LocoCruiser Standard series DCC decoder

User Manual

Ver 2.4

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Before you start to use the decoder, please read the following warnings first.

1、This product is only for HO scale railroad models and some N scale railroad models.

2、Please read this manual carefully before installing the decoder.

3、This product is not suitable for children under 14 years old.

4、Do not expose the product to the rain, humidity, fire, the direct sunlight and corrosive chemical product.

5、The suitable working temperature is 0-80°C.

6、Strong electromagnetic waves may interrupt the normal working of the product.

7、To avoid overheating, do not wrap the circuit board in insulation tape.

8、Do not forcedly press or fold the product.

9、This product is not waterproof.

10、Before installing the decoder, make sure to eliminate the static electricity from the installer.

11、Before installing the decoder, remove the locomotive from the track,

12、After installing the decoder, make sure that no wires are squeezed or cut.

Contents

Small caution: Please feel free to contact ANE MODEL or ANE MODEL Authorized Distributor with any questions or concerns you might have about our products. We are always looking forward

to hearing your voice, and make our products better. Don't be hesitate to tell us!

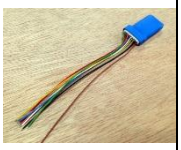
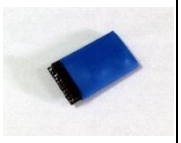
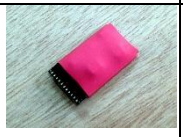
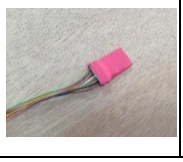
1. Introduction

Congratulation for choosing ANE MODEL LocoCruiser Standard series decoder. It's designed to give you exciting DCC control features with a reasonable price. ANE MODEL mobile decoder is suitable for all HO scale and DCC controlled N scale locomotives.

LocoCruiser Standard decoder complement the excellent properties of their predecessors and expand their capabilities by further functions. It can support the 14-step, 28-step and 128-step control of the DCC protocol and 8 lighting effects, including the dimmer, warning effect, blinking by speed effect, random blinking effect, strobe light effect and 3 fixed-frequency blinking effects.

ANE MODEL decoder is your first choice which can offer you flexibility and reliability that you may expect to have a state-of-the-art decoder for a long awaited.

2. LocoCruiser Standard decoder Series 2xx

	The picture of the product	Working voltage	Motor current	Function output	Function output max. current	Working temperature	Dimension (L*W*T)
LC201		12V-20V	1.5 Amp continuous and 2 Amp peak	6	100mA	0—80°C	1.2 "(28 mm)* 0.6" (15.5mm)* 0.2" (5 mm)
LC202		12V-20V	1.5 Amp continuous and 2 Amp peak	6	100mA	0—80°C	1.2 "(28 mm)* 0.6" (15.5mm)* 0.2" (5 mm)
LC203		12V-20V	1.5 Amp continuous and 2 Amp peak	6	100mA	0—80°C	1.2 "(28 mm)* 0.6" (15.5mm)* 0.2" (5 mm)
LC204		12V-20V	1.5 Amp continuous and 2 Amp peak	6	100mA	0—80°C	2.83"(72 mm)* 0.67"(17 mm)* 0.11"(3 mm)
LC205		12V-20V	1.5 Amp continuous and 2 Amp peak	4	100mA	0—80°C	1.2"(28mm)* 0.6"(15.5 mm)* 0.2" (5 mm)
LC206		12V-26V	1.5 Amp continuous and 2 Amp peak	4	100mA	0—80°C	1.2"(28mm)* 0.6"(15.5 mm)* 0.2" (5 mm)

3. General Properties of all Decoders

3.1 Operating Modes

When running the locomotive, if you needs to temporarily adjust CV value, you don't have to move the locomotive to the programming track, you can adjust it through DCC controller 's OPS mode (Operating mode), to call out the number of the locomotive, then modify the CV value directly for setting.

NOTE: OPS mode can only perform the function setting of the decoder. It can't read the CV value of the decoder. If you need to adjust the CV value precisely, then you must move the locomotive to programming track to read and program.

3.2 Motor Control

In order to provide more perfectly running performance, ANE MODEL LocoCruiser Series 2, has a specially designed a motor control program with Back-EMF function. For a variety of locomotives, the motor can adjust output control automatically.

3.3 Analogue Mode

LocoCruiser Series 2 CV29 provides you a dual mode, locos with decoders can run under the DCC environment and DC environment. This allows the running of your locos everywhere. You can run your locos smoothly through different controllers' eliminating the trouble of temporarily removing the DCC decoder.

3.4 Functions

LocoCruiser Series 2 have 4~6 function outputs. Each function output can reach the maximum current of 100mA'; allowing control of light bulbs or LEDs. At the same time, each function output has a variety of lighting effects; from the simplest on/ off to a wide variety of lighting performance. The CV value of variable lighting performance are below.

CV value	Function
0	Always Light On
2	Strobe Light
4	Mars Light
8	Light On When Reverse Direction
16	Light On When Forward Direction
32	1/4 Sec Flashing **(A)**
36	Firebox Light
64	1/4 Sec Flashing **(B)**
69	Warning Light
128	1/2 Sec Flashing
Other	Always Light Off

3.5 Programming

Some DCC controllers, have an individual programming track function. To use the programming track output, put the locomotive on this track, then you can read and program. LocoCruiser Series 2 decoders fully support programming track function. You can completely read and adjust the CV value of LocoCruiser Series 2 decoders through the programming track,

and let the Series 2 fully control the features of your locomotive, to run smoothly on your layout.

3.6 Operational reliability

LocoCruiser Series 2 running decoders have passed a extensive testing and functional adaptation. They can meet most manufacturers' DCC ready locomotives' running performance. You don't need to do any adjustments. In some locomotives, you just need to adjust a small parts of CV value to reach the perfect running performance and lighting control. We'll publish the related information on our website, please follow the description for adjusting.

If you found that your locomotive didn't run smoothly after installing ANE MODEL's decoder, please feel free to contact with us at once. We'll process your question instantly. We'll make sure to let your locos run smoothly.

3. 4. Installation

Installing the decoder is not difficult, Just follow these simple steps carefully. Each ANE MODEL decoder comes with an instruction sheet that shows you the specifics of the decoder.

4.1 Ten Steps for successful decoder installation

1. Read the instructions FIRST and PLAN your installation
2. Choose the proper tools on hand.
3. Choose a locomotive that runs well on regular DCC or DC system.
4. Choose the appropriate decoder for the installation.
5. Test the decoder before installation.
6. Carefully to take part the shelter of the loco.
7. plug the pins into the socket in accordance with the marks of the decoder and the circuit board of the locomotive
8. If there's no socket or only 6-pin socket on your loco, please choose LC202 version decoder and follow the wiring diagram at bellow.
9. Test the installation first on DC/DCC.
10. Customize your decoder by programming selected CVs.

4.2 Requirements for installation

ANE MODEL Series 2 decoders are mainly designed for OO/HO scale(1/76~1/87) locomotives and railcars. Decoder models have different connections.

The type of decoder	Statements
LC201	With NMRA Medium 8 pin plug, apply to the locomotive with NMRA 8 pin socket
LC202	With 9 NMRA standard wirings, so modelers can solder on non-DCC ready's locomotives themselves.
LC203	With NMRA 21pin socket, apply to the locomotive with 21pin plug
LC204	board replacement (Drop in) type decoder, suitable for most locomotives which is lack of internal space, such as: ATLAS, Athearn

	locomotive.
LC205	With NMRA 21pin socket and 4 function output.
LC206	With NMRA 8 pin plug decoder and 4 function output
LC201,LC202,C206	These three types of decoder have configured with NMRA standard JST 9 pin connector. You can purchase the wirings from us, and replace the connector with 8 pin plug or without 8 pin plug by yourself.

4.3 Installation recommendations

We have available a DT001 decoder testing board. We recommend the modeler use this testing board to test the decoder before installing the decoder in their loco.

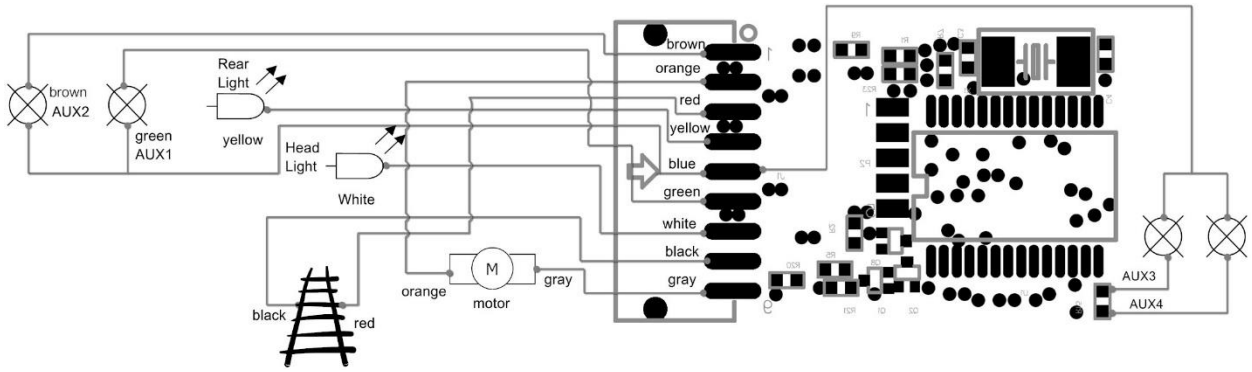
4.4 Locomotive with 8-pin DCC-standard Interface

According to the instructions in the locomotive manual, remove the shelter, and find the 8 pin socket. First, remove the socket above the dummy plug, and find the correct direction(Usually there's a number or arrow marked "pin 1" on the 8 pin socket. And then fit with 8 pin head, you'll finish the installation.

The wire color comparison table of 8-pin DCC-standard interface

No.	Color	Connect
1	Orange	Motor +
2	Yellow	Rear light -
3	Empty	Empty
4	Black	Left track
5	Gray	Motor -
6	White	Front light -
7	blue	Common + pole
8	Red	Right track

4.4.1 Wiring Diagram for LocoCruiser LC201



4.5 Locomotive with 6-pin DCC-standard Interface

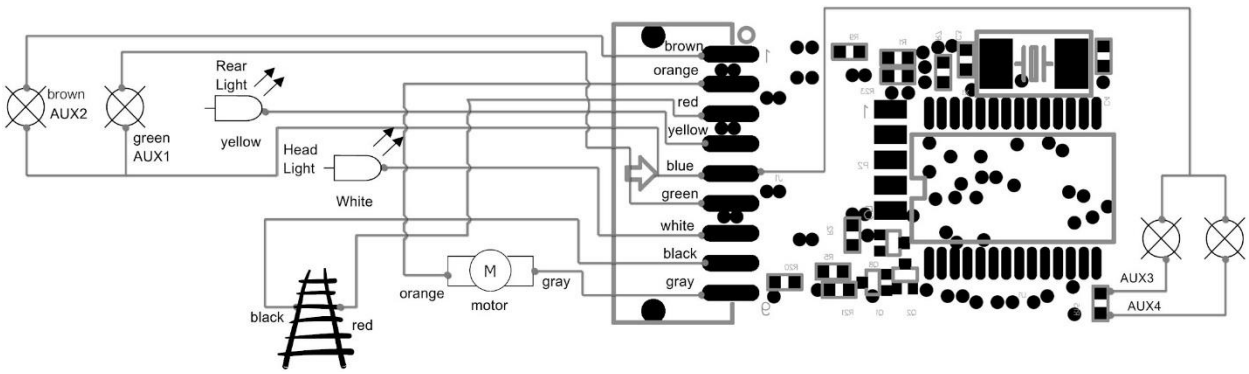
Connect the following wires as shown.

The wire color comparison table of 6-pin DCC-standard interface

No.	Color	Connect
1	Orange	Motor +
2	Gray	Motor -
3	Red	Right track
4	Black	Left track
5	White	Front light -
6	Yellow	Rear light -

After finishing the installation, please confirm whether the motor and function wiring is correct. NOTE: The warranty does not cover miswiring. Please be careful!

4.5.1 Wiring Diagram for LocoCruiser LC202



4.6 Locomotive with 21-pin DCC-standard Interface

According to the instructions in the locomotive manual, remove the shelter, and find the 21 pin plug. First, remove the head above the dummy socket, and find the correct direction(Usually the pin No. 11 without hold. you'll easy to identify which direction is correct to install the decoder)

4.7 Connecting Additional Functions

The Series 2 decoders have 4~6 additional functions. Each function output can reach 100mA.

4.8 Suitable Light Bulbs

FL and FR output can directly connect with bulb, unless the specified description said **it** can not support the function output of connecting blub. In order to help modeler to connect LED easier, we have added 1k ohm resistance on F1 to F4 output. It also can connect with bulb. But we can't promise the bulbs brightness is acceptable. We will suggest you to connect LED directly in F1 to F4.

4.9 Suitable locomotive type

The ANE MODEL LocoCruiser standard decoder is suitable for all HO scale and some N scale locomotives. The decoder is fully compatible with NMRA/DCC standards and can be controlled by various DCC (digital command control) systems. Operating by conventional DC controller is possible without any problem.

5. Initial operation

5.1 Speed control

There are two speed control settings: the speed curve setting and the speed table setting.

5.1.1 Speed curve setting（Factory Default）:

The speed curve setting is to set the starting voltage in CV2, the maximum voltage in CV5 and the medium point voltage in CV6. In order to explain more, the speed step and the speed value are represented with a curve in an axis graph. In the following 4 figures (from 4-1 to 4-4), the horizontal line represents the speed step while the vertical line represents the speed value. The speed of locomotive is divided into 28 steps in the speed step line. Thus, each step represents one speed step and the value is from 0 to 28. The speed value is the current speed of the locomotive and the value is from 0 to 255. The 14-step and the 128-step settings are similar with the curves. The 14-step speed setting is 14, the middle speed will be 7-step; on the hand, when the loco is under 128-step speed, the middle speed will be 64-step.

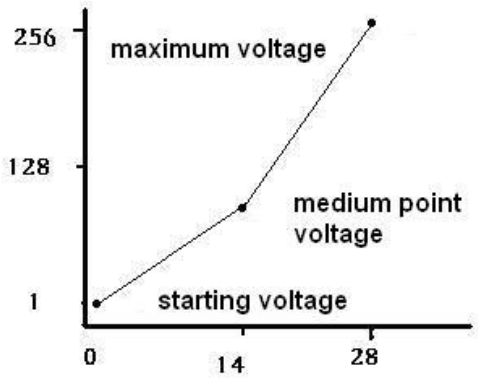


Figure 4-1：Speed curve with CV6 < CV5/2

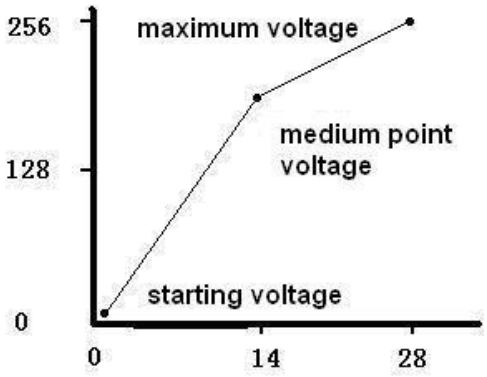


Figure 4-2：Speed curve with CV6 > CV5/2

You can see the change from the figure 4-2. If CV6>CV5/2:

When the speed value is less than the middle value 14 (i.e., in a low speed status), the speed change is fast.

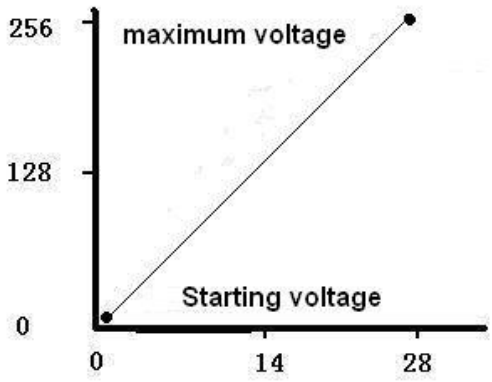


Figure 4-3：Speed curve with CV6=CV5/2

You can see the change from the figure 4-3. If CV6=CV5/2, both high and low speed change are slow. It's the same result for the speed curve with CV6=0 or 1.

5.1.2 Speed table mode

The speed curve is divided into 28 steps in the speed table mode. Each speed value responds the values from CV67 to CV94 (as per figure 4-4).

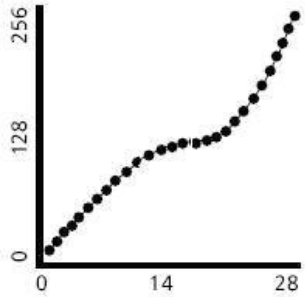


Figure 4-4：Speed table

In the speed table mode, to modify the CV of the responding speed step means to modify the value of the speed step to achieve different result.

5.1.3 Speed model Exchange

Setting bit 4 of CV29 enables to switch the two modes. The speed curve mode is activated if the value is 0; If the value is 1, the speed table mode is activated (default setting)

5.1.4 Acceleration & Deceleration

The final acceleration of the locomotive is determined by the value of CV3; on the other hand, the deceleration is determined by the value of CV4.

The higher the acceleration（CV3）/deceleration（CV4）value, the higher the final acceleration/deceleration. That is to say, the acceleration/deceleration speed of the locomotive is lower. The lower the value is, the lower the final acceleration/deceleration is.

That is to say, the acceleration/deceleration speed of the locomotive is higher.

5.2 DC control method

Using a conventional DC controller to operate is possible without any problem. You can run a locomotive that already installed the ANE MODEL LocoCruiser Standard series decoder on 16VDC track. DC environment does not support Back-EMF function and lighting effect.

5.3 Engine address setting

5.3.1 Engine address

The engine address indicates the assigned numbers of the moving locomotives on the track. Setting the engine address will enable you to control the locomotives by the DCC control box. The following describes show the definitions of DCC protocol's engine address.

CV1：Engine address

CV17&CV18：Extended engine address

CV19: Consist address

The priority of the 3 engine addresses which defined in the DCC protocol is: Consist address>Extended engine address >Engine address

5.3.2 Locomotive engine address setting

The first priority is the Consist address of CV19. The locomotives are under the control of the Consist address unless the value is 0 or 128. As for the "Extended engine address" (CV17&CV18) and the "Engine address" (CV1), if the value of the Extended engine address is not 0 and the value of bit5 of CV29 is 1, the locomotives will be under the control of the Extended engine address. If the value of the Extended engine address is 0 or the value of CV29 bit5 is 0, the locomotives are under the control of the Engine address.

The Chapter 6 of this manual will show you the CV values. You can find the CV values which related to the engine address. The range of CV19 value that responds to the Consist address is from 1 to 127 and from 129 to 255. If the value of CV19 is larger or equal to 1 and is smaller and equal to 127, the locomotive will agree the forward direction. At this time, the locomotive is under the control of the address 1-127. If the value of CV19 is larger or equal to 129 and is smaller and equal to 255, the locomotive will agree the opposite of the forward direction. At this time, the locomotive is under control of the address (CV19 value-128).

The range of the Extended engine address (CV17&CV18) value is 128-9999. The value is according to the value of the lowest 6 bits of the CV17 combines with the 8 bits of CV18.

5.4 Light effect

5.4.1 Turn on/off light

The LocoCruiser standard series Decoder is equipped with 5 fixed lighting outputs. The relative values are stored in CV33 to CV37. The table 5-1 shows their default settings:

CV	Function	Default	Range
33	F0F (on/off)	1	1, 2,
34	F0R(on/off)	2	

35	F1(on/off)	4	4, 8, 16, 32, 128
36	F2(on/off)	8	
37	F3(on/off)	16	
38	F4(on/off)	4	
41	F7(on/off)	32	

Table 5-1: Lighting output on/off allocation (F0F is front light and F0R is rear light)

Note:

Value =1 control by F1

Value =2 control by F2

Value =16 control by F0

Value =128, always light on.

CV	Description	Output										
		F9	F8	F7	F6	F5	F4	F3	F2	F1	FR	FL	
33	Froward Headlight FL(F)											d	
34	Reverse Headlight FL®										d		
35	Function 1									d			
36	Function 2								d				
37	Function 3							d					
	CV value				128	64	32	16	8	4	2	1	Value
38	Function 4						d						
41	Function 7			d									
	CV value	128	64	32	16	8	4	2	1				Value

5.4.2 Light effect

The CV33, CV34 values just reflect the turn on or off status. However, the LocoCruiser standard series Decoder is featured with 10 lighting effects including the dimmer, the warning effect, the blinking per speed effect, the random blinking effect, the strobe light effect and 3 fixed-frequency blinking effects. Understanding more about the CV49 to CV53 will help you adjusting the CV settings to bring you more than one thousand of lighting effects. The information of CVs, outputs and light effects are shown on table 5-3 as below.

CV	Function	Default	Range	Record your number in here
49	FOF light effect	16	0-255	
50	FOR light effect	8	0-255	
51	F1 light effect	0	0-255	
52	F2 light effect	0	0-255	
53	F3 light effect	0	0-255	
54	F4 light effect	0	0-255	

Table 5-3: Light effect allocation

5.5 Special function

In order to offer more useful function for modeller, we offer two special design in this new version LC2xx decoder. In our future decoder, we also will keep these special function on it.

5.5.1 Motor Braking

The factory default is F7 and deceleration rate is 5. No matter your DCC throttle speed knob how fast, when you press F7, and your locomotive will follow your setting deceleration rate to slow your speed. When you press F7 again, it means release your loco brakes and loco will go back your setting speed. This function use CV63 to adjust the deceleration rate. Factory default value is 5.

5.5.2 Motor overload protect

This function is a special design to protect your LC201 not to burn out. Factory default is CV64=40. It is calculated using the following formula.

$I_{Motor} \cong 0.02148 \times CV64$ (Ampere)

When this function starts, it will turn off the motor, F1~F4 outputs and FL and FR will flash to inform you need to resolve this overload situation immediately. You should remove the short-circuit condition and re-power the track. It will re-work well. If you want to make it higher, Adjust CV64=70. The current will reach 1.5A.

Function	Function Key	CV	Default value
Motor braking	F7	63	5
Motor overload protect	---	64	60 (1.2 Amp)

CV63 adjust motor braking time

CV64 adjust motor overload amp.

6. CV value table

CV	Function	Default	Range	Remark
1	Engine address	3	1-127	
2	V start	1	1-255	
3	Acceleration Rate	5	0-255	
4	Deceleration Rate	5	0-255	
5	V high	0	0-255	
6	V mid	0	0-255	
7	Manufacturer Version number	201	***Read-only***	
8	Manufacturer ID	45	***Read-only***	
10	EMF Feedback Cutout	128	1-128	
11	Packet time-out Value	25	0-255	
17	Extended engine high byte	192	192-231	
18	Extended engine low byte	0	0-255	
19	Consist address	0	0-255	
21	Consist Address Active for F1-F8	0	0-255	

22	Consist Address Active for FL and F9-F12	0	0-255
29	Configuration register	6	0-255
Bit 0	Locomotive Direction	0	0,1
Bit 1	FL location	2	0,2
Bit 2	Dual Mode Selection	4	0,4
Bit 4	Speed Table	0	0,16
Bit 5	Long address	0	0,32

The Bit0 of CV29 is to set the locomotive's moving direction. Setting to 0 represents default direction and 1 represents moving in reverse direction.

The bit1 FL location: "0" = bit 4 in Speed and Direction instructions control FL, "1" = bit 4 in function group one instruction controls FL

The bit2 is for speed step. Setting to 0 represents the 14-step speed package. Setting to 1 means under the 28 or 128 speed step in which the CV does not need to be changed.

The bit4 enables the speed table. Setting to 0 is deactivated while 1 is activated. When you use the speed table, you should set it to 28-step speed.

The bit5 determines to activate the extended address. Setting to 0 is deactivated while 1 is activated.

6.1 Light function

	Function	Default	Range	Record your number in here	Remark
33	F0F (on/off)	1	1, 2, 4, 8, 16, 32, 128		
34	F0R(on/off)	2			
35	F1(on/off)	4			
36	F2(on/off)	8			
37	F3(on/off)	16			
38	F4(on/off)	4			
49	FOF light effect	16	0-255		
50	FOR light effect	8	0-255		
51	F1 light effect	0	0-255		
52	F2 light effect	0	0-255		
53	F3 light effect	0	0-255		

6.2 Speed table

67	Speed Table 1	1	0-255		
68	Speed Table 2	6	0-255		

69	Speed Table 3	12	0-255		
70	Speed Table 4	16	0-255		
71	Speed Table 5	20	0-255		
72	Speed Table 6	24	0-255		
73	Speed Table 7	28	0-255		
74	Speed Table 8	32	0-255		
75	Speed Table 9	36	0-255		
76	Speed Table 10	42	0-255		
77	Speed Table 11	48	0-255		
78	Speed Table 12	54	0-255		
79	Speed Table 13	60	0-255		
80	Speed Table 14	68	0-255		
81	Speed Table 15	76	0-255		
82	Speed Table 16	84	0-255		
83	Speed Table 17	92	0-255		
84	Speed Table 18	102	0-255		
85	Speed Table 19	112	0-255		
86	Speed Table 20	124	0-255		
87	Speed Table 21	136	0-255		
88	Speed Table 22	152	0-255		
89	Speed Table 23	168	0-255		
90	Speed Table 24	188	0-255		
91	Speed Table 25	208	0-255		
92	Speed Table 26	230	0-255		
93	Speed Table 27	252	0-255		
94	Speed Table 28	255	0-255		

6.3 Special function

Function	Function Key	CV	Default value
Motor braking	F7	63	5
Motor overload protect	---	64	60 (1.2 Amp)

CV63 adjust motor braking time
CV64 adjust motor overload amp.

7. Disclosure announcement

This warranty excludes the LocoCruiser standard series Decoder malfunction by the following reasons:

- User does not follow the installation instructions, damaging the product or causing it to malfunction.
- User does not follow the operating instructions and causes ~~the~~ product damage~~s~~ or malfunction.
- User disassembles or replaces the component of the product by himself, causing product

damage or malfunction.

- The product is corroded, ignited or broken, because of improper management by user so that the product cannot work normally.

The right of the above declaration belongs to ANE Model.

8. Troubleshooting

Some reasons may cause the LocoCruiser standard series Decoder to not work as desired. Here are some frequently asked questions and the answers that may help you use the product properly.

8.1 The Decoder is installed. After electrified, the lights do not work and the locomotive does not move after changing speed.

Check if the wires are connected.

Check if there are any short circuits between the control box and the track.

8.2 The locomotive is moving but not continuously.

Check if the track is clean.

Check if the wires are connected.

8.3 The locomotive runs normally, but the lights do not work

If the lights do not work, check if the wires are connected. Repeatedly press the light button to see if there's a change.

Read the CV value that activates the lights and check if the lights are turned off. Refer to Chapter 5.3.1 for more detail.

If the problem remains, please ask our dealer for a new one.

8.4 Headlights work, but the locomotive does not move

Read the value of CV1 and check if the engine address is different from the Decoder. Rewrite the engine address.

8.5 When I use the consist address control the loco, I have changed the value of CV17 & CV18. But I still can't control the loco?

Please check the CV29, bit 5 value. If the value of bit 5 is not 1, please change to 1.

8.6 I have followed the manual to do, but still have problems not included in the manual. What can I do?

If you still can't solve the problems, please contact us via E-mail or telephone, we will reply you soon.

Appendix I：Repair information

ANE Model provides you with the warranty and service for LocoCruiser standard series decoder as the following:

1、 The LocoCruiser standard series decoder is replaced free of charge within 90 days and repaired free of charge within one year after purchasing.

2 、After the free-of-charge repair period (one year), the LocoCruiser standard series Decoder provides a lifelong repair service with charge.

At ANE Model's sole discretion, it will repair, replace or refund the purchase price.

In the event, ANE Model's products are not installed or used in accordance with the manufacturer's specifications. Any and all warranties either expressed or implied are void. Except to the above extent expressly state in this section, there are no warranties, express or implied, including but not limited to any warranties of merchantability or fitness for a particular purpose.

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