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NTSC Digital Test Signal Generator and Inserter

1910



1910 NTSC Digital Test Signal Generator and Inserter

FEATURES

- Four External VITS Inputs for Insertion of Teletext, Closed Captioning, Source ID, Etc.
- Nonvolatile Memory to Maintain Selected VITS and Full Field Signal Configuration After Power Interruption
- Signal Stored in Replaceable PROMs
- The Accuracy and Stability of All-digital 10-Bit Sync and Signal Generation
- RS-232 Remote Control Port

The 1910 Digital Generator is a state-of-the-art test signal generator designed for performance testing of NTSC video systems and equipment. The 1910 is especially suited where high accuracy and stability are required. It is also a VITS inserter (internal and external) with a full complement of signals that allow testing in studio, transmitter, production or research environments. Four external VITS inputs permit insertion of signals such as videotext, closed captioning, source ID, and other similar sources. These four inputs may be converted to four pulse outputs for use in a production environment.

Test signals are stored as 10-Bit digital words and converted to analog form by a 10-Bit precision DAC (with deglitching to reduce differential gain and differential phase) to ensure signal accuracy as well as long term stability and repeatability.

Since all signals are stored in replaceable EPROMs, changing needs and industry standards will not cause obsolescence.

Control and versatility of the 1910 are greatly enhanced by the use of its RS-232 control port. Most functions of the 1910 can be controlled, reconfigured and saved. This includes VITS and full field signal selection, matrix signal creation, and sequences.

Program Line

The 1910 offers full VITS and VIRS insertion capabilities which can be controlled through the RS-232 control port or through ground closures with the remote control unit. The 1910 may be used to insert either internally or externally generated test signals or data patterns in any combination on lines 10 through 20. Full sync and burst insertion capabilities with accurate SCH phasing eliminate the need for proc amps. When used as a VITS inserter, the program line is bypassed upon loss of incoming sync to prevent non-synchronous VITS or sync insertion. The 1910 may be reconfigured so that transmitter protection may be enabled where the loss of incoming sync will automatically cause a test signal to be inserted on the program line to maintain sync continuity until normal operation is restored.

External VITS Inputs

Four terminated inputs are standard in the 1910. Externally generated VITS from another source such as teletext, source ID, close captioning, etc., can be internally gated and inserted into the

program. External VITS can be inserted on any field of lines 10 through 20 as selected by RS-232 control port or the remote control unit.

Pulse Out Feature

This included feature of the 1910 allows the user to change the four external VITS inputs to four pulse outputs. The outputs available are H Drive, V Drive, Composite Blanking, and Burst Flag. Composite sync and subcarrier outputs are always available.

The 1910 can also be used as a stand alone signal source that will remain SCH phased and locked to an internal oven-controlled reference.

Remote Control

Remote control via a ground closure interface allows the user to control the full field signals, VITS insertion on lines 14 through 20 (VITS changes are saved in nonvolatile memory), VIR mode, bypass/operate, genlock source, control mode and reset to preprogrammed condition.

The 1910 can also be programmed and controlled through the RS-232 interface. Control could be via RS-232 terminal, personal computer, or an automated measurement set such as the Tektronix VM 700A, which would use the 1910 as a programmable signal source to stimulate and measure television equipment.

In addition to the functions available via ground closure control, the RS-232 port provides the ability to redefine the signal selection on the front panels to better meet particular user needs such as placing frequently used signals in a preferred position or in a convenient sequence for calibration, production testing or other special uses.

Nonvolatile Memory

The 1910 has an EEPROM nonvolatile memory (no need for battery backup) where configurations different from the factory set can be saved even if the instrument is powered down or a power failure occurs.

Signal Sequencing

The 1910 has commands that allow the user to program the VITS or full field signals to be displayed for definable periods of time in specific sequences.

An example of color frame sequence would be to set field one to white and the other three fields to black. In this way it becomes simple to identify color field one for an accurate indication of color framing. This particular color frame sequence can also be used to measure the delay through frame synchronizers, effects generators, etc.

The VITS sequence can optimize the use of the vertical interval by specifying different signals (e.g. test signals, teletext, etc.) for each of the four color fields. One line of the vertical interval can be used to insert up to four signals. These signals may be programmed to change to new signals with the time sequence feature, thus multiplexing many signals onto one vertical interval line.

Sequencing full field or VITS signals provides for manual or automated testing without requiring operator interaction. It also is useful in generating programmable duty-cycle signals.

Diagnostics

When powering up, the 1910 automatically performs a number of checks to determine if its microprocessor interface is working properly. More extensive internal diagnostics are available for

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further isolation of faults on an out of service basis.

GCR Signals

The Philips, BTA, and Korean GCR signals are now available in the 1910. The Philips GCR signal is included in the standard signal set, while the BTA GCR signal is included in the optional 0% setup test signal set. The Philips GCR signal is also included in the optional CBC 7.5% setup test signal set. The Korea GCR is included in option 1K. The vertical interval line the GCR signal resides on is completely programmable.

Eye Height Data Test Signal

The Eye Test Pattern signal indicates the capability of a system to pass teletext or similar data patterns. Programming the Eye Test Pattern and the Eye Test Reference signals into a VITS or a field sequence allows monitoring for the possibility of data errors. A standard waveform monitor can be used to observe the resulting zero crossings and data height relative to the clock reference.

Signal Matrixing

The matrix feature of the 1910 divides the field into 16 blocks of lines consisting of approximately 16 lines each. Through the RS-232 control port the user can program any full field signal to appear in any of the 16-line blocks. Any signal can be repeated in as many blocks as necessary. There are three matrix signals in the 1910 that are factory set, but can be user-redefined and saved in a nonvolatile memory.

Some of the applications of this feature include user-defined tape headers or monitor test patterns. The matrixed signal can serve several users simultaneously, reducing the need for multiple signal outputs. By using the 15-line feature of the Tektronix 1780R/1781R Series Video Measurement Sets, particular signals in the matrix can be viewed by the users.

Characteristics

Program Control System-VITS Inserter

Program Line Input Level - 1 V ± 3 dB
(0.7 to 1.4 V) into 75 Ohm.

Program Line/Monitor Out

Impedance - 75 Ohm nominal.

Hum Rejection - >/=10 dB, (>/=20 dB user selectable) referenced to 1 V hum.

Video Gain - Unity gain ±0.5%.

Pulse to Bar Ratio -
2T Pulse to Bar Ratio: 100% ±0.25%.

Frequency Response - 0.5% to 5 MHz;

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1.0% to 10 MHz.

Differential Phase - (10-90 APL) </=0.15°.

Differential Gain - (10-90 APL) </=0.2%.

Random Noise (Weighted) - >/=75 dB (rms) down, referenced to 1 V.

Crosstalk (Internal to Program Line) -
2T >/=70 dB; (down, referenced) to 0.714 V.
Subcarrier: >/=60 dB down referenced
to 0.714 V.

External VITS Input

Insertion Gain - Unity ±1% (into 75 Ohm).

Insertion Level - DC coupled ±2 mV.

Frequency Response -
Flat within 1% to 5 MHz.

External Input Isolation - >60 dB to 5 MHz.

Switching Transients - <10 mV_{p-p} to 5 MHz.

Genlock

Source - Program Input or Black Burst Input.

Sync or Burst Amplitude - 40 IRE ±6 dB.

Burst Lockup Range - 3.579545 MHz ± 20 Hz (sync must be locked to burst).

Sync Lockup Range - 15.73426 kHz ± .079 Hz.

Free Run Frequency - 3.579545 MHz ± 10 Hz.

Jitter - < 5 ns (free run and burst lock mode).

Full Field Output Characteristics (Timing)

Line Blanking Width -
11.5 µs ± 100 ns at 50% amplitude points (measured on 100 IRE Ped).

Front Porch Width - 1.8 µs ± 100 ns at 50% amplitude points (measured on 100 IRE

Ped).

Full Field Output Characteristics (General)

Output Impedance - 75 Ohm nominal.

DC Level - 0 V, ±2 mV (Clamp on);
0 V, ±50 mV (Clamp off).

Luminance Gain - Within ±1%.

Chroma Amplitude Accuracy -
Within ±0.72%.

Relative Frequency Flatness - ±1% max using 50 IRE; Multiburst (500 kHz to 4.2 MHz).

Differential Phase - </=0.3% using 100 IRE Mod Ramp with 40 IRE p-p subcarrier.

Differential Gain - </=0.6% using 100 IRE Mod Ramp with 40 IRE p-p subcarrier.

2T Pulse Bar Ratio - 100% ±1%.

2T Pulse Ringing - </=1 IRE p-p.

Group Delay Error - </=10 ns, up to 5.0 MHz.

RS-232 Interface

Supports EIA Standard RS-232 format to the extent shown below.

Baud - 300, 1200, 2400, or 4800 bits/sec.

Input/Output - ASCII, Serial, Asynchronous Data. Full duplex input and output.

Character Length - 9 bits per character, including start and stop bits.

Parity -
Input: No parity required and, if present, is ignored.
Output: No parity sent.

Digital Data Interface

Parallel, 12 balanced, signal pairs consisting of 10 bits per sample, a clock, a timing reference signal.

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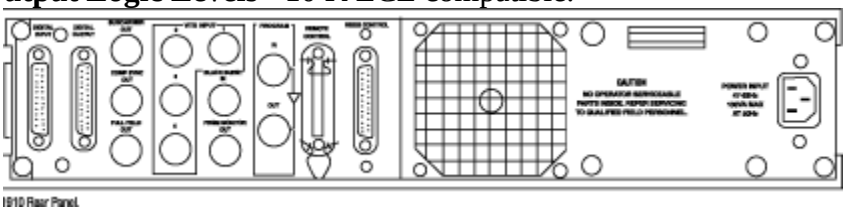
Sampling Frequency - 4 time color subcarrier; Nominally 14.31818 MHz.

Sampling Phase Angle - Referenced to I and Q axis.

Dynamic Range -
10 Bits/Sample: Blanking level (0 IRE) is at digital word 240; Reference white (100 IRE) is at digital word 800 (5.6 LSB/IRE).

Input Logic Levels Terminated in 100 Ohm -
10 K ECL compatible.

Output Logic Levels - 10 K ECL compatible.



1910 Rear Panel

Power Supply

Line Voltage Range - 90 to 132 V AC;
180 to 250 V AC.

Maximum Power Consumption - 130 W.

Line Frequency - 47 Hz to 63 Hz.

Environmental

Temperature -
non-operating: - 40°C to + 65°C.
Operating: 0°C to + 50°C.

Altitude -
non-operating: To 50,000 ft.
Operating: To 15,000 ft.

Certifications

Safety - Approved to: UL1244,
CAN/CSA-C22.2 No.231.
Complies with: IEC 348.

Physical Characteristics

Rackmount Dimensions	**mm**	**in.**
Height	88	3.5
Width	486	19.1
Length	525	20.6
Cabinet Dimensions	**mm**	**in.**
Height	96	3.8
Width	442	17.4
Length	525	20.6
Net Weight	**kg**	**lb.**
Rackmount	12.2	27
Cabinet	11.6	25.2
Shipping Weight	16.7	37

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