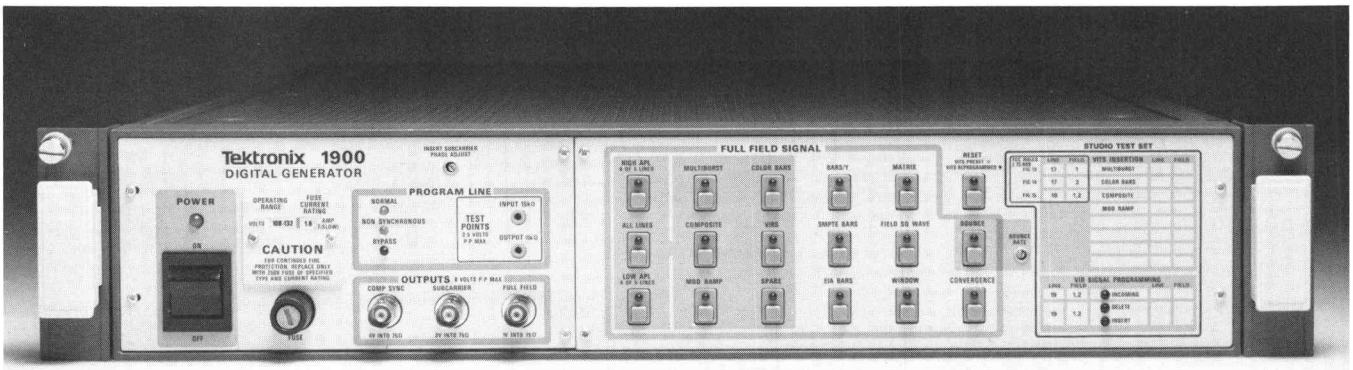
1900 Series Tektronix

Digital Generator



Studio Test Set

An NTSC test signal generator and VITS inserter, featuring 10 bit digital signal generation, three new test signals, digital word input and output, and RS-232-C and ground closure remote control interfaces.

The 1900 Digital Test Signal Generator and VITS Inserter is designed for state-of-the-art performance testing of NTSC video systems and equipment. Available in three different versions, this generator supports a wide range of transmitter, studio, common carrier, and equipment manufacturing applications. The three 1900 versions available are the Transmitter Test Set, the Studio Test Set, and the NTC 7 Test Set. Each version provides a special test signal complement, and all three offer these unique 1900 features:

- 10-bit digital signal generation increases test signal accuracy and long-term stability.
- PROM memory allows easy signal modification when industry signal formats change.
- SMPTE Color Bars, Sin x/x, and Multipulse signals facilitate the alignment of color monitors and enhance testing of frequency response and group delay.
- FCC or NTC 7 VITS and VIRS meet most testing requirements and provide a reference signal for automatic video correctors.
- Digital signal output allows accurate alignment of D to A converters, while digital signal input allows alignment of A to D converters and facilitates conversion of user generated digital signals to an analog format.
- RS-232-C and ground closure interfaces allow wide-ranging remote control functions and application versatility.

All-Digital Circuitry.

The 1900's generator functions are controlled by an internal microprocessor and its associated PROM memory. Test signals are stored as 10 bit digital words and converted to analog form by a 10 bit precision DAC to insure signal accuracy as well as long term stability.

Since the 1900's signals are stored in PROM, test signal format changes are accomplished by replacing the appropriate test signal memory. No recalibration is required, and changing industry test signal standards will not cause obsolescence.

Genlock and Program Line Control.

The 1900 may be genlocked to the incoming program signal or to a black burst signal. This assures accurate timing and phasing of the inserted VITS and the full field signals to the incoming reference signal.

When the 1900 is genlocked, loss of incoming color burst will cause the generator to lock its sync and subcarrier to the leading edge of incoming sync. If there is a loss of sync, the 1900 will then enter into a internal oscillator state which is controlled by a crystal in a constant temperature oven. When in the internal mode, subcarrier is within 10 Hz of nominal and, as when genlocked, is locked to H sync and SCH phased.

Normally, with loss of incoming sync, the program line signal is bypassed to prevent nonsynchronous VITS insertion. Through pin jumper programming, the 1900 can be set to enter into a transmitter-protect mode. In this mode, sync and burst or a full field signal (user selectable) will appear at the program line output to maintain continuity until normal operation is restored.

Full sync and burst regeneration capabilities are also included in the 1900. When the incoming program signal is monochrome, burst regeneration is inhibited. Normal sync and burst regeneration occurs when the incoming program signal is color.

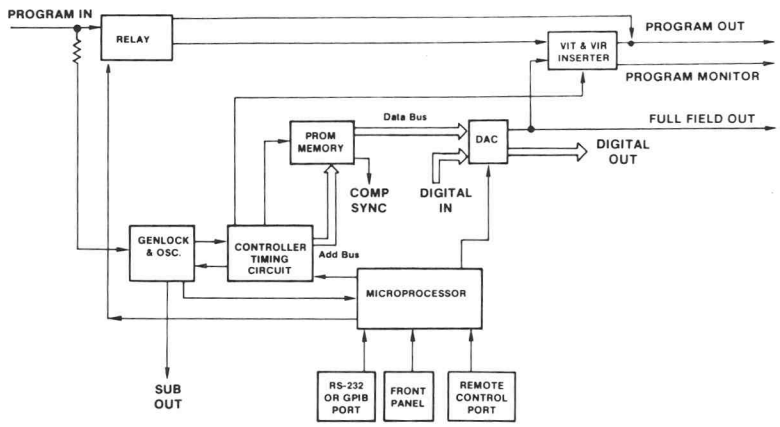
Phasing of the inserted burst to program signal phase is accomplished with front panel screwdriver adjustment. As the 1900 is fully SCH phased, the leading edge of the regenerated sync will occur 19 subcarrier cycles before the 50% point of the leading edge of the regenerated burst. No sync phasing adjustment is required and program signal SCH phasing is always maintained.

The sync and burst regeneration capabilities of the 1900 eliminate the need for additional proc amps.

VITS and VIRS Insertion.

The 1900 Digital Generator offers full VITS and VIRS insertion capabilities. The inserted VITS, either FCC or NTC 7, are a function of the 1900 test set version in use. FCC VITS are available in the Transmitter and Studio Test Sets, while NTC 7 VITS are provided in the NTC 7 Test Set. All 1900 versions are factory programmed to insert the standard FCC or NTC VITS.

For special applications, all VITS and VIRS line and field programming may be modified through the RS-232-C interface or through ground closures with the optional Remote Control Unit (part number 015-0374-00). Phasing of the inserted VITS chrominance is handled through a front panel screwdriver adjustment.



All-digital signal generation, microprocessor control, and precision 10-bit D to A conversion make the 1900 Generator the industry's most versatile and accurate NTSC video test instrument.

Digital Word Input and Output.

The 1900 features a digital word input and output. The digital word output provides a 10-bit digital word of the selected test signal. This highly accurate digital test signal may be used to evaluate and align D to A converters. It's a useful feature as the error incurred in digitizing an analog signal for this purpose is eliminated.

The digital word input will accept a user generated digital word (up to 10 bits) for conversion to analog with the precision DAC in the 1900. It's 10-bit resolution, 0.5% differential gain, and 0.2° differential phase performance guarantee a highly accurate conversion.

Interfacing and Remote Functions.

The 1900 Digital Generator offers RS-232-C and ground closure interface capabilities. With these interfaces, the 1900 is compatible with it's own remote control unit, a number of terminal devices, or a host computer system. All test signal selections and VITS/VIRS insertion functions are controllable through these interfaces.

Diagnostic PROM — In the event the 1900 should fail, the Diagnostic PROM may be used for fault isolation. This PROM is designed specifically for locating processor faults however, all I/O ports, RAM, VITS insertion functions, and the front panel keyboard are fully exercised. The Diagnostic PROM is available as an optional accessory to the 1900.

Standard Full Field Signals.

There are a wide range of test signals common to all 1900 Generator versions. Whichever test set you choose, you'll receive all of these test signals:

Modulated Ramp – Consists of a linear ramp going from 0 to 100 IRE modulated with 40 IRE subcarrier at 180°. The modulated ramp allows measurement of differential gain and phase distortions. Also available as a VITS.

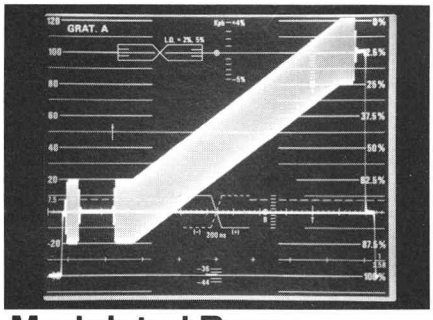
Field Square Wave – Approximates a 60 Hz square wave with sync and blanking added. This signal is useful in measuring field time distortions and clamper performance.

Window – An 18 usec white bar occurring on lines 72 through 202 of the field. This signal is used in measuring line-time and short-time distortions and picture monitor smear and ringing.

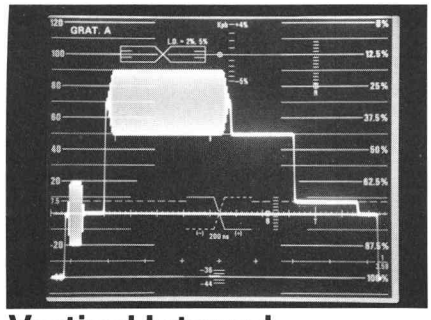
Convergence – Crosshatch and dot pattern. This signal is helpful when adjusting color picture monitor convergence and linearity.

VIRS – Consists of 70 IRE, 50 IRE, and 7.5 IRE pedestals. Chrominance modulation on the 70 IRE level is 40 IRE and a 180° phase. Also available on line 19 in vertical blanking.

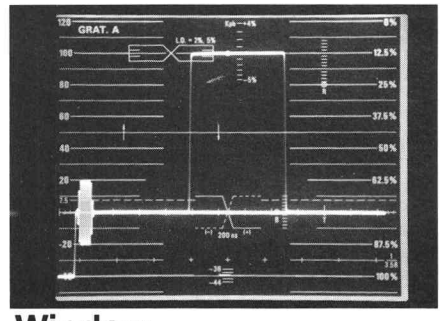
In addition to the above signals, each generator test set offers 4 out of 5 lines High or Low APL, and 4 out of 5 lines Bounce. The bounce rate is front panel adjustable.



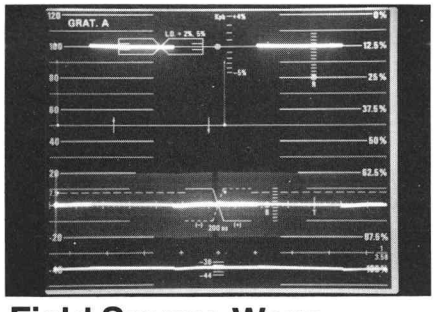
Modulated Ramp



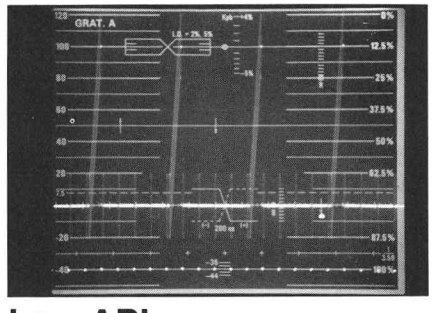
Vertical Interval Reference Signal (VIRS)



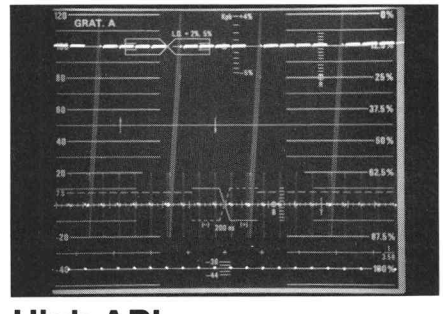
Window



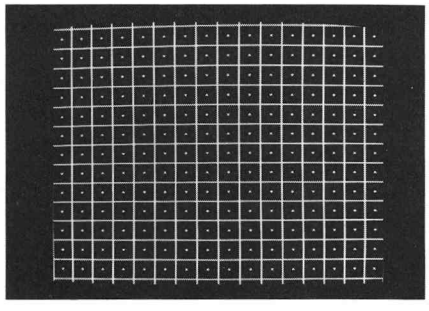
Field Square Wave



Low APL



High APL



Convergence Pattern

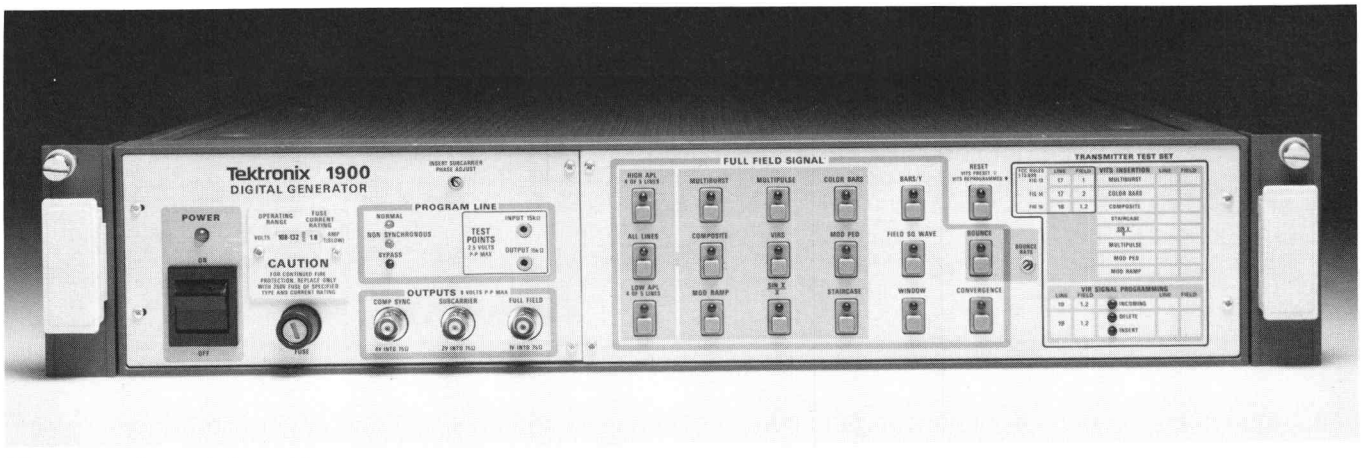
Multiburst – Consists of a 100 IRE white flag and six 60 IRE peak-to-peak packets of sine-wave bursts on a 40 IRE pedestal. Bursts are rise time controlled to reduce out of band harmonics. This signal conforms to FCC 73.699. Multiburst is used to check the television system frequency response. Also available as a VITS.

Multipulse – Consists of white flag, a 2T pulse, a 25T (1.25 MHz) modulated pulse, and four 12.5T (2 MHz, 3 MHz, 3.58 MHz, 4.1 MHz) modulated pulses. The white flag and all pulse elements are 70 IRE riding on a 10 IRE pedestal. The multipulse signal is especially useful for checking frequency response and group delay characteristics. Also available as a VITS.

Color Bars – Consists of eight equal intervals arranged in descending order of luminance. The signal conforms to FCC 73.699. When the incoming program signal is monochrome, VITS chrominance only is inhibited. The color bars are used for testing the luminance, hue, and saturation parameters of the television system. Also available as a VITS.

TRANSMITTER TEST SET.

This 1900 Test Set is specially designed for testing broadcast TV transmitters. It contains all the common generator signals plus these additional signals:



Transmitter Test Set

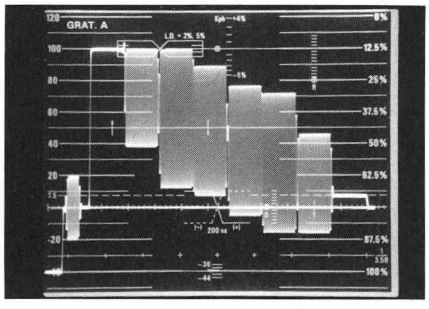
Composite – Consists of a 5-step modulated staircase, a 2T sine-squared pulse, a 12.5T modulated pulse, and a 100 IRE white bar. This signal conforms to FCC 73.699. The composite signal allows measurement of linear and non-linear distortions including chrominance to luminance gain and delay, transient response, differential gain and phase, and line-time distortions. Also available as a VITS.

Modulated Pedestal – Consists of three chrominance levels (20, 40, and 80 IRE) modulated on a 50 IRE pedestal, followed by 50 IRE pedestal having no modulation. Phase of the chrominance is 90°. The modulated pedestal allows measurement of chrominance to luminance intermodulation and chrominance nonlinear gain and phase distortions. Also available as a VITS.

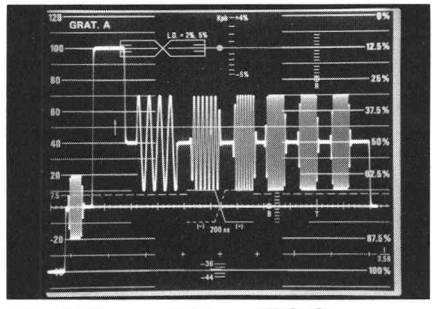
Staircase – Consists of 5 equal steps of unmodulated luminance information going from 0 to 100 IRE. The staircase signal allows measurement of differential luminance gain distortion. Also available as a VITS.

Bars/Y – A split field signal consisting of color bars followed by luminance levels only (gray scale). The Bars/Y signal is useful for simultaneously evaluating picture monitor gray scale tracking and color performance.

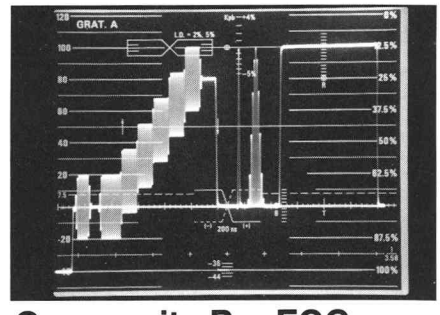
Sin x/x – Two Sin x/x pulses and an 18 usec bar. Used in the frequency domain, this signal provides an easy means for measuring the frequency response of television systems. Also available as a VITS.



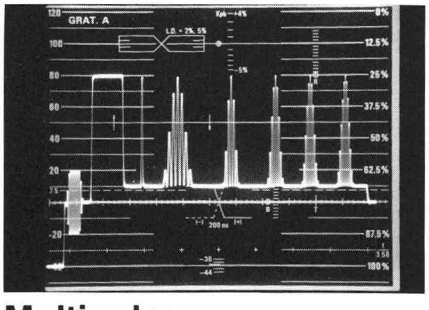
Color Bars Per FCC 73.699



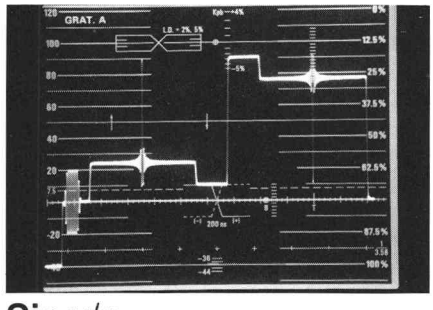
Multiburst Per FCC 73.699



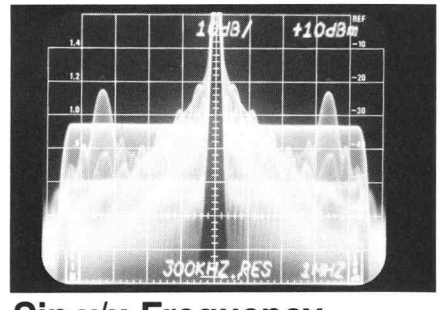
Composite Per FCC 73.699



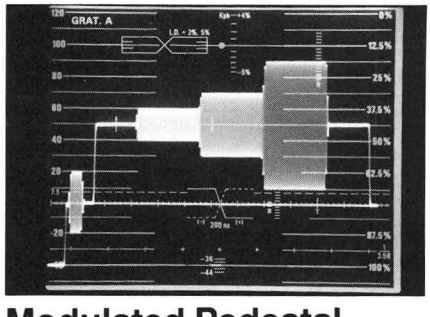
Multipulse



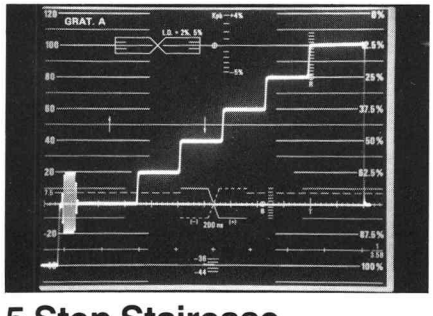
Sin x/x



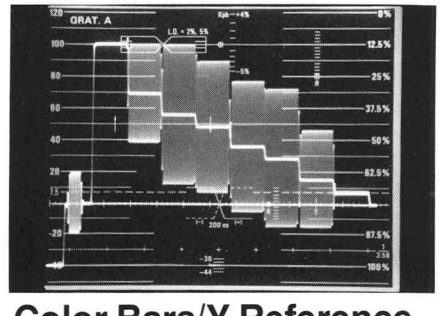
Sin x/x-Frequency Domain



Modulated Pedestal

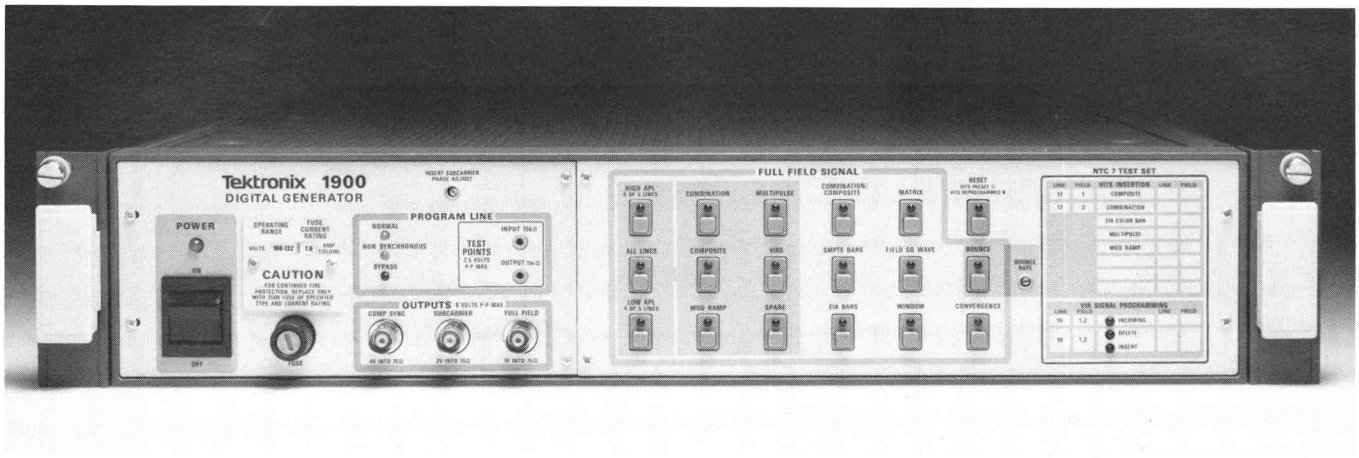


5 Step Staircase



Color Bars/Y Reference

NTC 7 Test Set



STUDIO TEST SET

This 1900 Generator version is designed for use in TV studio environments. In addition to the common test signals, the Studio Test Set provides these additional test signals:

Color Bars – See Transmitter Test Set.

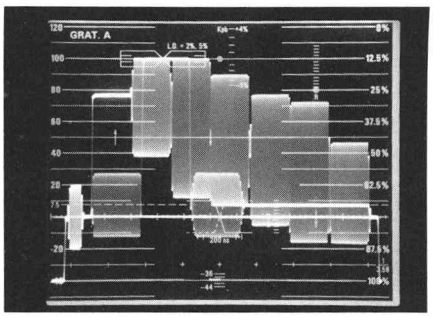
SMPTE Bars – A split field signal consisting of Standard EIA color bars for the first ⅔ of the field, reverse blue bars for the next 1/12 of the field, and – IWQB with pluge for the remaining ¼ of the field. The SMPTE Bars signal is extremely useful in color monitor alignment.

EIA Bars – A split field signal consisting of standard color bars for the first ¾ lines of the field, then – IWQB for the remaining ¼ lines of the field.

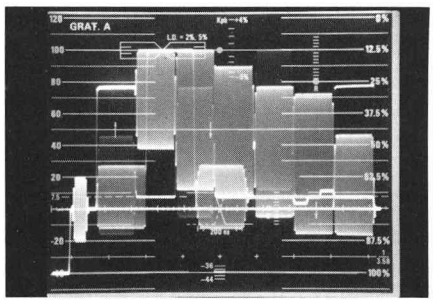
Composite – See Transmitter Test Set.

Multiburst – See Transmitter Test Set.

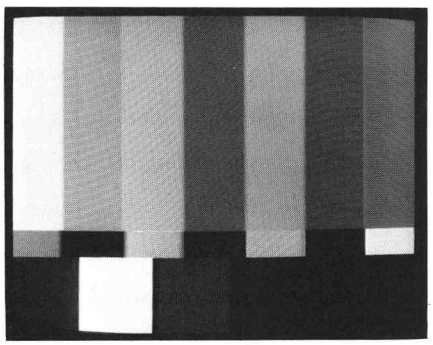
Bars/Y – See Transmitter Test Set.



EIA Color Bars



SMPTE Color Bars



SMPTE Color Bars

NTC 7 TEST SET.

Featuring NTC 7 VITS, this test set is designed for common carrier and network center applications. It offers the signals common to all generator versions plus these additional signals:

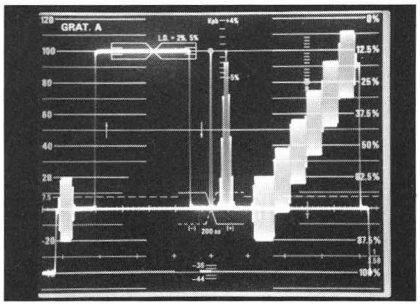
Multipulse – Consists of a 100 IRE white flag, a 2T pulse, a 25T 1-MHz modulated pulse, and four 12.5T (2-MHz, 3-MHz, 3.58-MHz, and 4.2-MHz) modulated pulses. The multipulse signal is useful in checking frequency response and group delay characteristics. Also available as a VITS.

Composite – Consists of a 100 IRE bar, 2T sine square pulse, 12.5T modulated pulse, and a 5-step modulated staircase. This signal conforms to NTC 7 Specifications. The composite signal allows measurement of linear and nonlinear distortions such as chrominance to luminance gain and delay, transient response, differential gain and phase, and line time distortions. Also available as a VITS.

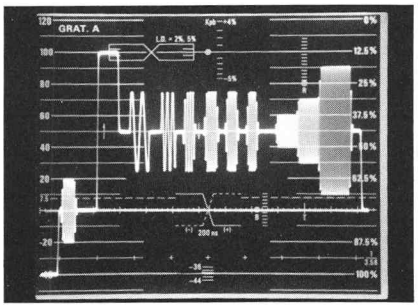
Combination – Consists of multiburst for the first portion of the line and modulated pedestal for the last portion. This signal conforms to NTC 7 specifications. The combination signal is used for frequency response, chrominance to luminance intermodulation, and chrominance nonlinear gain and phase measurements. Also available as a VITS.

SMPTE Bars – See Studio Test Set.

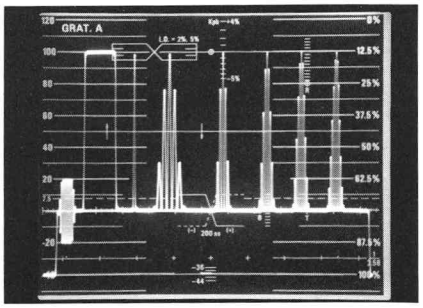
EIA Bars – See Studio Test Set.



Composite Per NTC 7 and CCIR Recommendation 473-2



Combination Per NTC 7 and CCIR Recommendation 473-2



Multipulse

1900 Specifications

PROGRAM CONTROL SYSTEM – VITS INSERTER

Program Line Input:
Input Level – 1 V ±3 dB (0.7 to 1.4 V).
Input Impedance – 75Ω nominal.
Return Loss – Power on: ≥46 dB to 5 MHz.
Power off/bypass: ≥40 dB to 5 MHz.

Program Line/Monitor Out:
Impedance – 75Ω nominal.
Return Loss – ≥36 dB to 5 MHz.
Hum Rejection – ≥10 dB, (≥20 dB user selectable), referenced to 1 V hum.
Keyboard (no noise) – <0.25 IRE.
Video Gain – Unity gain ±0.5%
DC Output Level – 0 V ±100 mV.
Pedestal Offset – 0 V hum: ≤2 mV.
1V Hum: ≤10 mV.
Isolation – Program line to others: ≥60 dB to 5 MHz, referenced to 1 V. Program line to program monitor: ≥40 dB to 5 MHz, referenced to 1V.
Pulse to Bar Ratio – T/2 Pulse to Bar ratio: 100% ±2%. 1T Pulse to Bar ratio: 100% ±0.5%. 2T Pulse to Bar ratio: 100% ±0.25%.
Waveform Tilt – Field tilt: ≤0.5%.
Bar tilt: ≤0.5%.
Frequency Response – 0.5% to 5 MHz; 1.0% to 10 MHz; 3.0% to 15 MHz.
Differential Phase – (10-90 APL) ≤0.15°.
Differential Gain – (10-90 APL) ≤0.2%.
Line-Time Amplitude Nonlinearity – ≤0.25%.
Random Noise – ≥75 dB (rms) down, referenced to 1 V.
Residual Subcarrier – ≥60 dB down, referenced to 1 V.
Hum or Transients – ≥60 dB down, referenced to 1 V.
Spurious Signals During Blanking – Up to 5 MHz: ≥40 dB down (≤10 mV). Above 5 MHz: ≥46 dB down (≤5 mV).
Delete Mode Signal Attenuation – 2T Pulse: ≥70 dB down, referenced to 0.714 V. Subcarrier: ≥60 dB down, referenced to 0.714 V.
Crosstalk (Internal to Program Line) – 2T: ≥70 dB down, referenced to 0.714 V. Subcarrier: ≥60 dB down, referenced to 0.714 V.
Insert Delay Range – ±8 μs (16 μs total) in 70 ns increments (internal DIP switch).
Insert Subcarrier-Phase Adjust Range (front panel adjustment) – 10° min.
Instrument Delay (program input to program output) – 25 ns typical.

GEN LOCK

Genlock Input:
Burst Amplitude – 40 IRE ±6 dB.
Sync Amplitude – 40 IRE ±6 dB.
Sync Source – Composite Video or Black Burst (Sync negative going).
Return Loss – ≥46 dB to 5 MHz.

Genlock Performance:
Burst Lock – 3.579545 MHz ±20 Hz.
Burst Loss – Clock referenced to leading edge of sync.
Sync Lock – 15.73426 kHz ±0.079 Hz.
Sync and Burst Loss – Clock is referenced to internal temperature controlled crystal oscillator.
Oscillator – (Free running) Subcarrier frequency: 3.579545 MHz ±10 Hz. Sync frequency: 15.73426 kHz ±0.04 Hz.

TEST SIGNAL CHARACTERISTICS – ALL 1900 VERSIONS

Modulated Ramp Signal:
Luminance Amplitude – 0 to 100 IRE ±0.7 IRE.
Linearity – Within 1%.
Chrominance – Amplitude: 40 IRE ±0.5 IRE. Differential gain: ≤0.6%. Differential phase: ≤0.3°. Envelope rise time: 400 ns ±40 ns. Phase: same as burst ±0.2°.

Field Square Wave Signal:
Field Timing – Lines (white): lines 72 to 202. Lines at blanking: all remaining active lines.
Field Tilt – 0.5% max.
Line Tilt – 0.5% max.
Amplitude – 100 IRE ±0.7 IRE.
Rise Time – 250 ns ±25 ns.

Window Signal:
White Bar Amplitude – 100 IRE ±0.7 IRE.
Rise Time – 250 ns ±25 ns.
Field Tilt – 0.5% max.
Line Tilt – 0.5% max.
Field Timing – Lines 72 to 202.

Convergence Signal
Peak Level – 77.5 IRE ±1 IRE.
Crosshatch Vertical Lines – Unblanked pulses: 17 per active lines. Pulse polarity: positive. Line pulse HAD: 225 ns ±25 ns. Dot pulse HAD: 350 ns ±35 ns.
Crosshatch Horizontal Lines – Unblanked Pulses: 14 per frame. Pulse polarity: positive. Line pulse rise time: 140 ns ±15 ns. Line pulse duration: 2 lines (1 line each field). Dot pulse duration: 3 lines (1 line on one field, two lines on the other field).

VIRS (Vertical Interval Reference Signal):
Chrominance Reference – Amplitude: 40 IRE ±0.4 IRE. Phase: same as burst ±0.3°. Envelope rise time: 1 μs ±100 ns. Average level of chrominance signal: 70 IRE ±0.7 IRE.
Luminance Reference – 50 IRE level: 50 IRE ±0.5 IRE. Black reference: 7.5 IRE ±0.5 IRE.

APL Signal Bounce:
Flat Field Bounce – Automatic bounce between 0 and 100 IRE levels. Rate adjustable from .033 Hz to 1 Hz.
Amplitude – 100 IRE ±0.7 IRE.
Rise Time – 250 ns ±25 ns.

TRANSMITTER TEST SET–TEST SIGNAL CHARACTERISTICS

Multiburst Signal:
White Reference Bar – Amplitude: 100 IRE ±0.7 IRE. Rise time: 250 ns ±25 ns.
Multiburst Packets – Amplitude: 60 IRE p-p ±1 IRE. Average level: 40 IRE ±1 IRE. Frequencies: 500 KHz, 1.25 MHz, 2.0 MHz, 3.0 MHz, 3.58 MHz, 4.1 MHz. Rise times: 500 KHz and 1.25 MHz, 140 ns ±14 ns; the remaining, 400 ns ±40 ns. Harmonic content: ≥40 dB down.

Sin x/x Signal:
Pulse to Bar Ratio – 100% ±1%.
Spectrum – Flat to 4.5 MHz ±0.2 dB. −3 dB at 4.75 MHz.
Pulse and Bar Height – 80 IRE ±1 IRE.
Main Pulse Zero Crossing – 210 ns ±21 ns.
Small Lobe Zero Crossing – 105 ns ±15 ns.
Bar Rise Time – 250 ns ±25 ns.

Multipulse Signal:
White Reference Bar – 70 IRE ±0.7 IRE. Rise time: 250 ns ±25 ns.
Pulse to Bar Ratio – 100% ±1%.
Pulse Half Amplitude Duration – 2T HAD: 250 ns ±20 ns. 25T HAD: 3.14 μs ±300 ns. 12.5T HAD: 1.57 μs ±150 ns.
Modulation Frequencies – 1st pulse, 1.25 MHz; 2nd pulse, 2 MHz; 3rd pulse, 3 MHz; 4th pulse, 3.58 MHz; 5th pulse, 4.1 MHz.
Group Delay – ≤10 ns.
Other Baseline Perturbation – ≤0.5 IRE.

Full Field Color Bars Signal:
See Studio Test Set –Test Signal Characteristics.

Composite Signal:
Modulated 5-step Staircase – Luminance amplitude: 80.4 IRE ±0.6 IRE. Luminance riser amplitude: 1/5 of 5-step amplitude ±0.5%. Luminance rise time: 250 ns ±25 ns. Chrominance phase: same as burst ±0.2°. Chrominance amplitude: 40 IRE ±0.5 IRE (3.6 mV). Inherent differential phase: ≤0.3°. Inherent differential gain: ≤0.5%. Envelope rise time: 375 ns ±37.5 ns.
2T Pulse – Pulse to Bar ratio: 100% ±0.5%. HAD: 250 ns ±25 ns. Ringing amplitude: ≤0.5 IRE.
Modulated Sine Square Pulse – Pulse to Bar ratio: 100% ±0.5%. HAD: 1.563 μs ±150 ns. Chrominance/luminance delay: ≤10 ns. Chrominance/luminance gain inequality: ±0.5 IRE (±1%). Other perturbations on baseline: ≤0.5 IRE. Harmonic distortion of subcarrier: ≥40 dB down. Phase: 60.8° ±1°.
Bar – Amplitude: 100 IRE ±0.7 IRE. Rise time: 250 ns ±25 ns.

Modulated Pedestal Signal:
Pedestal – Amplitude: 50 IRE ±0.5 IRE. Rise time: 250 ns ±25 ns. Tilt: ≤0.5%.
Chrominance – Amplitudes: 20.01 IRE ±0.5 IRE; 40.02 IRE ±0.5 IRE; 80.04 IRE ±0.6 IRE.
Phase – Relative to burst: 90° ±0.5°. Relative to other two levels: 0° ±0.3°. Harmonic distortion: ≥40 dB down.
Rise Time – 400 ns ±40 ns.

Stair Case Signal:
Luminance – Amplitude: 100 IRE ±0.7 IRE. Riser: 1/5 of 5-step amplitude + 0.5%. Rise time: 250 ns ±25 ns.
Chrominance – No modulation.

BARS/Y Signal:
See Studio Test Set –Test Signal Characteristics

STUDIO TEST SET–TEST SIGNAL CHARACTERISTICS

Color Bars Signal:
Luminance and Chrominance – Absolute amplitudes of luminance signal, setup, and sync are within 1% or 1.5 mv, whichever is greater, with respect to blanking. Chrominance amplitudes are within 1% of their given value.
Luminance Rise Time – Full Field 250 ns ±25 ns. EIA 140 ns ±15 ns.
Chrominance Rise Time – 400 ns ±40 ns.
Bar Duration – Full Field 6.5 μs/bar (8 bars). EIA 7.5 μs/bar (7 bars).
Time Difference Between Luminance and Chrominance – ≥20 ns.
Residual Subcarrier – At least 52 dB below 1V.
Spurious Subcarrier – At least 52 dB below 1V.
Other Spurious Outputs – At least 52 dB below 1V except 40 dB for 2nd harmonic.
Field Timing: Full Field Color Bars – 241 lines per field
Bars/Y – Modulated bars first 181 active lines per field: unmodulated bars last 60 lines of the field.
EIA Bars – EIA Color Bars first 181 active lines per field: IWQB last 60 lines of the field.
SMPTE Bars – EIA Color Bars first 161 active lines per field; Reverse Blue Bars for 20 lines; and IWQB with Pluge for the last 60 lines of field.

Composite Signal:
See Transmitter Test Set –Test Signal Characteristics.
Multiburst Signal:
See Transmitter Test Set –Test Signal Characteristics.
Bars/Y Signal:
See Studio Test Set –Test Signal Characteristics – Color Bar Section.

NTC 7 TEST SET–TEST SIGNAL CHARACTERISTICS

Multipulse Signal:
White Reference Bar – 100 IRE ±0.7 IRE. Rise time: 250 ns ±25 ns.
Pulse to Bar Ratio – 100% ±1%
Pulse Half Amplitude Duration – 2T HAD: 250 ns ±20 ns. 25T HAD: 3.14 μs ±300 ns. 12.5T HAD: 1.57 μs ±150 ns.
Modulation Frequencies – 1st pulse, 1 MHz; 2nd pulse, 2 MHz; 3rd pulse, 3 MHz; 4th pulse, 3.58 MHz; 5th pulse, 4.2 MHz.
Group Delay – ≤10 ns.
Other Baseline Perturbation – ≤0.5 IRE.

Composite Signal:
Modulated 5-step Staircase – Luminance amplitude: 90.2 IRE ±0.7 IRE. Luminance riser: 1/5 of 5-step amplitude ±0.5%. Rise Time: 250 ns ±25 ns. Chrominance phase: Same as burst ±0.2°. Chrominance amplitude: 40 IRE ±0.5 IRE (3.6 mV). Inherent differential gain: ≤0.5%. Inherent differential phase: ≤0.3°. Envelope rise time: 400 ns ±40 ns.
2T Pulse – Pulse to Bar ratio: 100% ±0.5%. HAD: 250 ns ±25 ns. Ringing amplitude: ≤0.5 IRE.
Modulated Sine Square Pulse – Pulse to Bar ratio: 100% ±0.5%. HAD: 1.563 μs ±150 ns. Chrominance/Luminance delay: ≤10 ns. Chrominance/Luminance gain inequality: ±0.5 IRE (±1%). Other perturbation on baseline: ≤0.5 IRE.
Bar – Amplitude: 100 IRE ±0.7 IRE. Rise time: 125 ns ±15 ns.

Combination Signal:
Multiburst White Reference Bar – Amplitude: 100 IRE ±0.7 IRE. Rise time: 250 ns ±25 ns. Over shoot: ≤1%. Tilt: ≤0.5%.
Multiburst Packets – Amplitude: 50 IRE p-p ±0.5 IRE. Average level: 50 IRE ±0.5 IRE. Frequencies: 500 kHz, 1 MHz, 2 MHz, 3 MHz, 3.58 MHz, 4.2 MHz. Packets rise time: 500 kHz and 1 MHz, 140 ns ±10 ns; all others, 400 ns ±40 ns. Harmonic content: ≥40 dB down.
Modulated Pedestal Signal: Pedestal Amplitude: 50 IRE ±0.5 IRE. Rise time: 250 ns ±25 ns. Tilt: ≤0.5%.
Chrominance: Amplitude: 20.01 IRE ±0.5 IRE; 40.02 IRE ±0.5 IRE; 80.04 IRE ±0.6 IRE. Phase: relative to burst, 90° ±0.5°; relative to the other two levels 0° ±0.3°. Harmonic distortion: ≥40 dB down. Rise time: 400 ns ±40 ns.

SMPTE Bars Signal:
See Studio Test Set –Test Signal Characteristics.

EIA Bars Signal:
See Studio Test Set –Test Signal Characteristics.

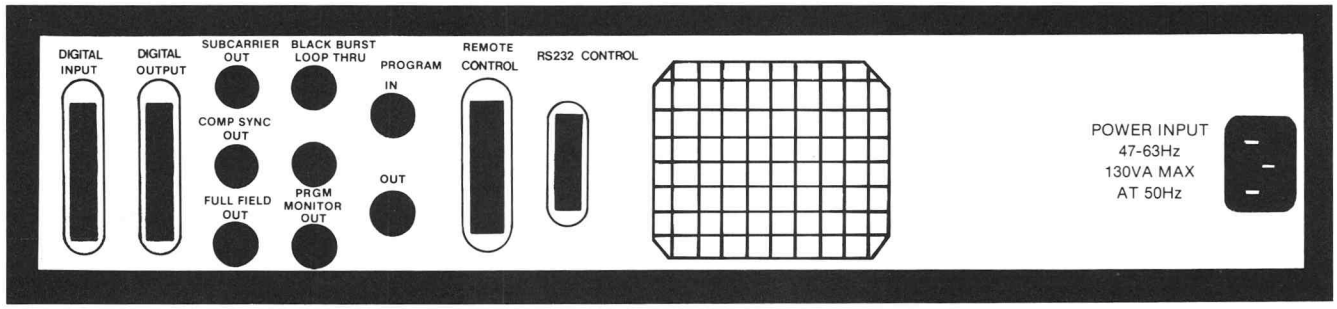
FULL FIELD OUTPUT CHARACTERISTICS

Amplitude – 1.2 V max. p-p into 75 Ω. Sync: 285.7 mV ± 2 mV. Peak level: 714.3 mV ± 5 mV.
Blanking Level – DAC DC Restorer disabled: 0 V ±50 mV. DAC DC Restorer enabled: 0 V ±2 mV.
Field Period – 16.68 ms.
Line Period – 63.56 μs.
Sync Rise and Fall Time – 140 ns ±15 ns.
Front Porch Duration – 1.5 μs, ±100 ns, at 50% amplitude point.
Line Blanking Interval – 10.9 μs ±100 ns at the 20 IRE point.
Breezeway – 0.6 μs, ±50 ns, at 50% of sync to 50% of burst ampliitude.
Back Porch Duration – 4.7 μs from the 50% point on the trailing edge of sync to the 20 IRE point on the trailing edge of blanking.
Line Sync – 4.7 μs, ±50 ns, at 50% amplitude point.
Vertical Serration – Duration: 4.7 μs, ±50 ns, at 50% amplitude point. Sequence: 3 lines. Period: 262.5 lines.
Equalizing Pulse – Duration: 2.33 μs, ±50 ns, at 50% amplitude point. Sequence: 3 lines.
Burst – Rise and fall time: 400 ns ±40 ns. Delay from line sync: 5.308 μs ±35 ns (19 cycles of subcarrier). HAD of envelope: 2.51 μs ±100 ns (9 cycles of subcarrier). Amplitude: 285.7 mV ±8.57 mV.
Residual Subcarrier – (Luminance and blanking) ≥52 dB below 1 V (2.5 mV).
Spurious Subcarrier on Outputs – ≥52 dB below 1 V (2.5 mV).
Chrominance Subcarrier Frequency – Free running: 3.579545 MHz ±10 Hz. Locked Mode: Locked to incoming burst or the leading edge of sync if burst is not present.
Output Impedance – 75Ω nominal.
Return Loss – ≥36 dB to 5 MHz.
Isolation (front and rear panel outputs) – ≥40 dB.

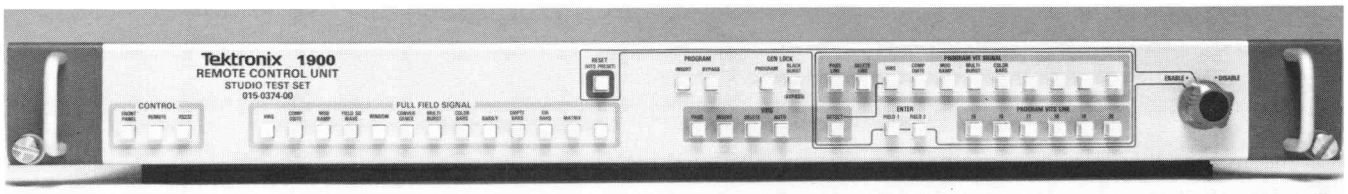
SYNC AND SUBCARRIER SIGNAL OUTPUT CHARACTERISTICS

Composite Sync:
Amplitude – 4 V, negative going, ±10% into 75Ω.
Return Loss – ≥30 dB to 3.58 MHz.
Rise and Fall Time – 140 ns ±20 ns, measured from 10% to 90% amplitude points.
Line Period – 63.556 μs.
Line Sync Duration – 4.7 μs ±50 ns.
Equalizer Pulse – Duration: 2.3 μs ±50 ns, measured at 50% amplitude. Sequence duration: 3 lines each.
Vertical Sync Pulse – Serration: 4.7 μs ±50 ns; measured at 50% amplitude point. Sequence duration; 3 lines
Field Period – 262.5 H lines, 16.6835 ms nominal.

Subcarrier:
Amplitude – 2 V p-p ±10% into 75Ω.
Return Loss – ≥30 dB to 5 MHz.
Frequency – Locked to incoming burst or to leading edge of incoming sync if burst is not present. If sync is not present, frequency is determined by the internal oscillator.



Rear Panel



Remote Control Unit

RS-232-C INTERFACE

Baud Rate – 300 bits/sec., Full Duplex Input and Output
Input – Serial Asynchronous Data
Output – Serial Asynchronous Data
Data Code – ASCII
Character Length – 9 bits per character including a start and one stop bit.
Parity – Input: No parity is required and if present it is ignored. Output: No parity is sent.

DIGITAL IN INTERFACE

Digital Format – Parallel, 12 balanced signal pairs consisting of 10 data bits per sample, a clock, and a timing reference signal.
Encoding Format – Positive Binary
Sampling Frequency – 4 times color subcarrier nominal (14.31818 MHz)
Sampling Phase Angle – Referenced to I and Q axis
Input Logic Levels – ECL compatible High: −1.10 to −0.81 V. Low: −1.85 to −1.475 V.
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)
Setup Time – Data needs to be valid at least 10 ns before the 50% point of the negative transition of the clock pulse.
Hold Time – Data needs to be valid for at least 10 ns after 50% point of the negative transition of the clock pulse.

DIGITAL OUTPUT INTERFACE

Digital Format – Parallel, 12 balanced signal pairs consisting of 10 data bits per sample, a clock, and a timing reference signal.
Encoding Format – Positive Binary
Sampling Frequency – 4 times color subcarrier nominal (14.31818 MHz)
Sampling Phase Angle – Referenced to I and Q axis
Logic Levels – ECL compatible. High: −0.96 to −0.81 V. Low: −1.85 to −1.65 V
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)
Clock Timing – The 50% point of the leading edge of the clock pulse preceeds the data by 5 ns ±5 ns.

POWER SUPPLY

Line Voltage Range – 100 Vac, 90 Vac to 110 Vac; 110 Vac, 99 Vac to 121 Vac; 120 Vac, 108 Vac to 132 Vac; 200 Vac, 180 Vac to 220 Vac; 220 Vac, 198 Vac to 242 Vac; 240 Vac, 216 Vac to 250 Vac.
Crest Factor – ≥1.35
Maximum Power Consumption – 130 W.
Line Frequency – 47 Hz to 63 Hz.

PHYSICAL CHARACTERISTICS

Rackmount Configuration – Length: 20.55 in (52.2 cm). Width: 18.98 in (48.2 cm). Height: 3.50 in (8.9 cm).
Cabinet Configuration – Length: 20.55 in (52.2 cm). Width: 17.48 in (44.4 cm). Height: 3.78 in (9.6 cm).
Net Weight – Rackmount: 27 lbs (12.2 kg). Cabinet: 25.5 lbs. (11.6 kg).
Shipping Weight – 37 lbs. (16.7 kg).

ENVIRONMENTAL CHARACTERISTICS

Temperature – Operating range: 0° to +50°C. Storage: −40°C to +65°C.
Altitude – Operating range: to 15,000 ft. Storage: to 50,000 ft.

Ordering Information

1900 Transmitter Test Set (cabinet model)
R1900 Transmitter Test Set (rackmount model)
Option 01 Studio Test Set
Option 02 NTC7 Test Set
Remote Control Unit **015-0374-00**
1900 to Remote Control Unit . . . **012-0108-00**
6′ Interconnecting Cable
1900 to Remote Control Unit . . . **012-0251-00**
22′ Interconnecting Cable
Diagnostic PROM for Instrument Service **067-0964-00**

Accessories

Standard Accessories for the rackmount R1900
1 Operators Manual
1 Service Manual
1 Power Cord, 3 wire **161-0066-00**
1 Slide Section pr., drawer: 12.625 inches long **351-0104-03**

Standard Accessories for the cabinet 1900
1 Operators Manual
1 Service Manual
1 Power Cord, 3 wire
1 Cabinet hardware

U.S.A.
Tektronix, Inc.
P.O. Box 1700
Beaverton, OR 97075
Phone: 800/547-1512
Oregon only 800/644-9051
503/644-0161
Telex: 910-467-8708
Cable: TEKTRONIX

Africa, Europe, Middle East
Tektronix International, Inc.
European Marketing Centre
Postbox 827
1180 AV Amstelveen
The Netherlands
Telex: 18312

Asia, Australia, Canada, Central & South America, Japan
Tektronix, Inc.
Americas/Pacific
P.O. Box 1700
Beaverton, OR 97075
Telex: 910-467-8708
Cable: TEKTRONIX

Tektronix®
COMMITTED TO EXCELLENCE

AX-4342 4/80