

The SM/1 to SM/2 Conversion for the 81 Class.

Late in 1997 Powerline Models Pty Ltd released the first Australian owned, researched, designed and mass manufactured mechanism in a ready to run Australian locomotive. This mechanism was a world leader with constant brightness directional lights. That is the light were always bright from about 3 volts onwards and they were directional with white markers and headlight shining up front and red markers on the rear which changed with the directional running of the locomotive. The weakness of this was the diode technology used and the ability to be DCC compatible when people really did not require it.

Roll on research and development with assistance from the Powerline Production Centre and Powerline team member's families. Solutions; a new PCB using voltage regulation technology and added improvements/enhancements new traction tyres, revised wiring, new wheel pressings, optional RP-25 wheels and revise light guides with a better medium (acrylic). The result is the SM/2 mechanism and an improved 81 class locomotive.

Note the SM/2 can not be fitted with or adapted to DCC, it is not DCC compatible. The SM/1 mechanism, which is now a collectable, is DCC compatible and has the 8 holes for DCC fitting. SM/1 PCBs will be available for those wanting to fit DCC to their Powerline 81 Classes. Those wanting to convert their SM/1 locomotive to SM/2, up grading, can do so.

Also please note that the wire of the PCB is the same for the 81, BL and G1 Class locomotives but globe wiring, lighting wiring, for the 81 Class is different to the G/BL Class. Both will be explained.

For converting an SM/1 mechanism to SM/2 you will require a SM/2 PCB, a soldering iron, screw drivers, solder and patience to do the basic up grade. To go the whole way I would also suggest some 2-amp wire, 1.5 mm drill bit, the new acrylic light guides and some new wheels. With the new wheels you have a choice of; standard with traction tyres, standard without traction tyres, RP-25 Nickel-plated wheels or RP-25 blackened wheels.

The basic conversion/up grade is the replacement of the SM/1 PCB with the SM/2 PCB. First you need to remove the body of the locomotive. This is easily done by undoing and removing the two screws found at either end of the fuel tank on the underneath of the locomotive. Then you place the locomotive on its wheels in front of you so that you may study the positions of the wiring and note which way round the new PCB fits, it can only fit correctly the correct way round as all holes need to line up.

Next you will need to unsolder the pick up wires and the motor wires. On a single motored locomotive this means three wire at the powered end and a single wire at the other. In a dual powered mechanism it means six wires, three at each powered end. Note the power pick up wire, usually white, goes to the centre. The top motor wire to the right and bottom motor wire to the left. When looking at a mechanism from side on you will note lighting wiring at either end, then a set of three holes to the left, a space and then another set of three holes to the right and then another lot of lighting wiring. From left to right the wiring is as follows. Left three holes, top hole is for the top motor wire, middle is for power pick up and bottom is for bottom motor wire. On the right three holes it is the opposite, top hole for bottom motor wire, middle hole for pick up wire and bottom hole for top motor wire. Remember this for refitting. Once the wires are removed you will need to remove the couplers at either end. After removing the couplers, not required if you have fitted Kadee couplers, you may now remove the bogie(s) by unscrewing the top centre bogie screw. The bogie will now just drop out, so take care.

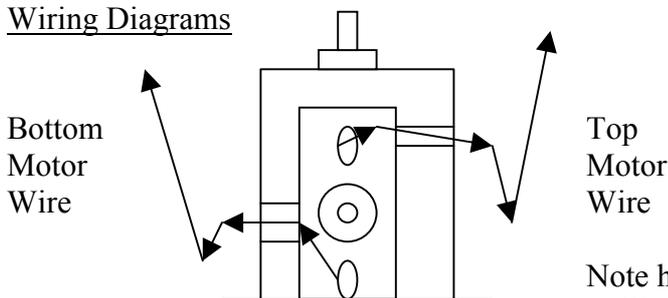
When rewiring the SM/1 to SM/2 it is best to use new 2 amp wire and re do the wiring from the motor(s) to the PCB. Those of you who have an early 1999 Powerline Update will have diagrams for up grading the SM/1 to make it run better. This wiring modification for the power bogie is what we suggest here.

This wiring modification is quite simple but make a world of difference to wire reliability and durability giving it a better life. First you are required to remove, unsolder, the existing wires from the power bogie(s). Then with the bogie in front of you, with the rear of the motor facing you and the worm gear end facing forward or away, drill a 1.5 millimetre hole on either side. The one on the right should be level with the top motor soldering point, the bottom one just below the level of the motor bearing. The right side wire should be tinned at one end first then fed through the hole to the top brush soldering point and carefully soldered into place. (Note the tinned section should only be about 4-5 millimetres at most. Then the wire should go down from the hole to level with the bottom of the motor and then bent so it goes straight back up from there to be cut level with the upper most point of the motor bogie, level with the top mounting point. Then the wire bared and tinned. The bottom motor wire should also be bared and tinned first the threaded through the 1.5 millimetre hole on the left and down to the lower brush soldering point. Carefully solder it into place taking care not to melt the motor clamp or the pick up wire. This wire too goes down from the hole to level with the bottom of the motor and is then bent so it goes straight up and is cut level with the top most point of the power bogie. Again the wire at the top is barred and tinned in preparation for fitment.

With the bogies removed and prepared for refitting now is a good time to replace the PCB. This requires the removal, unsoldering, of the lighting wires at either end and undoing a few screws. Remember to have noted which way round the PCB fits. All wiring points, screw holes and holes through which the locomotive body is secured must be correct.

To remove the old PCB you simply unsolder the lighting wiring at each end, taking care to keep it together as you remove them. The wiring of the light globes is very different for the SM/2 compared to the SM/1; they are not the same. Then unscrew the retaining screws and carefully remove the PCB. Then place the new PCB in position and screw it into place. Then all we need to do is resolder the lighting wires into place and refit the bogies. When refitting the bogies you screw them in to place first then resolder the new wiring into place. Just take your time and do it a step at a time and work logically, remembering the pick up wire always goes to the middle hole.

Wiring Diagrams

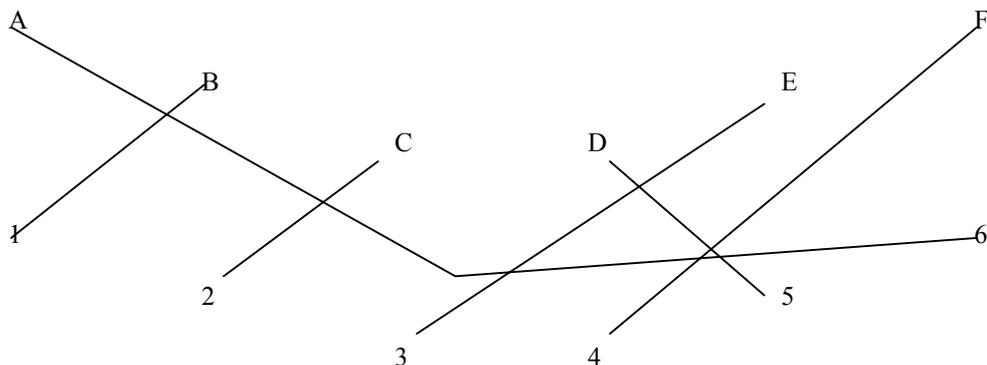


Note holes wires pass through are 1.5mm holes Drilled into side of plastic which holds motor.

81 Class globe/lighting wiring.

Now I will try and explain the wiring of the globes for the 81 Class as simple as possible in text. When facing the end of a mechanism you have three globes each with one red and one white wire. Then in the above PCB you have six holes for wiring. Starting from the back left the holes in the PCB we will call A-B-C-D-E-F and from left globe to right globe wires will be 1(red), 2(white), 3(red), 4(white), 5(red), and 6(white). With this in mind the wiring sequence for the 81 Class is 1B, 2C, 3E, 4F, 5D and 6A.

PCB

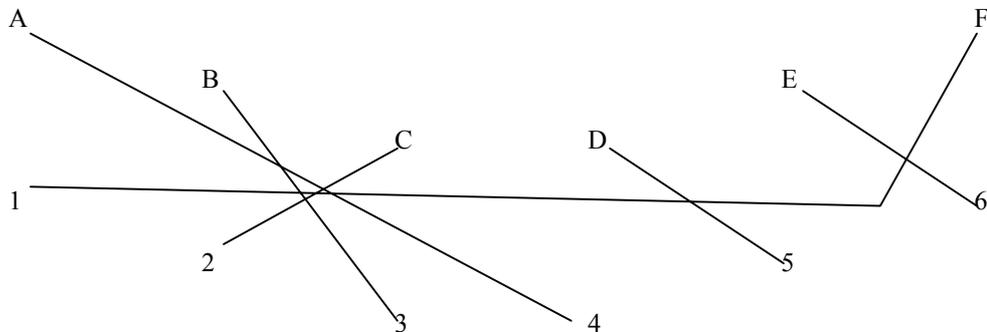


Globe Wires

G1/BL Class globe/lighting wiring.

Using the same idea as per the 81 Class the wiring for the mark one G Class and the BL Class is as follows. Facing the lighting end to be rewired the holes in the PCB again go A-B-C-D-E-F, from left to right, and the wires will be 1 red - 2 white - 3 red - 4 white - 5 red - 6 white. The wiring sequence for these locomotives is 1F, 2C, 3B, 4A, 5D and 6E. This will wire the globes up for correct operation in the G1/BL Class locomotives.

PCB



Globe Wires

For added improvement there are a few bonus options. To further enhance the lighting you can replace the SM/1 light guides with the new acrylic light guides. For those who want blackened or finer scale wheels there is the RP-25 wheel sets in either Nickel-Plated or blackened. For those whose track work requires all wheel pick extra pick ups can be added for all wheel power pick up. For those who want more power than most, single motored units can be made dual powered. Then there is also the Freight Corp decal to give that Freight Rail 81 Class its new corporate identity. The end result is one of the best Australian locomotives on any Australian model railway anywhere.

SM/2 Printed Circuit Board

