NoiseKen®

INSTRUCTION MANUAL

Calibration Cable Set for LSS-15AX/LSS-F02 series

MODEL 05-00099A

NOISE LABORATORY CO., LTD

1.02 edition
AEE00451-00E-0C

NOTICE

- The contents of this instruction manual（the “Manual”）are subject to change without prior notice.

- No part of the Manual may be reproduced or transferred, in any form and for any purpose, without the permission of Noise Laboratory Co., Ltd. (the “Company”)

- The contents of the Manual have been thoroughly examined. However, if you find any problems, misprints, or missing information, please contact the dealer where you purchased your product (the “Dealer”).

- The Company or the Dealer will not accept any responsibility for any loss or damage resulting from improper usage, failure to follow the Manual, or any repair or modifications of this product (the “Unit”) undertaken by a third party other than the Company or parties authorized by the Company.

- The Company will not accept responsibility for any loss or damage resulting from remodeling or conversion solely undertaken by the user.

- In addition, please note that the Company cannot be held responsible for any consequences arising from the use of this product.

1. IMPORTANT SAFETY PRECAUTIONS

The following matters are very important in order to safely handle the calibration cable set for LSS-15AX/LSS-F02 series MODEL: 05-00099A (hereafter “the Unit”). Read carefully them and strictly observe them.

1. **The LSS-15AX/LSS-F02 unit cannot be used in a fire prohibited area or the explosive areas. If used in such an area, the Unit is liable to cause combustion or ignition due to electric discharge etc.**

2. **Any person who has an implanted pacemaker in the body should not operate the LSS-15AX/LSS-F02 unit. Furthermore, such a person should not enter the test area while it is operating.**

3. **For safety, be sure to turn off the power of the LSS-15AX/LSS-F02 unit, before connecting the Unit to it.**

4. **As the LSS-15AX/LSS-F02 unit generates high voltage and great current, mishandling or careless operation may result in a fatal wound. Read the description of safety precautions of the instruction manual for Lightning Surge Simulator (Models LSS-15AX/LSS-F02) before testing.**

2. APPLICATION FORM FOR INSTRUCTION MANUAL

We place an order for an instruction manual.

Model: 05-00099A

Applicant:

Company name: _____

Address: _____

_____

Department: _____

Person in charge: _____

Tel No.: _____

Fax No.: _____

Cut line

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 your nearest sales agent of Noise Laboratory or Noise Laboratory.

Your sales agent:

3. CONTENTS

4. PREFACE

We thank you very much for your purchase of the calibration cable set for LSS-15AX/ LSS-F02 series MODEL: 05-00099A. It is recommended that the contents of this instruction manual (hereinafter “the Manual”) be thoroughly understood and used as a ready reference for operation.

- Keep the Manual by your side or other proper location so that it may be readily available when using the Unit.
- Refer to the instruction manual for Lightning Surge Simulator (Models LSS-15AX/LSS-F02) to ensure safety in testing since the Manual does not describe the full details of LSS-15AX/LSS-F02.

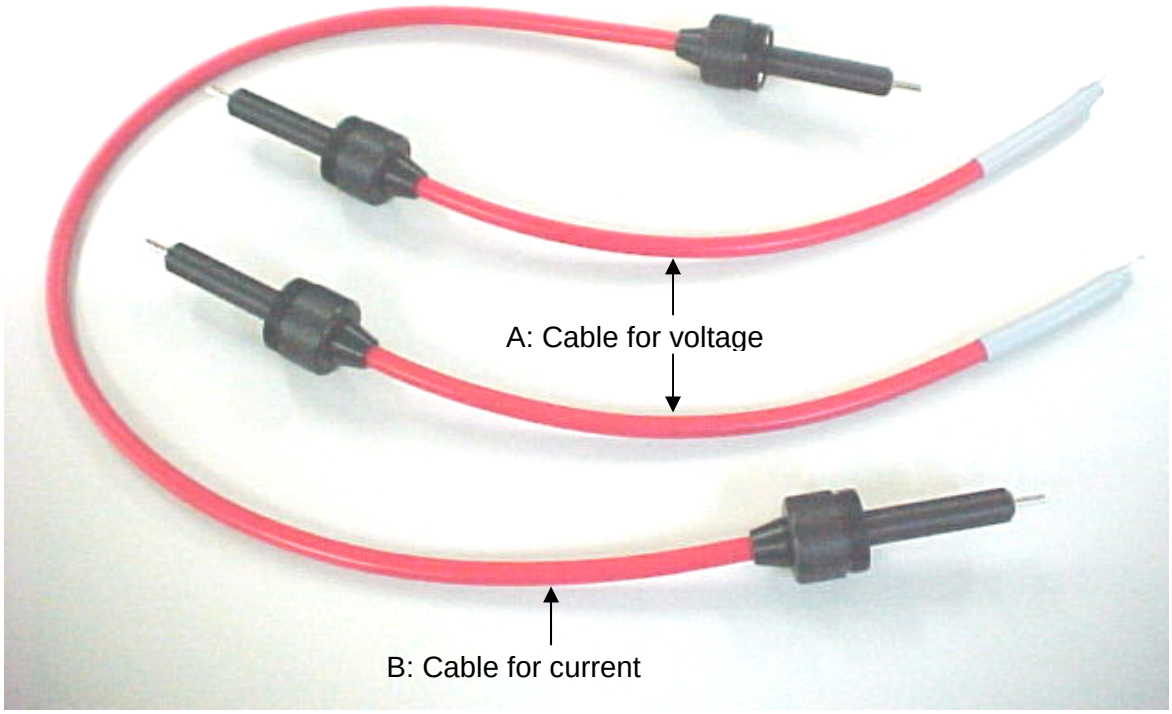
⚠ DANGER 危険

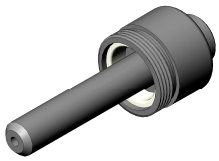
- **As the LSS-15AX/LSS-F02 unit generates high voltage and great current, mishandling or careless operation may result in a fatal wound.**
- **The surge generating part of LSS-15AX/LSS-F02 has (non-grounded) the floating construction, and in order to observe a voltage waveform, it needs to perform differential measurement. Please measure after fully storing the knowledge about differential measurement.**
- **Observation of output waveforms involves extreme danger so if there is any inquiry about measurement, please feel free to ask questions. Otherwise it may be fatally injured if wrong operation is**

5. ENCLOSED ITEMS

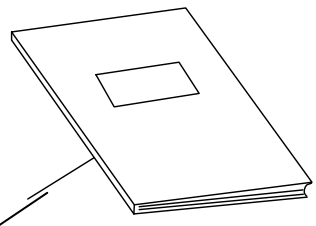
This product is the cable set for verifying output waveforms of Noise Laboratory 's LSS-15AX/LSS-F02 series. It is including following items. When it is delivered, confirm the contents immediately. If something wrong should be found, contact your sales agent immediately.

A: Cable for voltage (Length: Approx. 60cm, Refer to the photo.)・・2pcs
B: Cable for current (Length: Approx. 120cm, Refer to the photo.)・・1pc
C: Dummy cap・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 3pcs
D: Instruction manual (this book)・・・・・・・・・・・・・・・・・・1pc





C: Dummy cap (3pcs)



D: Instruction manual

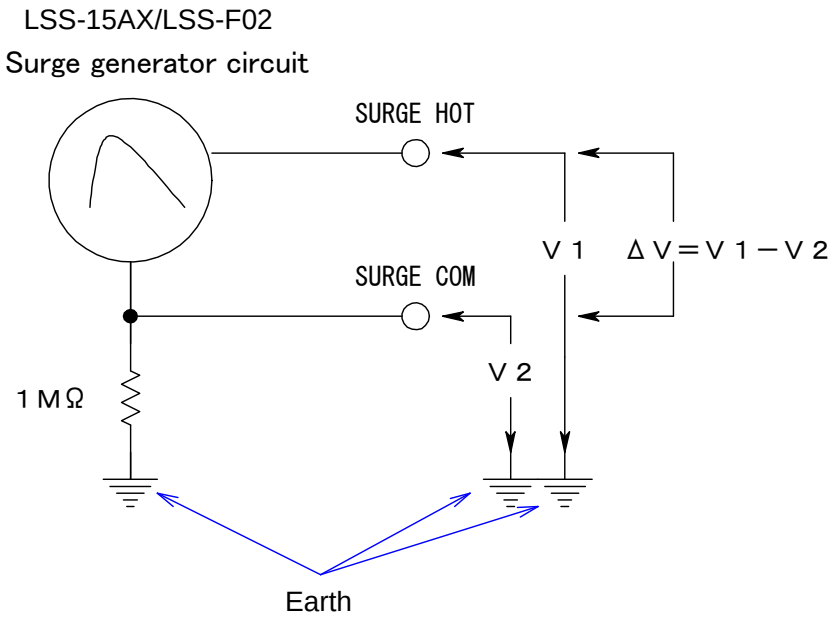
6. OBSERVATION OF WAVEFORMS

6-1. Necessity of Differential Measurement

The LSS-15AX/LSS-F02 series simulators adopt the floating system in which the return side of the surge generator circuit is not connected to chassis (ground earth). To measure high voltage surge outputted with the floating system safely, measurement should be done with “differential measurement” by using 2 high voltage probes.

Why “Differential measurement” is safe?

- As the surge generator is grounded to the earth, you cannot get an electric shock even if you touch the chassis of the generator.
- As electric potential of the oscilloscope is same as the earth because the oscilloscope is connected to the chassis of the lightening surge simulator via GND line of the HV probe, you cannot get an electric shock even if you touch the chassis of the oscilloscope.
- The high voltage generating part of the surge simulator is insulated by the of HV probe.



※ On the floating output system, high voltage may be generated at the surge common (SURGE COM), extreme caution shall be taken.

6-2. Prohibited Items in Waveform Observation

The following prohibited matters are extremely dangerous acts which can cause a fatal accident. Be sure to obey the instructions.

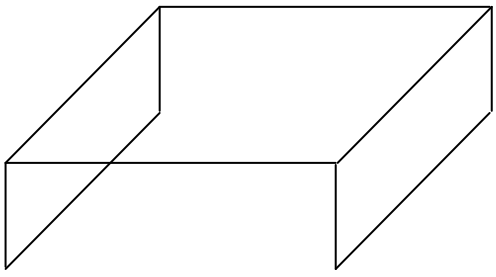
Prohibited	**Stop observing waveforms with using ordinary probes (e.g. a 10:1 probe usually attached to oscilloscopes as one of the standard accessories) which are not HV probes.** Reason of prohibition: For verifying surge waveforms, probes which withstanding voltage is higher than the maximum output voltage of the lightening surge simulator are necessary. If the withstanding voltage is not sufficient, the probe or the oscilloscope may be damaged, and a user can get a fatal electric shock in case the user touches the oscilloscope.
	Stop observing waveforms with using only one HV probe. Reason of prohibition: If only one HV probe is connected to HOT-COM, COM electric potential of the floating surge generating part varies to negative polarity, the oscilloscope can be damaged, and a user can get a fatal electric shock in case the user touches the oscilloscope.

6-3. Measurement Instruments to be Prepared

For observing surge output waveforms of LSS-15AX/LSS-F02 series, the following instruments are necessary as well as this product. Specification of each instrument should be ensured when it is prepared.

1) Oscilloscope: With differential calculation function (Ch1-Ch2)
2) High voltage probe: 2 pieces. Withstanding voltage: More than 15kV.
3) Current probe: Using with current transformer. For observing surge short-circuited current waveform.
4) Isolation transformer: For oscilloscope.
5) Earth cable: For connecting PE.

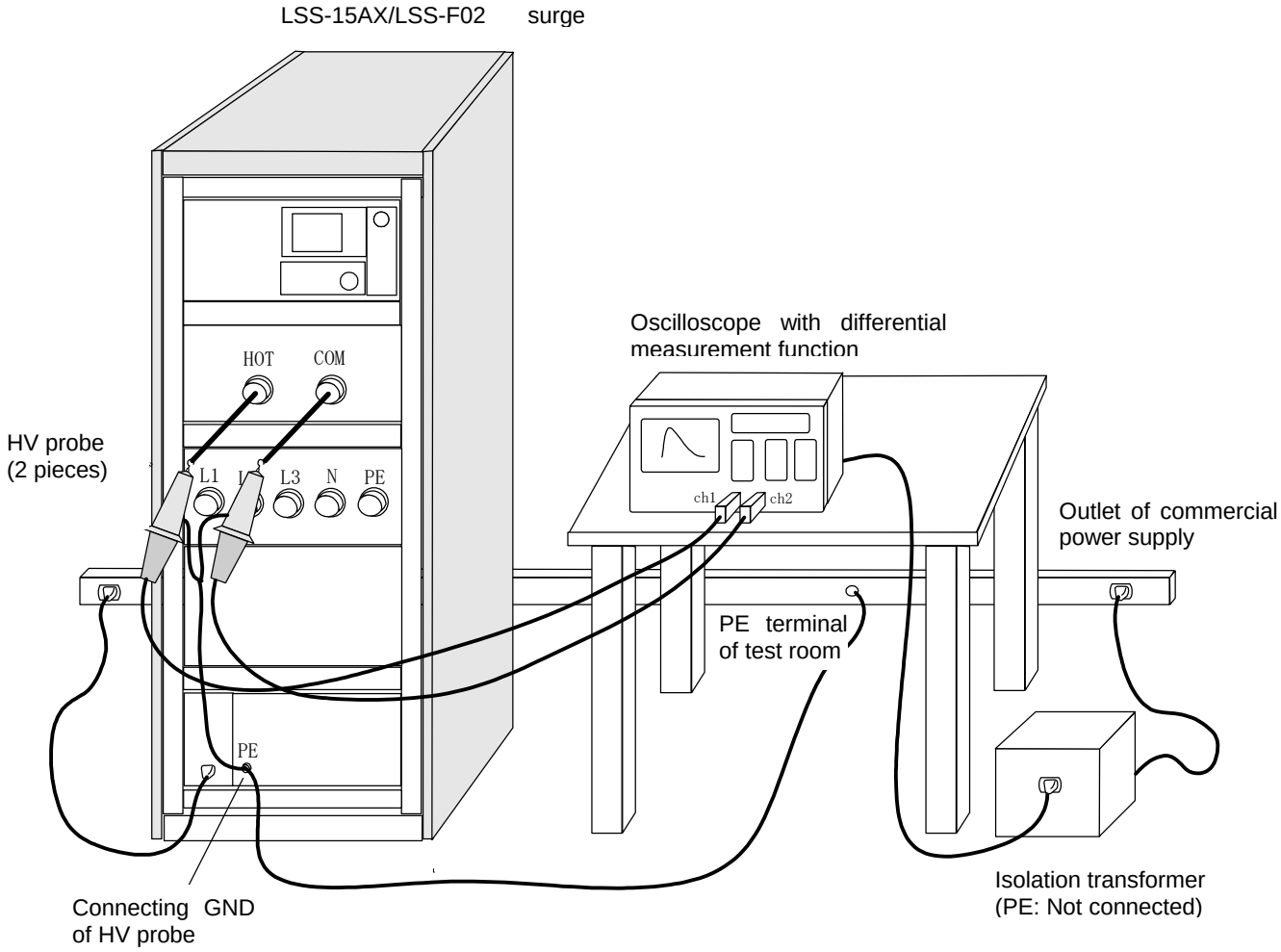
To avoid an inadvertent touch, covering tips of the HV probes with a protection cover is recommendable. A transparent half-box type of high voltage insulation sheet shown as the below figure can enhance safety of operators.



※Withstanding voltage of material of the protection cover should be more than 15kV.

6-4. Waveform Observation

6-4-1. Observing voltage waveform



Example of configuration for voltage waveform measurement

The following procedure shows how to configure and connect instruments and how to observe voltage waveform.

1) Install an oscilloscope and supply AC to it via an isolation transformer. Do not ground the oscilloscope side PE terminal of the isolation transformer.

2) Connect a high voltage probe to each of CH1 and CH2 of the oscilloscope.

3) Connect power line of the lightening surge simulator and then make sure that it is grounded securely with 3-pin type AC cable which has an earth terminal. If the grounding seems to be insufficient, connect PE terminal of the surge simulator to PE terminal of the test room with another line shown as the above figure.

4) Connect “cable for voltage” of this product (two pieces, length of the cable: approx. 60mm) to each surge out terminal HOT and COM. In this time, put a connector cap (installed on shipment of the LSS-15AX/LSS-F02 simulator) to each output terminal of AC/DC line injection part (L1~PE) of the simulator to prevent accidents. If there is an output terminal which is not covered with the connector cap in AC/DC line injection part (CDN), the LSS-15AX/LSS-F02 cannot output a surge since its safety function works.

5) Connect each of the HV probes to each (HOT, COM) of the solderless pressure terminals of the tips of the cables.
Be sure to put the HV probes on a stable stand which is made of insulation material and has appropriate height so that they do not drop and are kept on a proper position for measurement.
※In case a protection cover can be prepared, put it over the connecting part.

6) Connect GND line of both of the HV probes for CH1 and CH2 together to PE terminal of the LSS-15AX/LSS-F02 surge simulator. If the length of GND line is not enough, prepare another appropriate cable to relay.

7) With the status as the above, make the LSS-15AX/LSS-F02 simulator output surge and observe its waveform with the oscilloscope. Details of settings of differential measurement cannot be described here because they depend on the model of the oscilloscope, but generally, set trigger on CH1. Set the voltage range of CH1 and CH2 with considering attenuation ratio of the HV probe so that the whole shape of waveform appears within one screen. Math (calculation) waveform, which is formed after calculation CH1-CH2, is the surge voltage waveform to be required.

 **Danger**	**As high voltage which can cause fatal wounds generates from cables connected to the surge output terminals, HOT and COM, and from connecting part of the high voltage probe, carefully handle it.**

8) In case of observing output waveforms from AC/DC line injection part (CDN), connect the cable for voltage to the output terminal of CDN. In this time, put on a dummy cap, one of the accessories of this product, instead of a connector cap, which is installed on shipment of the LSS-15AX/LSS-F02 simulator, to each of an empty terminal which is not selected as the output terminal of the surge (e.g. When L1 is selected as injection phase and L2 is selected as return phase, put on the dummy caps to L3, N, and PE). If there is even one empty terminal which is not covered with a cable or a dummy cap, the LSS-15AX/LSS-F02 cannot output a surge since its safety function works.

9) The LSS-15AX/LSS-F02 surge simulator cannot output any surge from the output terminal of AC/DC injection part if that part is not electrified with AC or DC voltage which is prescribed in specification of the LSS-15AX/LSS-F02. Therefore, when setting voltage level, GND level, and trigger level of the oscilloscope, AC voltage or DC voltage to be injected should be taken into consideration as well as the surge itself. For other items, set them according to the way of differential measurement of the oscilloscope, similarly to the case of observing waveforms from surge out terminal.

6-4-2. Observing current waveform

For measurement of current waveforms, a current probe accompanied by a current transformer is necessary. Maximum peak current of the LSS-15AX/LSS-F02 surge simulator is 7500A. Since how many amperes of current waveforms can be observed with using this product depends on the attenuation ratio of the current probe and the current transformer, prepare appropriate instruments which have sufficient attenuation ratio.

Danger	**Observing current waveforms with a high voltage probe is impossible. As measurement with inappropriate instruments may cause a fatal accident, do not perform such an inappropriate act.**

The following procedure shows how to configure and connect instruments and how to observe voltage waveform.

1) Install an oscilloscope and supply AC to it via an isolation transformer. In case of observing current waveform, PE terminal of the oscilloscope does not have to be floated, but with considering the case of observing voltage waveform, it is recommendable that PE terminal of the oscilloscope be floated for safety even for current waveform.

2) Connect a current probe accompanied by a current transformer to the oscilloscope.

3) Connect power line of the lightening surge simulator and then make sure that it is grounded securely with 3-pin type AC cable which has an earth terminal. If the grounding seems to be insufficient, connect PE terminal of the surge simulator to PE terminal of the test room with another line shown as the figure in 6-4-1. Observing voltage waveform.

4) Short-circuit HOT and COM of the LSS-15AX/LSS-F02 surge out terminal with “cable for current” of this product (length of the cable: approx. 120mm). In this time, put a connector cap (installed on shipment of the LSS-15AX/LSS-F02 simulator) to each output terminal of AC/DC line injection part (L1~PE) of the simulator to prevent accidents. If there is an output terminal which is not covered with the connector cap in AC/DC line injection part (CDN), the LSS-15AX/LSS-F02 cannot output a surge since its safety function works.

5) Clamp curved part of the cable between HOT and COM with the current transformer.
   Be sure to put the current transformer on a stable stand which is made of insulation material and has appropriate height so that it does not drop and is kept on a proper position for measurement.
   ※As the cable and the current transformer are insulated from the short-circuited current, a protection does not have to be prepared.

6) With the status as the above, make the LSS-15AX/LSS-F02 simulator output surge and observe its waveform with the oscilloscope. Set the current (voltage) range of the oscilloscope with considering attenuation ratio of the current transformer and the current probe so that the whole shape of waveform appears within one screen. For observing current waveform, differential measurement does not have to be set. If it is set on the oscilloscope, release it (Math OFF) and set usual single measurement.
The waveform with the above setting status is the current waveform to be required.

⚠ CAUTION

In users' side, it is impossible to observe current waveform from the output terminal of AC/DC line injection part.
If the AC/DC line injection part is turned on (LINE ON) with "cable for current" of this product installed to the output terminal there, the line breaker on the input panel of the LSS-15AX/LSS-F02 works to shut up the electricity. The LSS-15AX/LSS-F02 surge simulator cannot output any surge from the output terminal of AC/DC injection part if that part is not electrified with AC or DC voltage which is prescribed in specification of the LSS-15AX/LSS-F02.

When verifying current waveform from the AC/DC line injection part is required, enquire your sales agent or Noise Laboratory (Verifying waveform has to be paid for).

7. WARRANTY

7-1. 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 our Company, which are intentional or caused by negligence, our 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

7-2. 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 force 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

8. MAINTENANCE

1. When repair, maintenance or internal adjustment of the simulator 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 simulator.

3. When checking or replacing the fuse, turn off the switch of the simulator and disconnect the plug socket beforehand.

4. When cleaning the simulator, 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 the simulator.

9. 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