



## Milk Carton MARS MOBILE

For the  
LED Sled (kit LS-1)



### Materials

- 600ml milk cartons (x2). 1litre milk cartons can be used to make a 'stretch' vehicle
- Plastic drink bottle caps (x8)
- 4mm metal garden riser/stake (300mm length)
- 14mm garden poly tube (70mm length)
- 4mm garden flexi poly tube (50mm length)
- 3mm clear vinyl tube (60mm length)
- 25mm M3 bolts with nuts (x4)
- Small cable tie
- LED Sled (kit LS-1) and 9V battery

### Tools and adhesives

- Small hand drill
- 3mm, 4mm and 5mm drill bits or wad punches
- 1 1/64" or 4.5mm drill bits
- Small hacksaw and file
- Craft knife
- Fine/medium grit sandpaper
- Plastic model adhesive (or super glue)
- Hand soldering equipment
- Heat gun for heat shrink tubing

### 1. Make the bottle cap wheels (see page 8)

**1(a)** Drill or punch axle holes in the centres of the caps



**1(b)** Remove surface roughness from rims with sandpaper

**1(c)** Hold the caps together, and run a thin trail of adhesive around the rim joint

## 2. Make the vehicle body (see page 8)



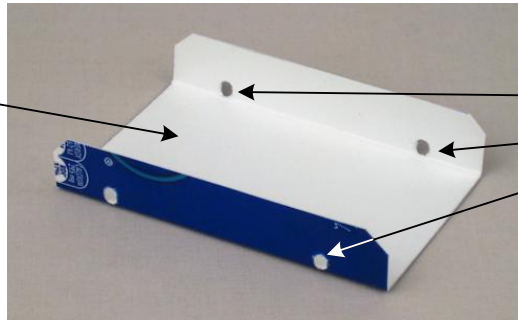
**2(e)** Cut an access hatch into the bottom of the body carton, leaving a 'ledge' of about 10mm on all sides



**2(f)** Into the top of the vehicle body, drill or punch holes for mounting bolts, and cut slots for switch levers. Use the LS-1 printed circuit board as a stencil, or download the adhesive label file **LS-1\_Hole&SwitchGuide.zdl** from the WENNIG site. Use the free Avery Dennison software **DesignPro 5 Light for PC** to print onto Avery L7163 labels.

### 3. Make the hatch cover (see page 8)

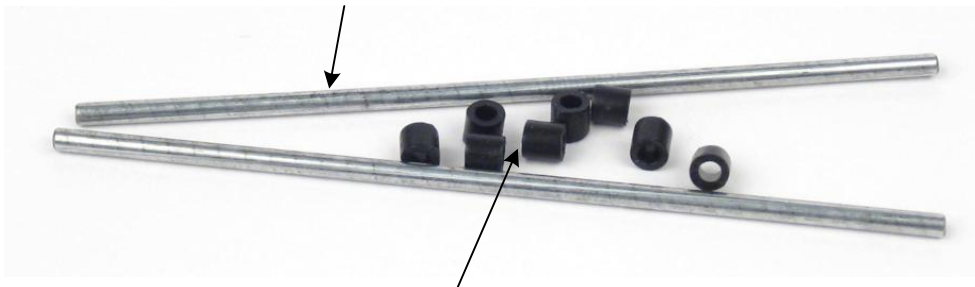
**3(a)**  
Unfold a second milk carton, and cut out a cover for the access hatch on the vehicle body



**3(b)**  
Drill or punch holes for the axles. These should align with axle holes in the body carton

### 4. Make the axles and wheel spacers (see page 8)

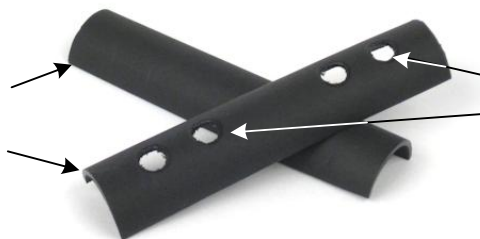
**4(a)** Cut two axles from 4mm diameter metal garden riser/stake, and smooth all ends with a file or grinding wheel



**4(b)** Cut eight spacers from 4mm flexi poly tube to hold the axles and wheels in place on the body carton

### 5. Make the front bumper (see page 8)

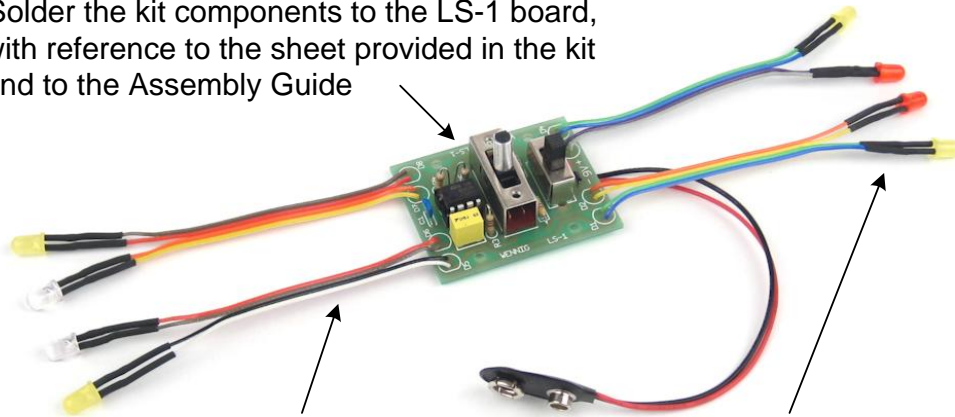
**5(a)**  
With scissors, split 14mm garden poly tube into two half-tubes



**5(b)**  
Drill or punch four holes for the front LEDs

## 6. Assemble the LED Sled kit (refer to LS-1 Handbook on WENNIG site)

**6(a)** Solder the kit components to the LS-1 board, with reference to the sheet provided in the kit and to the Assembly Guide



**6(b)** Use the rainbow cable supplied in the LS-1 kit to connect the LEDs to the assembled board

**6(c)** Use the heat-shrink tubing supplied in LS-1 kit to protect and insulate these solder joints

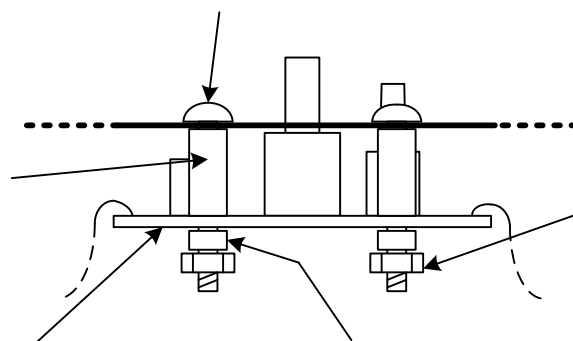
**6(d) Test the assembly.** Connect a 9V battery, and check that headlights and tail-lights respond to switch S1, and turning indicators respond to switch S2. The turning indicators should flash at about 1.4 flashes per second.

## 7. Bolt the LED Sled board to the vehicle body (see page 5)

**7(a)** Push 4 x 25mm M3 bolts down through the 3mm mounting holes in the top of the body carton

**7(b)** Cut 4 x 12mm 'spacers' from 3mm vinyl tube, and slide them onto the M3 bolts

**7(c)** Slide the LED Sled board onto the bolts

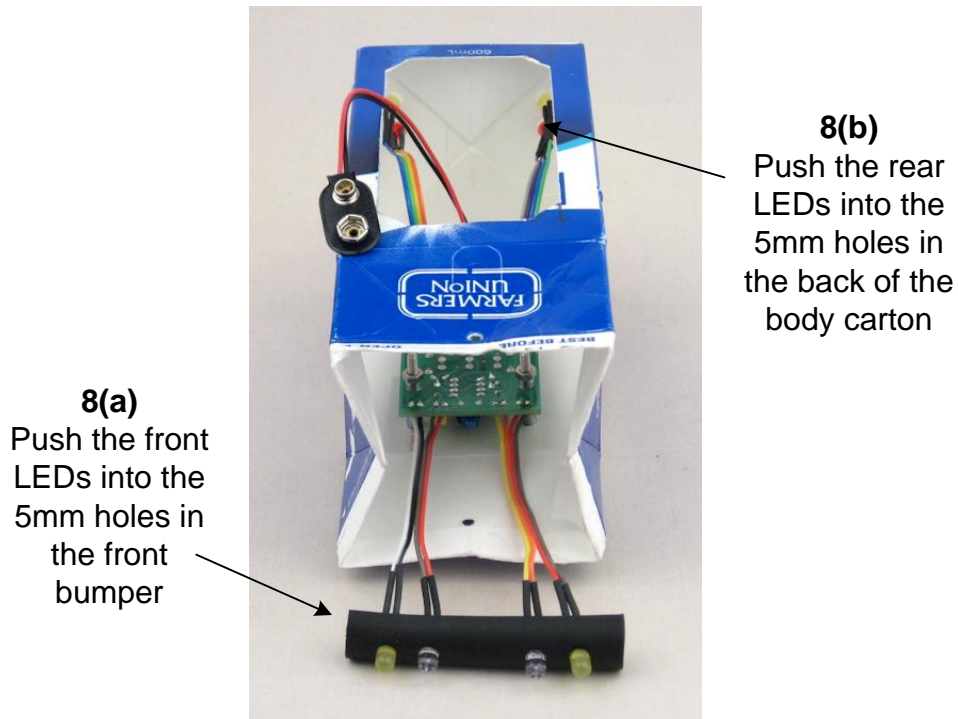


**7(d)** Cut 4 x 2mm insulating 'washers' from 3mm vinyl tube, and slide them onto the bolts

**7(e)** Fix the assembly in place with 4 x M3 nuts

## 8. Position the LEDs on the vehicle (see page 7)

Front/bottom view

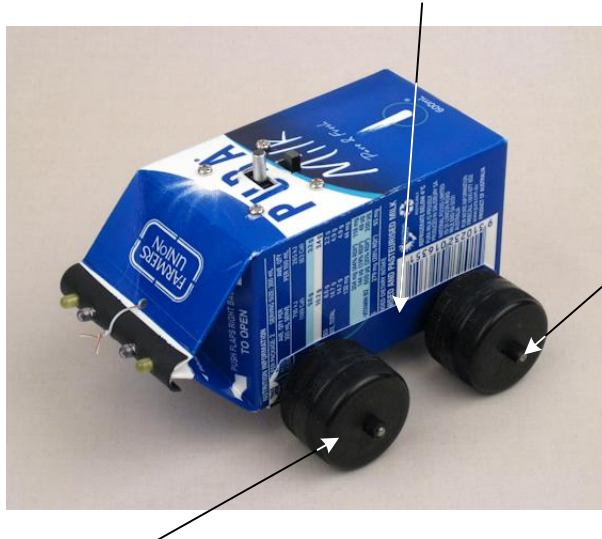


## 9. Attach front bumper and battery (see page 7)



**10. Complete the vehicle assembly (see page 7)**

**10(a)** Connect the LED Sled to the 9V battery, and place the hatch cover over the hatch in the body carton



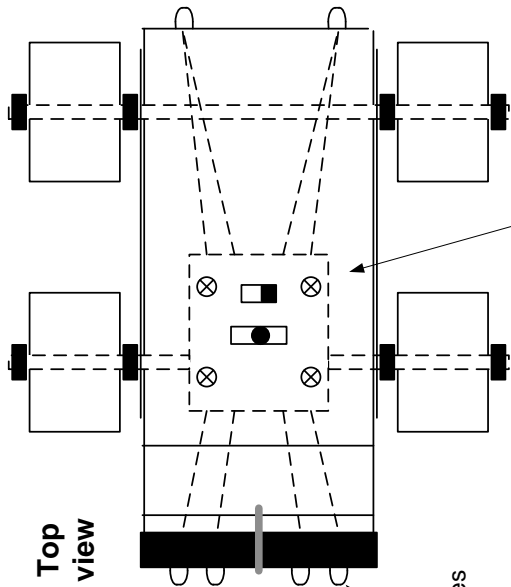
**10(b)**  
Slide axles through the 4mm holes in hatch cover and body carton, and fix them in place with flexi poly tube wheel spacers.

**10(c)** Fit wheels to the axles, and hold them in place with flexi poly tube wheel spacers. Ease the outer spacers away from the wheels to allow free rotation

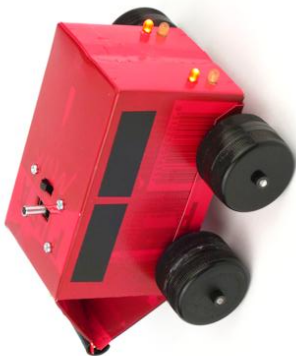
**10(d)** Dismantle the vehicle, paint the body carton and hatch cover with oil-based paint, and add 'windows' (insulation tape) and any other markings

**10(e)** Re-assemble the vehicle, this time fixing the rear LEDs in place with a drop of adhesive, and using a cable tie to secure the front bumper.





Top view



5mm LEDs  
Pushed through holes  
in front bumper

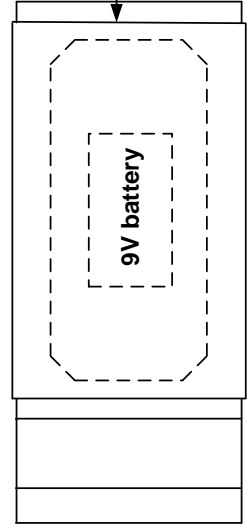
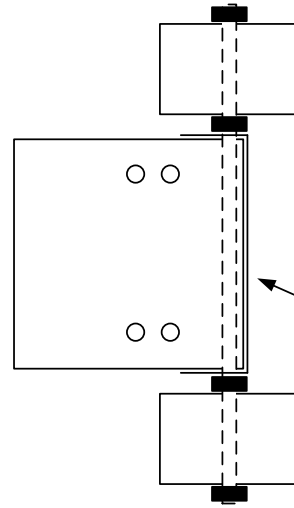
LED Sled (kit LS-1)

Cable tie  
Attaches front  
bumper  
to carton

Front bumper

Front view

Rear view



Bottom view

Hatch cover

Positioned over access  
hatch, and held in place  
with the vehicle axles.

