Ch.1 Ch.2 Ch.3 Change Test Signal Ch2	Allows the test pattern to be changed for channel 2 - the luminance channel.
SIGNAL: Ch.1 Ch.2 Ch.3 Change Test Signal Ch3	Allows the test pattern to be changed for channel 3 - the luminance channel.

8.6.1.1 Option Button, 350-26, Change Test Signal

Select the test signal required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

TEST SIGNAL OUTPUT FULL FIELD RED	Allows the test signal to be changed, from a list of 38 PAL or 32 NTSC currently available.

Note that as test signals are selected they will appear immediately at the output.

8.6.2 Option Button, 350-26, Options

A further menu is displayed. Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.

OPTS: APL FORMAT Set signal apl	Allows the APL (average picture level) mode to be set. This option is only available on certain waveforms.
OPTS: APL FORMAT Change RGB/YUV/Sep.	Allows the signal format, RGB, YUV or Separate to be selected. Separate allows 3 different composite waveforms to be produced.

8.6.2.1 Option Button, 350-26, Options, APL CH1, 2, 3

This menu will only appear if the unit is set to operate in separate mode, otherwise the menu in the following section will appear.

Use the knob or << or >> buttons to select one of the three sub-menu options. The options are as follows.

APL: Ch.1 Ch.2 Ch.3 Change APL Channel 1	Allows the APL to be changed for channel 1 - the full Composite channel.
APL: Ch.1 Ch.2 Ch.3 Change APL Channel 2	Allows the APL to be changed for channel 2 - the luminance channel.
APL: Ch.1 Ch.2 Ch.3 Change APL Channel 3	Allows the APL to be changed for channel 3 - the luminance channel.

8.6.2.2 Option Button, 350-26, Options, APL

Select the option required using the knob or << or >> buttons, followed by the **SELECT** button.

SIG1: OFF HI LO BOUNCE Signal APL off	Turns APL off.
SIG1: OFF HI LO BOUNCE Signal APL high	Turns APL HI on. This will select a repeating pattern of 9 lines of white and 3 lines of the selected test signal.
SIG1: OFF HI LO BOUNCE Signal APL lo	Turns APL LO on. This will select a repeating pattern of 9 lines of black and 3 lines of the selected test signal.
SIG1: OFF HI LO BOUNCE Signal APL bounce	Turns APL bounce on. This will alternate between APL HI and APL LO every 3 seconds.

8.6.2.3 Option Button, 350-26, Options, Format

Select the format required using the knob or << or >> buttons, followed by **SELECT** to return to the previous menu.

FORMAT: RGB YUV SEP 350-26 card: RGB	Sets the component output to RGB.
FORMAT: RGB YUV SEP 350-26 card: YUV	Sets the component output to YUV.
FORMAT: RGB YUV SEP 350-26 card: SEPARATE	Sets the composite output to Separate: three separate signals, two of which are luminance only (with burst).

8.6.3 Option Button, 350-26, Ident

Select the character to be changed using the left/right buttons, and the required character using the knob, followed by **SELECT** to return to the previous menu.

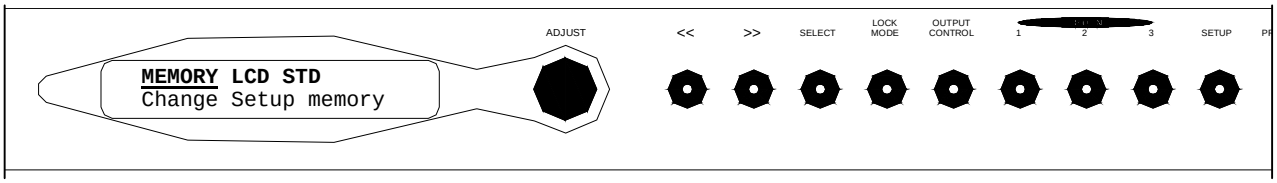
POSN:<< >> CHAR:KNOB IDENT: TRILOGY SPG1	Allows the 13 character Ident that may be selected on certain outputs to be changed.

Note that the new Ident will not appear on the test signal output until the **SELECT** button is pressed.

9. SETUP

The Setup button is used to change the settings of the four memories provided on Mentor Plus, and also to allow adjustment of the LCD contrast (brightness).

Setup settings may be changed as follows. Press the **SETUP** button .



Use the knob or << or >> buttons to select one of the three sub-menu options. The options are as follows.

MEMORY LCD STD Change Setup memory	Allows the 4 setup memories to be saved, recalled and named.
MEMORY LCD STD Set LCD contrast	Allows the front panel display contrast (brightness) to be set.
MEMORY LCD STD Set Video Standard	Allows the Mentor Plus SPG to be set to 625(PAL) or 525(NTSC) operation.

To enter one of these sub-menus, press **SELECT**. To return to the top level display press **SETUP**. To go to another menu, press either **LOCK MODE / OUTPUT CONTROL / OPTION 1 / OPTION 2 / OPTION 3** as required.

The sub-menus are described below.

9.1 Setup, Memory

Use the knob or << or >> buttons to select one of the three sub-menu options. The options are as follows.

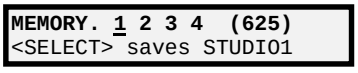
MEMORY:SAVE LOAD NAME Save to memory	Allows the current Mentor setup to be stored to one of four memories.
MEMORY: SAVE LOAD NAME Load from memory	Allows one of four previously stored Mentor set-ups to be recalled.
MEMORY: SAVE LOAD NAME Name setup	Allows the four setup memories to be given names.

To enter either of these sub-menus, press **SELECT**. To return to the previous menu display press **SETUP**. To go to another menu, press either **LOCK MODE / OUTPUT CONTROL / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

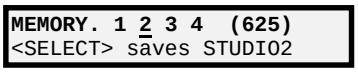
The sub-menus are described below.

9.1.1 Setup, Memory, Save

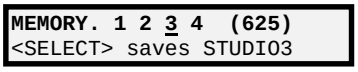
Select one of the four memories to store the current Mentor setup.



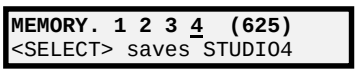
Stores the current setup in memory 1 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.



Stores the current setup in memory 2 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.



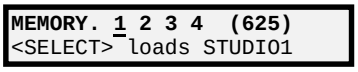
Stores the current setup in memory 3 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.



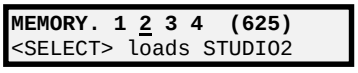
Stores the current setup in memory 4 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.

9.1.2 Setup, Memory, Load

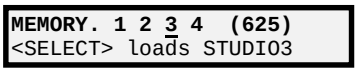
Select one of the four memories to load a Mentor setup.



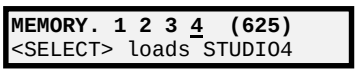
Loads the setup from memory 1 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.



Loads the setup from memory 2 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.



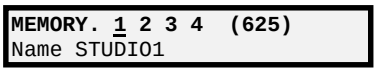
Loads the setup from memory 3 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.



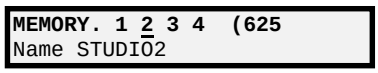
Loads the setup from memory 4 when the **SELECT** button is pressed. The name displayed is that stored in the NAME option (see below). The memory location is tagged as being 625 or 525 as appropriate.

9.1.3 Setup, Memory, Name

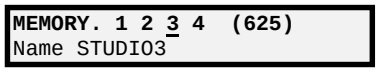
Select one of the four Mentor setup memories to name.



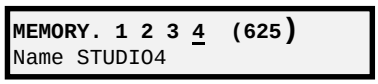
Selects memory one to be renamed.



Selects memory two to be renamed.



Selects memory three to be renamed.



Selects memory four to be renamed.

9.1.3.1 Setup, Memory, Name, Memory 1

Change the setup memory name using the **<<** or **>>** buttons to select the character to be changed, and the knob to select the character required

Allows the name of setup memory 1 to be changed.

9.1.3.2 Setup, Memory, Name, Memory 2

Change the setup memory name using the **<<** or **>>** buttons to select the character to be changed, and the knob to select the character required

Allows the name of setup memory 2 to be changed.

9.1.3.3 Setup, Memory, Name, Memory 3

Change the setup memory name using the **<<** or **>>** buttons to select the character to be changed, and the knob to select the character required

Allows the name of setup memory 3 to be changed.

9.1.3.4 Setup, Memory, Name, Memory 4

Change the setup memory name using the **<<** or **>>** buttons to select the character to be changed, and the knob to select the character required

Allows the name of setup memory 4 to be changed.

9.2 Setup, LCD contrast

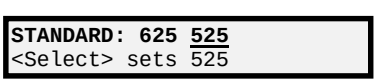
Use the knob to change the display contrast (brightness), or press the right arrow key (**>>**) to restore the contrast to the default value.

Allows the LCD contrast (brightness) to be set or restored to the default value.

9.3 Setup, Standard (525/625 Operation)

Use the arrow keys or the knob to select one of the two sub-menu options. The options are as follows.

Shows the current operating standard of the Mentor Plus SPG. (PAL/625 in this example).



Allows the unit to be set to NTSC/525 line operation.

To choose a different operating standard press **SELECT**. To return to the previous menu display press **SETUP**. To go to another menu, press either **LOCK MODE / OUTPUT CONTROL / OPTION 1 / OPTION 2 / OPTION 3 / SETUP** as required.

Once a new standard has been selected, the following message will be displayed for approximately 5 seconds whilst the unit re-initialises to the new operating standard.

```
STANDARD: 625 525
Resetting Memory..
```

10. OTHER FEATURES

10.1 Front Panel Lockout

If it is required in a particular installation to prevent inadvertent or unauthorised adjustment, the Mentor Plus unit has a software controlled locking mechanism that disables the front panel.

This may be activated by simultaneously pushing the **<<, >>** *and* **SELECT** buttons. The LCD will temporarily start displaying status information (see below) and then display a message indicating that the unit is locked.

```
MENTOR (625 +)
<Front Panel Locked>
```

Indicates that the front panel is locked.

The operation of the genlock status lamps is not affected by locking the panel.

Unlocking the front panel is by the same procedure. Push **<<, >>** *and* SELECT together. The unit will return to normal operation and re-enable the front panel.

10.2 Viewing Status

In order to check the settings of all the normal unit functions, provision is made to cycle through a number of status messages without having to actually select the function itself.

The normal display on the LCD shows the name of the unit (i.e. Mentor) and the current operating standard (625 or 525) on the top line. The bottom line gives an invitation to use the **<<** or **>>** buttons to display status. Using these buttons will cycle through the unit status.

To finish viewing the status either

- push **SELECT** to return to the normal display
- push any function button to change another setting
- wait for the timeout period.

One of the status displays indicates the software revision and date. Some fault conditions will overwrite the date with an error message which may prove useful in tracking the faults.

11. IDENTIFYING PROBLEMS

The Trilogy 350 Mentor Plus is a complex, software driven precision instrument.

Before concluding that the unit is faulty please check the following.

- Read this User Guide thoroughly. The menu system is complex, and many faults are attributable to incorrectly set features and functions.
- Check that the unit is powered; check the mains fuse in the IEC connector. Note that the main PCB uses self-resetting thermal fuses.
- Check that the genlocking signal is present (if appropriate). Use the front panel status LEDs to confirm this.
- Check that any cables leading to and from the unit are not faulty, and have been properly connected.
- Check that the outputs are properly terminated at the destination equipment.
- Check that the air intakes and fan exhausts are not blocked. Overheating of the unit is possible if the warning in the installation section of this guide is not heeded!
- Isolate the fault to a specific output if possible. Refer to the maintenance guide for detailed descriptions of the electronics.
- If the fault cannot be located, please contact Trilogy Broadcast Limited by emailing `support@trilogy-broadcast.co.uk` and a member of our staff will be pleased to assist you.

11.1 Reversion to Factory Default Settings - Loss of Battery Back-up.

Should the internal battery back-up fail, and the unit is re-powered, the unit will automatically reset all its parameters to the factory default.

This includes, for example, re-setting all the genlock and black burst offsets to zero.

It also will cause the unit to default to the PAL/625 operating standard.

The battery is trickle charged from the internal power supply, and under normal operating conditions will provide in excess of 1000 hours of data retention. In keeping with all trickle charged batteries, if the battery is discharged, power must be applied for a suitable period (greater than 24 hours in the case of Mentor Plus) to ensure that it is fully charged.

12. LIST OF CURRENTLY AVAILABLE TEST PATTERNS

12.1 PAL Composite Waveforms (350-26)

FULL FIELD RED
FULL FIELD BLACK
FULL FIELD WHITE
100% BARS+SPLIT+ID
100% BARS+ID
100% BARS+SPLIT
100% BARS
EBU BARS+SPLIT+ID
EBU BARS+ID
EBU BARS+SPLIT
EBU BARS
100% VTBARS+SPLIT+ID
100% VT BARS+ID
100% VTBARS+SPLIT
100% VT BARS
CHROMINANCE RAMP
LUMINANCE RAMP
SHALLOW RAMP (11mV)
SHALLOW RAMP (105mV)
5 RISER CHROMA STAIR
5 STEP CHROMA STAIR
5 RISER LUMINANCE STAIR
SPLUGE
PLUGE
PLUGE + 100% WHITE
PLUGE + 15% WHITE
100% WHITE WINDOW
15% WHITE WINDOW
CONVERGENCE GRILLE
LINEARITY GRILLE
14 X 19 GRILLE
MONITOR LINE UP
TEST MATRIX
2T PULSE AND BAR
20T CHROM/2T + BAR
MULTIBURST
6.0 MHz LINE SWEEP
SIN(X) / X

12.2 NTSC Composite Waveforms (350-26)

FULL FIELD RED
0 IRE FIELD + BURST
BLACK BURST
FULL FIELD WHITE
FULL FIELD BLUE
SMPTE BARS + IDENT
SMPTE BARS
SMPTE BARS+ID+0 S/UP
SMPTE BARS+0 S/UP
75% BARS+SPLIT+ID
75% BARS+ID
75% BARS+SPLIT
75% BARS
IDENT
MODULATED RAMP
LUMINANCE RAMP
1.6 IRE SHALLOW RAMP
15 IRE SHALLOW RAMP
MUDULATED 5 STEP
5 STEP
SPLUGE
PLUGE
CONVERGENCE GRILLE
MONITOR SETUP MATRIX
TEST MATRIX
NTC7 COMBINATION
NTC7 COMPOSITE
MOD PULSE + BAR
MULTIBURST
MULTIPULSE
6.0 MHz LINE SWEEP
SIN(X) / X

12.3 625 RGB Waveforms, (350-26)

FULL FIELD RED
FULL FIELD BLACK
FULL FIELD WHITE
100% BARS+SPLIT+ID
100% BARS+ID
100% BARS+SPLIT
100% BARS
EBU BARS+SPLIT+ID
EBU BARS+ID
EBU BARS+SPLIT
EBU BARS
100% VTBARS+SPLIT+ID
100% VT BARS+ID
100% VTBARS+SPLIT
100% VT BARS
FS LUMINANCE RAMP
LIMIT RAMP
46mV SHALLOW RAMP
105mV SHALLOW RAMP
5 RISER STAIR
CONVERGENCE GRILLE
LINEARITY GRILLE
MONITOR LINE UP
2T PULSE AND BAR
GBR MULTIBURST
6.0 MHz LINE SWEEP
SIN(X) / X
BOWTIE

12.4 525 RGB Waveforms, (350-26)

FULL FIELD RED
FULL FIELD BLACK
FULL FIELD WHITE
100% BARS+SPLIT+ID
100% BARS+ID
100% BARS+SPLIT
100% BARS
75% BARS+SPLIT+ID
75% BARS+ID
75% BARS+SPLIT
75% BARS
FS LUMINANCE RAMP
LIMIT RAMP
46mV SHALLOW RAMP
105mV SHALLOW RAMP
5 STEP STAIR
CONVERGENCE GRILLE
2T PULSE AND BAR
MOD PULSE + BAR
MULTIPULSE
GBR MULTIBURST
6.0 MHz LINE SWEEP
SIN(X) / X
BOWTIE

12.5 625 YUV Waveforms, (350-26)

FULL FIELD RED
FULL FIELD BLACK
FULL FIELD WHITE
100% BARS+SPLIT+ID
100% BARS+ID
100% BARS+SPLIT
100% BARS
EBU BARS+SPLIT+ID
EBU BARS+ID
EBU BARS+SPLIT
EBU BARS
100% VTBARS+SPLIT+ID
100% VT BARS+ID
100% VTBARS+SPLIT
100% VT BARS
YUV CHROMA RAMP
FS LUMINANCE RAMP
LIMIT RAMP
VALID RAMP
46mV SHALLOW RAMP
105mV SHALLOW RAMP
YUV CHROMA STAIR
5 RISER LUMINANCE STAIR
5 RISER STAIR
VALID 5 RISER STAIR
SPLUGE
PLUGE
CONVERGENCE GRILLE
LINEARITY GRILLE
MONITOR LINE UP
14 X 19 GRILLE
3T 2T PULSE AND BAR
YUV MULTIBURST
6.0 MHz LINE SWEEP
SIN(X) / X
BOWTIE

12.6 525 YUV Waveforms, (350-26)

FULL FIELD RED
FULL FIELD BLACK
FULL FIELD WHITE
100% BARS+SPLIT+ID
100% BARS+ID
100% BARS+SPLIT
100% BARS
SMPTE BARS + IDENT
SMPTE BARS
75% BARS+SPLIT+ID
75% BARS+ID
75% BARS+SPLIT
75% BARS
MODULATED RAMP
FS LUMINANCE RAMP
LIMIT RAMP
VALID RAMP
46mV SHALLOW RAMP
105mV SHALLOW RAMP
MODULATED 5 STEP
5 RISER LUMINANCE STAIR
5 STEP STAIR
VALID 5 RISER STAIR
SPLUGE
PLUGE
CONVERGENCE GRILLE
MONITOR SETUP MATRIX
3T 2T PULSE AND BAR
MOD PULSE + BAR
MULTIPULSE
YUV MULTIBURST
6.0 MHz LINE SWEEP
SIN(X) / X
BOWTIE

12.7 625 Line SDI Waveforms

IDENT
FULL FIELD RED
FULL FIELD WHITE
FULL FIELD BLACK
LINE TIMING CHECK
100% BARS+SPLIT+ID
100% BARS+ID
100% BARS+SPLIT
100% BARS
EBU BARS+SPLIT+ID
EBU BARS+ID
EBU BARS+SPLIT
EBU BARS
100% VTBARS+SPLIT+ID
100% VT BARS+ID
100% VTBARS+SPLIT
100% VT BARS
CONVERGENCE GRILLE
LINEARITY GRILLE
14 X 19 GRILLE
SPLUGE
PLUGE
100% WHITE WINDOW
15% WHITE WINDOW
CO-SITING CHECK
DIGITAL GREY
SDI CHECK FIELD
FULL FIELD UK ITS1
FULL FIELD UK ITS2
FULL FIELD ITS A
FULL FIELD ITS B
FULL FIELD ITS C
FULL FIELD ITS D
5 RISER STAIR
VALID 5 RISER STAIR
5 RISER LUMINANCE STAIR
RAMP
LUMINANCE RAMP
VALID RAMP
LIMIT RAMP
SHALLOW RAMP
SHALLOW BLUE RAMP
3T 2T PULSE AND BAR
BOWTIE
SIN(X) / X
MULTIBURST
6.0 MHz LINE SWEEP

12.8 525 Line SDI Waveforms

FULL FIELD RED
FULL FIELD WHITE
FULL FIELD BLACK
LINE TIMING CHECK
FULL FIELD BLUE
100% BARS+SPLIT+ID
100% BARS+ID
100% BARS+SPLIT
100% BARS
EBU BARS+SPLIT+ID
EBU BARS+ID
EBU BARS+SPLIT
EBU BARS
SMPTE BARS + IDENT
SMPTE BARS
75% BARS+SPLIT+ID
75% BARS+ID
75% BARS+SPLIT
75% BARS
100% VTBARS+SPLIT+ID
100% VT BARS+ID
100% VTBARS+SPLIT
100% VT BARS
IDENT
CONVERGENCE GRILLE
PLUGE
CO-SITING CHECK
DIGITAL GREY
SDI CHECK FIELD
5 RISER STAIR
VALID 5 RISER STAIR
5 RISER LUMINANCE STAIR
RAMP
LUMINANCE RAMP
VALID RAMP
LIMIT RAMP
SHALLOW RAMP
SHALLOW BLUE RAMP
NTC7 COMBINATION
NTC7 COMPOSITE
3T 2T PULSE AND BAR
BOWTIE
SIN(X) / X
MULTIBURST
6.0 MHz LINE SWEEP

13. ADDING/REMOVING AN OPTION BOARD

It is possible to retro-fit or remove an option board to the Mentor Plus SPG. The procedure involves the removal of the top cover, so should only be carried out by competent personnel.

ENSURE THAT MAINS POWER IS REMOVED FROM THE UNIT BEFORE REMOVING THE LID OF THE UNIT!

Once an option board is fitted or removed, this will be detected automatically by software when the unit is re-powered.

13.1 Disassembly Instructions

To remove the top cover, undo the thirteen M2.5 countersunk screws that hold the top cover to the frame. The cover will then lift away to reveal the internal electronics.

The electronics comprises two 'layers' of boards. The bottom layer comprises the main electronics PCB. The upper layer comprises the option boards. These are fixed on the M3 pillars by bolts, and by the location of the BNCs in the rear panel.

The unit has the capacity for a number of combinations of option boards. Please see section 1.2 or refer to Trilogy Broadcast Ltd. for the currently available range of options.

All option boards are connected to the main PCB by a 34 way ribbon cable fitted to the main PCB.

Most option boards also plug into one of the three 40 way connectors, J6, J7 or J8, on the main PCB.

All boards are powered using 8-way connectors on flying leads that plug into connectors on the main PCB.

13.2 Removal of an Option Board

An option board should be removed using the following steps:

1. Disconnect the 34 way cable from the option board, and the 40 way cable from the main PCB.
2. Disconnect the option board power lead from the which plugs onto the main PCB.
3. A 350-25 option board must have the XLR cable on PL6 disconnected.
4. A 350-24-01 must have the AES interconnect lead and XLR cable disconnected from J10 and J11 respectively.
5. Remove the BNC nuts and washers for the option board on the back panel.
6. Undo the M3 X 6 screws (and nylon washers) that hold the option board onto the stand-off pillars.

The option board can now be removed.

13.3 Installation of an Option Board

Mechanically, assembly is the reverse of the removal process, but note the following:

The 350-25 is normally fitted adjacent to J6 as this is nearest the XLR mounting position.

The power cable should connect to the nearest power connector (J31, J32 or J33).

Each option board is supplied with a fitting kit of BNC nuts and washers and M3 bolts with nylon washers. A legend plate is also provided to allow the board to be identified from the rear of the unit.

See section 13.3.1 below for details of the link settings.

13.3.1 Option Board Link Settings

The jumper link is located near the 40 way connector on each option board. It is labelled 'SEL' and has three possible settings, labelled '1', '2' and '3'. The jumper should be set to position '2'.

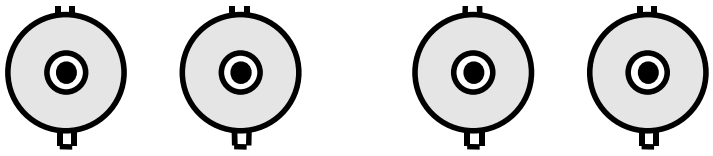
Slot 1 is on the right as the unit is viewed from the front.

13.3.2 350-28 Pulse Option Board DIP Switch Settings

The 350-28 Pulse Option Board is designed to provide fundamental video timing signals.
The board can generate the following signals:

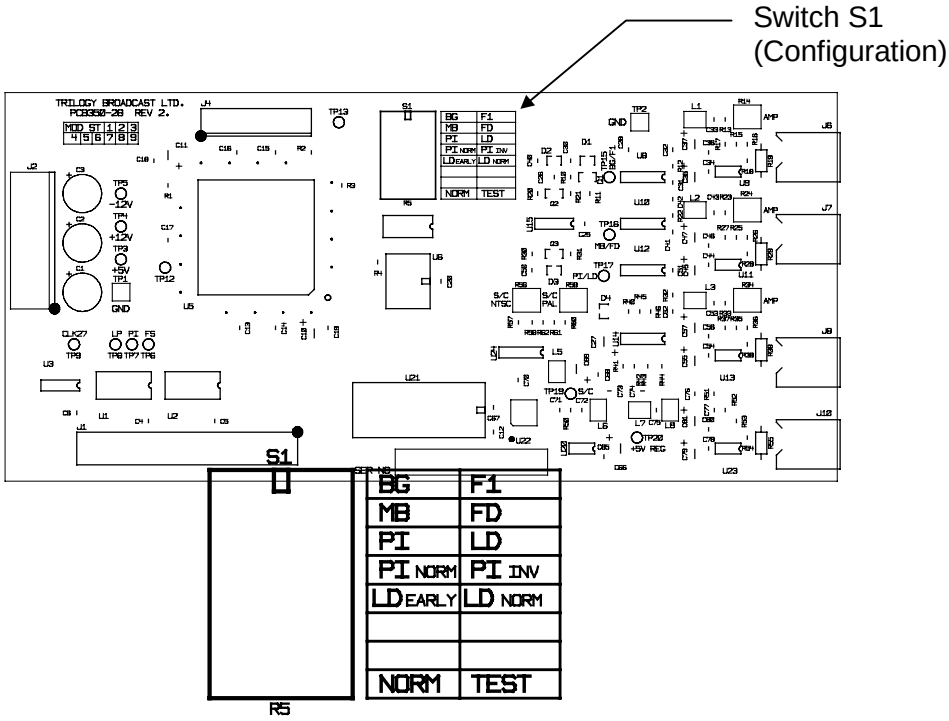
- Line Drive
- Field Drive
- Mixed Blanking
- PAL Ident
- Burst Gate
- Field 1 of eight (PAL) / four (NTSC) marker
- Subcarrier sine wave

The board is dual standard - the signals will be appropriate for PAL or NTSC depending on the standard of the Mentor unit.
The board only has four BNC outputs. One output is used for the subcarrier signal; each of the remaining outputs can supply one of two signals depending on on-board switch settings. The BNCs are assigned as shown :



Output 4	Output 3	Output 2	Output 1
Subcarrier	PAL ident or Line Drive	Mixed Blanking or Field Drive	Burst Gate or Field 1 of 8 (4)

The sense of the PAL Ident signal may be inverted.
The falling edge of the line drive may be set 'early', to be coincident with start of the horizontal blanking period or 'normal, to be coincident with the falling edge of sync signal.
The switches are arranged as an eight way DIL switch mounted on the board. The location of the switch is shown below. Each switch has two positions and the panel to the right of the switch indicates the function when the switch for either position of the switch. This is explained below.



Summary of switch functions

S1 Switch	Function of switch in left position	Function of switch in right position
Switch 1	Output 1 is Burst Gate	Output 1 is Field 1 marker
Switch 2	Output 2 is Mixed Blanking	Output 2 is Field Drive
Switch 3	Output 3 is PAL Ident (Line Drive if the unit is NTSC)	Output 3 is Line Drive
Switch 4	PAL Ident is normal	PAL Ident is inverted
Switch 5	Line Drive is early	Line Drive is normal
Switch 6	not used	not used
Switch 7	not used	not used
Switch 8	Normal	Test mode - do not use this

13.3.3 350-24-01 SDI With Embedded Audio – Functions and DIP Switch Settings

Some models of Mentor Plus are provided with a 350-24-01 embedded audio card as standard fitment. Alternatively a module may be retrofitted as an option.

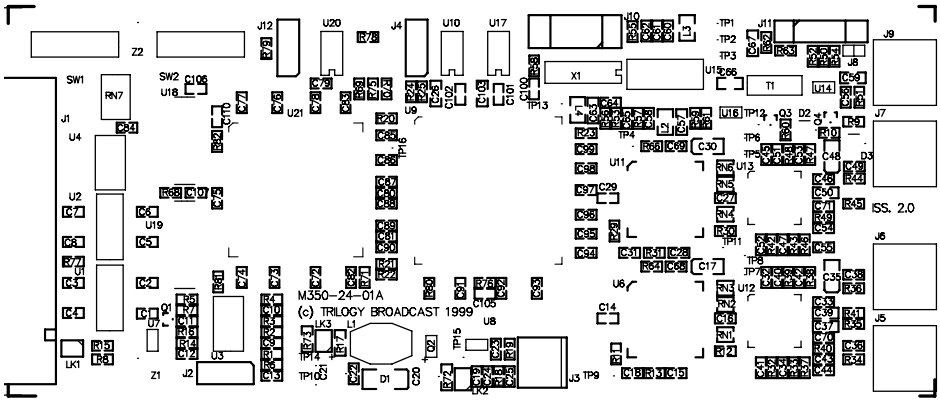
Note that this board will only work with software revisions P onwards.

13.3.3.1 Summary of Features

Number of test pattern outputs	2 SDI with EDH
Number of reference black outputs	1 SDI with EDH
Front Panel adjustment of vertical video timing for all outputs.	± 3 vertical lines
Test Patterns available	As per 350-24-00
Number of AES audio channels on test pattern outputs	4 channels (2 stereo pairs)
Number of AES audio channels on reference black outputs	4 channels (2 stereo pairs)
AES Audio mode control options	Sourced from Mentor motherboard AES audio generator
AES Audio modes supported for insertion into SDI	48kHz 20bit synchronous. (Any other modes selected disable audio insertion on all SDI outputs)
AES/EBU serial digital audio output	1 buffered output of AES/EBU serial digital audio input. (Normally connected to rear panel 3 pin XLR)
AES/EBU serial word clock output	1 output of AES/EBU serial digital word clock operating at the frequency selected by the front panel.
AES/EBU serial word clock output level and impedance	1volt peak-peak into 75 Ohms. (Link selectable DC or AC coupling)
Selection of embedding tone or silence when reference black is selected on test pattern outputs.	Enabled or disabled by on board link
Selection of audio group to be embedded for test pattern output	Any one of the four groups selected by on board link selection, or no groups i.e. embedding disabled.
Selection of audio group to be embedded for reference black output	Any one of the four groups selected by on board link selection, or no groups i.e. embedding disabled.
Selection of audio channel pairs for test pattern output	By on board link selection with the following options for each channel pair: Tone or Silence Enabled
Selection of audio channel pairs reference black output	By on board link selection with the following options for each channel pair: Tone or Silence Enabled
Specification conformance	Conforms to ITU-R BT 601/656 (CCIR 601/656); EBU Tech. 3267; ANSI/SMPT 259M, ANSI/SMPTE 272M-A-1994, ANSI/SMPTE RP155 (audio levels), ANSI/SMPTE RP165 (EDH), ANSI/SMPTE 125M-1995, ANSI/SMPTE RP 168-1993

13.3.3.2 DIP Switch Settings

The 350-24-01 module has a number of facilities that may not be configured from the front panel – these need to be pre-configured.
There are two DIP switches (SW1 and SW2), located adjacent to the 40 way ribbon cable at the end of the board, as shown below. The switches should be each labelled 1 through 8 (switch 1 being nearest the BNC connectors), with ON clearly marked (the ON position being towards the middle of the module)



Summary of DIP Switch Functions

SW1	Function of switch in OFF position		Function of switch in ON position
Switch 1	Test output Embedding enabled		Test output Embedding disabled
Switch 2&3	Test Output Audio Group	Group 1-4: Switch 2 ON Switch 3 ON Group 5-8: Switch 2 OFF Switch 3 ON Group 9-12: Switch 2 ON Switch 3 OFF Group 13-16: Switch 2 OFF Switch 3 OFF	
Switch 4	Test Pattern Tone Pair 0 enabled		Test Pattern Tone Pair 0 silent
Switch 5	Test Pattern Tone Pair 1 enabled		Test Pattern Tone Pair 1 silent
Switch 6	not used		not used
Switch 7	not used		not used
Switch 8	Test Pattern output set to black		Test Pattern output set to test patterns

SW2	Function of switch in OFF position		Function of switch in ON position
Switch 1	Black output Embedding enabled		Black output Embedding disabled
Switch 2&3	Black Output Audio Group	Group 1-4: Switch 2 ON Switch 3 ON Group 5-8: Switch 2 OFF Switch 3 ON Group 9-12: Switch 2 ON Switch 3 OFF Group 13-16: Switch 2 OFF Switch 3 OFF	
Switch 4	Black Tone Pair 0 enabled		Black Pattern Tone Pair 0 silent
Switch 5	Black Pattern Tone Pair 1 enabled		Black Pattern Tone Pair 1 silent
Switch 6	not used		not used
Switch 7	not used		not used
Switch 8[1]	AES receiver = CS8414		AES receiver = CS8412

[1] Note – factory set to indicate the device used in position U15. Do not alter this setting.