



How to Install the WifiTrax WMH-20 Harnessed Wi-Fi Loco Controller in a Kato GP35 Locomotive

Practical notes by Steve Shrimpton

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I love Kato locomotives! They run smooth and are well weighted to pull long trains. I think the GP35 series by EMD are good locos to have on a small model railroad as they look good even on fairly tight curves. In this application note I explain how to install one of our WMH-20 harnessed Wi-Fi locomotive controllers in one of my new Kato GP35 Ph1 locos.

The WMH-20 harnessed Wi-Fi control fits a number of similar locomotives such as the Atlas Train Master series and many other DCC-ready locomotives such as more recent Kato models. It receives power from the track and controls the locomotive motor and two lights, front and rear. By the term “harnessed” we mean that the Wi-Fi Controller connects via a short harness to the DCC-Ready connector in the locomotive. Most DCC-Ready Locos have the NMRA standard 8-pin connectors and the WifiTrax product line includes a selection of harnesses of different length with some “reversed” so that the controller module can sit to the back or front of the 8-pin connector.

For the Kato GP35 we have chosen a standard (not-reversed) 1.5” JST 9-pin to NMRA 8-pin harness. The harnesses we supply have wire colors and functions identical to the DCC standard.

On the WMH-20 only the front and rear lights are connected so the green and purple leads are unused but we include them in the harness to keep it standard. You can therefore buy these for DCC locomotives if you need them.

Tools and Skills Required

1. Pointed nose pliers
2. Scissors
3. Small flat bladed screwdriver or similar tool
4. Tweezers may be helpful.
5. There is **NO** soldering required.

Installation Procedure

1. Carefully remove all of the plastic handrail detail parts from your locomotive body using tweezers.



Figure 1 The Kato GP35 ph1a after removing the handrails with the WMH-20 Unit and selected 1.5" Standard Harness

2. Remove the plastic body shell from the locomotive frame. The Kato instructions say to squeeze the sides of the locomotive gently. I could not get this to work as the plastic latches seem to grip on the inward side, so I'll describe how I do it. There are four plastic latches on the loco body that grip on the *inside*. There is just enough room to slip a small flat bladed screwdriver under the rear truck and ease the latch outwards (Figure 2). Be very careful not to damage the truck or the latch. At the same time as the latch is released, slip your thumb nail between the body shell and the plastic footplate to prevent the latch from springing back.

Repeat the operation on the other side of the rear of the loco and ease the shell from the frame as in Figure 3.



Figure 2 Releasing the plastic latches under the rear truck and easing the body off with the thumb nail



Figure 3 Lifting the body shell off the locomotive frame

3. Once the body shell is removed you can see how the power is routed from the truck pick-up points to the printed circuit board (PCB) supplied in the locomotive.



Figure 4 Original internal construction of the Kato GP35

4. Using a pair of pointed nose pliers, grip each of the links that are installed in the 8-pin DCC socket as supplied as in Figure 5. These links allow the locomotive to run directly from variable DC track power when no DCC decoder or Wi-Fi controller is installed. Take note of the position of these in case you want to go back to DC running.



Figure 5 Removing the links from the 8-pin DCC socket

5. Lay your WMH-20 and its harness on top of the locomotive as in Figure 6. Check that the harness is the right length. (The 1.5-inch harness should be perfect). Note the point where the rear of the body shell will fit on the frame. Your installed unit should not extend back beyond this point. Note also that there is quite a lot of space between the edge of the Kato PCB and the 9-pin connector on the WMH-20 unit. This will allow the colored wires to go around the rear LED on the Kato board so that the plastic light guide to the rear light can extend down to the LED.



Figure 6 Checking for size and positioning

- When the WMH-20 module is installed in the loco it should not make electrical contact with the frame of the loco. In order to allow better heat dissipation, we do not recommend putting shrink wrap sleeving around the module. The best approach is to simply stick a piece of electrical tape to the frame. The WMH-20 can then sit on top of that.

Cut a length of electrical tape as in Figure 7



Figure 7 Cut a length of electrical tape, 4 cm should be about right.

Fold one end over and stick it to the frame as in Figure 8.

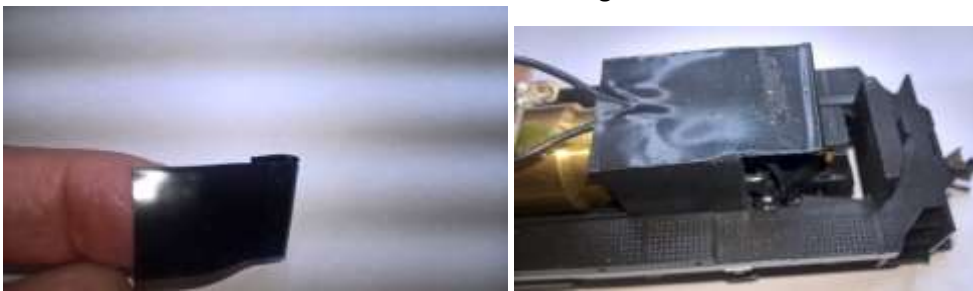


Figure 8 Fold the tape at one end and stick the other end over the frame

- Insert the 9-pin connector on your harness into the 9-pin JST connector on the WMH-20 module.

These connectors are small and very precisely made. They are a tight fit and easily damaged so you have to be careful. I recommend the technique shown in Figure 9 and describe below.

Grasp the WMH-20 unit firmly with the thumb and fingers of your left hand and the harness with the thumb and fingers of your right hand (a). Note the positioning of the green and purple leads. The connectors will only fit when they are the correct way round so do not try to force them if they are the wrong way round!

Make sure the units locate properly when halfway in (b), then firmly push them fully together with the thumb nails (c).

If you should need to remove the connector you can reverse the technique, grasping the module and **ALL** the wires firmly to pull them apart. **NEVER** pull on one or two wires as you will pull them out of the white plastic housing and they cannot reliably be replaced.

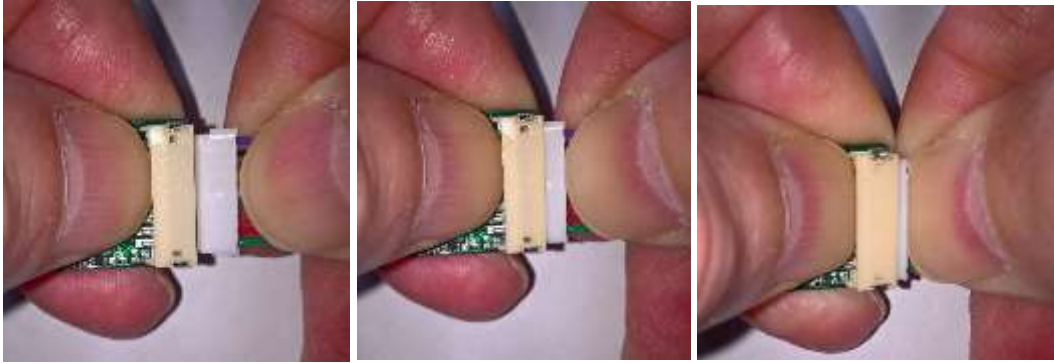


Figure 9 Insert the harness connector into the JST 9-pin connector on the WMH-20 Module. Left to right: (a), (b) and (c)

8. Now you are ready to plug in the 8-pin NMRA standard connector to the DCC socket on the locomotive as in Figure 10. Be sure that the pin labelled Orange on our connector coincides with the socket labelled orange on the Kato circuit board.

If you need to install the WMH-20 module in a locomotive with the harness pointing towards the front instead of the rear, you can either fold the wires over towards the front, or better, purchase one of our “reversed” harnesses which will allow the harness to fit more neatly.

Wherever you place the WMH-20 module, you must be **VERY CAREFUL** that no part of it touches the 12 volts from either rail. This is most important since the Wi-Fi Module and other devices work from 3.3 Volts and if they are somehow connected to 12 Volts they will be instantly “fried”. We cannot replace units that have been destroyed due to misuse such as this. So use your electrical tape where necessary!

Take care to ensure that all 8 pins fit into their corresponding socket and that none are bent. If any pins have been bent somehow during handling you can straighten them with your pointed nosed pliers.



Figure 10 The WMH-20 module and its harness installed in the locomotive.

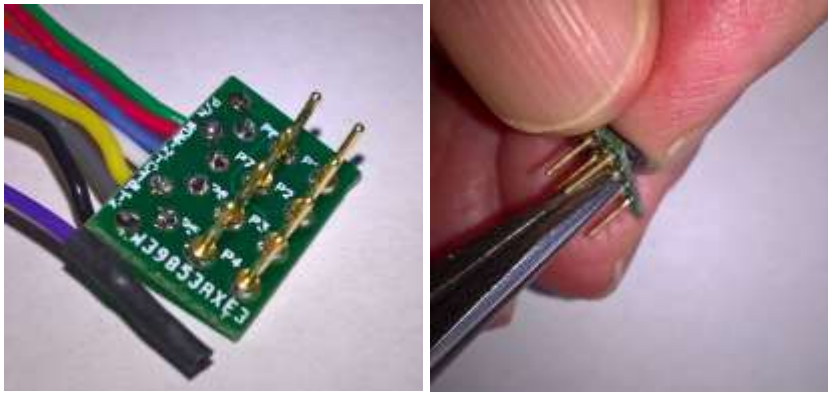


Figure 11 Make sure that none of the pins are bent. You can straighten them with pliers.

9. On some locomotives, there is a screw fixing the printed circuit board to the frame. We have designed our 8-pin connector circuit board to avoid any contact with this but it's a good idea to check that no stray bits of wire have somehow contacted this screw. Have a quick look as in Figure 12.



Figure 12 Make sure no wires touch the mounting screw.

10. Tuck the colored leads down around the LED that provides the rear light. As explained earlier, the plastic light guide needs to descend so that the light from the LED shines into it.



Figure 13 Tuck the colored leads down around the rear light LED.

11. Inspect the locomotive before replacing the body shell to make sure the black leads from the truck pick-ups will not prevent the body from fitting. Also make sure that they are well away from the flywheel, universal joints and truck gearing.

Replace the body shell on the locomotive. It's best to start by fitting the rear end over the new WMH-20 module circuit board. It is a snug fit but the body should fit over it freely.

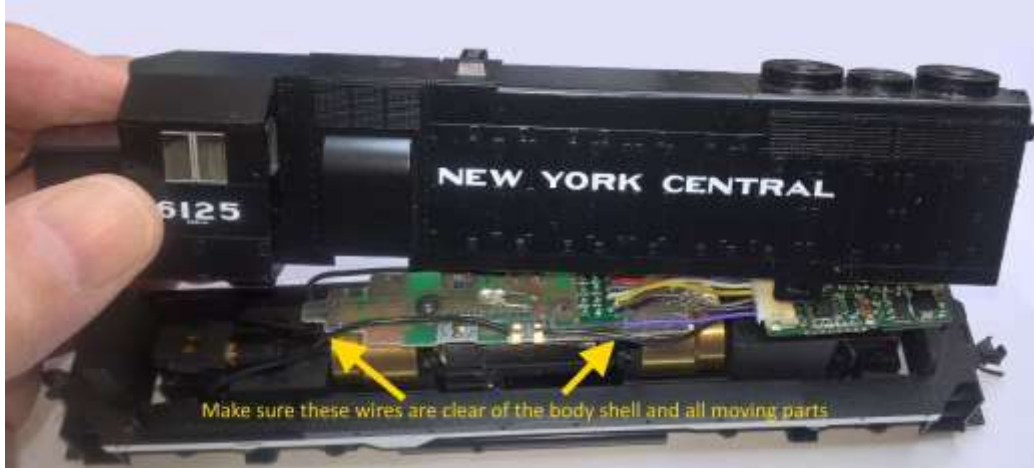


Figure 14 Replace the locomotive body shell over the internal parts. It's best to start with the rear of the body by fitting it over the WMH-20 module. It is a snug fit, but it should fit freely.

12. Complete the fitting of the body shell by moving it down carefully so that it sits against the foot plate. Investigate any obstruction!

Finally, you will have to gently press the front and rear to get the plastic latches to engage. Inspect the body all around to make sure the lower edge fits snugly against the foot plate.



Figure 15 Complete the fitting of the body shell

13. It's probably a good idea to perform test and tuning of your locomotive before replacing all of the detail body parts such as the handrails.



Figure 16 Installation complete! Now you can test, tune and replace the detail parts.

Please see our application notes:

You can obtain these from our website www.wifitrax.com

- (1) [Managing your Model Railroad Wi-Fi Network](#) – this will tell you how to create your Model Railroad Wi-Fi Network and how to add new locomotives to it or remove a locomotive from it.
- (2) [Tuning your locomotive](#) – this will tell you how to tune your locomotives configuration to achieve best performance.