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## Cruise Control Upgrade Manual for Mikado & Hudson Locomotives

### General Information:

Examine the kit and verify that all the parts are there. The kit should contain the following parts: 1 new motor, 1 MDK090 updated motor driver board, 1 new cable assembly, 1 Scotchlok connector, 2 wire wraps, 4 screws, and 4 nuts.

You will need the following items to complete the upgrade: #2 phillips screwdriver, #1 phillips screwdriver, small flat blade screwdriver, wire snips, soldering iron, needle nose pliers, wire strippers and white lithium grease.

The steps for the upgrade process vary slightly between the Mikado and the Hudson. Steps that are different for the two engines will have engine designations for the differences in the step.

**The upgrade procedures require changing out the motor. Be very careful when handling the motor to not drop it and bend the shaft.**

**As part of the upgrade process, a new MDK090 motor driver board will be installed. Minimal handling of this board is recommended. Avoidance of static electricity is extremely important as this is an electrostatic sensitive device that can be damaged by static electricity.**

### Upgrade Steps:

1. Carefully place the engine upside down in a soft support -- foam rubber, a pillow, or a thick folded towel, to prevent breaking off any details (like the bell) and the unit from being scratched.
2. Locate the screws to remove the shell. For the Mikado there are 4 screws: two under the cab and one recessed in each cylinder.



Upgrade Kit



Front Chassis Screw

Rear Chassis Screw

Front Chassis Screw

Rear Chassis Screw

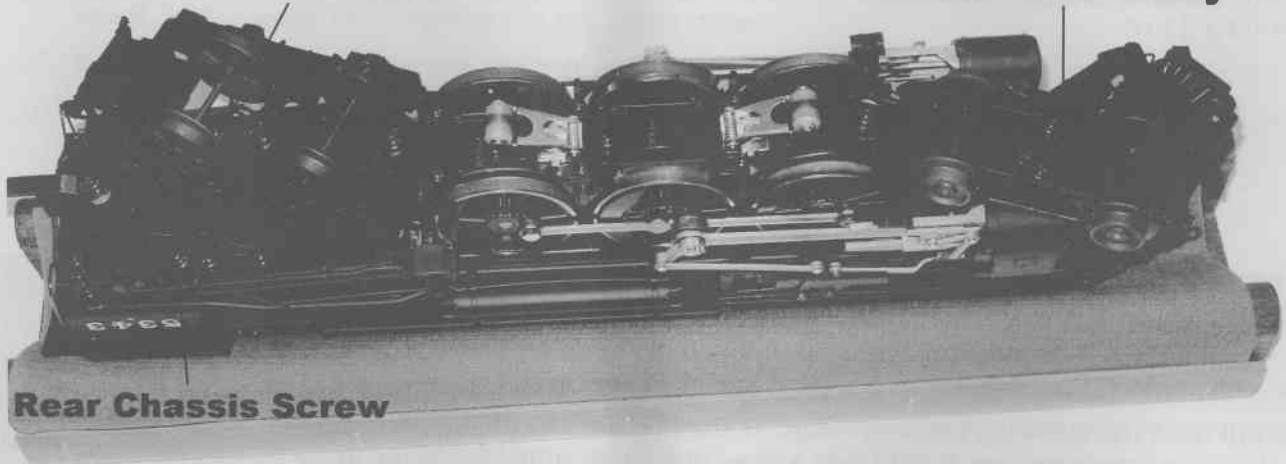


## Cruise Control Upgrade for Mikado and Hudson Engines

For the Hudson there are 3 screws: two under the cab and one under the pilot truck. Removal of the front pilot truck screw will allow the truck assembly to be pivoted so that removal of the chassis screw is easier.

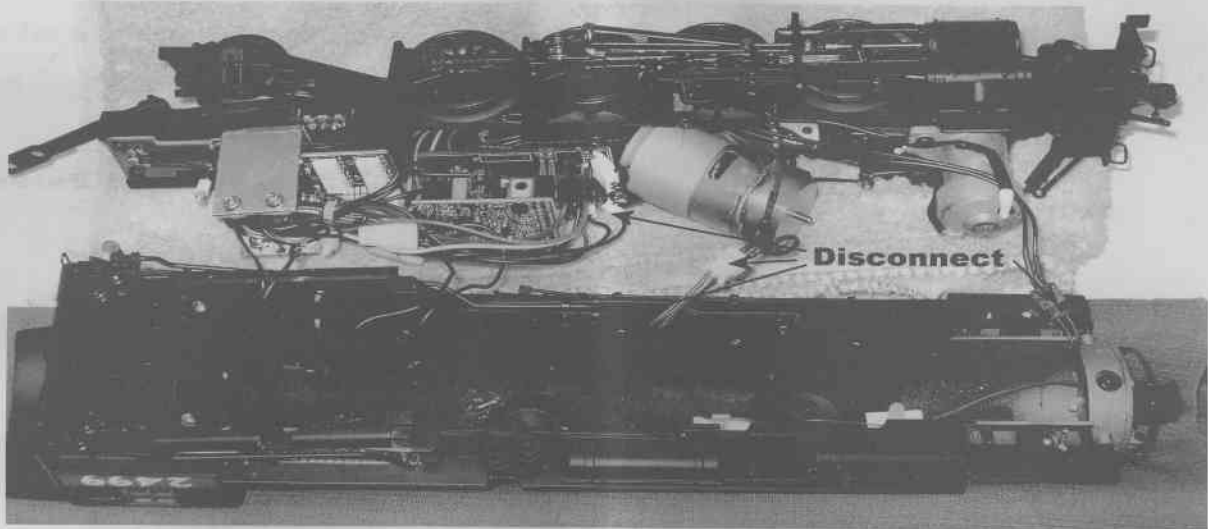
### Rear Chassis Screw

### Front Truck Assy



### Hudson Chassis Screws

3. Remove the shell carefully, making sure that no parts fall off.
4. Observe how the wires are run. This will help with reassembly later.
5. Disconnect all the wires from the chassis to the shell. This will make the job easier and prevent scratching as there isn't a lot of slack available. To disconnect the shell, lay the chassis on its side next to the shell. Unplug the connector on the wires that run to the headlight. Unplug the connector on the wires that run to the marker lights. Locate the yellow wire nut that joins the 2 black wires from the shell to a 3<sup>rd</sup> black wire that is plugged into **J2** on the mother board. Unplug the connector from the mother board. Finally push the LED in the cab back through its rubber grommet so that it and the connector attached to its leads are free of the shell. Place the shell aside for later reconnection.

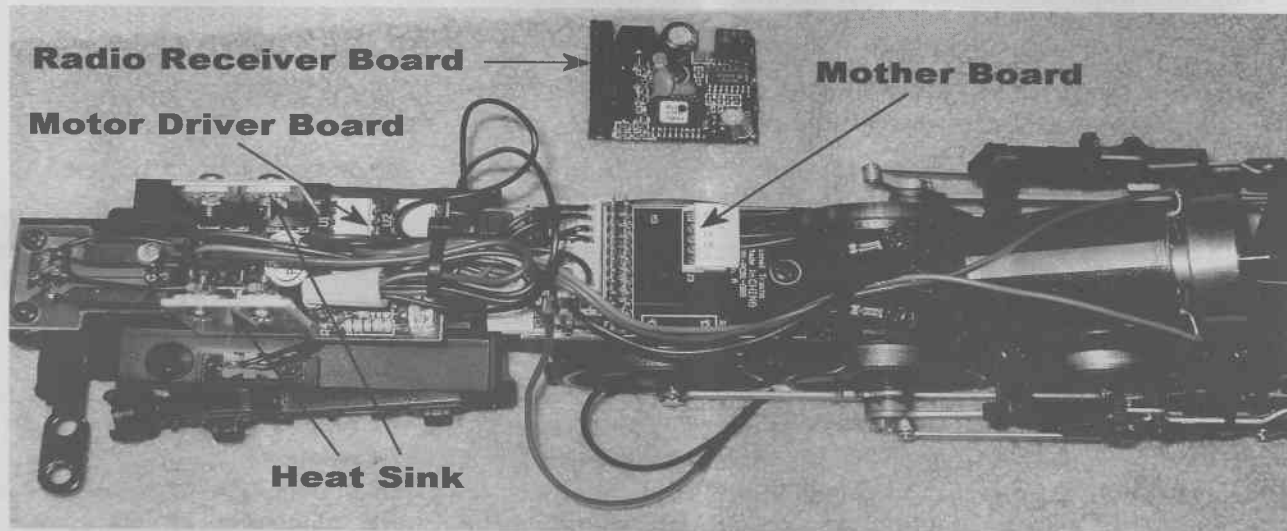


### Mikado & Hudson Chassis Disconnects



## Cruise Control Upgrade for Mikado and Hudson Engines

6. Locate the *motor driver board*. It is mounted to an aluminum heat sink. Remove the wire ties binding the wires near the motor driver board..



### Printed Circuit Board Locations

7. Unplug the 2 plugs that connect to the *motor driver board*. The black one has a latch that must be pressed back toward the plug.
8. Remove and discard the 4 wire harness with the white plug, that runs from the *motor driver board* to the *mother board*.
9. Remove and discard the 4 screws and nuts holding the *motor driver board* into its heat sink. Remove and discard the old *motor driver board*.
10. Place the new *motor driver board* in the heat sink, and attach using the 4 new screws and nuts provided. The black wire soldered to the back of the MDK090 should stretch toward the motor.
11. Locate the *radio receiver board*. It has no wires attached to it, and is plugged into the *mother board*. Unplug it and set it aside.
12. **Mikado Only** Remove the screws holding the *mother board* to the chassis. Slide the mother board aside so the motor mounting screws are accessible.
13. Remove the screws attaching the motor mount to the chassis.
14. Un-solder the motor wires from the old motor.
15. Remove the motor mount from the old motor by removing the two screws that hold it in place.
16. Attach the motor mount to the new motor so that plugs on the *motor circuit board* are facing toward the top of the engine.
17. Grease the worm gear before replacing the motor.
18. Replace the motor by attaching the motor mount screws to the chassis.
19. **Mikado Only** Reinstall the *mother board*.
20. Connect the new 3 wire harness to the *motor driver board* and to the *motor circuit board*. Note that the plugs are different at each end.
21. Plug the original black connector back into the new *motor driver board*. This connector has a black, red, grey and brown wire. The grey and brown are the motor wires. The white socket labeled **JMP2** can get in the way of the plug latch. It can be moved out of the way with a small screwdriver.



## Cruise Control Upgrade for Mikado and Hudson Engines

22. Plug the supplied connector with the black and white wire into the *motor driver board*.
23. Solder the brown motor wire into the hole on the *motor circuit board* with the large round outline.
24. There is a black wire soldered directly to the *motor driver board*. Solder it to the motor circuit board, in the small hole between the two motor wires.
25. Solder the grey motor wire into the hole with the large square outline on the *motor circuit board*.
26. Locate a connector labeled **J3** on the *mother board*. Unplug this connector. Locate the black wire from the *motor driver board* with a silver terminal on it, and plug the terminal into slot #2, counting from the edge of the board. Be careful to align the terminal the same way as the existing terminals, with the locking latch at the top. Push it into the connector until it locks in place. Plug the connector back into the *mother board*.
27. Locate the remaining white wire on the *motor driver board*. This wire must be spliced into the wire coming out of slot #1 on the connector labeled **J3**. To do this, cut the black wire. Then push both ends of the black wire, along with the white wire into the supplied Scotchlok connector. At least 1/2 inch is needed to go into the connector. While holding the wires in place, use pliers to press the red button on the connector all the way down. This will crimp the wires in place and connect them. Some insulating gel will cover the exposed wires.
28. Reinstall the *radio receiver board*.



29. Carefully re-bundle the wires together, and hold them in place using the supplied wire wraps. Trim the excess wire wrap. Test the engine at this point.
30. Reconnect all wires to the shell.
31. Carefully place the shell back on the chassis making sure that no wires are caught between the shell and chassis.
32. Reinstall the screws that hold the shell and chassis together.