



INSTRUCTION MANUAL

Automotive Transient Surge Simulator
MODEL ISS-T1321

NOISE LABORATORY CO., LTD.

Edition 2.00
AEJ00527-001-1

NOTICE

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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

The "Important Safety Precautions" explain rules that must be followed to prevent any risk of harm or injury to the user of the instrument.

- 1. This unit has open-close covers. When the cover is open, be careful of an electric shock as the operating personnel runs a risk to exposure to the high voltage circuitry when adjusting the 3-needle gap.**
- 2. This unit cannot be used in a fire prohibited area or the explosive areas. If used in such an area, this unit is liable to cause combustion or ignition due to electric discharge etc.**
- 3. A person having a pace maker or other electronic medical device implanted into or connected to his body should not operate this unit and also should not enter the test area while this unit is operating.**
- 4. Prior to connecting the equipment under test, options and cables, be sure to turn off power supply. Otherwise supply power voltage may cause an electric shock hazard.**
- 5. Be sure to go through Section 5 Basic Safety Precautions listing safety precautions prior to test set-up, connection and execution of test.**

2. APPLICATION FORM FOR INSTRUCTION MANUAL

We place an order for an instruction manual.

Model: ISS-T1321

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

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3. CONTENTS

1.	IMPORTANT SAFETY PRECAUTIONS	1
2.	APPLICATION FORM FOR INSTRUCTION MANUAL	3
3.	CONTENTS	5
4.	PREFACE	6
5.	BASIC SAFETY PRECAUTIONS	6
	SYMBOLS OF HAZARD.	6
	BASIC SAFETY PRECAUTIONS.	6
6.	DESCRIPTION OF EACH CONTROL DISPLAY AND TERMINAL AND ITS FUNCTION	8
	6-1 FRONT PANEL	8
	6-2 REAR PANEL	11
7.	INCLUDED ACCESSORIES	12
8.	CONNECTIPON	13
	8-1. INSTALLATION	13
	8-2. CONNECTION EXAMPLE (CI 220 AND CI 260T TESTS)	13
	8-3. CONNECTION EXAMPLE (FOR RI 130 TESTING)	14
9.	OPERATION	15
	9-1. PREPARATION	15
	9-2. TEST SETTINGS	15
	9-3. TESTS PULSES AND MODES SETTING	16
	9-4. SWITCHING RELAY REPLACEMENT	16
10.	SCHEMATIC AND TIMING CHART	17
	10-1 RI130/CI220 (PULSE A1/A2-1/A2-2/C-1/C-2)	17
	10-2 TIMING CHART	17
	10-3 PULSE TIMING MODE	18
	10-4 CI260 WAVEFORM F SCHEMATIC	18
	10-5 CI260 WAVEFORM F TIMING	18
11.	SPECIFICATIONS	19
12.	WARRANTY	20
13.	MAINTENANCE	22
14.	NOISE LABORATORY SUPPORT NETWORK	23

4. PREFACE

- Generates the following pulses defined in Ford standard EMC-CS-2009.1 (revised on 2010.2.11)
Transient pulses A2-1 and A2-2 for RI 130 testing
Transient pulses A1, A2-1, A2-2, C-1 and C-2 for CI 220 testing
Waveform F in CI 260 Immunity to voltage dropout testing
- The equipment is designed for a DC12V system only and compatible with the maximum 50A current load depending on the pulse selected.

The Manual will help operators handle and utilize this product in safety.
Keep the Manual in a place where readily available.

5. BASIC SAFETY PRECAUTIONS

Symbols of Hazard

WARNING

This symbol indicates that failure to comply with the associated precaution "may result in death or serious injury".

CAUTION

This symbol indicates that failure to comply with the associated precaution "may result in damage but that only physical damage is likely to occur".

Basic Safety Precautions

WARNING 警告

1. **This unit cannot be used in a fire prohibited area or other explosive areas. If used in such an area, this unit is liable to cause combustion or ignition due to electric discharge etc.**
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. **NOISE LABORATORY and its selling agents shall not be liable for any accident resulting in injury or any physical damage due to abuse or mishandling of this unit, and also shall not assume the responsibility for any resultant damages. 【Precautions for human body, operation, environments and connection】**

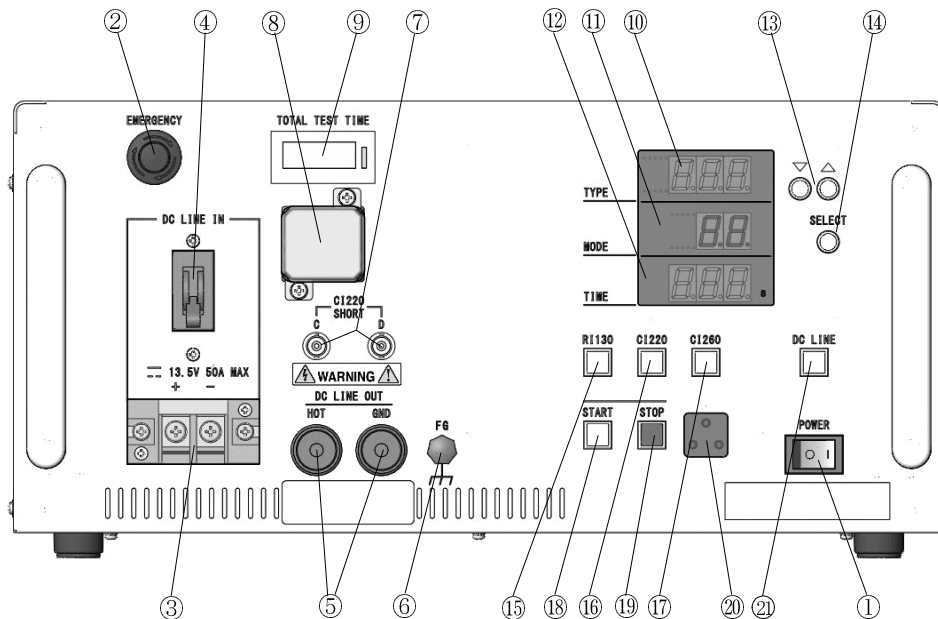
-
4. When connecting cables and carrying out settings, place the unit in the STOP conditions and interrupt the EUT supply beforehand, otherwise, an electric shock due to high voltage may be caused or the unit may be damaged. 【Precautions for human body and connection】
 5. For safety in operation, use the standard and optional accessories supplied by our company. 【Precaution for connection, operation and environment】



6. Be sure to connect the ground plane to the safety ground. 【Precautions for operation and safety】
7. 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】
8. Do not use nor keep the unit in a hot or cold environment (Operating temperature: 10°C~35°C) otherwise, the unit may be damaged or only exhibit limited performance. 【Precaution for environments】
9. If condensation is found, fully dry the unit before operating it, otherwise, the unit may be damaged or only exhibit limited performance. 【Precautions for environments】
10. Avoid using this unit in a high relative humidity or dusty environment. 【Precaution for environments】
11. When repair, maintenance work or internal adjustment (except for the internal discharge gap adjustment) is required, our company's service engineer or our designated service engineer takes charge of such work.
12. Do not wipe off the body and peripheral equipment with thinner, alcohol or other solvent. When the unit is dirty, soak a cloth in a detergent, wring it and wipe the unit with this cloth. Using solvents may spoil the appearance. 【Precautions for handling】
13. When installing the unit, do not block the vent. [Precaution for environments]
14. Operate this unit on the supply voltage and current specified. Misuse may cause damage of this unit or other equipment. 【Precautions for supply connection】

6. DESCRIPTION OF EACH CONTROL DISPLAY AND TERMINAL AND ITS FUNCTION

6-1 Front panel



- ① POWER switch
turns on and off the simulator

- ② EMERGENCY stop switch
A mushroom-form push-lock switch. When pressed while DC is supplied or test is being conducted, the system automatically stops pulse generation and turn off the DC LINE. At this instance, the indication of “-E” is shown on TYPE display.
For releasing the EMERGENCY stop, turn the stop switch knob clockwise and turn on POWER again after checking to see that safety is assured. In EMMERGECEY stop status, the system does not accept any control.

- ③ DC LINE IN terminal
DC power input ports. Connect a DC source rated 12V/50. Without connection of a DC source, no transient pulse/waveform can be generated.

- ④ DC LINE IN circuit breaker
Trips when the current on the DC LINE exceeds the limit of 60A. When conducting testing, raise the lever up to turn on the circuit. With no DC potential on the DC LINE, no transient pulse/waveform can be generated.

⑤ DC LINE OUT terminal

Output ports of the DC LINE. The selected transient pulse/waveform with DC12V is available at these ports. The current capacity varies depending on the selected transient pulse/waveform. The maximum current is 50A and refer to the table in Section 9-3

⑥ FG terminal

Common to the chassis ground (PE on the rear panel), also common to GND of the DC LINE. FG terminal shall be connected to the ground plane.

⑦ C/D connectors

BNC connectors to connect the source wire (inductive line) of Coupling Test Fixture called for in RI 130 Coupled Immunity test (optional accessory Model 15-N1583)

For CI 220 Immunity from Transient Disturbances, short-circuit C/D connectors by using the supplied BNC short-circuit cable. For CI260 testing, C/D connections shall be open.

⑧ Switching relay (KUP-14A15-12)

This model number is specified by the FORD EMC-SC-2009 document. One hundred hours of operation is a rough estimate for replacement with a brand new relay.

⑨ TOTAL TEST TIME (**h**m**s) display

Indicates the accumulated operation (transient pulses/waveform produced) time by the **h**m**s system. When the time reaches the maximum (100h ≐ 99h 59m 59s), a replacement relay shall be installed and the time indications shall be reset to "0" by pressing "RST" button next to the display. Operation time is saved and backed-up in EEPROM.

⑩ TYPE display

Indicates the selected transient pulse. Transient pulses A2-1, A2-2, C-1, and C-2 are shown as A21, A22, C1, C2, respectively. TYPE display blinks when selecting the transient pulse. The indication of "-E" is shown when EMMERGECY stop button has been pressed or when the safety interlock circuit on the rear panel is open.

⑪ MODE display

Indicates the pulse timing mode for the selected transient pulse on TYPE display. The display blinks when selection is being done.

⑫ Test TIME display

Indicates the remaining test duration in second unit. When a test is not being run, the test time setting by the operator is shown. The maximum is 999 seconds. The display blinks when selection is being done.

⑬ Setting button ($\triangle \cdot \nabla$)

In STOP status, changes the setting of the selected parameter (the relevant display blinks) by SELECT button. Press and hold this button for a fast change.

⑭ SELECT button

In STOP status, pressing this button selects the parameter, the setting of which the operator is going to change, in the order of \rightarrow TYPE \rightarrow MODE \rightarrow TIME \rightarrow (cyclic operation). The relevant DISPLAY of the selected parameter blinks.

⑮ RI 130

Selects RI 130 test. When RI 130 test is selected, the lamp illuminates. In START status, selection cannot be done.

⑯ CI 220

Selects CI 220 test. When CI 220 test is selected, the lamp illuminates and DC LINE switch functions. In START status, selection cannot be done.

⑰ CI 260

Selects CI 260 test. When CI 260 test is selected, the lamp illuminates and DC LINE switch functions. In START status, selection cannot be done.

⑱ START switch/lamp

Starts the pulse generation. In START status, the lamp illuminates. CI 220 test starts only when DC LINE switch is on. An alarm sound is generated when the DC LINE is off.

The simulator stops testing (comes into STOP status) by either of the following reason.

- the desired test time has been achieved.
- STOP switch has been pressed.
- EMERGENCY stop switch has been pressed.
- The safety interlock has been released (open-circuit)

⑲ STOP key

Terminates the pulse generation

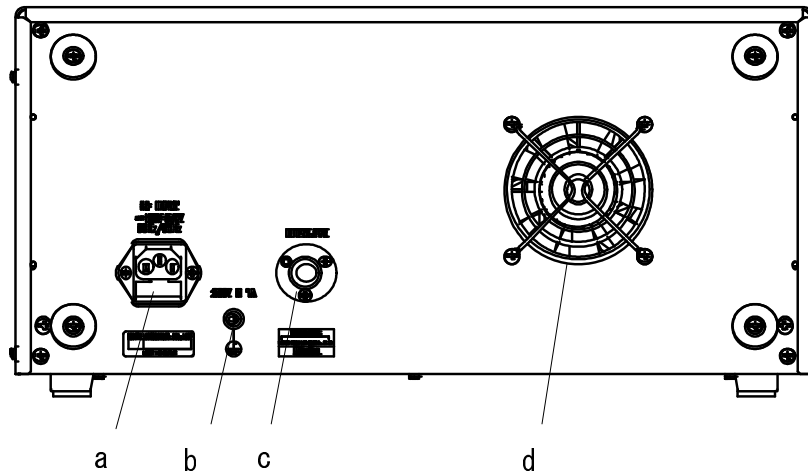
⑳ Warning lamp

Illuminates in red while DC LINE switch is on. In START status, this lamp blinks in red.

㉑ DC LINE switch

Turns on (lamp illuminates) and off DC power output from DC LINE OUT for other tests than RI13. This switch toggles between on and off.

6-2 Rear panel



- a AC inlet/fuses
Power supply input connector for this simulator. Fuses are employed. The PE plug of the AC cord shall be connected to the protective ground.
- b PE terminal
In case that the simulator cannot be earthed through the AC cord connected to the AC inlet, ground this simulator to the protective ground by using this terminal.
- c Safety interlock connector
Only when the supplied interlock plug is connected to this connector, the simulator enables to turn on the DC LINE and start testing. The pin No. 1 and 3 are short-circuited when the simulator leaves the factory. For controlling STOP testing for safety purpose, open the circuit between Pin No. 1 and 3. (Turn on by using contacts or open-collector when externally making short-circuit. Pin No. 1 outputs +5V and 1mA to Pin No. 3. Pin numbers 2, 4 and 5 are connected to the simulator chassis (PE))
- d Fan
Cooling fan for the internal circuitry. Do not block the ventilation holes of this fan and slits on the front panel.

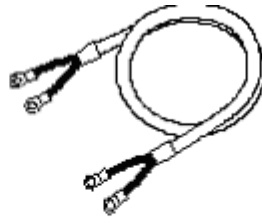
7. INCLUDED ACCESSORIES



Switching relay



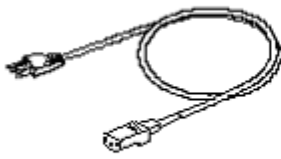
Interlock plug



DC input cable



DC output cable



AC cord



BNC short cable



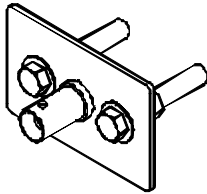
Fuse



Instruction



Accessory bag



BNC adaptor

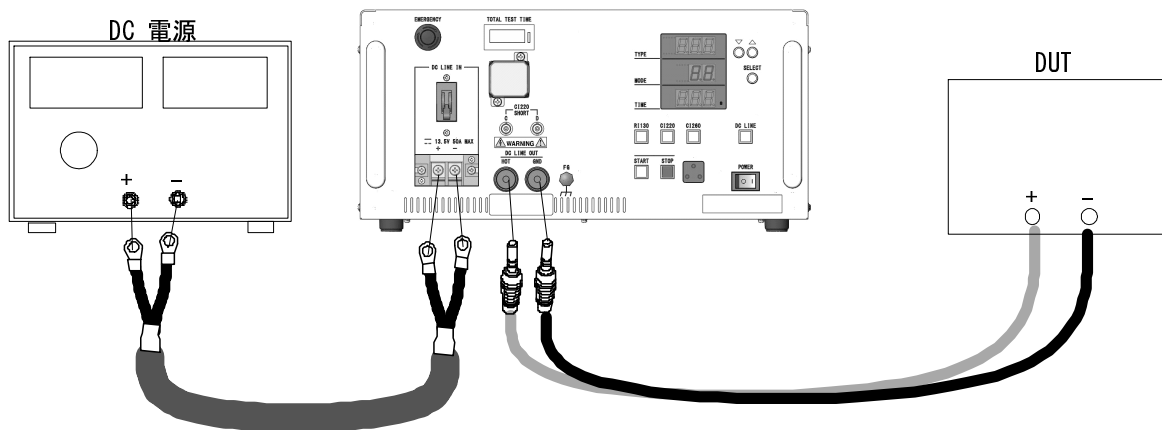
	Quantity
• Switching relay (KUP-14A15-12) mounted/spare	1 each
• Interlock plug	1
• DC input cable (8sq, with $\phi 5/\phi 6$ terminals, 2m).....	1
• DC output cable (2m), red, black.....	1 each
• BNC short cable (0.15m)	1
• AC cord	1
• Fuse (1A)	2
• Instruction manual (this booklet)	1
• Accessory bag	1
• BNC adaptor	1

8. CONNECTIPON

8-1. Installation

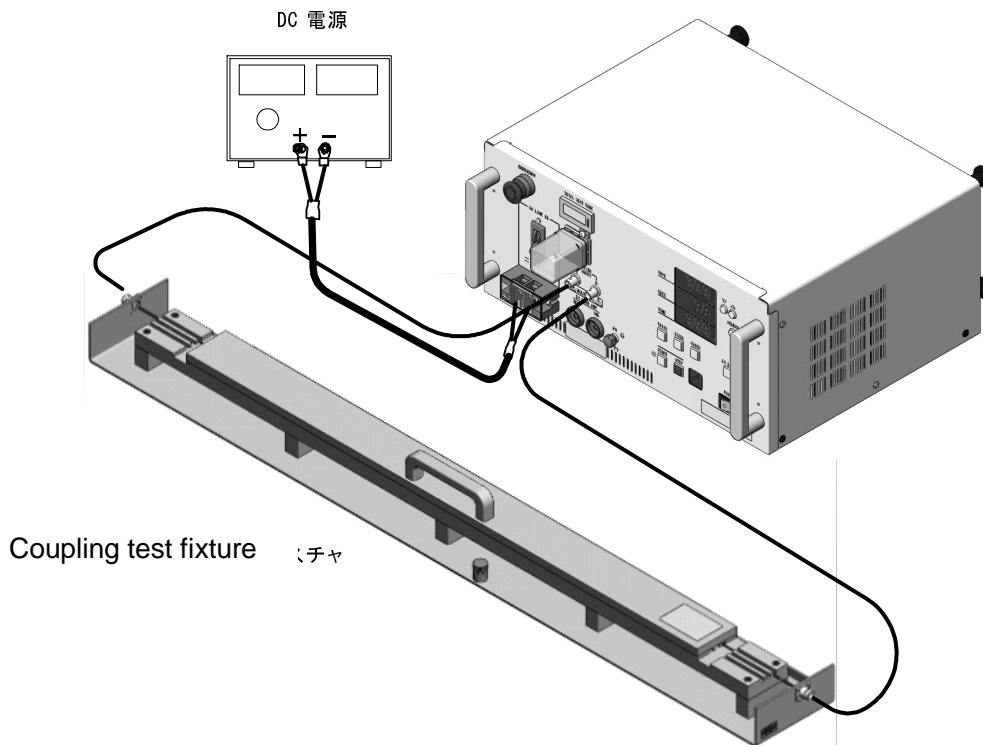
- 1) Place this simulator, DC source and DUT on a stable, level and hard surface. Care shall be taken in order not to block the ventilation holes of the fun on the rear side.
- 2) Refer to the FORD standard for the details for test set-up for the simulator, DUT and ground plane.

8-2. Connection example (CI 220 and CI 260t tests)



- ◇ Attach the supplied interlock plug onto the safety interlock connector on the rear panel.
- ◇ Supply AC power to this simulator.
- ◇ Connect a DC 12V supply meeting the DUT current specification to DC LINE IN terminal by using the supplied DC input cables. (When the solderless terminals do not fit, replace them with appropriate ones)
- ◇ Connect the DUT to DC LINE OUT terminal by using the supplied DC output cables. The DUT side of the cables is with no fitting attached. Attach appropriate fittings/connectors meeting the DUT. Insert the connector of the cables deep to DC LINE OUT terminal and the connectors will be locked and cannot be released. To release them, push them to the further depth again (Snap-in lock type).

8-3.Connection example (for RI 130 testing)



- 1) Attach the supplied interlock plug onto the safety interlock connector on the rear panel.
- 2) Supply AC power to this simulator
- 3) Connect a DC 12V/10A supply to DC LINE IN terminal by using the supplied DC input cables. (When the solderless terminals do not fit, replace them with appropriate ones)
- 4) Connect the test fixture to C/D connectors by using the BNC cables supplied as accessories of the test fixture.
- 5) Refer to the FORD standard for the details for test set-up for the simulator, DUT and ground plane.

9. OPERATION

9-1. Preparation

- 1) Check to see that EMMERGENCY stop switch is in up position.
- 2) Turn on the simulator power.
- 3) Turn on the DC source.

Check to see that the output voltage is within DC 13V+0.5V/-1.0V. (DC13.5V for CI 260 Waveform F)

- 4) Connect the DUT and place it in stand-by status
- 5) Turn on the DC LINE IN circuit breaker

Note: The simulator generates the test pulses pulse only when DC+12V (13.5V) is present at DC LINE IN terminal and DC LINE IN breaker is on.

The maximum current for the EUT varies depending on the pulse being generated. Care shall be taken not to allow currents exceeding the current specifications of each pulse. The failure to obey the current specification for each transient pulse/waveform may cause damage to the switching relay.

9-2. Test settings

- 1) The table on the next page lists all available transient pulses/waveform, pulse timing modes and the allowable DUT current.
- 2) Select the desired test among R1130, CI 220 and CI 260 by pressing the relevant key. The selected lamp will illuminate.
- 3) Selected the transient pulse among Pulse A1, A2-1, A2-2, C-1, C-2 and F.
- 4) Select the pulse timing mode.
- 5) Set the test duration.
- 6) In a case of CI220 testing, turn on the DC LINE by pressing DC LINE key.
- 7) Press START key.
- 8) Pulse generation automatically stops after a lapse of the test duration set on the test TIME.
- 9) Pressing STOP key terminates testing. When the DC LINE in on, press DC LINE key to turn off the DC LINE.

9-3. Tests pulses and modes setting

Test type	Transient pulse/Waveform	Mode	Test duration (in second)*2	Maximum output current (A)	Output connector
RI130	A2-1	2	60	*1	C,D connectors (BNC)*1
		3	60		
	A2-2	2	60		
		3	60		
CI220	A1	1	120	10	DC LINE OUT (C and D connectors shall be short-circuited)
		2	20	10	
	A2-1	1	120	10	
		2	20	10	
		3	20	10	
	A2-2	2	20	10	
		3	20	10	
	C-1	2	20	50	
		3	20	50	
	C-2	2	20	50	
		3	20	50	
	CI260	Waveform F	-	60	

*1 The dedicated Coupling Test Fixture shall be used.

*2 The test duration shown in the table follows the FORD standard and can be set to any desired value.

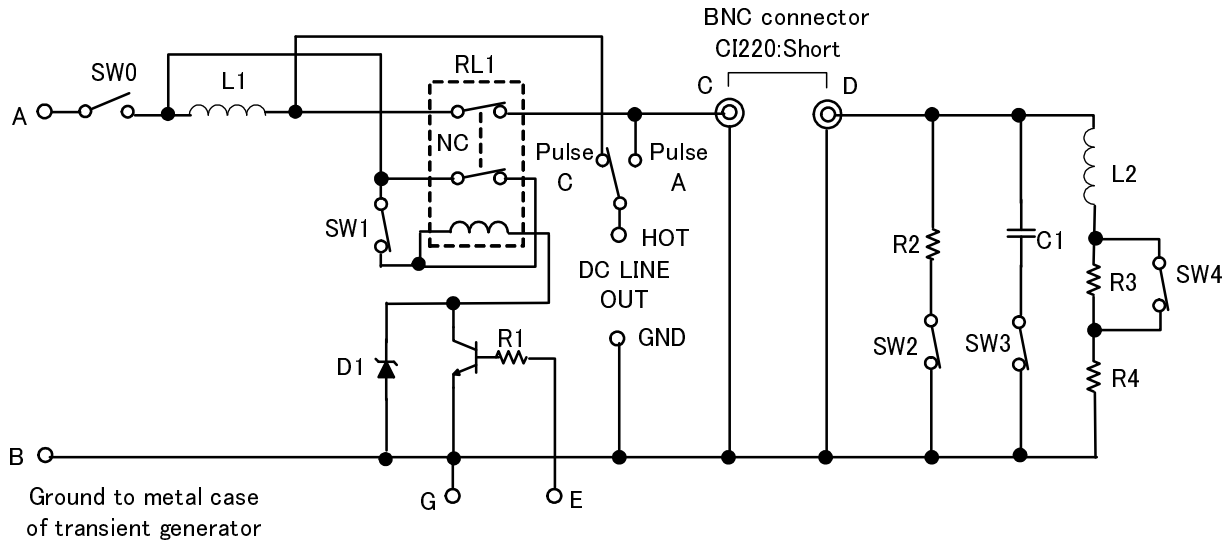
9-4. Switching relay replacement

Replacing the switching relay is recommended when the reading on TOTAL TEST TIME exceeds 100H (it indicates 00h00m00s after 99h99m99s). Turn off the simulator power. Pull the switching relay straight out of the front panel. To install a new one, insert it straight. After replacement, rest TOTAL TEST TIME to "0 (zero) by pressing RST button.

10.SCHEMATIC AND TIMING CHART

A schematic of the simulator is shown below.

10-1 RI130/CI220 (Pulse A1/A2-1/A2-2/C-1/C-2)

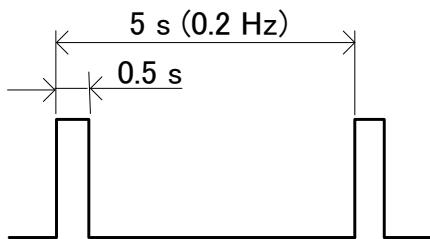


Key

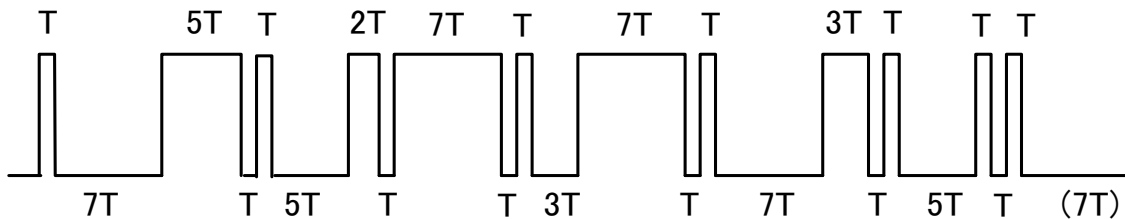
R1	51 Ω 25W	L2	100 mH Osborn transformer 32416
R2	220 Ω 5W	D1	Zener Diode 39 V 5W
R3	33 Ω 10w	Q1	NPN transistor
R4	6 Ω 50W	SW0-4	
C1	100 nF 2kV	RL1	12 V AC relay Potter & Brumfield KUP-14A15-12
L1	5 μ H Osborn transformer 8745		

10-2 Timing chart

MODE 1



MODE 2, MODE 3

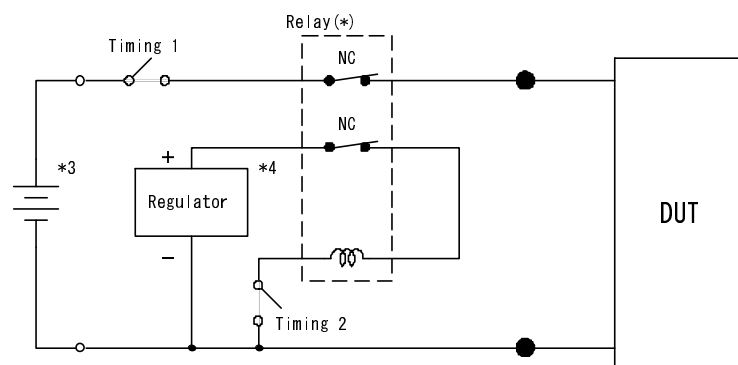


T:50ms

10-3 Pulse timing MODE

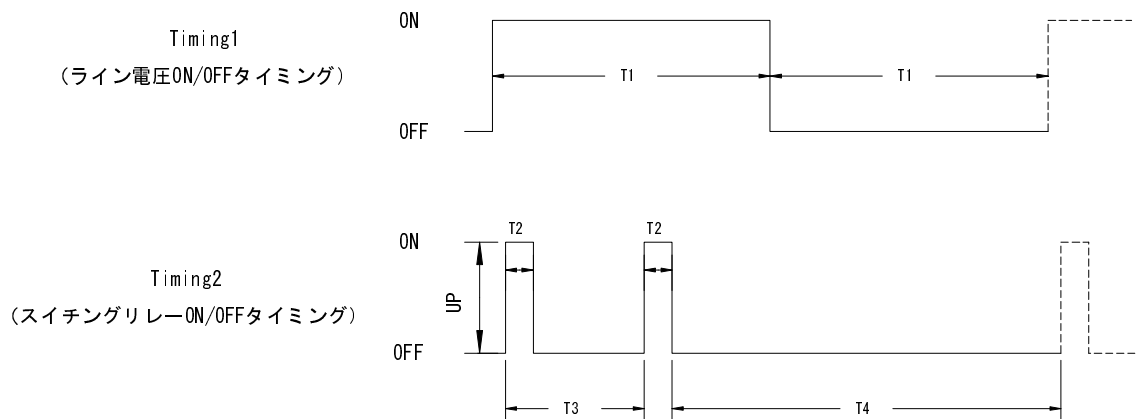
In Mode 1, 5s periodic timing pulses are generated. In Mode 2, pseudo-random pulses are generated based on 50ms unit in MODE 2. Transient pulses are generated at on and off edges of the random pulses. The same pseudo-random pulses as in MODE 2 are used in MODE 3. The switching relay is self-excited and transient pulses are generated during ON state. For MODE 2 and MODE 3 operation, the actual pulse timing is not exactly the same as timing pulse since the switching relay requires a delay for 10ms to 20ms for both of on and off operation.

10-4 CI260 Waveform F schematic



Relay: AC12V relay:Potter & Brumfield KUP-14A15-12

10-5 CI260 Waveform F timing



Key

Up	13.5V
T1	5sec
T2	100msec
T3	2.5sec
T4	7.4sec

11.SPECIFICATIONS

Parameter	Specifications
Compliant standard	Ford Motor Co. standard EMC-CS-2009.1
Maximum DC input voltage	DC13.5 V
Maximum DC output current	10 A, 50 A (varies depending on the selected waveform. Refer to section 9.3)
DC LINE IN circuit breaker	60 A
Transient pulses/waveform	Refer to the table in Section 9.3
Test TIME setting	1s to 999s (The settings at the latest use for all the available combinations of Test type/Transient pulse/waveform and mode are saved for about 3 months)
Switching relay	KUP-1415-12 (Potter & Brumfield), replacement recommend for every 100h operation
TOTAL TEST TIME indicator	Indicates the total test time from 1s to 99 h 59 min 59 s (backed-up for black-outs)
EMMERGENCY STOP key	Red-mushroom type (push-lock and return-reset) Stops pulse and DC output To run the simulator again, power on and off operation required
Interlock	Allows external control via contacts or open-collector circuit Open interlock circuit has the same functions as those for EMMERGENCY stop.
Operating voltage	AC100 V to AC240 V $\pm 10\%$ (50 Hz/60 Hz) 50 VA
Dimensions	Approx. W430 mmxD322 mmxH200 mm (projection excluded)
Weight	Approx. 10 kgs.

Note 1: Employs the components specified by the Ford standard (inductor 8745, inductor 32416 and switching relay KUP-14A15-12). Exactly the same transient pulse waveforms as shown in the Ford standard are not guaranteed.

Note 2: Consistent output is not available due to the nature of discharge phenomena caused by relay contacts chattering of the switching relay (switch contact bounce)

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 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.

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.

14.NOISE LABORATORY SUPPORT NETWORK

- If a symptom that seems a trouble is found, check the symptom against the following check sheet and inform the model name and serial Number of the product together with the symptom to Noise Laboratory or our nearest sales agent in your area.
- 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, pack the product and repair order sheet in the former package or equivalent suitable for transit, and send them back.

NOISE LABORATORY CO., LTD.

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