LIGHTNING TRANSIENT GENERATOR

Model 2654-1

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SOLAR ELECTRONICS COMPANY
Innovative EMI Solutions Since 1960 • A Division of A.T. Parker, Inc.
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Lightning Transient Generator

The Solar Model 2654-1 Lightning Generator synthesizes electrical impulses needed for testing susceptibility to transients induced in aircraft equipment by lightning strikes. The peak voltage and current requirements of RTCA/DO-160E, Section 22 are met at Levels 1 through 3. Using available accessory probes, pulses can be applied by pin injection, cable bundle injection, and ground injection.

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The transient format, repetition rate, and amplitude are selected using two controls on the front panel of the Solar Model 2654-1. The system can generate a single transient at the press of a button, or it can be programmed to generate multiple strokes or bursts of transients with uniform or pseudo-random spacing, as required by RTCA/DO-160E, Section 22. Waveforms can be delivered singly, in groups of 10 or as 3-minute or 5 minute sequences. Transient generator modules installed in the system mainframe are automatically recognized by the microprocessor controller, and transient format and repetition rate options are displayed on an LCD screen. Each DO-160, Section 22 transient is generated in a 2" x 5 ¼" x 9 ¾" module. Because of its modular design, the system may be ordered with only the modules a user requires. Other modules supporting additional DO-160 transients may be added at any time. Custom modules can be prepared on request.

Cable bundle injection probes are available for the Waveform 1, 2, 3, and 4 modules. These are manufactured by Solar Electronics and combine efficient materials and lab-tested mechanical design techniques to simplify test setup and operation.

Features

The Controller and Power Supply Module

Required in all systems, this module manages control functions and delivers low-voltage system power. Using a backplane similar to those found in computer designs, it determines which modules are present and allows the user to select waveforms and determine if they will be delivered as single strokes, multiple strokes, or, in the case of waveforms 3a and 3b, multiple bursts.

Waveform Timing

The rise and fill times of each waveform are determined by components in each generator module. The pulse-to-pulse timing of each waveform is tightly controlled by a microprocessor. This allows multiple-stroke and multiple-burst events to be delivered with either uniform or pseudo-random pulse spacing. The microprocessor also provides visual and aural cues for the operator about the status of the system.

The High Voltage Power Supply

The high voltage power supply is controlled by means of a knob on the front panel of this module. This continuously variable supply is capable of delivering over 1100 volts DC, and it can source in excess of 25 amperes of current for rapidly recharging capacitors between pulses.

The High Voltage Modulator

The output of the high voltage supply is also controlled by a "modulator" circuit which ensures that the first and succeeding pulses in multi-stroke sequences are delivered at the proper levels. The Modulator is controlled by the system microprocessor.

System Status Displays

Two LCD displays on the front panel of the controller module provide information about the operation of the system. The upper display of two 16-character lines shows the tiered menu system used to control the waveform generator. Turning the selector knob prompts the user with information about:

• Which waveform modules are present in the system;

• Whether a test will use single-stroke, multiple-stroke, or multiple-burst application;

• Whether a test will include 1 or 10 applications, or if it will apply waveforms at 3-second intervals for 5 or 10 minutes.

The lower, HV power display shows the voltage delivered to the waveform modules plugged into the system buss. This value is used during the calibration phase of a test to enable the operator to pre-set or vary waveform amplitudes during testing.

• LCD displays for transient selection and peak voltage.

• Visual and aural annunciators.

• Pulse rate selection options:

   • Single pulse

   • Multiple strokes (per RTCA/DO-160E, Section 22)

   • Multiple bursts (per RTCA/DO-160E, Section 22)

• Multiple-stroke and multiple-burst sequences precisely controlled by a microprocessor.

• Uniform or pseudo-random pulse spacing.

• Field-upgradeable microprocessor firmware.

• Continuously variable high voltage power supply (0-1000 volts).

Transient Source Modules

All modules feature:

• Internal, low ESR/ESL energy storage.
• Clean pulses produced by reliable high-voltage, high-current solid-state devices.
• LED indicators for Module-Selected and Pulse-Initiated conditions.

6.4/69 µS Double-Exponential Modules for Waveform 1 and 4

• Low impedance output compatible with pin, induction, and ground coupling devices.
• Single-stroke and multiple-stroke capability.

100 ns/6.4 µS Double-Exponential Module for Waveform 2

• Low impedance output compatible with pin, ground, and induction coupling devices.

• Single-stroke and multiple-stroke capability.

1 and 10 MHz Damped Sine Wave Modules for Waveforms 3a and 3b

• Low impedance output compatible with pin, ground, and induction coupling devices.

• Single-stroke, multiple-stroke, and multiple-burst capability.

40/120 µS Double-Exponential Module for Waveform 5A

• Low impedance output compatible with pin and ground injection coupling.

• Single-stroke and multiple-stroke capability.

Specifications

Solar Model 2654-1 Module	DO-160E Transient	Transient Format*	Pin Injection Level	Cable Bundle Injection Level
6.4/69 µs**	1	SS, MS	N/A	1 – 3
100 ns/6.4 µs	2	SS, MS	N/A	1 – 3
6.4/69 µs**	4	SS, MS	1-3	1 – 3
1 MHz Sine	3A	SS, MS, MB	1-3	1 – 3
10 MHz Sine	3B	SS, MS, MB	1-3	1 – 3
40/120 µs	5A	SS, MS	1-3	n/a

* SS = Single Stroke, MS = Multiple Stroke, MB = Multiple Burst.

** RTCA/DO-160E, Section 22 transients 1 and 4 are generated using the same module. The remaining transients are produced by separate modules.

115 Volt AC and 230 Volt AC, 47-63 Hz versions are available

Injection Probes for RTCADO-160E

Type 9616-1	6µS/69µS
Type 9144-1N	1 MHz
Type 9142-1N	10 MHz
Type 9335-2	1 MHz, 10 MHz

Additional Spike Generators

Model 9354-1 Transient Pulse Generator

Designed to meet the requirements of MIL-STD-461E test method CS116. Also capable of limited testing for RTCA DO-160E section 22 (Single Stroke to level 4) when used with the appropriate coupling device.

Generator provides six fixed frequency damped sinusoidal waveforms as specified in MIL-STD-461E pulse three double exponential waveforms for RTCA DO-160E. Variable sweeping through the frequency range 10 KHz to 100 MHz can be provided with the addition of five optional Variable Frequency Modules:

Type 9554-10K/100K	10 KHz to 100 KHz
Type 9554-100K/1M	100 KHz to 1 MHz
Type 9554-1M/6M	1 MHz to 6 MHz
Type 9554-6M/50M	6 MHz to 50 MHz
Type 9554-50M/100M	50 MHz to 100 MHz

Step Frequency Module Type 2154-500K/50K provides the nine frequencies available for DEF STD 59-41 testing.

Model 9355-1 Pulse Generator

Generator provides 35 nanosecond pulse required for test method CS115 of MIL-STD-461E.

Model 7054-1 Spike Generator

Provides a 600 volt, greater than 10 µS pulse for section 17 of RTCA DO-160E when used in conjunction with Type 2201-1 Impedance Matching Pulse Transformer.

Model 8282-1 Transient Pulse Generator

Transient generator for Test Method CS06 of MIL-STD-461C.

Model 7399-2 Spike Generator

Generator for the requirements of MIL-STD-1399 with appendices A, B, C and D.

High Power Audio Amplifiers

Model 8850-1 and 8850-2 High Power Sweep Generators

Combination Audio Frequency Generator and Power Amplifier for performing test method CS101 of MIL-STD-461D and E.

Model 2352-1 Audio Power Amplifier

200 Watt standalone Audio Power Amplifier for MIL-STD-461E Test Method CS101.

For complete technical product information, please visit **www.solar-emc.com**