

# INSTALLATION INSTRUCTIONS

## Mac•five MkII

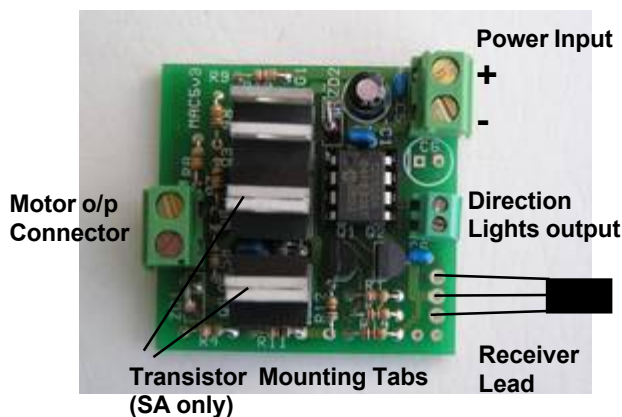
- All versions -

### GENERAL PROCEDURE

Mac•five controllers can be installed at any angle, but installation with the power transistor tabs face up is best. ALWAYS ALLOW PLENTY OF FREE AIR SPACE ABOVE THE CONTROLLER FOR VENTILATION.

If the transistors get very hot due to high motor current, then the motors being used are probably unsuitable for battery powered locomotives, or the motor is faulty. Try a "dry run" with the various components, including the Mac•five, prior to wiring up your loco. Permanent fixing can be made with self-adhesive Velcro. DO NOT drill any holes through the controller to fix it in place. Do not remove the sleeve as this protects the controller from short circuits, and retains the serial number label of the Mac•five. **This is used for identification!**

**STANDARD CONNECTIONS** - See Figure 1 below.



The '+' power input terminal is marked with a red spot. **'Tin' all multi-stranded wire connections with solder, before clamping in the terminals.** Do not over-tighten the terminals. *Note that the clamps in the screw terminals rise when tightened, so put wires above the clamps, not below.*

White or yellow >Receiver signal }  
Red > Receiver power (+) } On plug-in receiver lead  
Black > Receiver power (-) }

**N.B.** It will be necessary to cut off the tab on the side of the receiver plug, if you are using a Hitec or Spektrum receiver. Use a pair of sharp side cutters to do this NOT scissors. If necessary clean up the side with a needle file afterwards.

The Direction Light outputs **MUST NOT** be shorted together or to the power lines. **N.B. Only 2 red, yellow or green LEDs or 1 white LED per o/p. If more LEDs or filament bulbs are required a LAMP-1 amplifier must be used.**

**The receiver is powered by the Mac•five. A receiver battery must not be used!**

The power inputs are protected against reverse connection.

### OVERLOAD PROTECTION

A fuse or cut-out must be fitted to protect the Macfive from short circuits or motor faults. Fuses or cutouts should be 4 amps, or less, for the SA type, or 1 amp for the LA type. They can be chosen to suit the motor stall current if this is less than these maximum ratings, and so protect the loco motor too.

Regardless of type, most equipment fuses blow, and cutouts open, at about twice their marked current rating. E.g. A 4 amp fuse will blow at 8 amps, but will remain intact at 6 amps. The same applies to most thermal cut-outs.

### TESTING AND DRIVING

Double check the wiring against the circuit diagram in Figure 2. Make sure there are no loose connections, including on/off switches with faulty contacts. Intermittent power connection will cause the Mac•five to lose the 'centre-off' reference. Once satisfied that the wiring is correct, switch on the transmitter power first, and then the loco/controller power. **N.B. Ensure that the joystick is at the centre of its travel so that equal forward and reverse speeds can be obtained, and centre any joystick trimmer controls.** Make sure the transmitter and loco are well away from large metal structures e.g. metal gates or fencing, and that the transmitter aerial is pointing towards the sky. This ensures that the Mac•five locks on to your transmitter's proper signal and not a reflection or another false signal source. No adjustments are needed, as the Mac•five automatically aligns to the transmitter joystick. Make sure you do not move the transmitter joysticks whilst switching on, or else the Mac•five will select an incorrect reference to stop the locomotive. To drive the loco, move the joystick in the required direction of travel. The further it is moved from centre, the faster the loco goes in that direction. The traction control software will prevent sudden changes in speed, and hence wheel-slip, however an emergency stop can still be performed by allowing the joystick to return to centre by its return spring.

**One final point - if the loco power is turned off, allow 10 seconds before switching back on.**

### AUTODRIVE

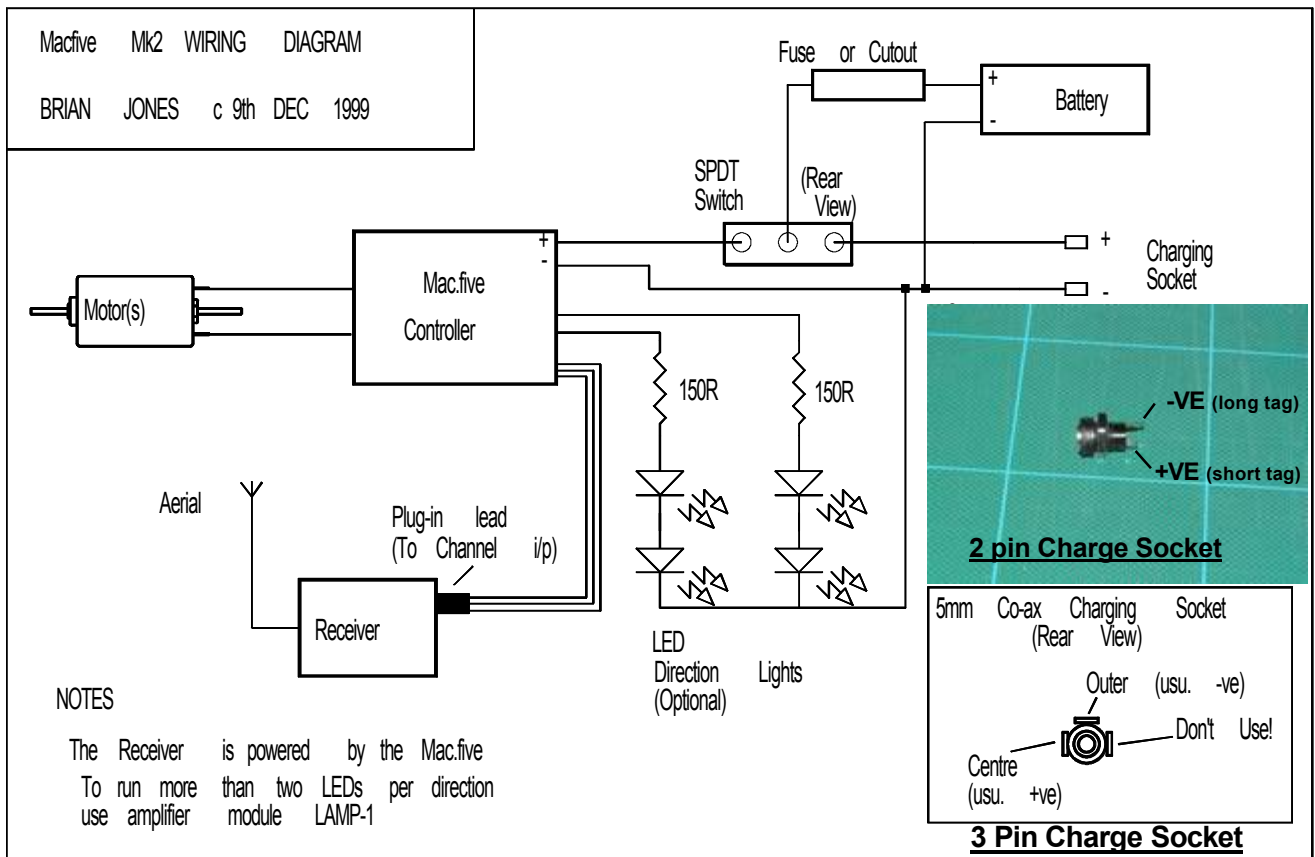
Mac•five controllers are fitted with Bi-directional Autodrive as standard. Run the loco up to speed in the required direction and smartly switch off the transmitter. Mac•five will then take over running in the same direction. To regain transmitter control, move the joystick to the position at switching off, and turn on the transmitter power.

### USEFUL HINTS

If the locomotive has been converted to battery power make sure ALL the track pickups have been removed. Otherwise, the Mac•five could be damaged if the loco is run on a track power system.

**DO NOT SHORTEN RECEIVER AERIAL LEADS.** It will degrade the performance of the receiver. On 27MHz and 40MHz receivers, reception can be enhanced by soldering the end of the aerial lead to an electrically isolated cab roof plate, up to about 3" (75mm) square.

**Figure 2**



Do not use the whole metal body of a locomotive as the aerial. Reflections from various surfaces will confuse the receiver. Tender coal rails are not usually very good either ! **2.4GHz receiver aerials should be left as they are supplied. DO NOT MODIFY THEM!!**

Never point the transmitter aerial at the loco. There is a dead spot in line with the aerial. Holding or setting the aerial at 45 degrees will emit the best signal.

**Don't fit a flywheel** to the motor(s). It can damage the controller in certain circumstances and is not needed as a 'flywheel effect' is produced electronically by the **Macfive**.

**HEAT-SINKING (SA Versions only)**

If you are forced to fit them, then two separate heat-sinks are required, one for each pair of transistor mounting tabs, as shown in fig 1 overleaf. They MUST be isolated from one another, and should NEVER be allowed to touch each other, or anything else, as each one is a live connection to a motor lead.

**MOTOR SUPPRESSION**

Use twisted pairs for the power wiring between the battery pack, controller, and motor, to reduce interference. If not already suppressed, motors should be fitted with a 0.1uF capacitor directly across the motor terminals. If it is not fitted directly on the motor it will not be effective.

**SPECIFICATIONS**

**Working Voltage**

Macfive-SA 24v: 9 to 24 volts DC.  
Macfive-SA 18v: 6 to 18 volts DC  
Macfive-LA : 6 to 18 volts DC

**Maximum Current**

**Macfive LA** 3 Amps (Starting), 1 Amp (Running)  
**Macfive SA** 12 Amps (Starting), 4 Amps (Running)  
**Macfive 24SA-UHC** 25A (Starting), 7 Amp (Running)

**WARNING! Fully charged batteries will reach a voltage higher than their nominal rating!**

**N.B.** If for any reason you need to return your **Macfive** please return it in the anti-static bag in which it was supplied, or wrapped in aluminium foil before packing.

*If you decide at any time to sell your **Macfive** controller, please ensure that you pass this instruction sheet to the new owner and tell them to contact BRIAN JONES, so that we may update our records.*

**Macfive** controllers are not suitable for locos fitted with MTS or DCC decoders. No liability is accepted for damage to either a controller or decoder used in this situation as the **Macfive** was not designed for this purpose.

**DECLARATION OF SELF CERTIFICATION**

**Macfive** is compliant with the EMC Directive 89/336/EEC when used with a Buhler 13.21 motor.

**Motor interference suppressor**  
Solder to motor terminals if none already fitted

**BRIAN JONES**

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