# A053 DCC Decoder Small size, general purpose type
# A059 DCC Decoder Room light multi type
# Common Instruction manual

Thank you for purchasing Rokuhan DCC decoder A053 or A059. Please read this User's Manual carefully before use to familiarize yourself with safe and effective usage. This procuct is for railway models only. After reading this manual, please keep it in a safe place for future reference.

## 1. Warnings 【Be sure to read before use】

- When a problem (abnormal over heating, smoking, odor, etc.) occurs at controller or locomotives, turn the power off and unplug the power cord immediately. Continuing to use with a fault could lead to failure.
- Do not use this product for any application, other than in railway models intended.
- Do not disassemble or alter this product.
- Handle the soldering iron with care after reading the attached manual closely. Keep out of reach of users younger than 15 years old.
- Do not touch Decoder PCB for 5 minutes after running. When decoder (especially A053 Small size general purpose decoder) is installed into other brand Z-scale engines which draw too much current, decoder PCB may become hot and may burn skin especially on fingers.

## 2. Cautions 【Be sure to read before use】

- Do not store the product in an area exposed to moisture, dust, high heat, or water.
- Due to the characteristics of the product, it is unsuitable for use by those younger than 15 years old without supervision of an adult.
- Due to their construction not all other brands of Z-scale engines are suitable for conversion to DCC with this decoder.
- DC type Room light PCBs such as A009 / A015 / A030 / A031 can not be used together with DCC decoder room light multi type A059.
- Confirm good running condition of DC lit car before installing Rokuhan decoders.
- Maximum output of Rokuhan decoders for motor is 400mA & for function in same circuit is 12mA. Do not exceed this maximum current.
- Do not place A053 Small size general purpose decoder close to plastic part such as car body wall and plastic sheathed wire etc. It may have heat and deform such plastic items.

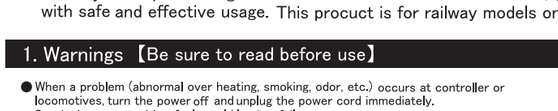
## 3. Required tools and equipments before set

＜Necessary tools＞ (sold separately)
Soldering iron (around 20w) / Solder (for electric works) / Wire strippers (to prepare wires) / Tweezers (to adjust wire angle) / Screwdriver / Thin carton tape (to fix decoder in the car) / 2.0 DIA drill (N.A. 5/64 drill bit) / Side cutter (for A059)

＜Necessary DCC command station＞ (sold separately)
DCC command station is necessary to operate Rokuhan decoders.
Recommend Rokuhan e-Tain controller (sold separately). For detail, read the instruction manual attached to its package. Other brands of DCC controllers are still OK to operate Rokuhan decoders with some exceptions. Read each instruction manual carefully.

[Warning about Soldering iron]
Pay attention to handling not to injure the hands or fingers, and not to damage plastic part of the locomotive or car.

## 4. Contents

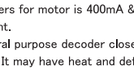



①DCC decoder ····· 1pc.
(Small general purpose type A053 or Room light multi type A059)
②Tension Spring ····· 4pcs.
＊Only for A059 (2pcs. are spares)
③Screw (Ø1.4mm) ·····2pcs.
＊Only for A059 (1pc. is a spare)
④Heat shrink tube (Only for A053 ) ·····1pc.
⑤Instruction manual (English) ·····1pc.
⑥Instruction manual (Japanese) ·····1pc.

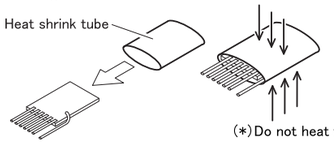
## 5. How to use Rokuhan DCC decoder

These DCC decoders are made by Rokuhan, Small general purpose type and room light multi type as of (2018/6).
Small general purpose type (A053) can be used for electric locomotive etc. which does not require a room light. Room light multi type (A059) is a dedicated type for use in Rokuhan made Z-scale vehicles etc.

● A053 Small size, general purpose type



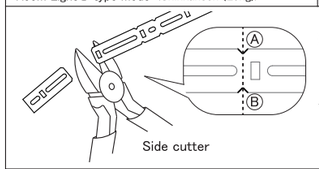
A heat shrink tube is enclosed which is recommended to cover A053 decoder to protect it from damage or short circuit.




Use a hot air hair dryer to shrink the tube and fit tightly over the decoder and start of attached wires. Be careful not to over heat tube and damage wires or your fingers.

● A059 DCC Decoder Room Light Multi type
Several forms are generated by cutting a part of the board with side cutter, which can be applied to various Rokuhan vehicles.

| Cut at the the line ①～④ by nipper | Main compatible models | Remarks |
|---|---|---|
| ① ② ③ ④ Room Light Multi type (before cutting) | Some N-scale vehicles | Original long condition can be used for some N-scale cars. |
| ① ④ Room Light A type mode | 113 Type 115 Type 415 Type 103 Type 24 Type (Sushi only) 14 Type 50 Type etc. | This form, applicable to most Rokuhan Z-scale cars. |
| ③ Room Light B1 type mode | Kiha 52 etc. | This form, used for KIHA 52 series. |
| ② Room Light B2 type mode | 24 Type (Other than sushi) etc. | This form, used for 24 series other than Sushi |
| ② ④ Room Light C type mode <Shinkansen (Short)> | 500 Type Shinkansen the lead car, tail car, E6 Type Shinkansen lead car etc. | This form, mainly used for lead car and tail car of Shinkansen. |
| ④ Room Light D type mode <Shinkansen (Long)> | 500 Type Shinkansen intermediate car etc. | This form, mainly used for intermediate car of Shinkansen. |




※ Please make a straight flush cut from A to B with side cutter.

＜ Caution ＞ avoid an angle cut as damage to PCB may result.

## 6. Wire color and function

Here is a table listing wire color and its meaning.
- The wire color & DCC function of A053 decoder is white (F0) and yellow (F0) only.
- The wire color & DCC function of the 6 style modes of A059 are white (F0), yellow (F0), green (F1) and violet (F2) (total 4 DCC functions).
  ＊"DCC Function" means lighting output in this case.

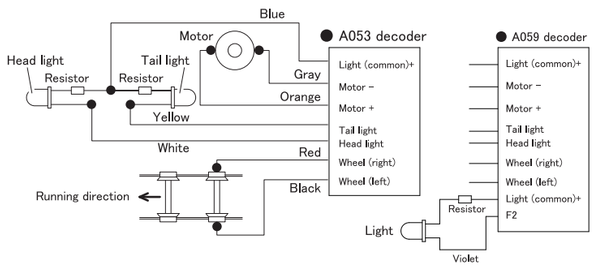
| Function (Spec) | Color | A053 | A059 |
|---|---|---|---|
| Collect current from track (right) | Red | ○ | ＊1 |
| Collect current from track (left) | Black | ○ | ＊1 |
| Motor (＋): right | Orange | ○ | ○ |
| Motor (－): left | Gray | ○ | ○ |
| F0 (Front): Head light | White | ○ | ○ |
| F0 (Rear): Tail light | Yellow | ○ | ○ |
| F1: DCC function 1 | Green | － | ＊2 |
| F2: DCC function 2 | Violet | － | ○ |
| Light (Common use) 5V+ | Blue | ○ | ○ |

＊1 : Actually collecting current is done through 'Spring', thus, there is no red wire and black wire on the decoder A059.
＊2 : Room light LED is pre-mounted on decoder, thus, there is no green wire on the decoder A059.

## 7. Install Rokuhan decoder into the car

### 【Wiring diagram Rokuhan decoder and car】

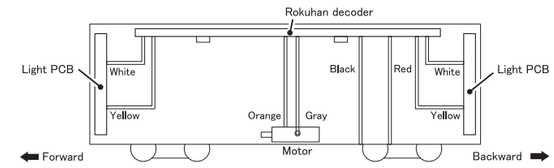
This is the wiring diagram between decoder PCB and each car motor chassis/motorless chassis.



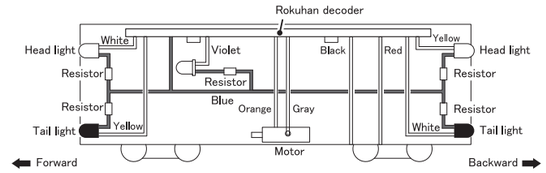

### 【Assembly image of Rokuhan decoder and car】

- The head light will be turned ON and tail light will be ON to run forward. When it runs backward, the head and tail light are swiched automatically.
- F0 port will handle ON/OFF of head/tail light on a single car. But F0 does not support the complicated ON/OFF of connected cars.

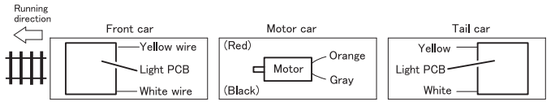
Simple assembly to use head/tail light PCB




Higher grade assembly for expert to use F2 DCC function




※ Here is necessary wire coloring to the decoder when the cars are connected.




＊ Rokuhan decoder MAX out put current is 12mA. So use LED, not light bulb. If other brand of head light PCB is used, adjust the output current from Rokuhan DCC decoder within 12mA.

## 8. How to set DCC decoder (Case study)

- First of all. Confirm car was running and functioning well before installing Rokuhan decoder. If it's not good on DC, it will be also no good after installing decoder.
- Please check car operating condition before you try to install decoder.
- Confirm smooth running and no problems with lighting before install.
- Pay attention to use of soldering iron to install decoder.

### ＜ *Case study 1* ＞

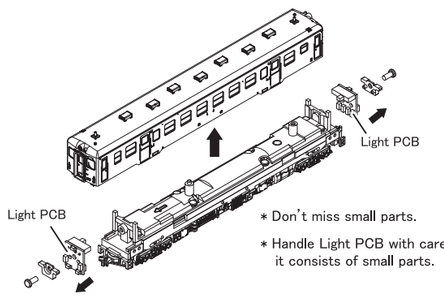
*Rokuhan DCC decoder A059 set on Rokuhan Z-scale motor car KIHA 52*

### 【Step1】 Take off car body from chassis

CAUTION !
○ Watch each part so that none are lost and remember how it was assembled.
○ Use tweezers for small parts.

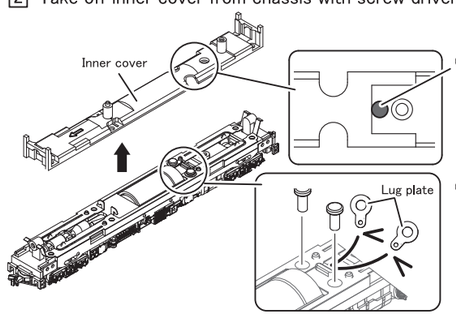
＊ Car will be out of warranty if you install decoder and come up with a problem after install.
＊ Check condition of car operation & lighting before install.

1 Remove the car body, then remove the light board.




＊ Don't miss small parts.
＊ Handle Light PCB with care because it consists of small parts.

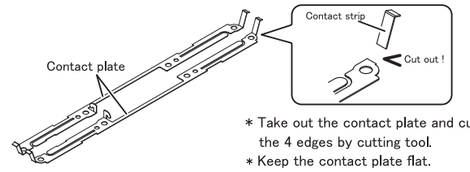
2 Take off inner cover from chassis with screw driver.




① Make a hole as shown 2.0mm DIA. (N.A. 5/64 in.) .

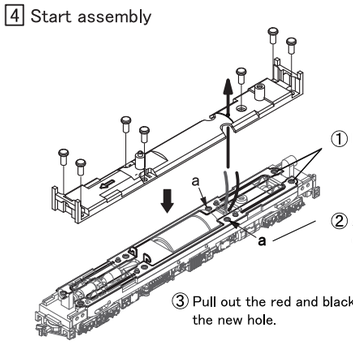
② Unscrew the lug plates and unsolder them from wire.

3 Take out the contact plate, then cut off the 4 raised contact strips at edge of plate with side cutter.




＊ Take out the contact plate and cut out the 4 edges by cutting tool.
＊ Keep the contact plate flat.

4 Start assembly




① Reassemble the contact plate.

② Attach contact plates with original screws.

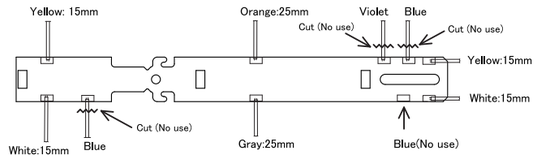
③ Pull out the red and black wires (track power wires) through the new hole.

＊ This is the final process before install decoder.

### 【Step2】 Install Rokuhan decoder

5 How to prepare wires

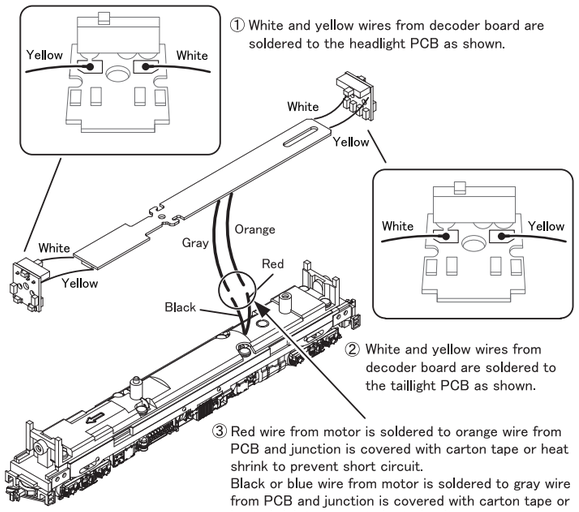
The space in the car is limited. To prevent any unexpected trouble, make wire leads as short as possible. The wires that will not be used will be removed from the PCB by desoldering them. Remove 1 violet wire and 2 blue wires as shown as they will not be used.
(A059 Room light B1 type mode)




＊ Strip 3mm from end of remaining wires

6 Connect wire by soldering to each part

＊ Face the LEDs on the A059 PCB down to car body first.




① White and yellow wires from decoder board are soldered to the headlight PCB as shown.

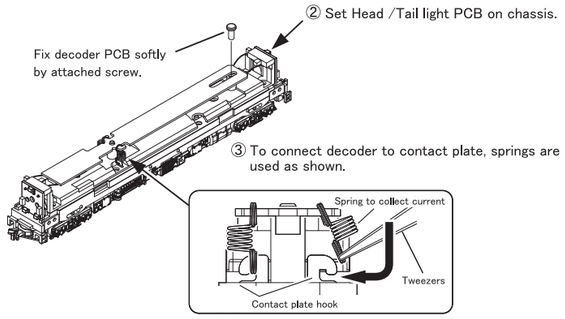
② White and yellow wires from decoder board are soldered to the taillight PCB as shown.

③ Red wire from motor is soldered to orange wire from PCB and junction is covered with carton tape or heat shrink to prevent short circuit.
Black or blue wire from motor is soldered to gray wire from PCB and junction is covered with carton tape or heat shrink to prevent short circuit.

＊ Matching of decoder PCB wire and motor wire will be changed depend on each motor chassis. Please confirm running direction and lighting condition then fix wire by soldering.

## 7 Set up decoder PCB on the chassis.

① Screw the decoder PCB to fix on the chassis.
(CAUTION!) PCB surface wil be damaged easily and may cause short circuit if tightened excessively. So do not over tighten screw to avoid damage to PCB.




( CAUTION! ) Pay attention not to extend the spring too long !

＊ Completed process after set body.

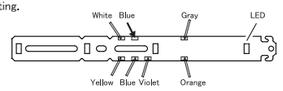
## 〈 *Case study 2* 〉

*Rokuhan DCC decoder A059 set on motor car or intermediate car.*

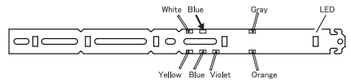
### [Ex. Install into Motor car]

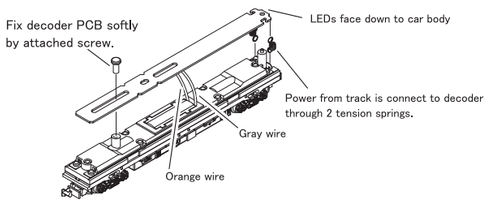
Rokuhan motor car 103 type enclosed in T022-1 is used in this case study 2.
Red wire from motor is connected to orange wire from PCB.
Black or blue wire from motor is connect to gray wire from PCB.
Both connected joints are protected by carton tape or heat shrink tubing.
Room light and motor are controlled by this setting.

● Room light A type mode




● Room light D type mode
〈For Shinkansen (Long) 〉



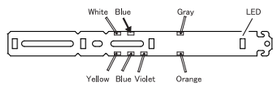

## 〈 *Case study 3* 〉

*Rokuhan DCC decoder A059 set on front car.*

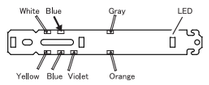
### [Ex. Install into front car without motor]

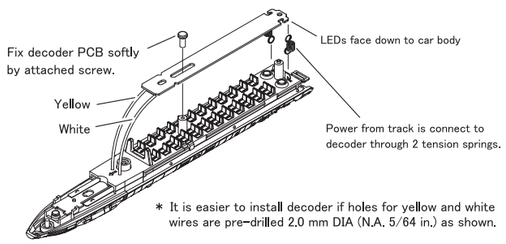
Shinkansen front car is used in this study 3.
White and Yellow wires are connected to the head light PCB.
Room light and head light are controlled by this setting.

● Room light A type mode




● Room light C type mode
〈For Shinkansen (short) 〉



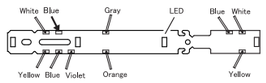




＊ It is easier to install decoder if holes for yellow and white wires are pre-drilled 2.0 mm DIA (N.A. 5/64 in.) as shown.

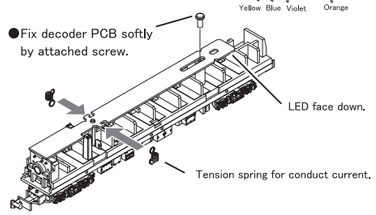
## 〈 *Case study 4* 〉

*Rokuhan DCC decoder A059 set on 24 type passenger cars except dining car "SUSHI"*

● Room light B2 type mode




●Fix decoder PCB softly by attached screw.




### 【How to adjust the Brightness of head/tail light after install of these lights】

When head/tail light PCB is connected with decoder without any adjustment, the brightness of the head/tail light may be no enough. In such case it will be effective to change LED to a brighter type or change the resistor value to the lower value. This reworking of PCB is for expert user who knows Room light PCB well or studied about electronics. After this modification the decoder is no longer covered by warranty. To replace the LED, pay attention to polarity of original LED. To change the resistor to a lower value, use the one from 560 ohm resistor to 1k ohm resistor. Do not change 100 ohm resistor which is essential for this PCB, also do not change any capacitor values.

### 【Function test】

After completing installation, do a function test and read CV1 default vlaue is 3. Decoder may be damaged if you do not confirm this reading test first. If CV1 displays 255, there is a possibility you have a short circuit on decoder PCB. If CV1 is zero or "failure to read", there is a possibilty of soldering error on the decoder PCB.

## 9. Decoder programming

"Programming" means to read and write CV value from/into decoder using controller.

### 【Meaning of CV】

CV = "Configuration Variables", and consists of CV number and CV value.
CV number varies from 1 to 1024 which depends on device supplier.
CV value decides individual running, lighting, sounding, etc. condition of each decoder which is changeable according to operator's requirement.
Rokuhan decoders are programmed in the best condition to suit Z-scale cars.
So original setting will provide good condition for your Z-scale cars.

### 【Programming mode】

There are two main modes Page Mode and Direct mode, Rokuhan decoders support Direct mode only for Programming.
Rokuhan e-Train controller supports Direct mode only and no problem to program.
Other DCC controllers in the market may support several program modes to use such DCC controller. Please select Direct Mode for programming Rokuhan decoders.

### 【Reading and writing CV】

Rokuhan e-Train controller supports both read and write.
Some DCC controllers and decoders in the market may support write only.
Please read each instruction manual before use.
When doing read write to decoder, only one car at a time should be on the program track (Rokuhan e-Train controller asks for program track to read/write).

### 【Read/Write trouble】

Some cars particularly Z-scale ones are very light to reliably read and write to the decoder. Try to softly place a weight on the car to ensure good electricl contact with rail.

## 10. CV and programming

At first try to change acceleration CV3 and deceleration CV4 to 10 and 20 respectively. This changes the rate of acceleration and deceleration independent of control movement. You will become the fun of DCC control by such simple setting change.

You will also see a CV table (see next page) and will start changing address (CV1).

CV2 to CV6 will be enough to make a customs speed table. Or you may adjust each CV value according to the "Setting range" in the table if these CVs are left at default value.

Rokuhan e-Train controller (sold separately) can provide easy programming without complicated calculation and setting.

### 【How to set and address】

There are 2 types address, one is 2 digit address and the other is 4 digit address.

**When you want to set address as 3 to 127, enter the number into CV1**

To make effective 2 digit address circumstances, CV29 must be set like this.

● CV29 : Set as 2 or 3

＊ If address is set as more than number 127, it's automatically sellected to number 127.

**When you want to set address as 128 to 9999, take 4 digit address setting**

To make effective 4 digit address circumstances, CV29/CV17/CV18 must be set like this.

● CV29 : Set as 34 or 35
● CV17 : Set as 192 through 231 (Which number to use ? See next step ! )
● CV18 : Set as 0 through 255 (Which number to use ? See next step ! )

### 【How to calculate CV17 and CV18】

When you want to set CV1 as number A, divide the number A by 256 first.
(Its result + 192) = CV17
Its rest = CV18

Ex. ① When CV1 = 1000
1000÷256＝3 and the rest 232
3 + 192 = 195 = CV17　　232 = CV18

＊ If you want to set CV1 = (less than 256), CV17 becomes 192 automatically.
＊ Then CV18 becomes same as CV1 figure automatically.

Ex. ② When CV1 = 250
250÷256＝0 and the rest 250
0 + 192 = 192 = CV17　　250 = CV18

＊ If you want to set CV1 as (more than 10000), CV1 becomes 9999 automatically.
＊ It's possible to set CV1 as 3 through 127 in 4 digit address circumstances. But some other brand controllers may not support such setting and becomes unable to control the car. So Rokuhan recommends to use 2 digit circumstances to set CV1 as 3 through 127.

### 【CV (Configuration Variables) table supported by Rokuhan decoder】

| CV number | CV name | Default value | Setting range |
|---|---|---|---|
| CV1 | Primary address (2 digit address) | 3 | 3～127 |
| CV2 | Starting voltage | 0 | 0～255 |
| CV3 | Acceleration Rate | 0 | 0～255 |
| CV4 | Deceleration Rate | 0 | 0～255 |
| CV5 | Highest voltage | 160 | 0～255 |
| CV6 | Middle voltage | 80 | 0～255 |
| CV7 | Decoder Version Number | 4 | – |
| CV8 | Factory reset | – | 8 |
| | The decoder manufacturer ID | 13 | – |
| CV11 | Packet time-out Time | 0 | 0～30 |
| CV17 | Extended Address (Enable 4 digit address) | 192 | 192～231 |
| CV18 | Extended Address (Enable 4 digit address) | 128 | 0～255 |
| CV29 | Configurations Supported | 2 | 2, 3, 34, 35 |

● CV1 : Primary address
Though it's called 2 digit address, 3 digit range (100 – 127) is also regarded as 2 digit here. Default setting is number 3. To make effective 2 digit address circumstances, CV29 must be set as number 2 or 3.

● CV2 : Starting voltage
Start voltage for those cars that require more voltage to get going. Set this just high enough to get a smooth start.

● CV3 : Acceleration Rate
The higher the value, to slower the acceleration.

● CV4 : Deceleration Rate
The higher the value, to slower it will decelerate.

● CV5 : Highest voltage
Set the voltage when the throttle is at full speed. Though it's possible to use the range (0 upto 255), Rokuhan decoders have the best default setting (value 160) to suit Rokuhan cars.

● CV6 : Middle voltage
Set the voltage when the throttle is at midpoint. Though it's possible to use the range (0 upto 255), Rokuhan decoders have the best default setting (value 80) to suit Rokuhan cars.

● CV7 : Decoder version number
This value is just to read.

● CV8 : Factory reset
It's possible to return it to the state when buying each CV value, by writing 8 in CV8. When CV8 is read, it's possible to confirm the decoder manufacturer ID number.

● CV11 : Packet time-out value
This CV contains the maximum time period that the decoder will maintain its speed without receiving a valid packet. The value entered is equal to the maximum sec. time. 0 upto 30 can be used.

● CV17 / CV18 4 digit address
4 digit address is calculated from CV17 and CV18.
The formula is like this.
4 digit address = (CV17-192)×256＋CV18
＊ Make sure 4-digit Addressing is enabled in CV29.

● CV29 Basic configuartion for Decoder
Rokuhan decoder supports such setting like the table.

| Value | Contents |
|---|---|
| 2 | 2 digit address, 28/128 speed step mode |
| 3 | 2 digit address, 28/128 speed step mode, backward run |
| 34 | 4 digit address, 28/128 speed step mode |
| 35 | 4 digit address, 28/128 speed step mode, backward run |

＊ NMRA also mentions 14 speed step mode, but Rokuhan decoders support 28/128 step mode only.

## 11. Special attention to control cars by decoders

When Rokuhan decoders are set in DC cars, there are some special instructions to make smoother your control.

● Z-scale cars have no much weight, so it's difficult to get good electrical conducting with tracks. So they are sometimes unable to get the signals from the controller completely. If the running speed is so high, such problem will happen often. So adjust CV5 (Highest voltage) and control running speed properly.
● Rokuhan decoders (especially A053 small size, general purpose) may heat-up easily when much current to run is required. So do not make run by high speed and for long period.
● Power-off the controller immediately if any derail or any abnormal stop happens.

## 12. Trouble shooting

Check following when such no good running condition or unexpected running condition happens before calling for repair.

### 〈 Not smooth running 〉

● This kind of problems mostly come from poor electric conducting due to dirty condition of wheels and tracks. And some are from car inside conducting error due to dirt. Please clean-up wheels, tracks and related contacting parts.

### 〈 Runaway 〉

● When tracks and wheels are in dirty condition, control signal communication will not be done completely, then it comes into NO-control condition. Please clean-up wheels and tracks.
● Check the car wheels are correctly placed on the tracks, car running mechanism has no problem, there is no problem on the motor, etc.
● See CV value setting.

### 〈 Not run 〉

● See decoder wiring to confirm no wrong issue.
● If the throttle is at full speed but no running, read the address from the car and confirm there is no wrong setting.
● Check all the cables are connected between controller and tracks. Also check the condition of metal contacts at the end of the cables to confirm there is no dirty condition.
● Power-off controller and tablet (if necessary), then restart.
● Check the address matching of controller and decoder.
● Read the trouble shooting of controller, too.

### 〈 Unexpected running 〉

● Reset programming (enter 8 into CV8) and enable factory set.

## 13. Rated specification

[ Rokuhan decoder rated specification ]

Rated input voltage : 10～16V
Rated output voltage (For motors) : DC10～16V At most 400mA
Rated output voltage (For function): DC5V At most 12mA for each
(When white and yellow wires (Not using blue wire) are used, total current of the two wires shall be at most 12mA.)

## 14. Failure and repair

● We will not be responsible for any accident, damage and failure caused by incorrect utilization or operation, disassembling or modifying of this product. We cannot accept any repair of disassembled and modified products.
● The specification, apperance and application may be changed for improvement without prior notice.
● Although extremely care has been taken in manufacturing this product, if you notice other problems, please contact us at the following.

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Rokuhan website: http://www.rokuhan.com/english/

※Information in this manual is current in January, 2018.