

Table 3-1
Test Signal Generator — General Test Signal and Black Burst Characteristics

Characteristics	Performance Requirements	Supplemental Information
Luminance Amplitude Accuracy	$\pm 1\%$.	Measured at 700 mV.
DC Output Level	Test Signal: 0 Vdc ± 50 mV. Black Burst: 0 Vdc ± 5 mV.	Measured at blanking.
Chrominance-to-Luminance Gain	$\pm 1\%$.	Measured at 980 mV p-p, at 500 kHz, and 4.43 MHz referenced to 500 kHz.
Frequency Response	$\pm 1\%$ to 5 MHz.	
Chrominance-to-Luminance Delay	≤ 5 ns.	
Group Delay	≤ 5 ns to 5 MHz.	10 mV p-p = 9 ns delay on a 10T pulse.
SCH Phase Accuracy		± 2.5 ns typical.
Luminance Rise Time	250 ns ± 25 ns.	Except colour bars, 2T bar, and convergence.
Chrominance Rise Time	350 ns ± 35 ns.	
Burst Amplitude	300 mV ± 6 mV p-p.	
Burst Rise Time	350 ns ± 35 ns.	Slower than BBC spec to avoid ringing.
Sync Amplitude	300 mV ± 3 mV.	
Sync Rise Time	250 ns ± 25 ns.	
Horizontal Timing	See Figs.3-1 through 3-24 (to be inserted).	
Front Porch Duration	1.55 μ s minimim, except narrow blanking test signal.	1.65 μ s typical; narrow blanking front porch is 1.425 μ s.
Line Blanking Interval Nominal Blanking	12.05 μ s nominal for all test signals except narrow blanking signal.	Beginning at 50% point of active video.
Narrow Blanking	11.60 μ s ± 0.1 μ s for narrow blanking signal.	For blanking width measurement.
Breezeway Duration	900 ns ± 50 ns.	
Horizontal Sync Duration	4.7 μ s ± 50 ns.	50% amplitude point.
Vertical Serration Duration	4.7 μ s ± 50 ns.	50% amplitude point.
Equalizing Pulse Duration	2.35 μ s ± 50 ns.	50% amplitude point.

Table 3-1 (cont.)
Test Signal Generator — General Test Signal and Black Burst Characteristics

Characteristics	Performance Requirements	Supplemental Information
Burst		
Delay from Sync	5.6 μ s \pm 50 ns.	From 50% point of sync.
Burst Duration	2.255 μ s \pm 0.1 μ s.	10 cycles of subcarrier.
Output Impedance	75 Ω .	
Return Loss	36 dB to 5 MHz.	
Crosstalk	\geq 60 dB down.	
Residual Subcarrier	\geq 60 dB down.	
Glitches	\leq 2 mV.	

Table 3-2
Test Signal Generator — Test Signals

Characteristics	Performance Requirements	Supplemental Information																								
75% Colour Bars																										
Luminance Rise Times	150 ns \pm 25 ns.																									
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Colour Bars	Lines 23 – 156.																									
Narrow Blanking	Lines 157 – 176.																									
Red	Lines 177 – 310.																									
		Narrow blanking is a 700 mV bar with 150 ns luminance rise times and 11.6 μ s blanking.																								

Table 3-2 (cont.)
Test Signal Generator — Test Signals

Characteristics	Performance Requirements	Supplemental Information																																
75% Monitor Setup Matrix Field Timing Convergence Pluge with 5-step Convergence Colour Bars Reverse Blue Convergence	Lines 23 – 62. Lines 63 – 145. Lines 146 – 187. Lines 188 – 244. Lines 245 – 270. Lines 271 – 310.	Convergence, pluge with 5-step staircase, conv, colour bars, rev. blue, conv. This colour bars has 75% white (lum = 525 mV).																																
100% Colour Bars Luminance Rise Times	150 ns \pm 25 ns. <table border="1"> <thead> <tr> <th></th> <th>Lum Ampl. (mV)</th> <th>Subc. Ampl. (mV p-p)</th> <th>Subc. Phase (deg)</th> </tr> </thead> <tbody> <tr> <td>White</td> <td>700.0</td> <td>0.0</td> <td>0.0</td> </tr> <tr> <td>Yellow</td> <td>620.2</td> <td>627.3</td> <td>167.1</td> </tr> <tr> <td>Cyan</td> <td>490.7</td> <td>885.1</td> <td>283.5</td> </tr> <tr> <td>Green</td> <td>410.9</td> <td>826.8</td> <td>240.7</td> </tr> <tr> <td>Magenta</td> <td>289.1</td> <td>826.8</td> <td>60.7</td> </tr> <tr> <td>Red</td> <td>209.3</td> <td>885.1</td> <td>103.5</td> </tr> <tr> <td>Blue</td> <td>79.8</td> <td>627.3</td> <td>347.1</td> </tr> </tbody> </table>		Lum Ampl. (mV)	Subc. Ampl. (mV p-p)	Subc. Phase (deg)	White	700.0	0.0	0.0	Yellow	620.2	627.3	167.1	Cyan	490.7	885.1	283.5	Green	410.9	826.8	240.7	Magenta	289.1	826.8	60.7	Red	209.3	885.1	103.5	Blue	79.8	627.3	347.1	
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100% Colour Bars Over Red Luminance Rise Times Field Timing Colour Bars Red	150 ns \pm 25 ns. Lines 23 – 166. Lines 167 – 310.																																	
100% Colour Bars Over Red With Narrow Blanking Luminance Rise Times Field Timing Colour Bars Narrow Blanking Red	150 ns \pm 25 ns. Lines 23 – 156. Lines 157 – 176. Lines 177 – 310.	Narrow blanking is a 700 mV bar with 150 μ s luminance rise times and 11.6 μ s blanking.																																
100% Monitor Setup Matrix Field Timing Convergence Pluge with 5-step Convergence Colour Bars Reverse Blue Convergence	Lines 23 – 62. Lines 63 – 145. Lines 146 – 187. Lines 188 – 244. Lines 245 – 270. Lines 271 – 310.	Convergence, pluge with 5-step staircase, conv, colour bars, rev. blue, conv.																																

Table 3-2 (cont.)
Test Signal Generator — Test Signals

Characteristics	Performance Requirements	Supplemental Information
Pluge (BBC Version 2) Pluge Levels Lum. Ref. Levels Field Timing 700 mV 450 mV 200 mV 110 mV	-14 mV and 14 mV. 700 mV, 450 mV, 200 mV, and 110 mV. Lines 63 – 114. Lines 115 – 166. Lines 167 – 218. Lines 219 – 270.	
Pluge (BBC Version 1) Pluge Levels Lum. Ref. Levels Field Timing 700 mV 105 mV	-14 mV and 14 mV. 700 mV (100%) and 105 mV (15%). Lines 83 – 166. Lines 167 – 250.	
White Test Signal	22.5 μ s, 700 mV luminance bar on lines 83 – 250.	
Grey Test Signal	22.5 μ s, 105 mV luminance bar on lines 83 – 250.	
Convergence Amplitude Pattern Luminance Rise Times Pulse HAD	525.0 mV. 115 ns \pm 25 ns. 225 ns \pm 25 ns.	Crosshatch – 14 horizontal lines and 19 vertical lines per field. Horizontal line spaced every 40 lines starting at line 35.
Pulse & Bar With Window 20T Modulated Pulse HAD Chroma Phase Amplitude 2T Pulse HAD Standard Option 5 Amplitude	2000 ns \pm 20 ns. 60.7°. 700 mV. 200 ns \pm 20 ns. 166.7 ns \pm 20 ns. 700 mV.	

Table 3-2 (cont.)
Test Signal Generator — Test Signals

Characteristics	Performance Requirements	Supplemental Information
2T Bar Width Rise Time Standard Option 5 White Bar Amplitude Field Tilt Line Tilt Window Field Timing Pulse-to-Bar Ratio Ringing	26 μ s. 192.9 ns \pm 20 ns. 160.7 ns \pm 20 ns. 700.0 mV. \leq 0.5%. \leq 0.5%. Lines 89 – 244. 1:1 \pm 0.5%. \leq 1% peak.	50% amplitude point.
Field Square Wave Field Timing	Lines 89 – 244.	
Multipulse Amplitude Frequencies	700.0 mV. S/N B031877 & UP: 1.0 MHz, 2.0 MHz, 3.0 MHz, 4.0 MHz, 5.8 MHz.	Prior to S/N B031877 Multipulse Frequencies were: 1.0 MHz, 2.0 MHz, 4.0 MHz, 4.8 MHz, 5.8 MHz.
SinX/X Bandwidth Pedestal Peak	6 MHz. 124.9 mV. 575.1 mV.	Peak amplitude from pedestal.
Multiburst White Reference Bar Amplitude Packet Amplitudes Pedestal Burst Frequencies Packet Rise Time	560.0 mV. 420.0 mV p-p. 350.0 mV. 500 kHz, 1.0 MHz, 2.0 MHz, 4.0 MHz, 4.8 MHz, 5.8 MHz. 350 ns typical	Equal width packets. Sine squared shaped packets.
Line Sweep Amplitude Sweep Range Field Timing Markers Sweep Markers	700.0 mV p-p. 250 kHz to 6.1 MHz. Lines 26-62. Lines 63-270. Lines 271-310.	Markers at 1, 2, 3, 4, 5, and 6 MHz.

Table 3-2 (cont.)
Test Signal Generator — Test Signals

Characteristics	Performance Requirements	Supplemental Information
5-Step Staircase Amplitude Linearity Error	700.0 mV. $\leq 1\%$.	Relative step matching.
Luminance Ramp Luminance Ramp Linearity Error	0 to 700.0 mV. $\leq 1\%$.	
Modulated 5-Step Staircase Chroma Amplitude Phase	280.0 mV p-p. 60.7°.	
Modulated Ramp Luminance Amplitude and Linearity Chrominance Amplitude Phase Angle Diff Gain Diff Phase	Same as Luminance Ramp. 280.0 mV p-p. 60.65°. 0.6% maximum. 0.3° maximum.	
Flat Fields Amplitudes	0 mV, 350 mV, 700 mV.	
Red Field Luminance Rise Times Luminance Pedestal Chrominance Amplitude Phase	150 ns. 157.0 mV. 663.8 mV. 103.5°.	
ITS CCIR Line 17 Standard Option 5	2T bar (width = 10 μ s, rise time = 192.9 ns \pm 20 ns), 2T pulse (HAD = 200 ns \pm 20 ns), 20T modulated pulse (60.7°), 5-step. 2T bar (width = 10 μ s, rise time = 166.7 ns \pm 20 ns), 2T pulse (HAD = 160.7 ns \pm 20 ns), 20T modulated pulse (60.7°), 5-step.	

Table 3-2 (cont.)
Test Signal Generator — Test Signals

Characteristics	Performance Requirements	Supplemental Information
CCIR Line 18	Same as Multiburst.	
CCIR Line 330 Standard	2T bar (width = 10 μ s, rise time = 192.9 ns \pm 20 ns), 2T pulse (HAD = 200 ns \pm 20 ns), 5-step with 280 mV p-p modulation (60.7°).	
Option 5	2T bar (width = 10 μ s, rise time = 166.7 ns \pm 20 ns), 2T pulse (HAD = 160.7 ns \pm 20 ns), 5-step with 280 mV p-p modulation (60.7°).	
CCIR Line 331	350 mV luminance pedestal with three level (140 mV p-p, 420 mV p-p, 700 mV p-p), chroma bar (60.7°) followed by 420 mV p-p chroma bar (60.7°).	
Luminance Pedestal Rise Time		
Standard	192.9 ns \pm 20 ns.	
Option 5	160.7 ns \pm 20 ns.	
UK ITS 1 (Lines 19 & 332) Standard	2T bar (width = 10 μ s, rise time = 192.9 ns \pm 20 ns), 2T pulse (HAD = 200 ns \pm 20 ns), 10T modulated pulse (60.7°), 5-step with 140 mV p-p modulation (60.7°).	
Option 5	2T bar (width = 10 μ s, rise time = 166.7 ns \pm 20 ns), 2T pulse (HAD = 160.7 ns \pm 20 ns), 10T modulated pulse (60.7°), 5-step with 140 mV p-p modulation (60.7°).	
UK ITS 2 (Lines 20 & 333)	700 mV p-p 60.7° chroma bar on a 350 mV luminance pedestal. 280 mV p-p 60.7° chroma bar (no pedestal).	
Luminance Pedestal Rise Time		
Standard	192.9 ns \pm 20 ns.	
Option 5	160.7 ns \pm 20 ns.	

Table 3-2 (cont.)
Test Signal Generator — Test Signals

Characteristics	Performance Requirements	Supplemental Information
ITS MATRIX Field Timing CCIR17 CCIR18 (multiburst) CCIR330 CCIR331 UK ITS 1 UK ITS 2 Modulated Ramp	Lines 23 – 62. Lines 63 – 104. Lines 105 – 145. Lines 146 – 187. Lines 188 – 228. Lines 229 – 270. Lines 271 – 310.	
APL	1 line full-field signal and 3 lines 0 or 700 mV flat field. Selected test signal on 6 of 18 lines repeated; starting at line $22\frac{1}{2}$.	
AC Bounce Bounce Rate	1 second high, 1 second low.	

Table 3-3
Test Signal Generator — Diagnostic Signals

Characteristics	Performance Requirements	Supplemental Information
DAC Test 1	Split field: 500 kHz followed by 4.43 MHz (980 mV p-p).	Non-composite signal.
25 Hz Offset Test	25 Hz sine wave, 980 mV p-p.	Non-composite signal.
Nonburst Colour Bars		75% bars with no burst.

Table 3-4
Test Signal Generator — Black Burst Output

Characteristics	Performance Requirements	Supplemental Information
Black (or Blanking) Level	0 V \pm 5.0 mV.	
Blanking Width	< 11.2 μ s.	
Glitch Amplitude	< 20 mV.	
Phasing	< 2°.	Compared to test signal output.
Return Loss	\geq 36 dB to 5 MHz.	

Table 3-5
Sync Generator — General Pulse Output Characteristics

Characteristics	Performance Requirements	Supplemental Information
Amplitude	-2.0 ± 0.2 V.	Jumper selectable to -4 V.
Impedance	75 Ω .	
Return Loss	≥ 30 dB to 5 MHz.	
Rise and Fall Times	250 ns \pm 50 ns.	

Table 3-6
Sync Generator — Pulse Output Signals

Characteristics	Performance Requirements	Supplemental Information
Composite Sync Horizontal Sync Duration	4.70 μ s \pm 0.1 μ s.	
Vertical Serrations	4.70 μ s \pm 0.1 μ s.	
Equalizing Pulse Duration	2.35 μ s \pm 0.1 μ s.	
Blanking Horizontal Blanking Duration	12.01 μ s \pm 0.1 μ s.	Factory set to 12.01; Jumper selectable for 11.79 or 12.24 μ s.
Vertical Blanking Duration	25 lines.	Jumper selectable for 24 or 25 lines. Factory set to 25.
Burst Flag Delay from Horizontal Sync	5.6 μ s \pm 0.1 μ s.	Measured from sync pulse output to burst flag output.
Duration	2.255 μ s \pm 0.1 μ s.	10 cycles of subcarrier.
PAL Pulse	(H/2 Square Wave.)	Selectable polarity. Factory set to high for 135° burst.
Frame Field Reference Pulse	Low for active portion of line 7, field 1.	
Colour Frame Square Wave Position	Low for fields 1-4, high for fields 5-8.	Selectable for -2 V, -4 V, or TTL compatible output.

Table 3-7
Sync Generator — Subcarrier Output

Characteristics	Performance Requirements	Supplemental Information
Amplitude	2 V p-p \pm 0.2 V.	
Free-Running Frequency	4.43361875 MHz \pm 1 Hz.	After 20-minute warm up.
Long-Term Stability		Typical: 1 Hz per year after initial aging.
Sidebands and Harmonics	\geq 40 dB down.	Typically \geq 50 dB down.
DC Level	0 V \pm 100 mV.	
Return Loss	\geq 30 dB to 4.43 MHz.	

Table 3-8
Genlock Function

Characteristics	Performance Requirements	Supplemental Information
Burst Lock Genlock Phase Change with Input Amplitude	\leq 1° burst phase change for input sync or burst amplitude range of 300 mV +3 to -3 dB. \leq 2° burst phase change for amplitude range of 300 mV +6 to -6 dB.	For either composite video or burst amplitude errors.
Genlock Phase Change with Input Signal APL	\leq 1° burst phase change over 10% to 90% APL.	
Phase Dependence on Input Burst Frequency	\leq 1° burst phase change for \pm 10 Hz change in incoming subcarrier.	Factory tested to \leq 1° burst phase change for \pm 20 Hz change in incoming subcarrier.
Lock Range	4.43361875 MHz \pm 10 Hz.	Factory tested to 4.43361875 MHz \pm 20 Hz.
Genlock Phase Jitter		Typically \leq 0.3° peak for input sync or burst amplitude range of 300 mV +3 to -3 dB. No noise on input signal. Typically \leq 0.4° peak for input amplitude range of 300 mV +6 to -6 dB. No noise on input signal.

Table 3-8 (cont.)
Genlock Function

Characteristics	Performance Requirements	Supplemental Information
Horizontal Timing Range Genlock Timing Sync Timing		$\approx 7 \mu\text{s}$ advance and delay relative to Genlock Input. 55° of fine sync in 0.175° steps. (Front-panel control.) $\approx 3.5 \mu\text{s}$ advance and delay relative to Genlock Input. At least 50° of fine sync in $\approx 0.2^\circ$ steps. (Front-panel control.)
Colour Framing Decisions	Will be correct for input SCH of $0^\circ \pm 40^\circ$.	
Sync Lock Jitter	$< 10 \text{ ns}$ for input sync amplitude range of 300 mV +3 to -3 dB.	No noise on input signal.
Noise Performance		Remains locked at 29 dB S/NR.
Genlock Stability with Gross Input Amplitude Variations	$\leq 40^\circ$ for input sync or burst amplitude range of 300 mV +7 to -12 dB.	
Vertical Timing Range	0, 1, or 2 lines advance. 1 line delay.	
Input Configuration	75 Ω loop-through.	
Return Loss (Genlock Input)	$\geq 40 \text{ dB}$ to 5 MHz.	

Table 3-9
Option 1 (Audio Tone, and ID Over Selected Test Signal)

Characteristics	Performance Requirements	Supplemental Information
Option 1		Adds Audio tone and additional test signal output with or without ID over Black Field or selected test signal.
Phasing	$< 2^\circ$.	Compared to test signal output.
Identification	12 characters, 7 x 9 matrix.	
Character Amplitudes	660 mV \pm 20 mV.	
Black Level Matching	± 5.0 mV.	Referenced to test signal black level on Option 1 output.
Audio Tone Amplitude	0 to +8 dBu* adjustable.	50 Ω output balanced XLR impedance to drive 150 Ω , 600 Ω , or high impedance load.
Frequency	500 Hz or 1 kHz.	Locked to horizontal. Jumper selectable. Factory set to 1 kHz.
Distortion (THD)	$\leq 0.01\%$.	1 kHz into 600 Ω .
Audio ID "click" Frequency Range	4 Hz to 0.2 Hz.	

*dBu is the voltage equivalent to 1 mV into 600 Ω , regardless of whether the actual load is 600 Ω .

Table 3-10
Power Supply

Characteristics	Performance Requirements	Supplemental Information
Supply Accuracy +12 V +5 V -5.2 V -12 V		12 V \pm 300 mV. 5 V \pm 100 mV. -5.2 V \pm 300 mV. -12 V \pm 300 mV.
Current Limit +12 V +5 V -5.2 V -12 V		Total power limited to 75W.
Hum +12 V +5 V -5.1 V -12 V		Typical 10 mV. 10 mV. 20 mV. 10 mV.
Noise +12 V -12 V +5 V -5.1 V		\leq 50 mV (5 MHz bandwidth). \leq 50 mV (5 MHz bandwidth). \leq 50 mV (5 MHz bandwidth). \leq 50 mV (5 MHz bandwidth).
Line Voltage Range 110 Vac 220 Vac	90 - 132 Vac. 180 - 250 Vac.	
Crest Factor		\geq 1.35.
Fuse Data 115 V Setting 230 V Setting		2A Med-Blow. 1A Med-Blow.
Power Consumption Typical Maximum		40 W. 60 W.
Line Frequency		48 Hz to 62 Hz.

Table 3-11
Physical Characteristics

Characteristics	Information
Dimensions	
Rackmount Height	1.734 inches (4.4 cm).
Width	19.0 inches (48.3 cm).
Length	22.1 inches (56.1 cm).
Net Weight	6.14 kg (13.5 lbs).
Shipping Weight	10.4 kg (22 lbs, 14 oz).

Table 3-12
Environmental Characteristics

Characteristics	Information
Temperature	
Non-Operating	-40°C to +65°C.
Operating	0°C to +40°C.
Altitude	
Non-Operating	To 50,000 feet.
Operating	To 15,000 feet.
Vibration (Operating)	15 minutes each axis at 0.025 inch, frequency varied from 10-55-10 c/s in 4-minute cycles with instrument secured to vibration platform. Ten minutes each axis at any resonant point or at 55 c/s.
Shock	50 g's, 1/2 sine, 11 ms duration, 3 guillotine-type shocks per side.
Transportation	Qualified under NTSC Test Procedure 1A, Category II (24-inch drop).