

INSTRUCTION MANUAL
MULTICHANNEL SIGNAL GENERATOR
MODEL SG-7040A

NOISE LABORATORY CO., LTD.

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- 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

As each of the following items is very important matter to be attended, thoroughly read it before operation of the SG-7040 (hereinafter "the Unit").

- 1. The Unit cannot be used in a fire prohibited area or other explosive areas. If used in such an area, the Unit is liable to cause combustion or ignition due to electric discharge etc.**
- 2. A person who has a pacemaker on should not operate the Unit and also should not enter the area where it is operating.**
- 3. Before connecting the Unit to DUT (Device Under Test), accessories for test conditions, optional equipment and other equipment, turn off power supply of all connected instruments and confirm there is no remaining electricity. Otherwise you may receive an electric shock.**
- 4. Safety recommendations are listed in Par. "5. Basic Safety Precautions" (Page 7). Thoroughly read these recommendations before setting connection and starting a test.**

2. APPLICATION FORM FOR INSTRUCTION MANUAL

We place an order for an instruction manual.

Model: SG-7040A

Serial No.: _____

Applicant:

Company name: _____

Address: _____

Department: _____

Person in charge: _____

Tel No.: _____

Fax No. _____

**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

We thank you for your purchase of the MULTI CHANNEL SIGNAL GENERATOR SG-7040A (hereinafter “the Unit”). This instruction manual (“the Manual”) contains how to use the Unit and other important information. In order to obtain the highest performance from the Unit, thoroughly understand the contents of the Manual and use as ready reference for operation.

- This appliance generates arbitrary waveform from 1 channel to at most 4 channels.
- Connect to PC and USB cable and can control test wave pattern production and practice by Windows® software.
- Capable of generating required waveforms of DC variation to perform tests for in-vehicle devices.
- Capable of connecting to bipolar power supplies.
- This instruction manual is common for all of SG-7040A series models.

SG-7040A-1 MULTI CHANNEL SIGNAL GENERATOR 1ch (Waveform generating unit is 1 pcs)

SG-7040A-2 MULTI CHANNEL SIGNAL GENERATOR 2ch (Waveform generating unit is 2 pcs)

SG-7040A-3 MULTI CHANNEL SIGNAL GENERATOR 3ch (Waveform generating unit is 3 pcs)

SG-7040A-4 MULTI CHANNEL SIGNAL GENERATOR 4ch (Waveform generating unit is 4 pcs)

- **The Manual will help operators handle and utilize the MULTI CHANNEL SIGNAL GENERATOR SG-7040 in safety.**
- **Keep the Manual in a place where readily available.**

5. BASIC SAFETY PRECAUTIONS

5-1. Symbols of Hazard



It expresses a DANGER.

DANGER indicates an impending dangerous condition resulting in a serious **injury or death**, if such a condition is not avoided.



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



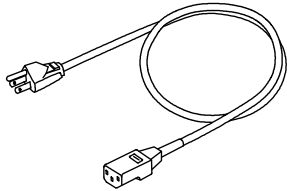
1. The Unit cannot be used in an explosive area, fire prohibited area, etc. Use of the Unit in such an area is liable to cause combustion or ignition.
【Precautions for human body and environments】
2. Do not open the cover of the unit. Only service engineers qualified by the Company can open the cover for maintenance and repair.
【Precautions for human body】
3. 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 the Unit undertaken by a third party other than the Company or parties authorized by the Company.
【Precautions for human body, operation, environments and connection】
4. Before connecting the Unit to DUT, accessories for test conditions, optional equipment and other equipment, turn off power supply of all connected instruments, confirm there is no remaining electricity, and connect each cable securely. Otherwise you may receive an electric shock or the instruments may be damaged.
【Precautions for human body and connection】
5. Use accessories and optional products supplied by the Company to operate the Unit securely and safely.
【Precautions for operation and connection】



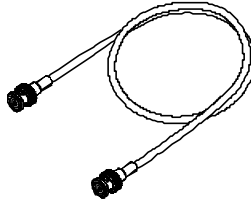
6. Supply power for test within the rated range (Do not let output terminals be short-circuited). Do not misplace the polarity. Otherwise the Unit may be damaged.
【Precautions for operation and connection】
7. Avoid using or storing the Unit in high or low temperature environment (Operating temperature range: 15~35°C / Operating humidity range: 25~75%).
【Precautions for environments】
8. If dewing or condensation occurs, thoroughly dry it before operating the Unit.
【Precautions for environments】
9. Avoid using the Unit in an extremely humid or dusty place.
【Precautions for environments】
10. Repair, maintenance and internal adjustment of the Unit should be performed by a qualified service engineer.
【Precautions for maintenance】
11. Do not wipe the 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.
【Precautions for maintenance】
12. Be sure to keep a vent of the Unit open for ventilation.
【Precautions for operation and connection】
13. Use input and output cables with withstand voltage and current capacity.
【Precautions for connection】

6. Accessory

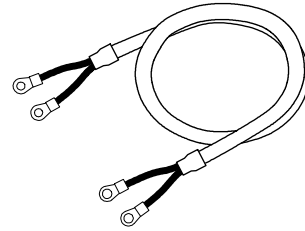
A



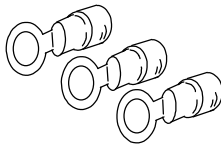
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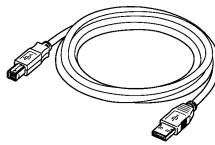
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D



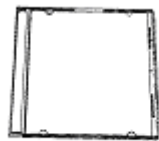
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F



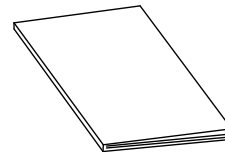
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H



I



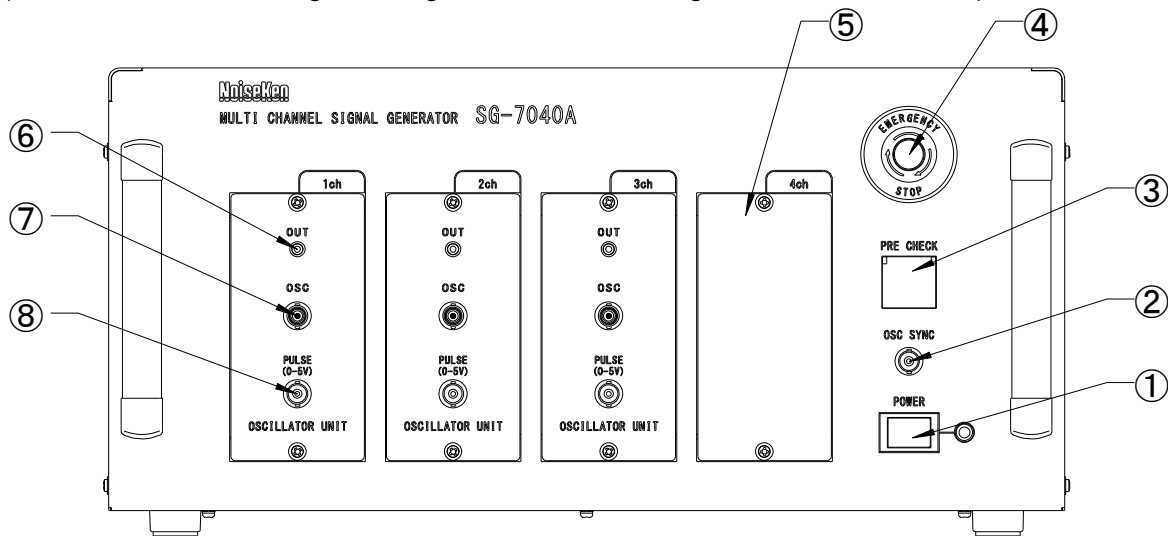
A) AC cable.....	1
B) Coaxial cable (BNC-BNC 2m)	(※)
C) Output cable (1m).....	(※)
D) Solderless terminal (M4)	Channel × 2
Solderless terminal (M6)	Channel × 2
Solderless terminal (M8)	Channel × 2
E) USB cable.....	1
F) Interlock Plug.....	1
G) Remote control software	1
H) Accessory bag	1
I) Instruction manual(Main body and software)	1

(※) The number is the same as the number of channels

7. NAME AND FUNCTION OF EACH PART

7-1. Front Panel

(The installed waveform generating unit varies according to the model number.)



① Power button and lamp 【POWER】

Turns on the waveform generating part. The pilot lamp is alight while electrified.

In starting the system, turn on the Unit prior to a bipolar power supply. In finishing, turn off the bipolar power supply first.

② OSC connector 【OSC-SYNC】

Outputs signals for synchronous communication with an oscilloscope. Outputs 5V active low pulse at the point of time set by software.

③ Pre-check button 【PRE CHECK】

Used for checking output of power supply. The button being pressed, 1kHz \pm 1Vp-p rectangular waveform outputs from OSC output.

④ Emergency stop button 【EMERGENCY】

Press the button in an emergency and make DC output of the generator 0V. Rotate it clockwise to release the status after securing thoroughly that the dangerous situation was evaded.

⑤ Waveform generating unit 【1ch/2ch/3ch/4ch】

Available to install maximum 4 channels from ch1 to ch4. A blank panel is attached when a unit is not installed.

⑥ Output lamp 【OUT】

Alight when the generator part is in output status.

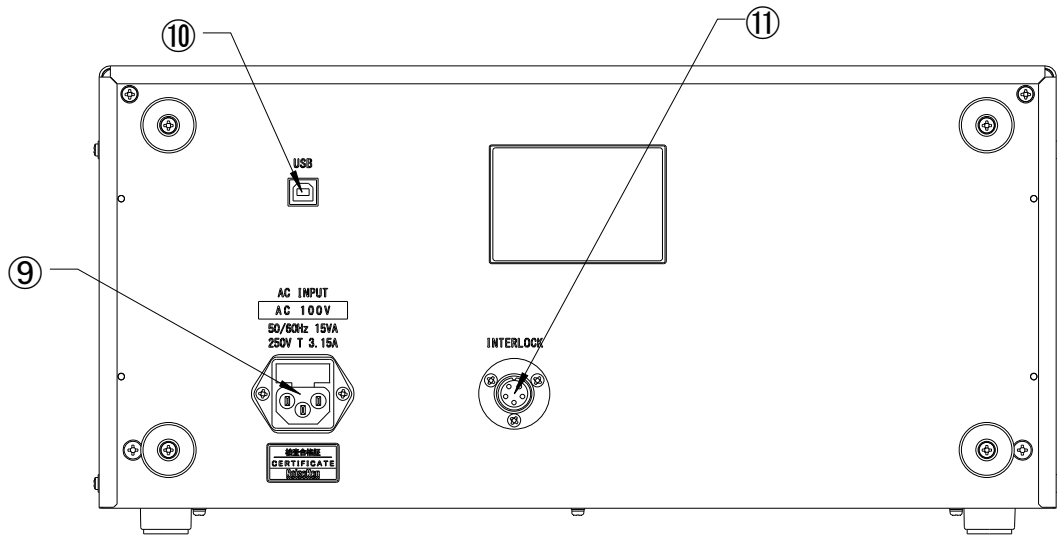
⑦ Output connector 【OSC】

Outputs waveforms which amplitude is conforming to the gain of amplifier set by software.

⑧ Pulse output 【PULSE】

Outputs gate signals controlling the optional DC cutoff unit SG-7044/7043. Outputs 5V active low signal. The DC cutoff unit cuts off (or open) output with FET switch.

7-2. Rear Panel



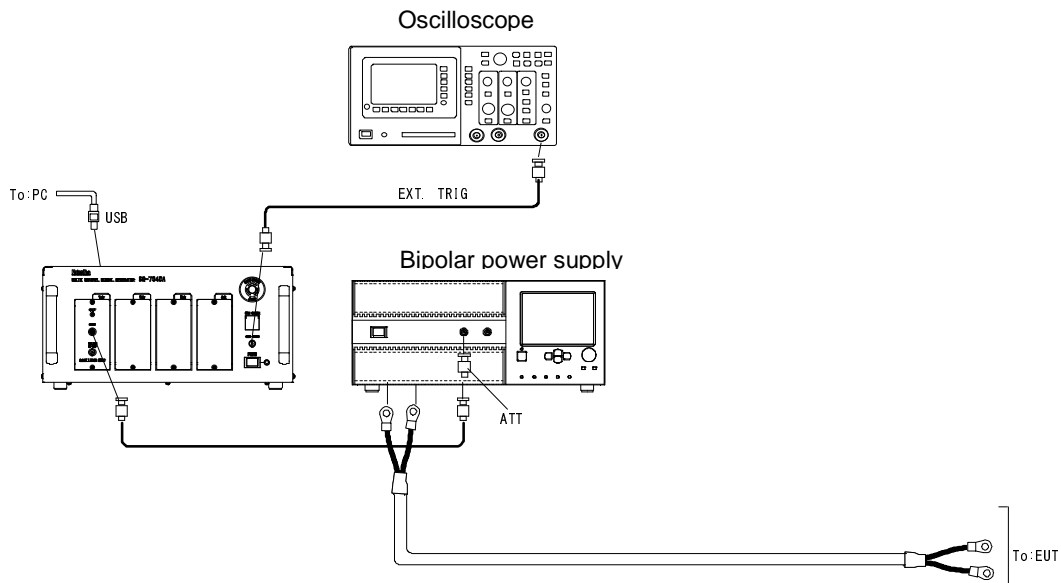
- ⑨ AC inlet 【AC INPUT】
Connect power supply with AC cable. Connect PE to the protective earth.Fuse(3.15A).
- ⑩ USB connector 【USB】
Used for connecting PC with the USB cable of accessory to control waveform generator remotely (USB1.1).
- ⑪ Interlock connector 【INTERLOCK】
Usually, interlock plug in accessories is connected.
It will work as same as emergency stop if it is open.
At the time of shipment from factory, 1-3 pin of this connector is short-circuited. For the sake of safety, please open this pin when the stop control of this equipment is operated externally. (If it is short-circuited by external signal, please turn on point of contact or open collector)

8. SETTING AND CONNECTION

8-1. Setting and Preparation

- 1) Set up the Unit and the bipolar power supply on a stable space.
- 2) Install the application software to PC.

8-2. Connection



- 1) Make sure that power supply of each unit is turned off.
- 2) Connect power supply to the Unit. (AC100V)
- 3) Connect the designated power supply to the bipolar power supply.
- 4) Connect the bipolar power supply to the OSC connector of each channel with the supplied coaxial cable. In case it is BP4610 (NF Corporation), connect them via the optional 20dB attenuator.
- 5) Connect the driving power supply of the bipolar power supply and connect EUT to the output terminal with the supplied output cable. Modify the size of the terminal of the output cable, if necessary.
- 6) Connect PC to the USB connector of the Unit (on rear panel). As for PC side, both USB1.1 and USB2.0 are available.
- 7) Connect the external trigger terminal to the OSC-SYNC of the Unit with the coaxial cable. Connect the probe of the oscilloscope to a observing point you give.

9. OPERATION

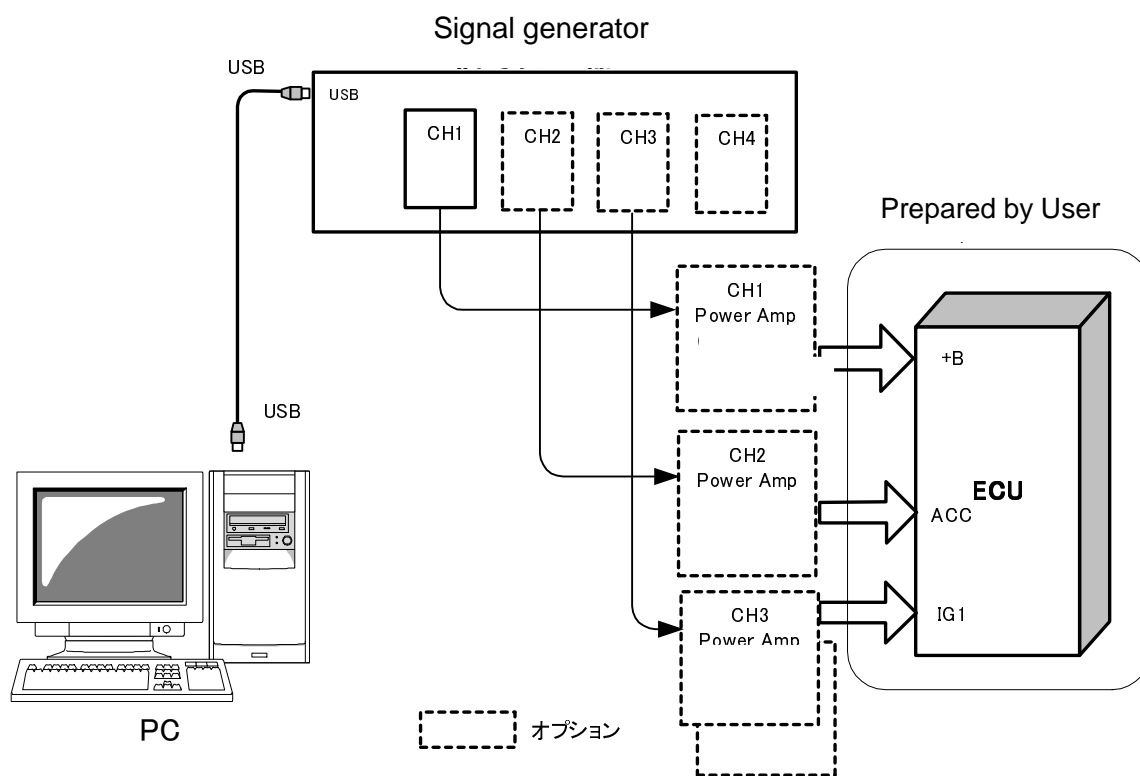
9-1. Initial Setting

- 1) If the bipolar power supply is AS-161-xx, make the BIAS setting key "0", and set the input gain switching key "x10".
- 2) In case other bipolar power supplies are used, set them according to the instruction manual of them.

9-2. Operation

- 1) Start PC.
- 2) Turn on the Unit.
- 3) Turn on every bipolar power supply.
- 4) Start the application software. Operate by the software.

10. SYSTEM CONFIGURATION



11. SPECIFICATIONS

【Base Unit】

Channel	Max. 4 channels
Emergency button	Make the generator part stop completely
Interlock	Emergency stop status when the external point of contact is cut off (Usually short-circuited).
Trigger output for oscilloscope (OSC-SYNC)	One point / BNC connector / 0-5V Active low Set a trigger point at an arbitrary point in waveform generating software. Observe generating waveforms with using trigger function of oscilloscope.
PC Interface	USB1.1
Temperature range	25°C±10°C
Humidity range	25~75%RH
Power supply	AC100V±10% 50/60Hz 15VA
Dimensions	Approximately W430×D590×H210 mm
Weight	Approximately less than 16kg

【Waveform Unit】

Waveform generating method	Partial waveform memory + DSP operation output Output sampling waveform by CSV data
D/A converter	14bit
Output voltage	0.00~±6.00V±(3%+0.03V)
Output current	5mA Max
Output impedance	50Ω
Resolution (Setting)	0.01V
Resolution (Output)	0.732mV
Offset voltage	±6.0V
Output magnification	1/10
Frequency response character	150kHz max (±6.00V amplitude sine wave) 150kHz max (±6.00V amplitude rectangular wave)
Frequency accuracy	±20ns+50ppm (accuracy of cycle time in whole frequency rang)
Rise time / Fall time	Less than 400ns (0±1.00V swing)
Through rate	20V/μs
Total harmonics distortion	2.0% (Sine wave)
Synchronization accuracy	Capable of adjusting the dispersion of the response time of each power amplifier (up to 10μs, with 0.1μs step). Capable of keeping the synchronization accuracy between channels less than 1μs at the output terminal of the power amplifier.
Pre-check output wave pattern	1kHz 1Vp-p (For test) Outputs basic signal to check operation
DC cut control terminal	Outputs voltage: 0-5V, active low, 10mA DC Connect DC cutoff unit (optional) to the output of the external amplifier and control with this signal. Set DC cut timing on waveform setting screen.

11.SPECIFICATIONS

【PC software control part】

Drawing waveforms

Arbitrary waveform

DC output time range	1 μ s~30min	
Rectangular wave cycle rang	10 μ s~30min	
Sawtooth wave cycle range	10 μ s~30min	
Ramp wave cycle range	10 μ s~30min	
Exponential wave cycle range	10 μ s~30min	
Sine wave frequency range	1Hz~150kHz	
Sine wave sweep	Output time range	10ms~30min

Frequency modulation	1Hz~150kHz
Amplitude modulation	6.0V max
Timing resolution	1ms

Amplitude modulated sine wave	Output time range	10ms~30min
	Frequency modulation	1Hz~150kHz
	Amplitude modulation	6.0V max
	Timing resolution	1ms

Ramped sine wave	Output time range	10 μ s~30min
	Frequency modulation	1Hz~150kHz
	Sine wave amplitude	6.0V max
	Ramp amplitude	6.0V max

Damped sine wave	Output time range	10 μ s~30min
	Frequency modulation	1Hz~150kHz
	Sine wave amplitude	6.0V max
	Ramp amplitude	6.0V max

Sine wave frequency LOG sweep	Frequency modulation	1Hz~150kHz
	Sine wave amplitude	6.0Vmax

Rectangular wave Sweep	cycle rang	10 μ s~30min
	Rectangular wave amplitude	6.0V max

※I put the waveform mentioned above together and file 1 basics wave pattern

CSV data wave	Number of waveforms	512Kword
	Clock cycle range	1Hz~5MHz

Waveforms Structure

Waveform File

A single channel waveform is basic waveform.

(Available loop instruction times: 1~9999 times)

Sequence File

Waveform File is combined and while it's multichannel, a synchronous relation is defined.

(Available loop instruction times: 1~9999 times)

Combined Sequence File

Small sequential files are collected and the last output wave pattern is defined.

(Available loop instruction times: 1~1000 times)

Waveform Structure limit

Waveforms	Waveform File	Sequence File	Combined Sequence File
DC	○	○	○
Rectangular wave	○	○	○
Sawtooth wave	○	○	○
Ramped sine wave	○	○	○
Exponential wave	○	○	○
Sine wave	○	○	○
Sine wave sweep	The same combination is possible	※	○
Amplitude modulated sine wave	Only Single waveform	※	○
Ramped sine wave	Only Single waveform	※	○
Damped sine wave	Only Single waveform	※	○
Sine wave frequency LOG sweep	Only Single waveform	※	○
Rectangular wave Sweep	Only Single waveform	※	○

○...It can be created and combined

※...With other corrugated files during an identical channel, it's impossible to combine.

DC variation waveform	Make variation waveforms which sweep parameters (voltage / time) of DC and ramp wave with loops and save basic waveforms as files. Set up various kinds of loops with program loop method. Available loop instruction times: 1~1000 times	
Output waveform check	Check each step on PC Check output waveform on an arbitrary point set by software as a trigger point (with an oscilloscope).	
Initial setting	Amplifier sensitivity	x10 (fixed)
	Voltage	0.00~±6.00V (amplifier amplitude: ±60.0V)
	Emergency stop voltage setting	0V
System Requirements	PC/AT compatible machine Windows 7 32Bit Professional Operating System	

**Notice

The waveform is assured with resistance load of the attached connection cable (5.5sq, length 1m), and is dependent on load capacitance, inductance of connected cables, and frequency of signals (The performance of the amplifier is an important factor).

12. WARRANTY

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

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.

13. 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.

14. 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.

NOISE LABORATORY CO., LTD.

Produced by: Noise Laboratory Co., Ltd.

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Printed in Japan