



# **INSTRUCTION MANUAL**

**AUTOMOTIVE TRANSIENT  
SURGE SIMULATOR**

**MODEL JSS-003**

**NOISE LABORATORY CO., LTD.**

The 4.05 edition  
AEJ00006-00E-3F

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## **1. IMPORTANT SAFETY PRECAUTIONS**

Thoroughly understand the following precautions before use, as they are important matters for handling this unit in safety.

- 1. This unit cannot be used in an explosive area, fire prohibited area, etc. Use of this unit in such an area is liable to cause combustion or ignition.**
- 2. A person who has a pacemaker on should not operate this unit and also should not enter the area where it is operating.**
- 3. When connecting this unit to accessories for test waveforms and test conditions, optional equipment and other equipment, turn off the high voltage circuit by pressing HIGH VOLTAGE CIRCUIT OFF SWITCH beforehand. Otherwise, you may receive an electric shock.**
- 4. Be careful of generated surge and an electric shock which may occur in the power supply to EUT. 【Precautions for human body and operation】**
- 5. As high voltage is generated inside the unit, do not open the cover of this unit. If touching the inside of the unit, you may receive an electric shock due to high voltage. 【Precautions for human body】**
- 6. A number of safety recommendations are listed in "Basic safety precautions for this simulator" mentioned later. Be sure to read them before setting a test environment, connection and starting a test.**



## 2. APPLICATION FORM FOR INSTRUCTION MANUAL

We place an order for an instruction manual.

**Model:** JSS-003

**Serial No.:** \_\_\_\_\_

**Applicant:**

Company name: \_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_

Department: \_\_\_\_\_

Person in charge: \_\_\_\_\_

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**Cut off this page "APPLICATION FORM FOR INSTRUCTION MANUAL" from this volume and keep it for future use with care.**

When an INSTRUCTION MANUAL is required, fill in the above Application Form and mail or fax it to the following sales department of our company.

**To: Noise Laboratory Co., Ltd.**

**1-4-4, Chiyoda, Chuo-ku, Sagamihara City**

**Kanagawa Pref. ,**

**252-0237 Japan**

**Tel: +81-(0)42-712-2051 Fax: +81-(0)42-712-2050**

Cut  
line



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## 4. PREFACE

### 4-1. Preface

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We thank you for your purchase of Automotive Transient Surge Simulator Model: JSS-003. This manual contains how to use the JSS-003 and other important information.

In order to obtain the highest performance from your JSS-003, thoroughly understand the contents of this manual and use as ready reference for operation.

- **This Instruction Manual will help operators handle and utilize the Automotive Transient Surge Simulator Model: JSS-003 in safety.**
- **Keep this Instruction Manual in a place where it is readily available.**
- **The JSS-003 is designed to test the immunity of electronic equipment for automobiles against the transient voltage surge on the basis of the General Provisions of the Environmental Test JASO D 001-94 enacted by the Automobile Technology Association.**
- **The resistance capacity of electronic equipment against transient voltage surge, which may be generated in power circuits and cause malfunctions, can be easily checked with JSS-003.**

### 4-2 Functions

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1. Classes A, B, D, and E transient voltage tests specified in "JASO D 001-94" can be performed.
2. Surge output voltage is digitally displayed on a 3-digit voltmeter.
3. The required number of surge generation can be set by a 6-digit preset counter and a buzzer alarming the completion of the test is signaled when the counting is up.
4. Surge waveforms can be selected by one touch of the pushbutton switch.
5. Surge voltage is infinitely variable set by the adjust knob.



## 5. BASIC SAFETY PRECAUTIONS FOR THIS SIMULATOR

### 5-1. Symbols of hazard

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**It expresses a WARNING.**

WARNING indicates a potentially hazardous situation which, if not avoided,

could result in **death or serious injury**.



**It expresses a CAUTION.**

CAUTION indicates a potentially hazardous situation which, if not avoided, may result

in **minor or moderate injury**.

### 5-2. Basic safety precautions

---



1. This unit cannot be used in an explosive area, fire prohibited area, etc. Use of this unit in such an area is liable to cause combustion or ignition. 【Precautions for human body and environments】
2. A person who has a pacemaker on should not operate this unit and also should not enter the area where it is operating. If you fail to follow this precaution, the electronic medical instrument may malfunction, causing a danger to the human body. 【Precautions for human body and operation】
3. When connecting this unit to supplied accessories, optional accessories or other equipment for test waveforms and test conditions, press HIGH VOLTAGE CIRCUIT OFF SWITCH to turn off the high voltage circuit. Otherwise, you may receive an electric shock. 【Precautions for connection】
4. Be careful of generated surge and an electric shock which may occur in the power supply to EUT. 【Precautions for human body and operation】
5. As high voltage is generated inside the unit, do not open the cover of this unit. If touching the inside of the unit, you may receive an electric shock due to high voltage. 【Precautions for human body】

6. **Our company and sales agents shall have no responsibility for any accident resulting in injury or death, any breakage or resultant damages due to irresponsible handling. 【Precautions for human body, operation, environments and connection】**
7. **When lowering the voltage setting of this unit with VOLT ADJ control, discharge extra energy, otherwise causing a danger. (High voltage remaining in the condenser in this unit will not lower even if VOLT ADJ control is operated, unless high voltage is discharged.) To discharge extra energy, turn off the high voltage circuit (by pressing HIGH VOLT OFF switch) or press START switch and then discharge until the meter indicates the desired voltage setting. If this operation is omitted, the operator may receive an electric shock. 【Precautions for human body and operation】**
8. **Never fail to watch equipment while this unit is operating. When leaving this unit, check that the voltmeter indicates “0V” and the high voltage circuit of this unit is turned off by pressing HIGH VOLTAGE CIRCUIT OFF SWITCH beforehand. Otherwise, a third person or equipment related to the test may be exposed to a danger. 【Precautions for human body, operation and environments】**
9. **Do not connect a cable etc. to any terminal unnecessary for setting a test. Do not mistake cable setting or connection. Otherwise, you may receive an electric shock or the internal unit of this unit and equipment connected to it may be damaged. 【Precautions for human body, operation and connection】**
10. **When conducting a DC line injection test, turn off power supply to EUT and DC ON switch (breaker) of this unit before connecting EUT or DC input cable to this unit. Otherwise, the operator may receive an electric shock by power supply to EUT. 【Precautions for human body and connection】**
11. **Connect each connector and cable securely. Otherwise, you may receive an electric shock or the internal unit of this simulator and equipment connected to it may be damaged. 【Precautions for human body and connection】**
12. **To ensure safety operations, use the standard and optional accessories supplied by NOISEKEN.**
13. **When this unit is not used, remove the supplied switch key and keep in a safe place**

## CAUTION 注意

14. For the DC power supply, keep the maximum rating (refer to 9.Specifications.) Otherwise, the internal mechanism of this unit may be damaged. 【Precautions for operation】
15. Do not connect a DC input cable to SURGE OUT terminal directly, otherwise resulting in a damage to the inside of DC power supply and this simulator. 【Precautions for connection】
16. Adjust the 50/60Hz-selector switch to the frequency of commercial power supply before using this unit. Continuous use by mistake will result in a trouble or burn of the power supply. 【Precautions for connection】
17. SURGE G terminal on the front panel of this unit is the grounding terminal for surge test. G terminal on the rear side is the grounding terminal of control system of this unit. Using G terminal on the front side and either of G terminal or DC G terminal on the rear side in common will cause a malfunction. Be sure to use them separately. 【Precautions for connection】
18. When testing EUT using this simulator, extensive electromagnetic waves are emitted depending on the type of EUT, adversely affecting electronic equipment and radiotelegraphy located near this simulator. User is required to eliminate such a harmful influence using shield room, shielding cable or other proper means. 【Precautions for environments】
19. Avoid using or storing the unit in high or low temperature environment. (Operating temperature range: 15~35°C/Operating humidity range: 25~75%)
20. When connecting an accessory, optional unit or other equipment and setting it for operating this unit, turn off the operating power supply to this unit beforehand. Otherwise, this unit or optional unit may be damaged. 【Precautions for connection】
21. If dewing or condensation occurs, thoroughly dry it before operating the unit. 【Precautions for environments】
22. Do not use this unit in a humid place or a dusty place. 【Precautions for environments】
23. Do not give a strong shock to this unit. 【Precautions for environments】
24. When installing this unit, do not block the ventilating opening. 【Precautions for environments】

## CAUTION 注意

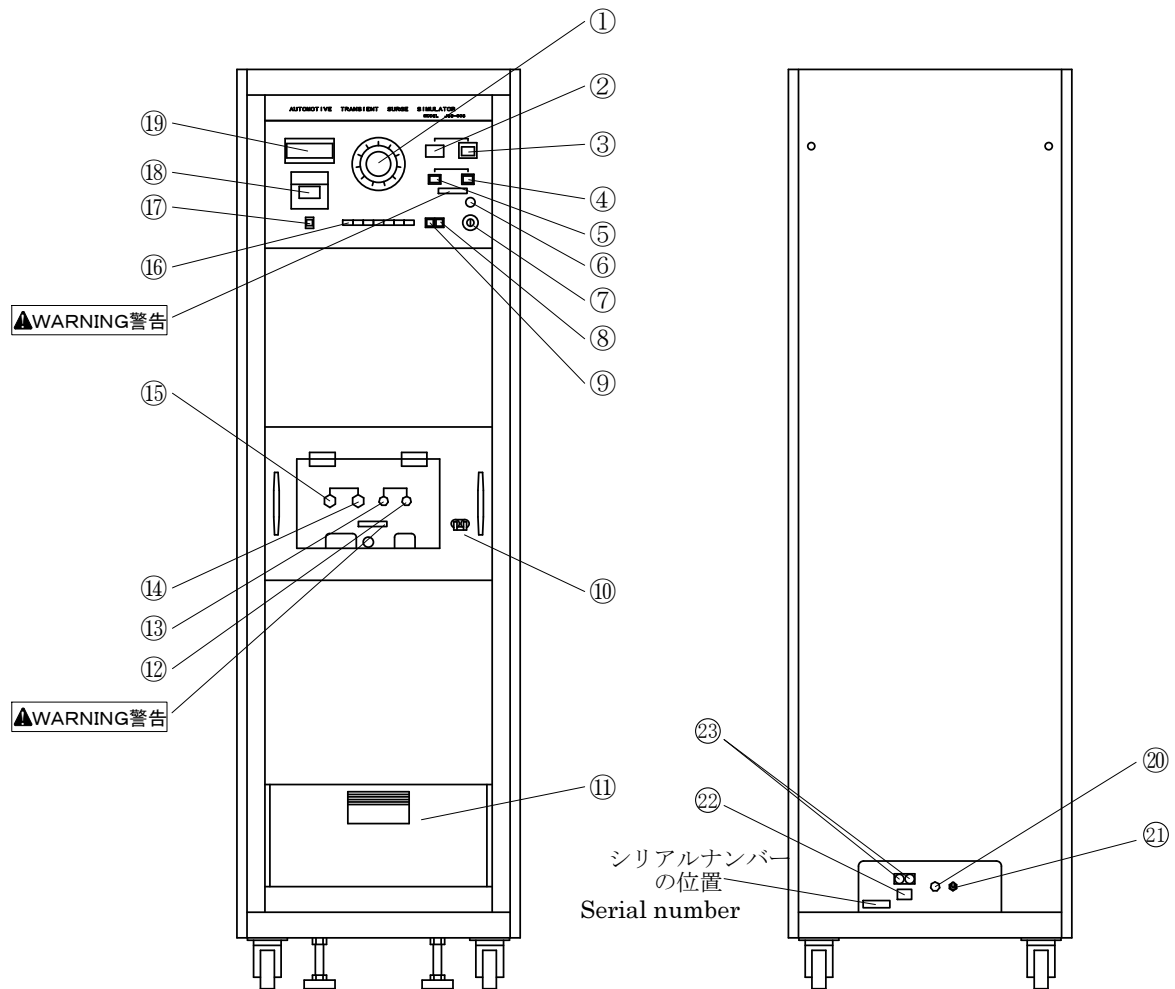
25. A caution label for power supply voltage is stuck above the AC input terminal on the rear panel of this unit. Use the unit within the range of  $\pm 10\%$  of power supply voltage. Avoid applying voltage exceeding this range. If these precautions are not followed, this unit may be broken. 【Precautions for connection】
26. Repair, maintenance and internal adjustment of this unit should be performed by a qualified service engineer. If these precautions are not followed, the prescribed performance may not be warranted.
27. Do not wipe this unit with thinner, alcohol or similar solvent. When the body is dirty, soak a cloth in detergent, squeeze the cloth and wipe the body with it.
28. Specifications of this unit and manual may be subject to change for further improvement.
29. No part of this manual can be reproduced and duplicated without permission.

### **5-3. Necessary Steps to be Taken when Caution or Warning Label is Missing**

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1. When the caution or warning label is peeled off, missing or dirty, attach a new one for securing safety.
2. When the caution or warning label is missing, ask the sales department or maintenance section of our company to send a new label.

## 6. NAME AND FUNCTION OF EACH PART



- |                            |                                 |
|----------------------------|---------------------------------|
| ① VOLTAGE ADJUST KNOB      | ⑬ DC IN TERMINAL                |
| ② HIGH VOLTAGE OFF SWITCH  | ⑭ SURGE G TERMINAL              |
| ③ HIGH VOLTAGE ON SWITCH   | ⑮ SURGE OUT TERMINAL            |
| ④ SURGE OUT START SWITCH   | ⑯ SURGE SELECT SWITCH           |
| ⑤ SURGE OUT STOP SWITCH    | ⑰ COUNTER RESET SWITCH          |
| ⑥ POWER LAMP               | ⑱ SURGE APPLICATION SET COUNTER |
| ⑦ POWER SWITCH             | ⑲ DIGITAL VOLTMETER             |
| ⑧ END BUZZER ON/OFF SWITCH | ⑳ FG TERMINAL                   |
| ⑨ END BUZZER STOP SWITCH   | ㉑ 50/60HZ SELECT SWITCH         |
| ⑩ DC BREAKER               | ㉒ POWER INPUT CONNECTOR         |
| ⑪ ACCESSORY BOX            | ㉓ FUSE                          |
| ⑫ DC G TERMINAL            |                                 |

**① VOLTAGE ADJUST KNOB (VOLT ADJ.)**

Switch to set to the peak value of the surge voltage. The set value is displayed on DIGITAL VOLTMETER⑱.

**② HIGH VOLTAGE OFF SWITCH**

When this switch is pressed, the lamp of HIGH VOLTAGE ON SWITCH③ goes out and the surge generation circuit is stopped.

**③ HIGH VOLTAGE ON SWITCH**

When this switch is pressed, the surge generation circuit stands by and the lamp inside the switch lights up. When pressing this switch, however, never fail to turn the VOLTAGE ADJUST KNOB① fully counterclockwise (to 0V) and close the acrylic door of the front panel. Otherwise, the safety device is actuated and this HIGH VOLTAGE ON SWITCH③ cannot be turned on.

**④ SURGE OUT START SWITCH**

When this switch is pressed with **HIGH VOLTAGE ON SWITCH ③** turned on, the lamp inside the switch lights up and the surge application is started. When the surge generation preset by the surge application set counter is reached, the surge application is stopped and the end buzzer sounds. Then, the lamp inside the switch goes out.

**⑤ SURGE OUT STOP SWITCH**

Press this switch when you stop the surge application.

**⑥ POWER LAMP**

lights up when POWER SWITCH⑦ is turned on.

**⑦ POWER SWITCH**

Power switch to drive the main unit. Turn it on and off using the supplied key switch. When this switch is turned on, POWER LAMP⑥ is lit.

**⑧ END BUZZER ON/OFF SWITCH**

Switch to actuate the buzzer at the end of a test. When this switch is turned on, the lamp inside the switch lights up and a buzzer sound is produced at the end of test until the END BUZZER STOP SWITCH⑨ is pressed.

**⑨ END BUZZER STOP SWITCH**

When the END BUZZER ON/OFF SWITCH⑧ is turned on, buzzer sound is produced when the number of times of surge application preset by the counter have been done. This buzzer continues until the END BUZZER STOP SWITCH⑨ is pressed. The lamp inside this lights up while the buzzer sound is produced.

**⑩ DC BREAKER**

Breaker to protect the equipment being tested from short-circuiting on the load side.

**⑪ ACCESSORY BOX**

A drawer which accommodates accessories.

**⑫ DC G TERMINAL**

The minus (ground) side output terminal of the power supply to the equipment being tested is connected to this terminal.

**⑬ DC IN TERMINAL**

The plus (hot) side output terminal of the power supply to the equipment being tested is connected to this terminal.

**⑭ SURGE G TERMINAL**

A signal ground terminal of the simulator. Connect the minus (ground) side power input terminal of the equipment being tested to this terminal.

**⑮ SURGE OUT TERMINAL**

The plus (hot) side power input terminal of the equipment being tested is connected to this terminal. Surge voltage is outputted from this terminal. When DC BREAKER<sup>⑩</sup> is turned off, no power is supplied to the equipment being tested.

**⑯ SURGE SELECT SWITCHES**

Push-button switches to select each waveform specified in JASO Standard. The waveform name specified in the standard is engraved on the key top.

**⑰ COUNTER RESET SWITCH**

Switch to reset the SURGE APPLICATION SET COUNTER<sup>⑱</sup> at 0.

**⑱ SURGE APPLICATION SET COUNTER**

The number of times of surge application can be set using this 6-digit preset counter.

**⑲ DIGITAL VOLTMETER (SURGE OUT VOLT)**

Voltmeter to display the peak value of surge voltage.

**⑳ FG TERMINAL**

A frame ground terminal of the simulator.

**㉑ 50/60HZ SELECT SWITCH**

Set this switch to 50Hz or 60Hz position according to the frequency of a commercial power supply to the simulator.

**㉒ POWER INPUT CONNECTOR**

Input connector of the power supply for driving the simulator. Connect it to a supply with the supplied power cable.

**㉓ FUSE**

Fuses used for the power supply for driving the simulator.

## 7. HOW TO CONNECT EQUIPMENT



Thoroughly read Par. 5 “Fundamental Safety Precautions for Safety Performance” before doing connection and starting a test.

### 7-1 Preparation

---

- 1) Install the simulator on a level floor and put a stopper under the caster.



**When installing this unit, do not block the ventilating opening. 【Precautions for environments】**

- 2) A radiation fan is provided on the top of the simulator. Check that nothing is blocking the fan.



**Adjust the 50/60HZ SELECT SWITCH ② to the frequency of commercial power supply before using this unit. Continuous use by mistake will result in a trouble or burn of the power supply. 【Precautions for connection】 .**

- 3) Set the 50/60Hz select switch ② to the position matching the frequency of the commercial power supply.

### 7-2 Connection to the equipment being tested

---

Connect the equipment being tested to the simulator by referring to the figure in page. 16. In this case, however, use a cable with sufficient resistance to voltage and current.



**When performing DC line injection test ,turn off the power supply for the EUT and DC ON SWITCH (breaker) before connecting this unit to the EUT and DC input cable. Otherwise, you will receive an electric shock by power supply for EUT. 【Precautions for human body and connection】**



**Connect each connector and cable securely. Otherwise, you may receive an electric shock or the internal unit of this simulator and equipment connected to it may be damaged. 【Precautions for human body and connection】**



- 1) Connect the plus side power input terminal of the equipment being tested to the SURGE OUT TERMINAL ⑮ of the simulator.
- 2) Connect the minus side power input terminal of the equipment being tested to the SURGE G TERMINAL⑭ of the simulator.
- 3) Pass the cable through the hole provided on the acrylic door on the front panel and tightly close the door. If the acrylic door is left open, the safety device will actuate to make the HIGH VOLTAGE ON SWITCH③ inoperative.

### 7-3 Connection with the power supply for driving the equipment being tested

Connect the power supply for driving the equipment being tested to the simulator in the following manner by referring to the figure in page 16. In this case, however, use a cable with sufficient resistance to voltage and current. Use of a thin, long cable may produce a disordered surge waveforms. So, a thick and short cable (2mm<sup>2</sup> and over) is preferable.



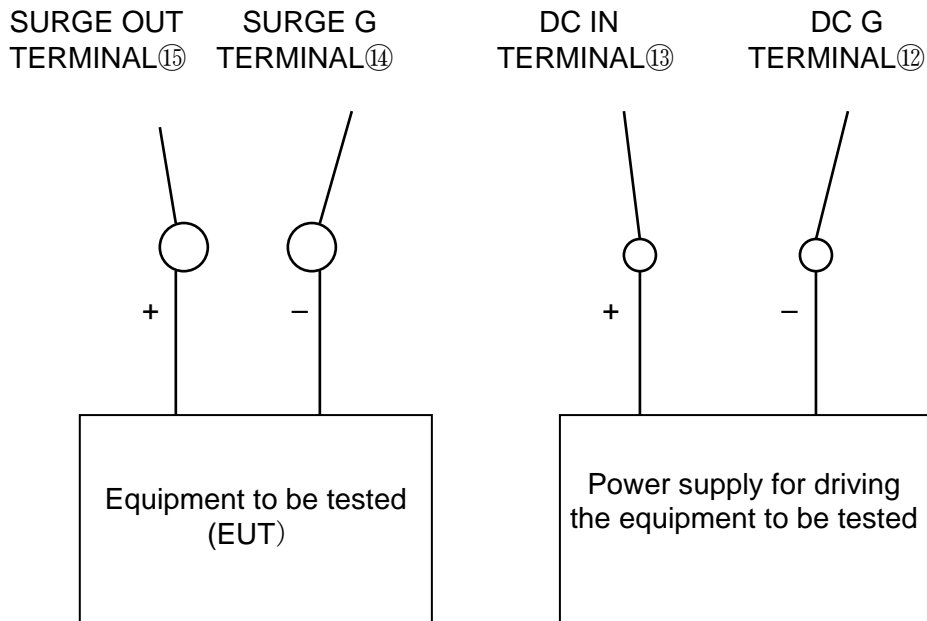
**When performing DC line injection test ,turn off the power supply for the EUT and DC ON SWITCH (breaker) before connecting this unit to the EUT and DC input cable. Otherwise, you will receive an electric shock by power supply for EUT.**  
 【Precautions for human body and connection】

- 1) Turn off the DC BREAKER⑩.



**Connect each connector and cable securely. Otherwise, you may receive an electric shock or the internal unit of this simulator and equipment connected to it may be damaged.** 【Precautions for human body and connection】

- 2) Connect the plus side of the power supply for driving the equipment being tested to the DC IN terminal⑬ of the simulator.
- 3) Connect the minus (ground) side of the same power supply to DC G terminal⑫ of the simulator.
- 4) Pass the cable through the hole provided on the acrylic door on the front panel and tightly close the acrylic door.



#### 7-4 Connection with a power supply for driving the simulator

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- 1) Be sure that the POWER SWITCH (7) is turned off.
- 2) Connect the supplied power cable to POWER INPUT CONNECTOR (22) on the rear panel.



**Connect each connector and cable securely. Otherwise, you may receive an electric shock or the internal unit of this simulator and equipment connected to it may be damaged. 【Precautions for human body and connection】**

- 3) Connect the plug of the power cable to the plug receptacle of a power supply.

## 8. OPERATION



Thoroughly read Par. 5 “Basic Safety Precautions for This Simulator” before doing connection and starting a test.

### 8-1. Power ON

---

- 1) Insert the supplied switch key into the POWER SWITCH⑦ and turn the switch key clockwise by 90°. Thus, the power is supplied to the simulator and the POWER LAMP⑥ lights up.
- 2) When the DC BREAKER⑩ is turned on, the power is supplied to the equipment being tested.

### 8-2. Selection of the surge waveform

---

- 1) The name of the surge waveform specified in JASO Standard is engraved on the top of the respective keys of the SURGE WAVEFORM SELECT SWITCHES⑯. The surge waveform is selected by pressing any of the SURGE WAVEFORM SELECT SWITCHES⑯. When the power is turned on, the surge waveform mode is initialized to Class A-1 waveform.

### 8-3. Buzzer setting

---

An end buzzer and a surge out buzzer are built into the simulator.

- 1) The surge out buzzer actuates at an interval of 30 seconds during surge application.



**When the SURGE OUT BUZZER actuates, surge is output from SURGE TERMINAL⑮. Be careful with electric shock.**

- 2) The end buzzer actuates when SURGE APPLICATION SET COUNTER ⑩ stops counting and surge application is completed. The buzzer sound continues until END BUZZER STOP SWITCH⑨ is pressed. While the buzzer sound is produced, the lamp provided inside this switch lights up. The end buzzer can be set with END BUZZER ON/OFF SWITCH⑧. When this switch is set to the ON position, the lamp provided inside the switch lights up and a buzzer sound is produced at the end of the test.

## 8-4. Surge voltage setting

- 1) Make sure that the acrylic door on the front panel is closed. Then, turn the VOLTAGE ADJUST KNOB① fully counterclockwise (0V).
- 2) Turn on the HIGH VOLTAGE ON SWITCH③. In this case, if the lamp inside HIGH VOLTAGE ON SWITCH ③ lights up, the surge generation circuit is on stand-by. On the other hand, if it does not light up, check Step 1) again. When the acrylic door is not closed, the safety device actuates to make HIGH VOLTAGE ON SWITCH ③ inoperative.

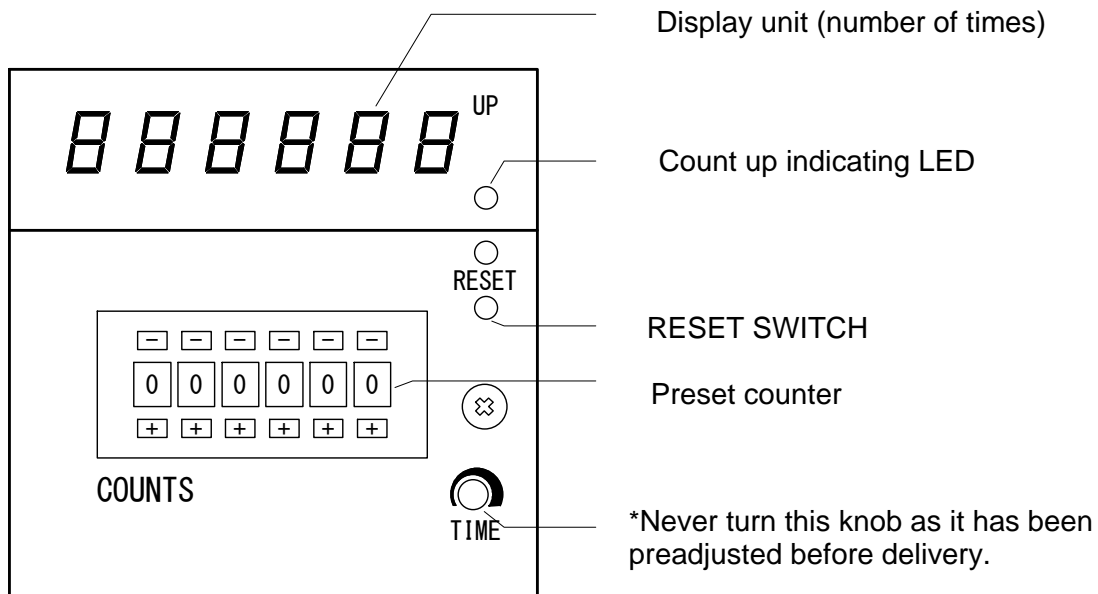
**⚠ WARNING 警告**

**Never fail to watch equipment while this unit is operating. When leaving this unit, check that the voltmeter indicates “0V” and the high voltage circuit of this unit is turned off by pressing HIGH VOLTAGE CIRCUIT OFF SWITCH beforehand. Otherwise, a third person or equipment related to the test may be exposed to a danger. 【Precautions for human body, operation and environments】**

- 3) Next, set the peak value of the surge voltage in the no-load state by turning the VOLTAGE ADJUST KNOB① while observing DIGITAL VOLTMETER⑨. The JSS-003 employs an inverted L type circuit specified in JASO Standard D 001-94 as a transient voltage generative circuit. Therefore, the set voltage (charge voltage to the condenser) specified in JASO Standard is equal to the peak value of the surge voltage (transient voltage) in the no-load state. The maximum transient voltage  $V_p$  specified in JASO Standard and the maximum set voltage of the JSS-003 are as shown in Table 1 below :

Class of test	Set Voltage (V)	Maximum set voltage $V_p$ (V) of JSS-003
Class A-1	70	100 $\pm$ 10%
Class A-2	110	150 $\pm$ 10%
Class B-1	-80	-100 $\pm$ 10%
Class B-2	-260	-320 $\pm$ 10%
Class D-1	110	150 $\pm$ 10%
Class D-2	170	200 $\pm$ 10%
Class E	-320	-400 $\pm$ 10%

## 8-5. How to set the counter



Set the number of times of surge application previously with the SURGE APPLICATION SET COUNTER<sup>⑱</sup> shown in the above figure. The generation of surge will stop after the preset number of times of surge application is accomplished.

The number of times can be set within the range of 1 to 999999, by pressing the upper (-) and lower (+) buttons on the preset counter.

The display unit displays the number of times of the actual generated surge.

To clear the displayed number, press RESET SWITCH or COUNTER RESET SWITCH<sup>⑰</sup> provided on the lower part of the counter. When the SURGE APPLICATION SET COUNTER<sup>⑱</sup> reaches the preset number of times, Count up indication LED lights up and no surge generation is started even if the SURGE OUT START SWITCH<sup>④</sup> is pressed. In such a case, reset the counter and then, press SURGE OUT START SWITCH<sup>④</sup>.

## 8-6. Execution of test

---

After completion of the above-mentioned settings, start the test.



**Be careful of generated surge and an electric shock which may occur in the power supply to EUT.** 【Precautions for human body and operation】

- 1) Be sure that the DC BREAKER<sup>⑩</sup> is turned on and the equipment to be tested is powered on.
- 2) Press SURGE OUT START SWITCH<sup>④</sup> and surge generation is started.
- 3) The surge is impressed at an interval of 30 seconds. When the surge is generated, a buzzer sound is produced.
- 4) Observe the operation of the equipment being tested. If the equipment malfunctions, press HIGH VOLTAGE OFF SWITCH<sup>②</sup> to turn off the high voltage and turn off DC BREAKER<sup>⑩</sup>. And take a proper countermeasure.

## 8-7. Completion of test

---

- 1) When the number of times of surge generation preset by SURGE APPLICATION SET COUNTER<sup>⑮</sup> is reached, the simulator stops generating surge.
- 2) At this time, if END BUZZER ON/OFF SWITCH<sup>⑧</sup> is set to the ON position in Step 8-3, a buzzer sounds announcing the completion of the test. While the buzzer is sounding, the lamp provided inside END BUZZER STOP SWITCH<sup>⑨</sup> lights up and the buzzer sounds continuously until Switch <sup>⑬</sup> is pressed.
- 3) When you want to stop surge application before the preset number of times is not reached, press the END BUZZER STOP SWITCH<sup>⑨</sup>.
- 4) After completion of test, turn the VOLTAGE ADJUST KNOB <sup>①</sup> fully counterclockwise (0V). Then, press the HIGH VOLTAGE OFF SWITCH<sup>②</sup>, turn off DC BREAKER<sup>⑩</sup> and POWER SWITCH<sup>⑦</sup>.

## 9. SPECIFICATIONS

### 9-1. Surge generating unit

The waveform and constant of each class of surge conforms to JASO D001-94.

	Surge output voltage (Vp)	Attenuation constant( $\tau$ )	Parallel resistor	Output impedance	DC cut time (ts)
Class A-1	100V $\pm$ 10% maximum Infinitely variable	200ms $\pm$ 10%	2 $\Omega$ $\pm$ 10%	0.8 $\Omega$ $\pm$ 10%	/
Class A-2	150V $\pm$ 10% maximum Infinitely variable	2.5 $\mu$ s $\pm$ 10%	0.6 $\Omega$ $\pm$ 10%	0.4 $\Omega$ $\pm$ 10%	/
Class B-1	-100V $\pm$ 10% maximum Infinitely variable	60ms $\pm$ 10%	20 $\Omega$ $\pm$ 10%	8 $\Omega$ $\pm$ 10%	300ms $\pm$ 10%
Class B-2	-320V $\pm$ 10% maximum Infinitely variable	2ms $\pm$ 10%	60 $\Omega$ $\pm$ 10%	80 $\Omega$ $\pm$ 10%	10ms $\pm$ 10%
Class D-1	150V $\pm$ 10% maximum Infinitely variable	400ms $\pm$ 10%	5.5 $\Omega$ $\pm$ 10%	1.5 $\Omega$ $\pm$ 10%	/
Class D-2	200V $\pm$ 10% maximum Infinitely variable	2.5 $\mu$ s $\pm$ 10%	1.2 $\Omega$ $\pm$ 10%	0.9 $\Omega$ $\pm$ 10%	/
Class E	-400V $\pm$ 10% maximum Infinitely variable	26ms $\pm$ 10%	13 $\Omega$ $\pm$ 10%	210 $\Omega$ $\pm$ 10%	120ms $\pm$ 10%



Waveform measurements shall be done at the SURGE OUT terminal with no load connection and with no input to the DC IN terminal by using a scope and probe with 10M ohm or higher input impedance.

## 9. Specifications

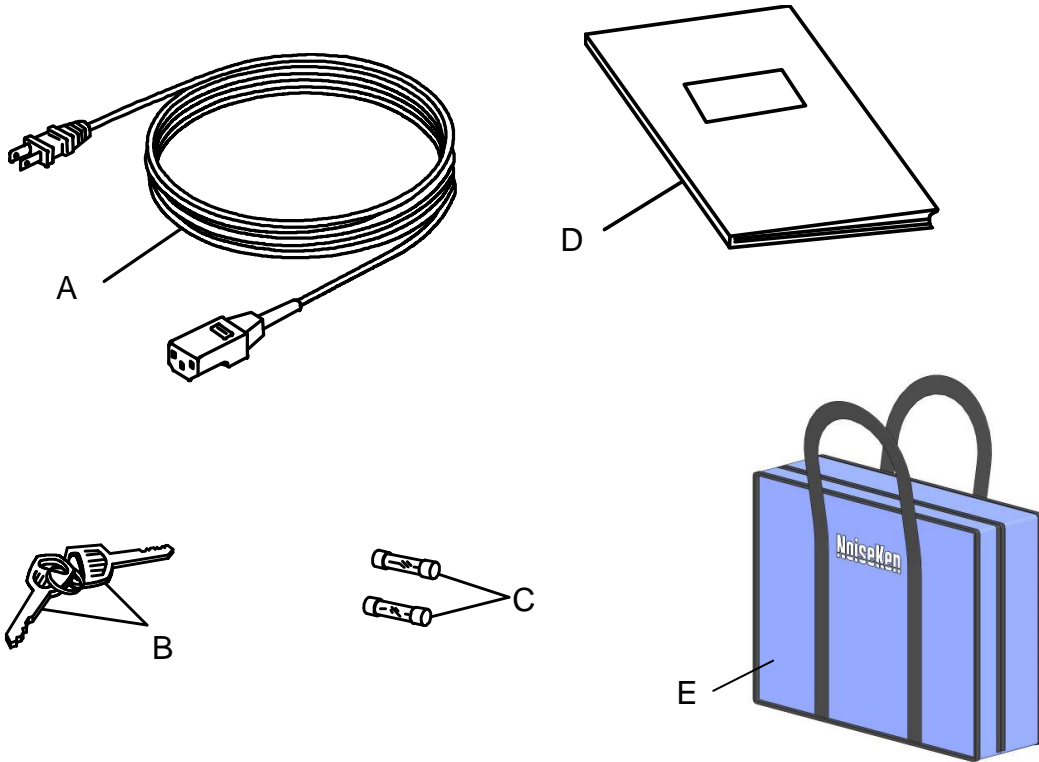
### 9-2. Main control unit

Item	Specifications
Repetition cycle of surge generation	30s $\pm$ 10%
Surge output voltage display	3-digit 7-segment
Repetition frequency of surge generation	1 ~ 999999 ( Can be set by 6-digit preset counter)
Surge output channel	1 channel
Power capacity of equipment being tested	50V DC 10A maximum (As an anti-reverse current diode is built in, a slight voltage drop will occur.)
Power input	$\pm$ 10% of the voltage indicated on a label above the AC input terminal on the rear panel of the unit, 50/60Hz
External dimensions	555(W) x 790(D) x 1800(H) mm
Weight	Approx. 200kg
Operating temperature range	15~35°C
Operating humidity range	25~75%

- As no power supply for equipment being tested is built in, use an external power supply.
- Select surge waveform using the seven serial push-button switches.
- When the counter completes counting, a buzzer is sounded and the high voltage is turned off.



## 10. STANDARD ACCESSORIES



A : Power cable

B : Switch key

C : Fuse(10A)

D : Instruction manual

E : Accessory bag

Quantity

1

2

2

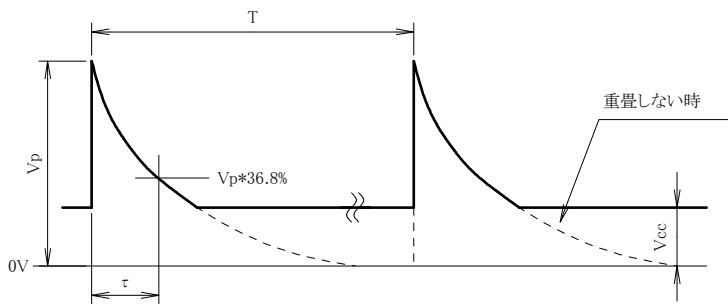
1

1

# 11. WAVEFORM CHECK/OBSERVATION

Each surge waveform can be observed by connecting an oscilloscope to the output terminals ( between SURGE OUT TERMINAL<sup>⑮</sup> and SURGE G TERMINAL<sup>⑭</sup>) of this unit .

## 11-1. Voltage waveform of class A and class D surges



$V_p$  : Maximum value of transient voltage

$T$  : Repetition cycle

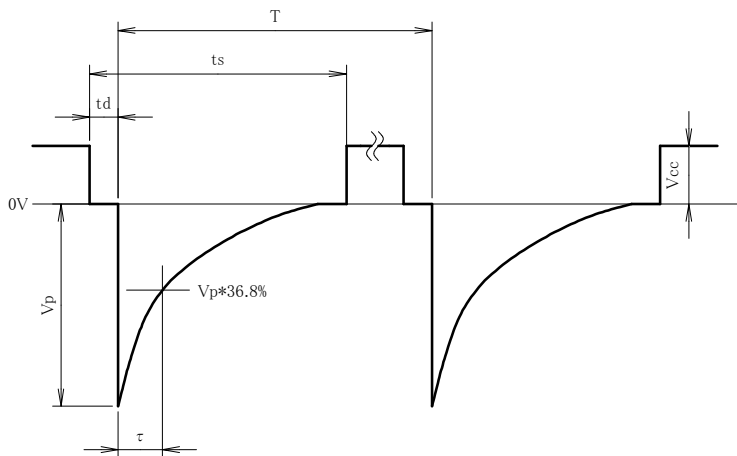
:

$\tau$  : Attenuation constant

:

$V_{CC}$  : DC voltage

## 11-2. Voltage waveform of class B and class E surges



$V_p$  : Maximum value of transient voltage

$\tau$  : Attenuation constant

$T$  : Repetition cycle

:

$V_{CC}$ : DC voltage

$t_d$  : Delay time (approx.  $20 \mu s$ )

:

$t_s$  : DC cut time

:

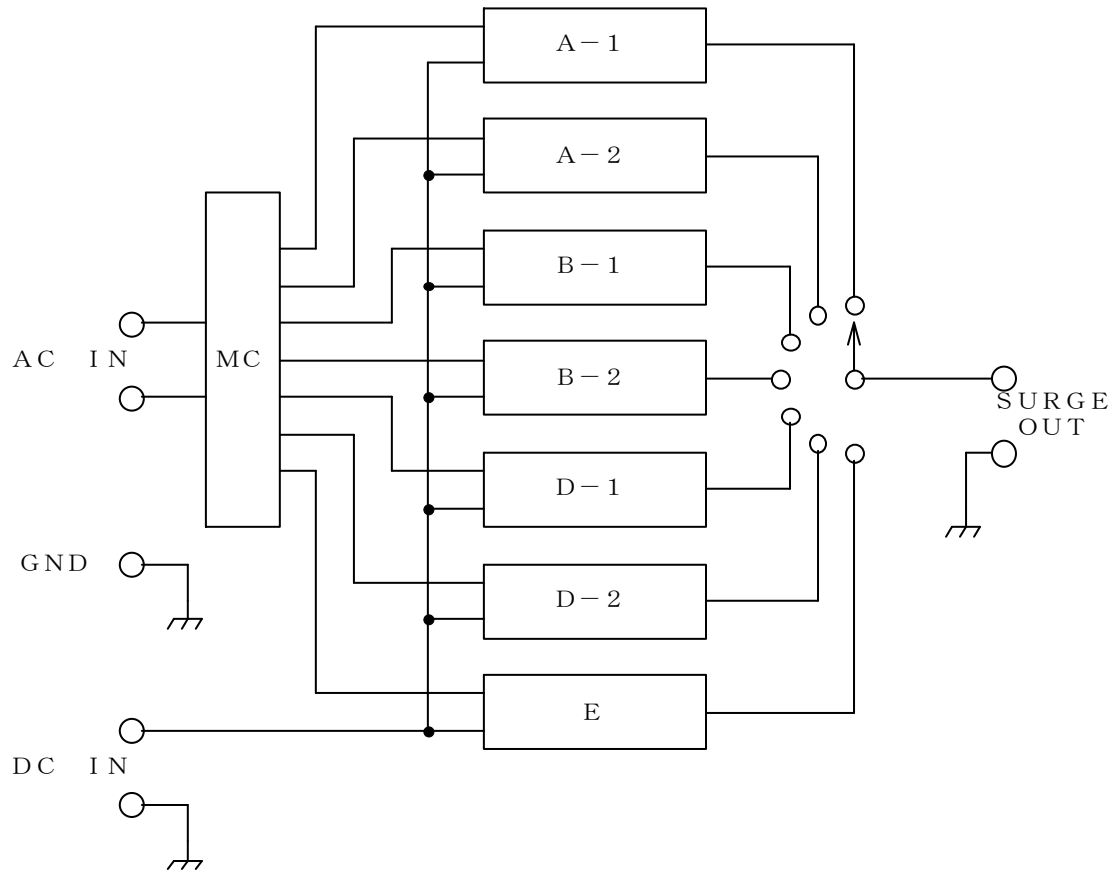
**⚠ CAUTION 注意**

Waveform is observed at DC

input/output terminal open. Input impedance of the probe:

$10M\Omega$  or more

## 12. BLOCK DIAGRAM



- MC : Main control unit
- A-1 : Class A-1 Surge generation unit
- A-2 : Class A-2 Surge generation unit
- B-1 : Class B-1 Surge generation unit
- B-2 : Class B-2 Surge generation unit
- D-1 : Class D-1 Surge generation unit
- D-2 : Class D-2 Surge generation unit
- E : Class E Surge generation unit

## **13. WARRANTY**

### **10.1 Servicing terms**

The following terms are applicable to servicing by Noise Laboratory Co., Ltd., (hereafter referred to as the Company) provided to maintain the intended performance of its products.

#### **1. Scope**

The following terms shall apply only to products made by the Company.

#### **2. Technical servicing fee**

In the event of a failure of a product within the warranty period (see warranty section), the Company will repair a product without charge. After the warranty expires, repairs will be billed at a nominal cost.

#### **3. Ownership of defective parts**

Any defective part exchanged under the Company's servicing belongs to it.

#### **4. Limited liability**

In the event that damages resulting from servicing by the Company are intentional or caused by negligence, the Company will pay the cost but at the purchase value of the relevant product maximum. But, notwithstanding the foregoing, the Company shall not be responsible for any incidental or consequential damages of any nature, including without limitation thereof loss of would-be profit or compensation demanded from a third party

#### **5. Refusal to offer servicing**

The company may not accept a repair order in the following cases:

- More than 5 years have passed since the product discontinued
- More than 8 years have passed after delivery
- Required component for servicing already discontinued and no alternative is available.
- Product changed, repaired or remodeled without obtaining a prior permission from the Company.
- Product severely damaged to the extent it has lost its original form

## 10.2 Limited warranty

Noise Laboratory Co., Ltd. (hereafter referred to as the Company) warrants its products to be free from defects in materials and workmanship under normal use and service for a period of one year from date of delivery. In the event of failure of a product covered by this warranty, the Company will repair the product or may, at its option, replace it in lieu of repair without charge.

Notwithstanding the foregoing, the Company shall not be responsible for any incidental or consequential damages of any nature, including without limitation thereof loss of would-be profit or compensation demanded from a third party. This warranty is valid only in Japan.

### 1. Scope

This warranty shall only apply to products made by the Company.

### 2. Period

One year from date of delivery. The warranty may be valid in 6 months after servicing if the same failure on the same component has repeated.

### 3. Exclusions

The followings are exclusions from this warranty:

- Consumable parts (including HV relay)
- Failure caused by misuse, neglect, accident or abnormal conditions of operation
- Failure caused by remodeling on the user side without prior permission from the Company
- Failure caused by servicing by unauthorized personnel by the Company
- Failure due to fore majeure including but not limited to, acts of God, fire, war, riot, rebellion and others
- Failure due to shock or drop in or after transit
- Failure due to operation in environment being out of ambient specifications.
- A unit shipped to overseas.

## **14. Maintenance**

1. When repair, maintenance or internal adjustment of the unit is required, a qualified service engineer takes charge of such work.
2. Maintenance on the user side is restricted to the outside cleaning and functional check of the unit.
3. When checking or replacing the fuse, turn off the switch of the unit and disconnect the plug socket beforehand.
4. When cleaning the unit, turn off the switch of this unit and the connected equipment and disconnect the plug socket beforehand.
5. Avoid using chemicals for cleaning. Otherwise, the coating of the unit may peel off or the sight glass may be broken.
6. Do not open the cover of this unit.

## 15. NOISE LABORATORY SUPPORT NETWORK

- If a symptom which seems a trouble is found, inform the model name and serial number of the product together with the symptom to Noise Laboratory or your nearest sales agent of Noise Laboratory.
- When the product is returned to Noise Laboratory, write the state of the trouble, contents of your request, model name and serial number in a repair order, and pack the product and repair order sheet in the former package of equivalent suitable for transit and send them back.

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Printed in Japan