

Modification of a Märklin 30000 locomotive (by COAX)

<https://www.eliveld.nl/articles/2025/0330/0330.html>

Introduction

Please read this document completely before beginning any CV reprogramming issues or hacking and breaking work on the 30000 Märklin locomotive.

These modifications and CV settings are only possible with the digital version of the original Märklin 3000 locomotive, the 30000 version, but please also note that the Märklin KN160725A locomotive decoder built this, this decoder supports both MFX and DCC as well as the older locomotive protocols, so this locomotive decoder, with the KN160725A notation on the back of the decoder board:



Front side Märklin KN160725A locomotive decoder Rear of Märklin KN160725A locomotive decoder

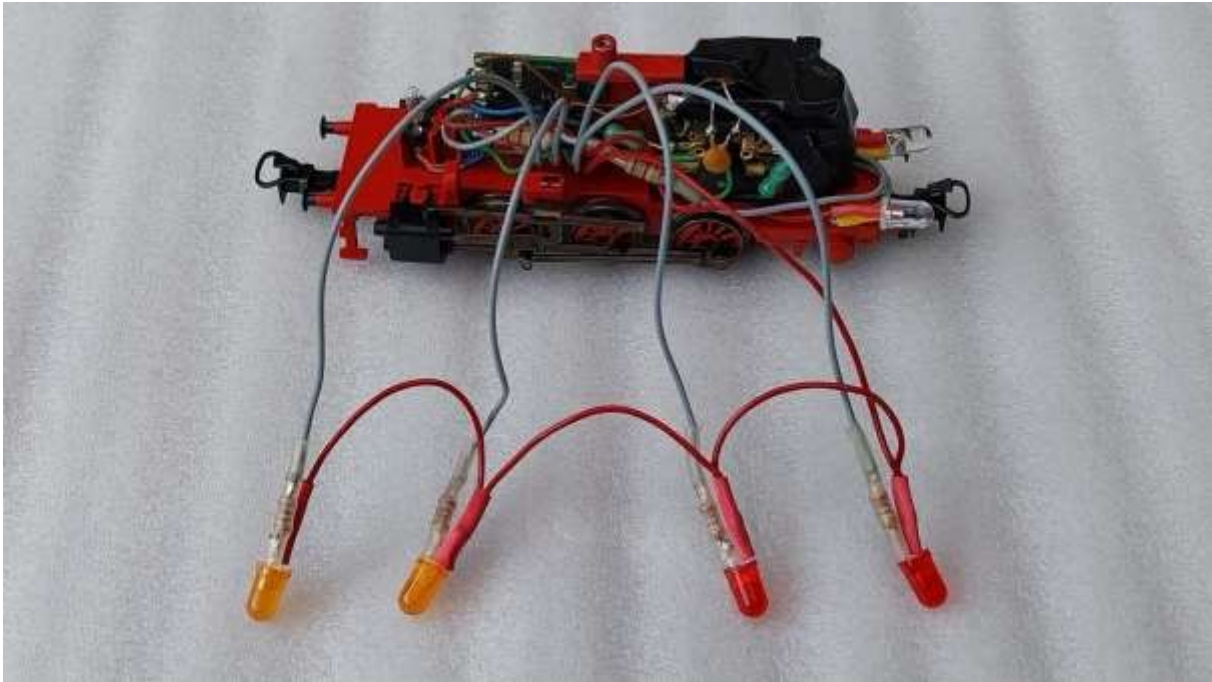
Earlier versions of this Märklin 30000 locomotive were digital versions, but unfortunately not modifiable as described in this document.

This Märklin KN160725A locomotive decoder is these locomotives from about 2017 by the factory, before then there were totally different locomotive decoders in them, Delta decoders or decoders that only had the FX or FX2 (MM1 / MM2) older digital locomotive protocols but do not support the newer MFX and DCC locomotive protocols. The DCC protocol is necessary otherwise the correct CV adjustments cannot be made and the technical conversion makes no sense, since the different light images and other things in that case can never be controlled with the function keys of the MS2. With MFX it is also possible to adjust CV settings, but this is limited to a maximum of CV address 80.
only with DCC.

The most convenient approach, if you know for sure that there is a Märklin KN160725A decoder in the 30000 locomotive, is to change the value 1 in DCC on CV address 357 to the value 2 before you start hacking and breaking in the lockapje. After that you can check whether the A-front signal light of the locomotive lights up only when the locomotive drives forward, so it does not light up when driving in both directions as originally set in this locomotive.

Only in that case is the Märklin KN160725A locomotive decoder usable and also suitable for 'reprogramming' the CV settings in it!

As an extra safeguard, it is also wise before drilling into the lockapje, after all necessary CV settings have been changed as later in this document, first connect separate test LEDs to the decoder, all in series with a 3K3 resistor or the like, to the LH, AUX1, AUX2, AUX3 and AUX4 outputs and then check whether the lighting and ABV and RS functions can indeed be addressed with the function keys of the MS2, so that everything does what it is supposed to do. Only then you can be 100% sure that 'cutting and breaking' the lockapje makes sense or maybe not and you will not end up with a destroyed cap.



This idea in terms of led test implementation

Before adjusting the values on CV addresses it is wise to the latest firmware version installed in the MS2 (= 'Mobil Station 2'), this prevents a lot of hassle. In my case I used to have version V 3.3 in it, but it was a bit 'baby carriage', sometimes starting up spontaneously, but with the latest V 4.15 firmware version in it now no longer a problem. Also the operation is a lot easier now, the MS2 remembers e.g. which of the F0..F7, F8..F15, F16..F23, F24..F31 submenus is active at any time, so this doesn't keep switching itself back to the F0..F7 situation.

Updating the MS2 can usually be done for free at the good Märklin dealer, from the 'Central Station 2' or 'Central Station 3'. Also a friend who happens to have an updated CS2 or CS3 at home can help, just connect the MS2 to the Canbus of that device and update it.

Back home, don't forget to also update from the MS2 your own Railbox first, that update came automatically with the MS2 firmware update.



Steps Overview

- 1** - Remove the 30000 loco and also all other locos from the rails or the "programming track", the idea is that other locos and wagons with decoders, should not be reachable by the MS2 at this time.
- 2** - On the MS2, in the 'Mobile Station' menu (key SHIFT together with Magnetic Items select Press the key) for 'Lok protocols', remember how this is currently set, you will need to reset this later in step 11. Now set this to 'DCC only', then return with the 'return' key.
- 3** - Put only the 30000 locomotive to be modified on the track or "programming track. Select with the rotary controller of the MS2 a new empty loc. position, on the line at the bottom of the screen, the MS2 hereby shows: 'No loc !'
- 4** - On the MS2, while it indicates 'No loco !', in the 'Configure loco' menu (SHIFT key together with Locomotive Keypad key) choose 'New loco' and then 'Enter manually'. In the next menu under 'New loco: decoder type' choose 'DCC', so do not make any other protocols active now.
- 5** - Next, the MS2 station wants to know the loco decoder CV address of the new DCC 30000 loco. From the factory this is set by default to DCC address 3, if the loco has a different DCC loco address in the meantime, then of course use that other DCC loco address here. Then press the The locomotive will indicate success by flashing its lights. If the locomotive would not blink the lights then it has not , in that case go back to step 1, the same applies to all steps below.

6 - After this, this "new locomotive" should be named in the MS2, letter A is flashing and the letters B and C are shown on the right. This loc. name can be set as desired, a quick press on the 'V', the 'agree' key is enough if this new 'ABC' loc. name is agreed, because this new DCC loc. is only created in the MS2 for temporary use anyway. By the way, in my own test situation, I named this DCC loc. 'TEST DCC LOC'.

7 - Choose a "locomotive symbol" for the new DCC loc., the top 1st symbol is fine but any symbol is also good, a small 3 axle steam locomotive symbol is of course for the face the nicest, for operation it does not matter.

8 - A new loco has now been created, with the loco name chosen above: 'TEST DCC LOC', with the loco name: 'ABC', or another name. With the dial speed controller on the MS2 now first check if this locomotive can drive, if it does, then it is good. If not, the set DCC locomotive address does not match the locomotive address currently set in the locomotive, then go back to step 1.

9 - Now we are ready to set the CV values to enable all new functions in the 30000 locomotive. Choose in the menu: 'Configure locomotive' (press SHIFT together with Locomotive Stick) for "CV programming.

10 - Now the correct new values at the indicated CV addresses should be entered into the locomotive to be programmed with the values from 2 tables. First check if the locomotive is completely alone on the track or programming track, is not moving and no light of this locomotive is lit, otherwise the programming will fail. Programming is done in 3 steps for each CV value, the first step consists of setting the desired CV address with the + and - keys. Once the desired CV address at STEP 1 the picture, press the "V", "agree", which STEP 2, the current value read at this CV address is done. If the current value at a CV address is already correct, press only the 'return' key and do NOT press the 'V', 'agree' key so that nothing is overwritten at this CV address because the correct value is already there. If the

If the reading is incorrect, first change the value with the + and - keys until the correct (new) value from the 2 tables is displayed, then press the 'R', 'agree', so that STEP 3 follows, programming this value at this CV address. The locomotive will indicate by blinking its lights that the programming was successful or there will be a time out message on the MS2 if it was not successful. Pay close attention in this process for all STEP 3 programming: Do not change any values at other CV addresses in this loco. and also program into it only the exact values from the 2 tables.

11 - After this is done, the temporary DCC locomotive with the: 'ABC' name (or other proprietary: 'TEST DCC LOC') is better left in the MS2 for a while. Removal can always be done at a later time when everything is completely ready and working.

12 - In the 1st 'Mobile Station' menu, reset the old protocol choice value as previously set in step 2.

13 - Now again select the standard MFX '89.009 DB' locomotive from the loc. list at the bottom of the MS2, briefly

check with the rotary controller whether the locomotive is running and if so, it is now necessary to adjust in the MS2, ('Change Loco' --> 'Loco functions' --> 'Change function symbol') this already existing '89.009 DB' locomotive, so that all new functions that are created here, controlled by the correct function keys, will actually work. See 2 pictures below: 'F0 to F7 settings on the MS2' and 'F8 to F11 settings on the MS2' how to do this with the correct or desired 'Function symbols', each function here is a 'continuous' function. Of course it is up to each person to any different function symbols, I use the 2 horizontal arrows for RS and the 2 vertical arrows for ABV, often the snail symbol is also used for this.

14 - When everything is completely ready and working, it is wise for future use, to save this loc. on a so called loc. card. At the moment it is configured all right to your liking in the MS2 but this MS2 sometimes loses locs. then a backup is very convenient and if the locomotive is taken to another track, the current locomotive data are then also immediately available so that the locomotive is immediately roadworthy there.



F0 to F7 settings on the MS2



F8 to F11 settings on the MS2

Table 1- Function settings of the decoder outputs.

-- CV section LV (= 3 white LEDs A-front signal front):

address 112 value 8= Light dimming off/on

address 113 value 255

address 114 value 20

-- CV section LH (= 3 white LEDs A-front signal rear):

address 115 value 8= light dimming off/on

address 116 value 255

address 117 value 20

-- CV section AUX1 (= 2 red LEDs back side):

address 118 value 8 = light dimming off/on

address 119 value 255

address 120 value 20

-- CV section AUX2 (= 2 red LEDs front):

address 121 value 8 = light dimming off/on

address 122 value 255

address 123 value 20

-- CV section AUX3 (= 3 white SMD LEDs driver's cab):

address 124 value 14= energy saving lamp

address 125 value 255

address 126 value 20

-- CV section AUX4 (= 2 orange LEDs fire box):

address 127 value 6= coincidence generator, flicker

address 128 value 255

address 129 value 20

-- Three separate CV addresses here directly below still:

address 130 value 0

address 131 value 128 or 64 (see comments)

address 132 value 180

Notes:

- CV address 131 sets RS or the shunting speed of the locomotive.

- If the locomotive is set with Vmax at 95, which corresponds to the maximum 50 km/h scale speed of this locomotive, then better set CV address 131 to:

address 131 value 128= bit 7= 1 , meaning: RS shunting speed is 1/2 speed of Vmax.

- If Vmax is set significantly higher than the 50 km/h scale speed, then better set CV address 131 to:

address 131 value 64= bit 6= 1 , meaning: RS shunting speed is 1/4 speed of Vmax.

Table 2 - MS2 function mapping to the F0 (= FL) <--> F31 keys

-- F0 key: White light only, switching with the direction of travel:

CV section mapping to F0 (= FL) when driving forward:

address 257 value 1= FV on (= white light in front)

CV section mapping to F0 (= FL) when driving in reverse:

address 357 value 2= FH on (= white light behind)

-- F1 key: White and Red light, switching with the direction of travel:

CV section mapping to F1 when driving forward:

address 262 value 5= FV and AUX1 on (= white light front and red light rear)

CV section mapping to F1 when reversing:

address 362 value 10= FH and AUX2 on (= white light rear and red light front)

-- F2 key: White and Red light, front only, switching with the direction of travel:

CV section mapping to F2 when driving forward:

address 267 value 1= FV on (= white light in

front) CV section mapping to F2 when

reversing:

address 367 value 8= AUX2 on (= red light in front)

-- F3 key: White and Red light, rear only, switching with the direction of travel:

CV section mapping to F3 when driving forward:

address 272 value 4= AUX1 on (= rear red light) CV

section mapping to F3 when reversing:

address 372 value 2= FH on (= white light behind)

-- F4 key: Double White= shunting light, independent of direction of travel, along with ABV and RS:

CV section mapping to F4 when driving forward:

address 277 value 195= FV , FH and RS on, ABV off (= white light front and rear along with ABV and)

CV section mapping to F4 when reversing:

address 377 value 195= FV , FH and RS on, ABV off (= white light front and rear along with ABV and RS)

-- F5 key: Double White and Red light= alarm situation, independent of driving direction:

CV section mapping to F5 when driving forward:

address 282 value 15= FV and FH and AUX1 and AUX2 on (= double white and red light front and rear) CV section mapping to F5 when reversing:

address 382 value 15= FV and FH and AUX1 and AUX2 on (= double white and red light front and rear)

-- F6 key: Driver's cab lighting 3 x white SMD LED, independent of direction of travel:

CV section mapping to F6 when driving forward:

address 287 value 16= AUX3 on (= driver's cab lighting) CV section

mapping to F6 when reversing:

address 387 value 16= AUX3 on (= driver's house lighting)

-- F7 key: Fire box flickering lights 2 x orange LED, independent of direction of travel:

CV section mapping to F7 when driving forward:

address 292 value 32= AUX4 on (= firebox flaring) CV

section mapping to F7 when reversing:

address 392 value 32= AUX4 on (= fire box flaring)

-- F8 key: RS shunting without light and without ABV:

CV section mapping to F8 when driving forward:

address 297 value 128= RS on (= RS shunting without light and without ABV)

CV section mapping to F8 when reversing:

address 397 value 128= RS on (= RS shunting without light and without ABV)

-- F9 key: Double White= shunting light, independent of direction of travel:

CV section mapping to F9 when driving forward:

address 302 value 3= FV and FH on (= white light front and rear)

CV section mapping to F9 when reversing:

address 402 value 3= FV and FH on (= white light front and rear)

-- **F10 key: ABV off (= Anfahrt und Brems Verzögerung), independent of driving direction:**

CV section mapping to F10 when driving forward:

address 307 value 64= ABV off (= ABV disabled) CV

section mapping to F10 when reversing:

address 407 value 64= ABV off (= ABV disabled)

-- **F11 key: Test function all lights on, independent of direction of travel:**

CV section mapping to F11 when driving forward:

address 312 value 63= FV , FH , AUX1 , AUX2 , AUX3 and AUX4 on (= test function, all lights on) CV

section mapping to F11 when reversing:

address 412 value 63= FV , FH , AUX1 , AUX2 , AUX3 and AUX4 on (= test function, all lights on)

Additional table 3- Explanation of function connections Märklin mLD/mSD decoder

Value	Effect (mode)	Note
0	Output out	
1	Dimmer	
2	Flashing light 1	
3	Flashing light 2	
4	Single flashlight	
5	Double flashlight	
6	Coincidence generator (e.g., firebox)	
7	Smoke generator	Condition dependent on "standing still" or "driving."
8	Light dimming off/on	
9	Mars Light	
10	Gyra Light	
11	Light according to "Rule 17" forward	Light is dimmed when standing still
12	Light according to "Rule 17" backwards	Light is dimmed when standing still
13	Neon tube	
14	Energy saving lamp	
15	Telex	
16	Precise time switching	Normal on, time controlled off
17	Min. time switching	Can only be after defined time disabled.

Functions explanation Märklin KN160725A locomotive decoder

The Märklin mLD/mSD decoder documentation can largely be used for our Märklin KN160725A locomotive decoder, this is pretty much compatible with it, with a few exceptions.

It sounds crazy, but for our KN160725A locomotive decoder (and also for the Märklin mLD/mSD decoder) we still have to download a table from the documentation of the Märklin mLD3/mSD3 decoder, although the latter decoder is otherwise totally incompatible with our locomotive decoder. For some inimitable reason, the table of function connections is actually missing from the Märklin mLD/mSD decoder document.

But in the Märklin mLD3/mSD3 decoder documentation, on page 21, this missing table 'Function connections', in Dutch, can be found. For convenience, this table is also included in this document as 'Additional Table 3'.

See these three links for the necessary Märklin locomotive decoder documentation:

https://www.maerklin.de/fileadmin/media/service/technische_informationen/Umruestdecoder_mLD-mSD_CV-Liste_DCC.pdf

https://www.maerklin.de/fileadmin/media/service/technische_informationen/CV-Tabelle-mSD3.pdf

https://www.maerklin.de/fileadmin/media/service/decoder-updates/mLD3_mSD3_Zusatzanleitung_0716.pdf

On the CV addresses 112 to 129 (see 'Table 1' and the 'Additional Table 3') are for all outputs of this locomotive decoder defined what they should do. For each output this is declared in three successive CV addresses, the 1st CV address is the 'behavior', the 2nd address the 'intensity' and the 3rd CV address the 'Blink frequency', the latter only applies to some effects, if these not used, then the value 20 is in here.

Example: CV addresses 115, 116 and 117 are intended for the FH (taillight) output of the decoder. Connected to this are 3 white LEDs in series (with a resistor) at the rear of the locomotive. The value 8 on CV address 115 (see 'Extra table 3') controls that this output turns the light 'slowly' on and off, I myself find this a nicer effect than the value 1 in here, which turns the light on and off. would turn off and on directly. At address 116 is 255, this determines that the maximum light intensity is

is used. The output is driven in such a pulsating manner that to the eye this appears to be a continuous control, however, at 255 the duty cycle of this output is 100%, ie the output level is 100% of the time low (= 0 V) at control and high (= DC max). The LEDs on that output are then continuously on full power. Suppose that the white light is found too bright, then a lower value can be set, but never lower than 20. If 128 would be put in, then the duty cycle of the pulsating control frequency of this output 50%, ie the

output level is then 50% of the time low (= 0 V) at control and 50% high (= DC max), the result would be that the white LEDs on this output would then be on at half power, so giving much less light in this. The value 20 on CV address 117 is the default value for outputs which are continuously or on, but suppose that this FH output would be set to the 'blinker 1' function (= CV address 115 to 2, see 'Additional table 3') then the value in CV address 117 determines the repeat blink frequency, this can be set higher or lower as desired with this. The 'turn signal 2' function flashes opposite to the 'turn signal 1' function, ie if one output would be set to 'turn signal 1' and another output would be set to 'turn signal 2' then these 2 outputs would flash alternately, as e.g. the 2 warning lights of some government service cars do.

Special effects are e.g. the 'Energy saving lamp' and the 'Fire box' idea, which I connected to the AUX3 and AUX4 outputs, see 'Table 1' along with 'Additional Table 3'.

Table 2 is used to link the function keys of the MS2 to a certain behavior of an output. For this, see the documentation of the Märklin mLD/mSD decoder and Table 2 above.

Turning the corresponding 'bits' positions in the bytes of the 1st linked CV address on or off then determines whether a particular output actually becomes active when that function key is pressed, this can also be set for the 'forward gait' and the 'backward gait' separately and possibly different from each other.

Example: for the F1 key (see 'Table 2'). This key switches on the white A-front signal lights at the front and at the same time the 2 red rear lights at the rear. For this purpose, bit 0 (= value 1) must be switched on to switch on the PV output (this is where the white A-front signal lights at the front are connected) and at the same time bit 2 (= value 2) must be switched on.

value 4) to be turned on to turn on the AUX1 output (that's where the red lighting is located rear connected to it), hence the value 5 (= 1+ 4) at CV address 262. Furthermore, this F1 key switches, when the locomotive is in the 'backward going' position, the white A-front signal lights on the rear and simultaneously the 2 red rear lights on the front. To do this, bit 1 (= value 2) must be turned on to turn on the FH output (which is where the white A-front signal lights are located rear connected to) and at the same time bit 3 (= value 8) should be turned on to turn on the AUX2 output (that is where the red lighting front is connected to), hence the value 10 (= 2 + 8) at CV address 362.

Difference between Märklin KN160725A locomotive decoder and Märklin mLD/mSD locomotive decoder

For all the "Function settings of the decoder outputs" and the "Function mapping to the F0 (= FL) <--> F31 keys of the MS2' from the 2 tables here, just the Märklin mLD/mSD decoder list can be used.

The ABV and RS functions are mapped slightly differently in the Märklin KN160725A locomotive decoder because the Märklin mLD /mSD locomotive decoder also still has the AUX5 and AUX6 outputs, but the Märklin KN160725A locomotive decoder does not.

With the Märklin mLD/mSD decoder, the ABV disable function is assigned to the 1st bit (= bit 0) of the 2nd byte and the RS function is assigned to the 2nd bit (= bit 1) of the 2nd byte of the 5 always matching mapping bytes (when driving forward) and the 5 always matching mapping bytes (in) which 10 bytes then belong to the function key currently used.

Two examples for ABV and RS with the Märklin mLD/mSD locomotive decoder:

- Suppose ABV is turned off with the F10 key:

Look in the Märklin mLD/mSD list at the bottom on pages 13-14 at the F10 key function. For mapping, the 5 CV bytes 307 to 311 are used for 'forward driving' and the 5 CV bytes 407 to 411 for 'reverse driving'. Here, at CV address 308 (= this is the 2nd associated byte, not CV address 307 = the 1st associated byte) the 'drive forward' position, the value 1 must be programmed if ABV should be disabled when "driving forward".

Similarly, at CV address 408 (= this is the 2nd associated byte, not CV address 407 = the 1st associated byte) the 'reverse driving' mode, the value 1 should be programmed if ABV should be disabled when 'reverse driving'.

- Suppose RS is enabled with the F10 key:

Look in the Märklin mLD/mSD list at the bottom on pages 13-14 at the F10 key function. For mapping, the 5 CV bytes 307 to 311 are used for 'forward driving' and the 5 CV bytes 407 to 411 for 'reverse driving'. Here, at CV address 308 (= this is the 2nd associated byte, not CV address 307 = the 1st associated byte) the 'forward driving' mode, the value 2 must be programmed if RS should be enabled at 'forward driving'.

Similarly, on CV address 408 (= this is the 2nd associated byte, not CV address 407 = the 1st associated byte) the 'reverse driving' mode, the value 2 should be programmed if RS should be enabled when 'reverse driving'.

However, in the Märklin KN160725A locomotive decoder, instead of AUX5 and AUX6 outputs, the ABV function assigned to the 7th bit (= bit 6) of the 1st byte and the RS function assigned to the 8th bit (= bit 7) of the 1st byte of the 5 associated mapping bytes (when driving forward) and 1st byte of the 5 associated mapping bytes (when driving backward), This of course applies to any function key assignment of ABV or RS, or in other words: RS is now here at the bit position of AUX6 and ABV is now here at the bit position of AUX5.

Two examples for ABV and RS with the Märklin KN160725A locomotive decoder:

- Suppose ABV is turned off with the F10 key:

Look in the Märklin mLD/mSD list at the bottom on pages 13-14 at the F10 key function. For mapping, the 5 CV bytes 307 to 311 are used for 'forward driving' and the 5 CV bytes 407 to 411 for 'reverse driving'. Here, at CV address 307 (= this is the 1st corresponding byte) the value 64 (= bit 6 = 1) must be entered.

Similarly, at CV address 407 (= this is the 1st corresponding byte) the "reverse driving" position, the value 64 (= bit 6 = 1) should be programmed if ABV should be disabled for "reverse driving".

- Suppose RS is enabled with the F10 key:

Look in the Märklin mLD/mSD list at the bottom on pages 13-14 at the F10 key function. For mapping, the 5 CV bytes 307 to 311 for 'forward driving' and the 5 CV bytes 407 to 411 for 'reverse driving' are used. Here, at CV address 307 (= this is the 1st corresponding byte) the value 128 (= bit 7 = 1) must be programmed if RS should be switched on when 'driving forwards'. Likewise should be programmed at CV address 407 (= this is the 1st corresponding byte) the 'reverse driving' mode, the value 128 (= bit 7 = 1) if RS should be enabled at 'reverse driving'.

Modifications and conversion of the 30000 locomotive

A number of 2 mm holes need to be drilled in both the front and rear of the locomotive, 2 holes at the front and 5 holes at the rear.

On the front 2 holes: Next to the lower 2 A-front signal front LEDs, there will be 2 red 2 mm LEDs, which can light up when the locomotive is reversing.

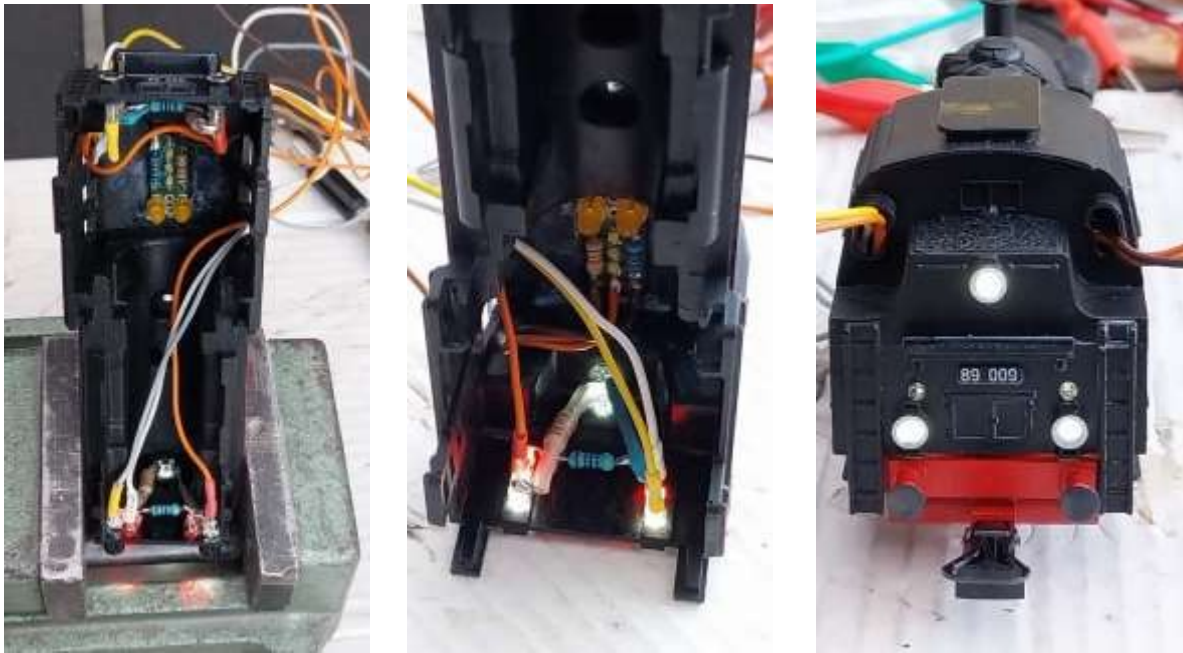
At the rear 5 holes: These are the 3 silver-colored circles, which indicate where the A-front signal lights at the rear could come, these are drilled out with 2 mm, there come 3 white 2 mm LEDs for the A-front signal code lights which can illuminate when the locomotive drives backwards. Just above the lower two A-front signal leds at the rear, two 2 mm holes will be , will be 2 red 2 mm leds, which can light up when the locomotive drives forward.

Almost all the LEDs used are 2 mm LEDs with molded-on legs, "thru hole" types, these are available with "round" or "flat" head only in the small PCB at the top of the driver's compartment
2 standard orange 3 mm LEDs and 3 white SMD LEDs are used. All these kinds of LEDs can be bought for next to nothing at the well-known Chinese web site.

At the front the 18 V light and the built-in plastic light guide that was intended to distribute the light from this light to the 3 A-front signal illumination holes at the front of the locomotive is omitted, in its place are now 3 separate 2 mm white LEDs.

All 2 mm LEDs and also the ballast resistors for each LED series chain are glued to the inside of the lockap with thick liquid super glue. Solder both at the front lights and at the rear lights 3 extra long connecting wires the LEDs, the orange + wire (= DC + from the locomotive decoder) is used in common for the 3 white and the 2 red LEDs, the connecting wires are later brought to the desired length.

Be careful that when drying out, no super glue leaks through to the front of the lockap, so that not the light openings, with now LEDs in them, would inadvertently be additionally filled at the outside with superglue what may flowed past the LEDs, this applies mainly to 3 white LEDs on the front as the existing holes in the lockapje for these lights are already quite wide. In that case, remove the flowed superglue on the outside of the cap and into the holes, carefully with a toothpick, this goes smoothly as long as that super glue is still liquid there.



In a dimple in the roof at the top of the driver's cabin, a small piece of experimental PCB, type hole PCB with loose solder pads, size 3 by 7 holes, is glued in upside down (solder pads visible) with super glue. On this PCB there are 3 white SMD LEDs for the driver's cab interior lights in series with each other, again in series with a ballast resistor of course. These 3 white SMD LEDs fit exactly between the side-by-side solder islands so that everything is also solidly attached.

There is also room on this PCB for 2 normal orange 3 mm LEDs, again soldered in series with each other and in series with the series resistor. These 2 orange LEDs simulate the effect of the firebox complete with flickering light effect, they should be soldered as close as possible to the PCB so that they do not get in the way with the motor housing directly below.

To the PCB also solder again 3 long connection wires, the orange+ wire (= DC+ of the locomotive decoder) is common for both functions on this PCB.



After everything is assembled, the cap is reunited with the chassis, its still long connecting wires shortened to the necessary lengths, and soldered to the Märklin KN160725A locomotive decoder PCB. Do not make the wires too short, of course for service and maintenance the gears, motor and carbon brushes should still be easily accessible.

This little decoder has 3 interconnected connection points for the DC+ output, intended for the 3 orange wires to the front, rear and top sections of lights. The front support of the old 18 V lamp holder on the chassis is provided with a piece of shrink tubing to prevent short circuits between the LEDs and resistors on the front of the locomotive and the loc. chassis.

All LEDs are by DC, in the locomotive decoder is a Graetz bridge rectifier which controls the digital track voltage rectifier for the logic on this decoder. All wires and LEDs connected to the decoder outputs must not make contact or short circuit with the chassis of the locomotive under any circumstances.

Also 1 point of interest is the tiny metal screw that attaches the locomotive decoder to the chassis. When detaching or attaching this, the permanent magnet of the motor next to it apparently a considerable and irresistible force on this screw. Several times I had to fish this screw out of the partially open motor housing next to it with tweezers. When reattaching the decoder board, make sure that no wires get stuck between the chassis and the decoder board. Prevention is better than cure.

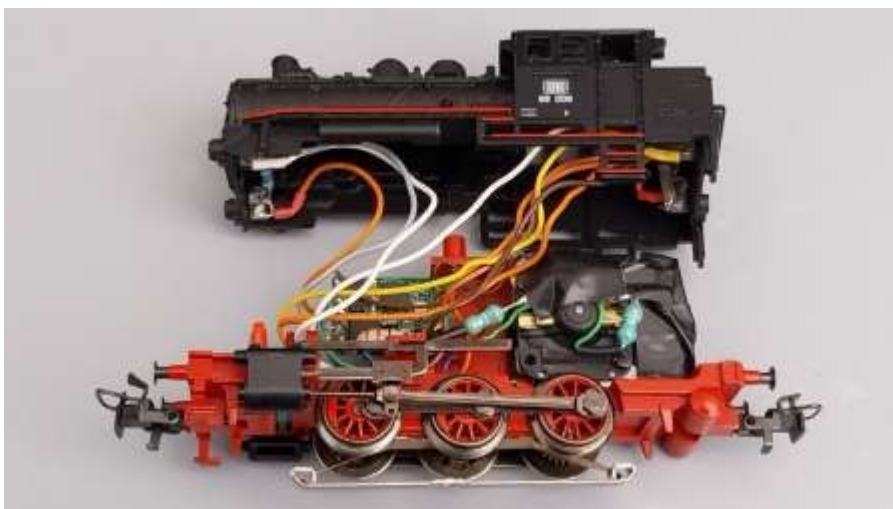
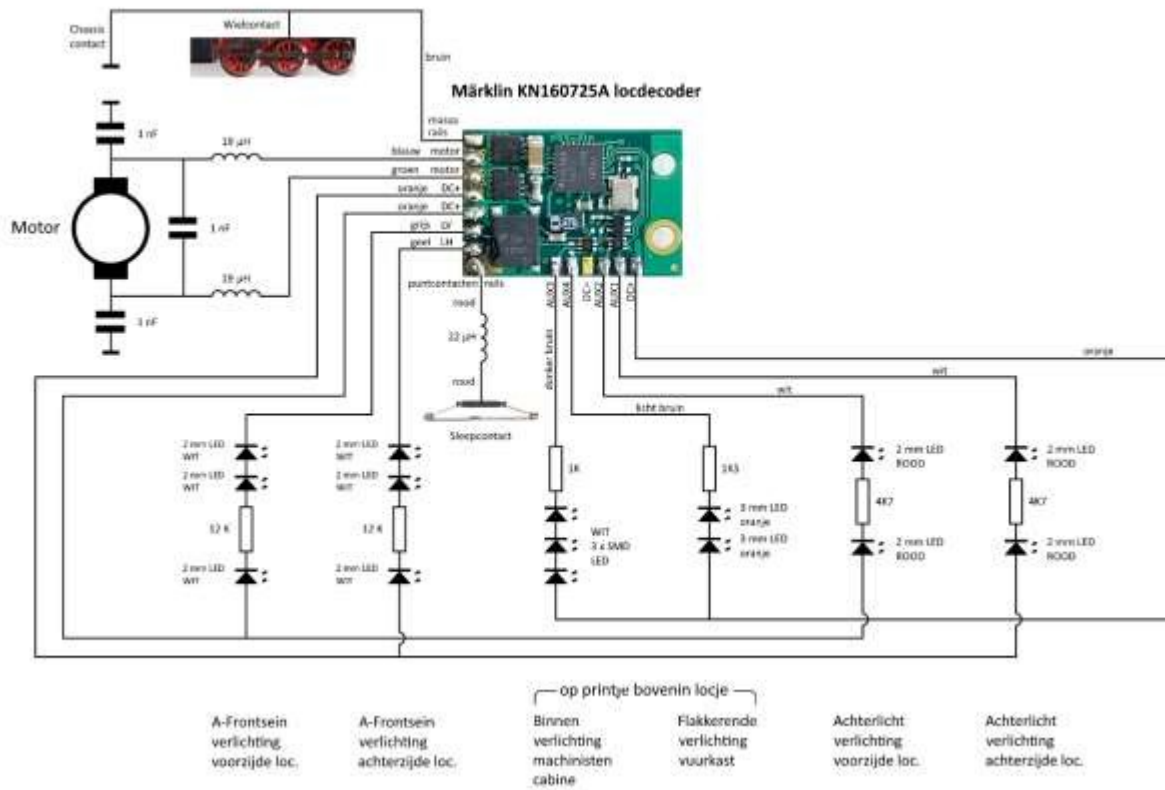
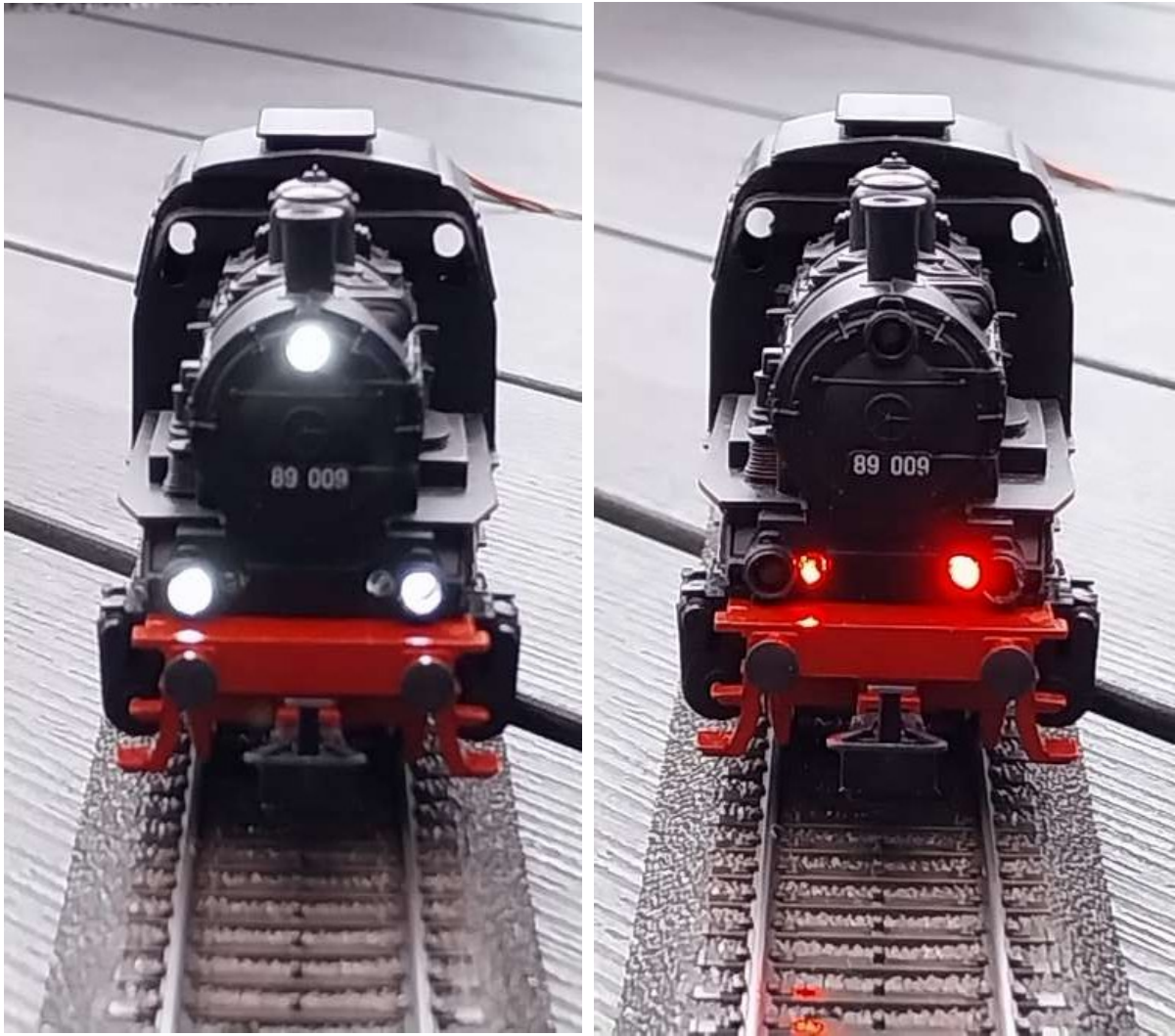


Diagram modified Märklin 30000 locomotive

Modificatie serie 89.0 DB - 89.009 - Märklin 30000 loc.



The final result



Closing Remarks

Also as part of the 70 years in the Märklin range of 3000 analog locomotive in H0, this project for the digital Märklin 30000 locomotive in 2025 was initiated by me.

Of course, it is up to the reader to start controlling things differently in the locomotive, e.g. recording events under different function keys or using different function symbols for it.

Just simple white light switching with the direction of travel is also possible of course, without all those extra bells and whistles, this makes the conversion process also a lot simpler, the original 18 V bulb and the plastic light guide on the inside

The front of the lockapje can remain in use and at the rear you only need drill 3 holes of 2 mm, mount 3 white LEDs and connect them in series with a resistor on LH of the locomotive decoder and you're done. The CV programming hassle is also much simpler, only changing at CV address 357 from the value 1 to the value 2 is sufficient for this.

This is also the original modification that I found earlier on the Stummiforum and gave me the idea to ...

But it is also possible to use the light functions which are now connected to AUX1 and AUX2 (the 2 red LEDs at the front and rear) and/or the light functions which are now connected to AUX3 and AUX4 (the driver's cab lighting and the flickering fire box) in a completely different way, for example by attaching Telex couplers to the front and rear of the locomotive or the like.

Building in a smoke generator, although programmatically possible, I would not do it myself, because of the plastic cover on top of this Märklin 30000 locomotive, which is likely to melt away slowly when the smoke generator is used.

With this explanation and step-by-step plan, I hope to have described everything as clearly as possible so that the Märklin 30000 modification project can also be easily recreated by the handy tinkerer.

COAX

March 30, 2025