



# A060 DCC Accessory Decoder for Turnout and LED Light INSTRUCTION MANUAL

Thank you for purchasing Rokuhan DCC Turnout & Accessory decoder. Please read this User's Manual carefully before use to familiarize yourself with safe and effective usage. 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, turnout or structure, turn the power off and unplug the power cord immediately. Continuing to use with a fault could lead failure.
  - Do not use this product for any application other than railway models.
  - Do not disassemble or alter this product.
  - Handle the soldering iron with care after reading the attached manual closely. Keep out of reach of younger users under 15 years old.
  - Do not touch Decoder PCB during or after play. When decoder is installed into other brand turnouts and etc. which draw too much current, decoder PCB may become hot and may burn especially on fingers.
- Please read the column [14 Rated specification] to know more detail.

## 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 characteristic 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 turnouts and accessories are suitable for conversion to DCC with this decoder. Please read carefully this manual and their instruction manuals, understand each spec and arrange connection properly.
- Turnouts or accessories are not operated by at a time this decoder and DC controller.
- Confirm good function of Turnouts and Accessories before installing Rokuhan decoders.
- Do not make a short-circuit by touching any metal part and lead wire. Any short-circuit could lead damage of decoders and turnouts.
- Maximum output of Rokuhan decoders for Turnout is 2.5A for a moment within 0.25 sec. Do not exceed this maximum current.
- Make sure to make a pair of Rokuhan decoder and Turnout when any Turnout is connected. Even if the same decoder address is assigned to several Turnouts, do not connect such decoders with one Turnout. Please also make a pair of Rokuhan decoder and Turnout in such case.
- When exceeding maximum current is detected, Rokuhan decoder will stop its function. If the turnout has no function, the consumption current of the turnout may have exceeded the rated current of the Rokuhan decoder.
- Rokuhan decoder will function at 10V through 16V. Adjust voltage so that connected turnout can work smoothly without heating or damage.

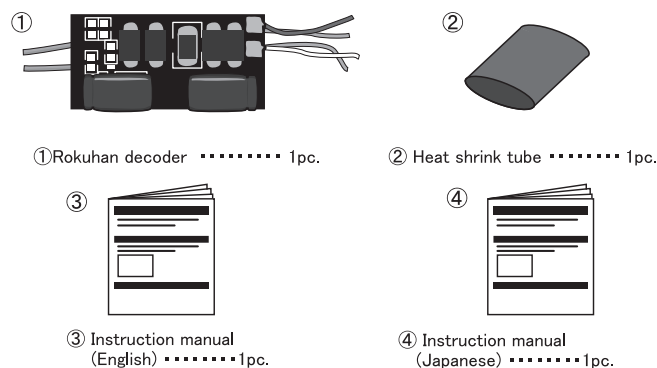
## 3. What is necessary before / after install

<Necessary tools> (sold separately)  
Soldering iron (more or less 20w) / Solder (for electric works) / Wire stripper (to prepare wires) / Tweezers (to adjust wire angle) / Thinner plastic tape or Heat shrink tube (to insulate)

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

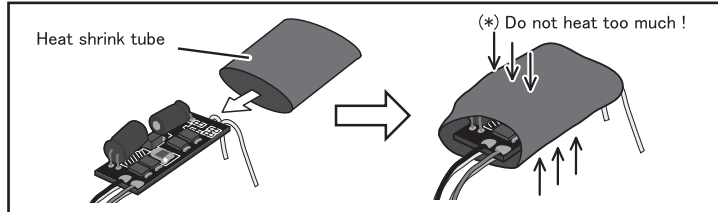
[Warning about Soldering iron]  
Pay attention to heated Soldering iron, not to injure the hands/fingers and not to deform plastic part of the tracks.

## 4. Contents



## 5. How to use Rokuhan DCC decoder

This decoder by Rokuhan is used for switching turnout or lighting accessory. Remote controlling such devices becomes possible when connected with DCC command station and tracks. A heat shrink tube is enclosed which is recommended to cover this 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. Be careful not to over heat tube and damage wires or your fingers.

This Rokuhan decoder is adjusted to suit Rokuhan turnout as factory reset. When its function mode is changed, it works to switch lighting accessories, other brand turnouts driven by magnetic force or turnout machines which are driven by motor rotating force. To change function mode, please see [ 11. CV and programming ] <How to change function mode>.

This Rokuhan decoder has 3 function modes as follows.

### Magnetic force drive Turnout mode

This is factory reset mode. Rokuhan turnouts and Rokuhan Uncoupler (R077) (sold separately) are operated without any setting adjustment. When operating time to the coil is made longer, some of other brand turnouts are also driven by this mode.

\* When Rokuhan turnouts and Rokuhan Uncoupler (R077) are connected, no need to change setting by any. Any change setting may cause un-smooth function or any heating/damage. In addition, switching with interval time more than 1 second is required to avoid any heating or damage.

### Motor rotating force drive Turnout mode

This mode will suit slow action Turnout machines which are driven by motor rotating force. Motor rotating time can be made longer to suit such Turnout machines.

\* This mode is suitable for upper grade model railroaders who know well about the spec of Rokuhan decoder and motor rotating force Turnout machines. Please read this instruction manual and those attached to the Turnout machines.

### Lighting accessory mode

This mode provides switching lighting accessories. Rokuhan LED unit (A017-1 or A017-2)(sold separately) suits this mode.

\* Do not operate Rokuhan turnout at Motor rotating force drive mode and lighting accessory mode which operating time is too long. Any heating or damage will happen. If the method to change function mode is unclear, please read [ 11. CV and programming ] <Factory reset and manufacturer ID> and try on factory reset. Then the function mode automatically back to suitable condition to Rokuhan turnout.

## 6. Wire color and function

Here is a table listing wire color and its meaning.

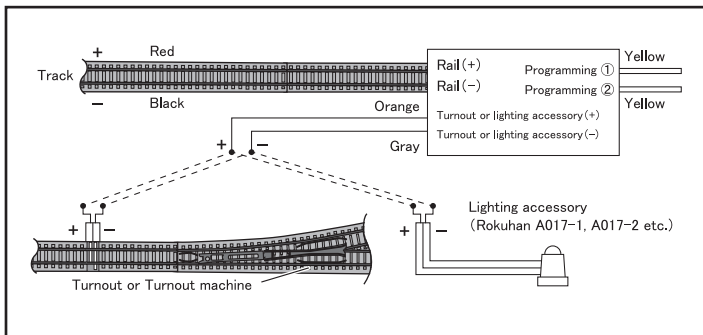
Function (spec)	Color	Function (spec)	Color
Collect current from track (+)	Red	Common + *1	No wire
Collect current from track (-)	Black	Turnout/Accessory (-)	Gray
Turnout/Accessory (+)	Orange	Programming (change CV value) *2	Yellow (2pcs.)

\*1: No wire at terminal Common+. The voltage at Common+ will vary dependent on track voltage.

\*2: Yellow lead wires (2pcs) for CV programming are just used to change CV address and other CV values. Do not connect these yellow wires with others during programming or operating. The decoder may be broken by such wrong connection.

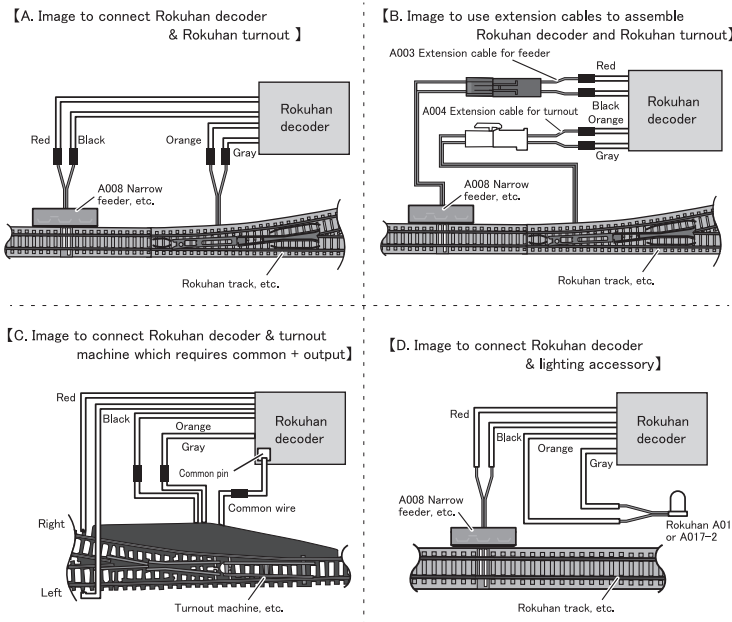
## 7. Image to connect decoder and turnout/lighting accessory

### 【Wiring diagram between Rokuhan decoder, Turnout and Lighting accessory】



### 【Assembly image between Rokuhan decoder, Turnout and Lighting accessory】

Here are images to assemble Rokuhan decoder and turnouts (magnetic force drive and motor rotating force drive) as well as lighting accessory. Please read the instruction manual attached to each product.

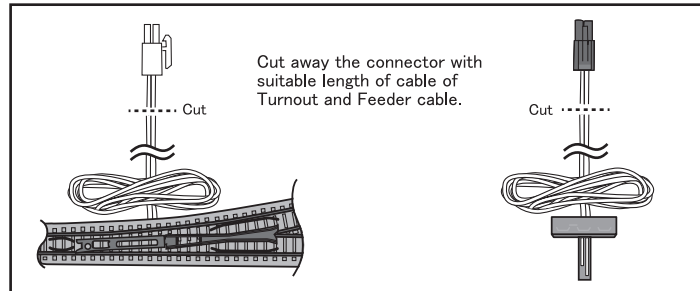


## 8. How to assemble

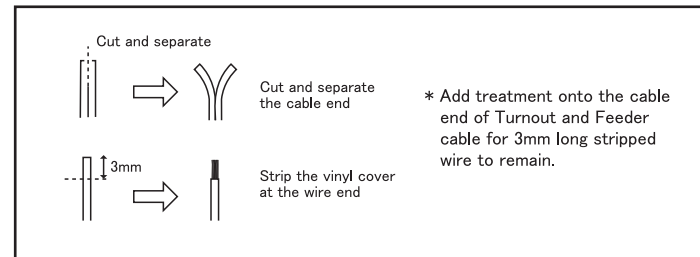
- First of all, confirm the turnout or lighting accessory was functioning well before installing Rokuhan decoder. If the function in DC is not good, it will be also no good or cause any heating trouble after installing decoder.
- Confirm smooth function and no problem with lighting before install.
- Pay attention to use of soldering iron to install decoder.

### 【 A. Connect Rokuhan decoder and Rokuhan turnout 】

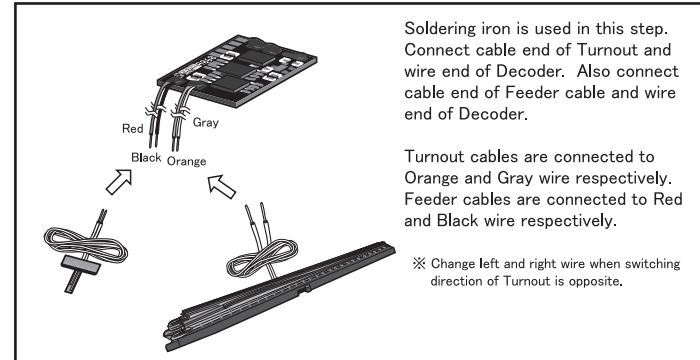
(1) Cut away the connector with cable from Turnout and Feeder cable



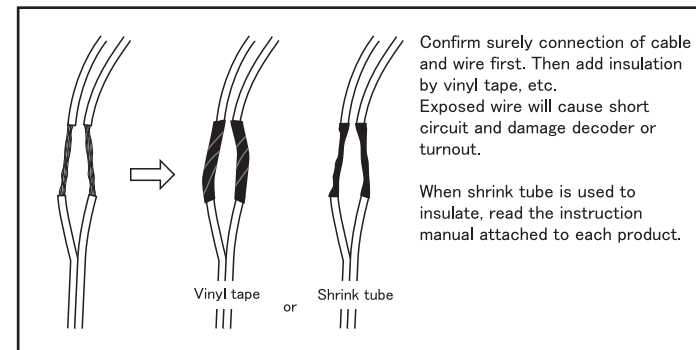
(2) Wire end treatment



(3) Connect turnout, feeder and decoder



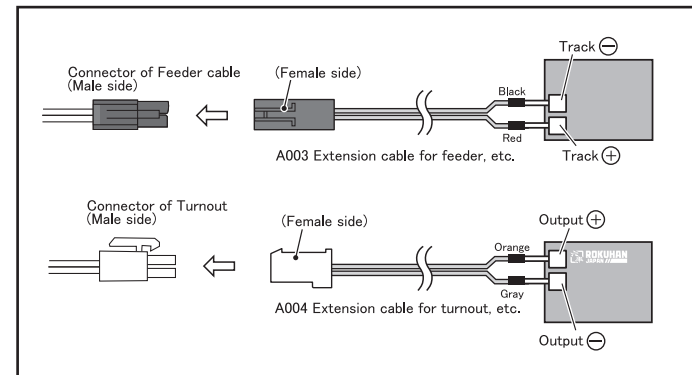
### (4) Wire/Cable connection treatment



This is the end of connecting in case A.

### 【 B. Use extension cables to connect Rokuhan decoder and Rokuhan turnout 】

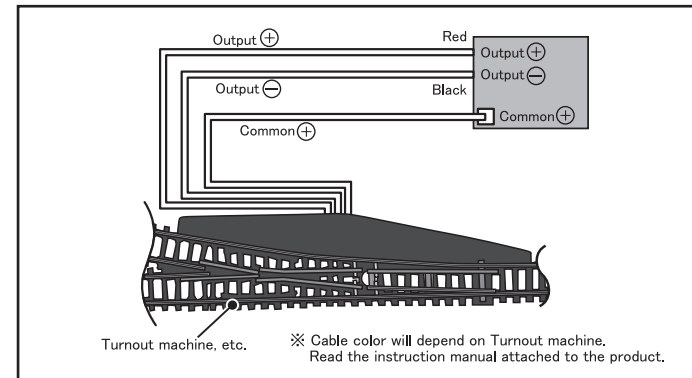
In case A, connectors of turnout and Feeder cable are cut away. This condition wastes time to replace when any damage happens. In case B, extension cables are used and no need to damage turnout and Feeder cable.



### 【 C. Connect Rokuhan decoder and turnout machine which requires common+ output 】

Rokuhan decoder can be connected to Turnout Machine, etc. which require (COMMON+) out put. There is no wire at the terminal of (COMMON+) which is located next to Orange and Gray lead wires.

Please use soldering iron to connect the (COMMON+) wire from Turnout Machine directly onto the terminal.

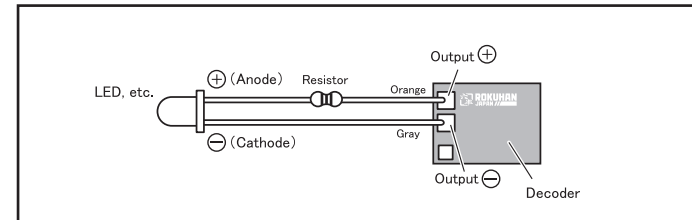


※ This connecting method suits upper grade users who understand deeply the specification of Rokuhan decoder and Turnout Machine. Please read the instruction manual attached to each product.

※ To connect wire onto decoder by soldering iron, please do that in shorter time. Too long time with high temperature may cause trouble to the decoder PCBA. Please use the solder with flux and arrange pre-tinning to do that in short time.

### 【 D. Connect Rokuhan decoder and lighting accessory 】

When Rokuhan decoder is used to switch lighting accessory, please connect (+) wire of LED to Orange wire of decoder and (-) wire of LED to Gray wire of decoder. If the lighting accessory does not have any electrical polarity, either wire color is OK to connect.





### <Function check>

When assembly work is finished, please check function before play.  
CV address check is enough as function check.

To do CV address check, it's necessary to connect decoder and command station by programming output. (Ex. C005 E-train controller by Rokuhan has Program output socket).

Do not play before CV address check! If not, there is a change to damage decoder and turnout. If CV address is same as the default address mentioned at [ 11. CV and programming ] (CV list for Rokuhan decoder), it's judged as OK.

To read CV address, please make sure yellow lead wires (2pcs) for CV programming are connected. For detail, please read the column of [ 9. Decoder programming ] .

If CV address is read as 255, there may be any short circuit on decoder or wires.  
If CV address is read as 0 or reading error happens, there may be any wiring error or no good soldering.

## 9. Decoder programming

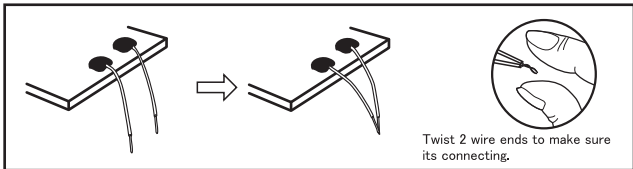
“Programming” means to read edit and write CV value from/into decoder using command station.

### < Programming wires >

There are 2 yellow wires on Rokuhan decoder. Programming is enabled only when these 2 wires are connected.

#### [How to use Programming wires]

Programming wires with vinyl tube at wire end is pre-stripped. Please connect the end of two wires by twisting. Then function output through orange and gray wires stops.



When read/write CV including decoder address is over, please separate the programming wires.

If ON/OFF function is done 3 times with same address on condition programming wires are connected, decoder address will be chance to the new address.  
For detail, please read [ 10. How to change decoder address ] .

#### [Caution to use Programming wires]

- Twisting is necessary to surely connect Programming wire each other. Do not separate the 2 wires until the programming is completely done. If the 2 wires are separated before completing programming, changing value will not be completed and any damage may be caused to decoder and turnout.
- Keep other cables, wires, electronic part and terminals on decoder away from the programming wires, not to touch them. If decoder function is done on condition the 2 programming wires are connected, decoder may be broken. If no more programming will be done, cut away the programming wires or dis-connect the programming wire by soldering iron.

### [What is 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 function, i.e., open/close, ON/OFF lighting, e.t.c.

condition of each decoder which is changeable according to operator's requirement.

Rokuhan decoders are pre-programmed in the best condition to suit Rokuhan turnouts.

So original setting will provide good condition to your Rokuhan turnouts.

### [Programming mode]

There are mainly 'Page mode' and 'Direct mode' as programing mode. Currently 'Direct mode' is becoming more popular. So Rokuhan decoder supports 'Direct mode' only.

Rokuhan E-Train controller also supports 'Direct mode' only and no problem to program.

Other command station in the market may support several program modes.

To use such command station, select 'Direct mode' to program Rokuhan decoders.

### [Reading and writing CV]

Reading & writing CV of Rokuhan decoder is done by command station even if any device (turnout, lighting accessory, etc.) is not connected.

Reading CV is so convenient when the player fogets the CV number/value.

Do not do Reading/writing CV of several decoders at a time.

One decoder only to be connected to the command station to do reading/writing CV.

There are some command stations which do not support reading CV.

Please read the instruction manual attached to the command stations.

## 10. How to change decoder address

Default (factory reset) address of Rokuhan decoder is set as [1].

Decoder address can be set from 1 through 2044.

If there are several decoders to operate, please arrange address change one by one.

[Step1] Connect one decoder to the command station and connect the programming wires of the decoder tightly.  
For detail of programming, please read [ 9. Decoder programming ] .

[Step2] Do open/close function of turnout or ON/OFF function of lighting accessory 3 times by the command station.

[Step3] Decoder address is now changed and there will be finish actions.

The finish action depends on the decoder mode like below.

For detail of decoder mode, please read [ 5. How to use Rokuhan DCC decoder ] .

< Address change finish action list >

- Magnetic force drive Turnout mode (factory reset condition)  
Turnout switches 2 times, then back to original direction.
- Motor rotating force drive Turnout mode  
Turnout switches 2 times, then back to original direction.
- Lighting accessory mode  
LED blinks 2 times

[Step4] Dis-connect Programming wires.

## 11. CV and programming

CV value decides individual function of each decoder. Here are the instructions of listed CV values for Rokuhan decoder.

### < Decoder mode change >

- In this column, there is explanation about Decoder mode change.  
For detail of each mode, please read [ 5. How to use Rokuhan DCC decoder ] .
- To start CV setting, edit CV33 first.
- ※ To change CV value, please connect Programming wires (2pcs.).  
For detail, please read [ 9. Decoder programming ] .

#### [Magnetic force drive Turnout mode]

Write CV value like this.

CV33 : 0 or 1

CV03 : 10 ~ 250 ( Possible to edit when CV33=1 only)

- CV03 provides running time of coil function.

Formula : Running time = CV03 value × 0.001 sec. (1ms)

Factory reset running time = 20ms (0.02sec)

Max. running time = 250ms (0.25 sec)

Ex.) When CV03 = 100, running time of coil is 100 × 0.001sec = 0.1sec

※ The coil which provide magnetic force in modelrailroad turnout is very small and precised. If coil running time is too long, the coil will generate heat or turnout will be broken. Try to keep default condition and minimize to change it. If it's necessary to change the running time, see how it goes and make it shorter as much as possible. Even if coil running time becomes longer, turnout will not function if there is any trouble at turnout body. If so, please repair the defect, then adjust running time again.

- CV03 value is adjustable only when CV33 = 1. Factory reset condition is CV33 = 0.  
So edit CV33 first to adjust CV03.

#### [Motor rotating force drive Turnout mode]

Write CV value like this.

CV33 : 255

CV03 : 0 or 10 ~ 250 ( Possible to edit when CV33=1 only)

- CV03 provides running time of motor.

Formula : Running time = CV03 value × 0.02 sec. (20ms)

Ex.) When CV03 = 100, the motor running time = 100 × 0.02 sec (2 sec)

- When CV03 = 0, the motor will continue to run. This setting is just for such turnouts which require continuous motor running.

#### [Lighting accessory mode]

Write CV value like this.

CV33 : 255

CV03 : 255 ( Possible to edit when CV33=1 only)

#### [Cautions to change decoder mode]

If decoder mode does not suit the turnout or lighting accessory, the device may be damaged. Especially, [Motor rotating force drive Turnout mode] will affect so much the turnout with [Magnetic force drive Turnout mode] due to too long coil running time. When such accident happens, please take an urgent action to OFF the power.

### < Other CVs which Rokuhan decoder supports >

#### CV list for Rokuhan decoder

CV number	Function	CV value	
		Default	Range
CV01 (CV513)	Decoder address (Lower)	1	—
CV02 (CV514)	Auxiliary input	0	—
CV03 (CV515)	Running time	20	0.10 ~ 250.255
CV07 (CV519)	Rokuhan decoder version	1	—
CV08 (CV520)	Factory reset	—	8
	Manufacturer ID	13	—
CV09 (CV521)	Decoder address (Upper)	0	—
CV29 (CV541)	Basic setting for Rokuhan decoder	192	—
CV33 (CV545)	Decoder mode	0	0, 1, 255
CV34 (CV546)	Function delay	0	0 ~ 5

\* Listed CV number can be converted to another supported number when 512 is added.

Ex. CV01 = CV513.

#### [ CV01 (CV513) : Decoder address (Low-order) ]

#### [ CV09 (CV521) : Decoder address (High-order) ]

This is CV address of Rokuhan decoder. Default address is 1. Rokuhan decoder supports Reading CV address. Low-order 8 bits and High-order 3 bits are stored as default respectively. This CV is just for reading only and not support writing.

#### [ CV02 (CV514) : Auxiliary input ]

ON/OFF setting of Auxiliary input. Rokuhan decoder does not support this function.

#### [ CV03 (CV515) : Running time setting ]

Running time setting. It depends on Decoder mode.

For detail, please read [ 11. CV and Programming ] < Decoder mode change > .

#### [ CV07 (CV519) : Decoder version ]

See decoder version. This CV is just for reading only and not support writing.

#### [ CV08 (CV520) : Factory reset / Manufacturer ID ]

When number 8 is input into CV08, factory reset becomes available.

When read CV08, manufacturer ID is seen.

#### [ CV29 (CV541) : Basic setting ]

CV29 setting means basic setting for decoder. Rokuhan decoder has such basic setting like this.

- Addressing method : Output address
- Type of decoder : Accessory decoder

Default CV number as above is 192 which is for reading only.

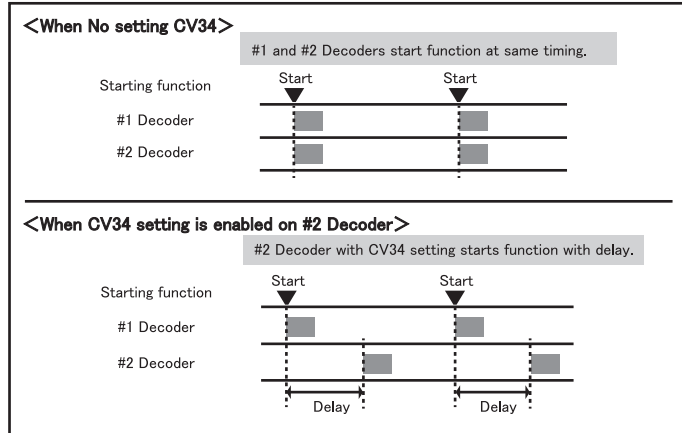
#### [ CV33 (CV545) : Decoder mode ]

Select one mode from 3 modes (i.e., Magnetic force drive Turnout mode, Motor rotating force drive Turnout mode & Lighting accessory mode.)

- When 0 or 1 is selected, it comes into Magnetic force drive Turnout mode.
- When 255 is selected, it comes into Motor rotating force drive Turnout mode or Lighting accessory mode.

#### [ CV34 (CV546) : Function delay ]

This CV setting enables to delay functioning. Here is one example of timing table.

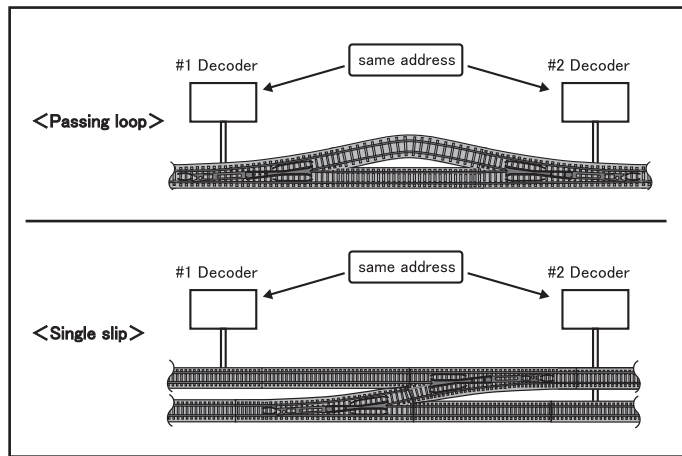


To explain this situation of actual turnouts in the diorama, some turnouts may have trouble due to their spec to draw much current to function in a short time.

There will be such situation that several turnouts may have function at the same timing at passing loop or single slip in the station area.

If they are magnetic force drive Turnouts, much current is drawn at a short time and command station may stop by its protection circuit.

If one of the turnouts has CV34 setting, it has some delay to start function, then no trouble will happen at the command station.



Formula : CV value × 0.1 sec

Maximum CV value : 5 (i.e. Max. delay time is 0.5 sec)

For Ex.) When CV34 = 3, delay time is 3 × 0.1sec = 0.3 sec

When CV value = 0, this function is disabled.

This function is available for Magnetic force drive turnout mode only.

When other mode is selected, this function becomes disabled.

## 12. Special setting to control turnouts by decoders

To play with turnouts connected with Rokuhan decoders, there are some special instructions to make smoother your control.

- When playing at magnetic force drive turnout mode, please keep more than 1 sec of interval time to switch the turnouts. If continuous switching without interval time is done, the turnouts may have heat or damaged.
- Rokuhan decoder is small and precised. Do not play continuously for long time.
- When turnouts do not function, please power off the command station.

## 13. Trouble shooting

Check following when such no good function or un-expected wrong function happens before calling for repair.

#### ■ No function of Turnout or Turnout machine

- Check voltage of the tracks. Rokuhan decoders function at 10~16V, but some turnouts (especially except Rokuhan) do not function or not smooth function at lower voltage. Conversely track voltage may be too high for the turnouts.
- Consumption current of turnouts or turnout machines may exceeds the rated specification of Rokuhan decoders. Rokuhan decoders have protection circuit and such program may have started to function.

#### ■ No smooth function of turnouts or turnout machine

- Check voltage of the tracks. Rokuhan decoders function at 10~16V, but some turnouts (especially except Rokuhan) do not function or not smooth function at lower voltage. Conversely track voltage may be too high for the turnouts.
- Please see the feeder cable from the controller. There are 2 outputs of command station. One is for functioning and the other is for programming. If it's connected to the programming output, its current draw may be restricted and too small to run.
- If other brand turnout (at magnetic force drive Turnot mode) is connected, its running time may be too short. Check CV03 setting and adjust running time.  
For detail, please read [ 11 CV and programming ] < Decoder mode change > .

#### ■ Unstable function of turnouts or turnout machine

- Check programming wires are connected each other or not.
- Arrange factory reset. (Write 8 into CV08.)

#### ■ Shut-down of controller happens or protection circuit stops power

- Check several turnouts or turnout machines are connected to one decoder. One turnout should be connected to one decoder which is not connected to any other.
- Check same decoder address is assigned to several decoders. When several decoders are operated at a time by assigning same address, CV34 should be edited properly  
For detail, please read [ 11 CV and programming ] < Function delay > .

## 14. Rated specification

### [ Rokuhan decoder rated specification ]

Rated input voltage : AC10 ~ 16V

Rated output : DC10 ~ 16V

Max. current 2.5A (within 0.25 sec) Continuous 1.0A

\* Running time setting : 10 ~ 250ms

※ When it's Lighting accessory mode, 30~100 pcs. of Rokuhan LED set (such as A017-1 or A017-2 (sold separately)) can be connected at a time dependent on capacity of Command station.

※ Addressing method: Output address

## 15. 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, appearance 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.



TOYTEC  
CORPORATION  
Rokuhan Division

7-27 Numawada, Tochigi-city, 328-0042, Japan  
Customer Service Center: Tel. +81 (0) 282-20-2365  
Operation hours: Monday to Friday 10:00 ~ 12:00 13:00 ~ 17:00

■ For more details and the latest information, please visit our Rokuhan website. ■

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

※Information in this manual is current in February, 2019.