

HP 45 45HP AEC RAIL CAR CLOSED TYPE

Nº OF CAR 17 22 26 28 30 33 36 37 45 51 55 61

TARE WEIGHT 6^T 6^C MIN. - 7^T 1^C MAX.

TO CARRY 24 PERSONS

GROSS WT. 7^T 16^S MIN. - 8^T 11^C MAX.

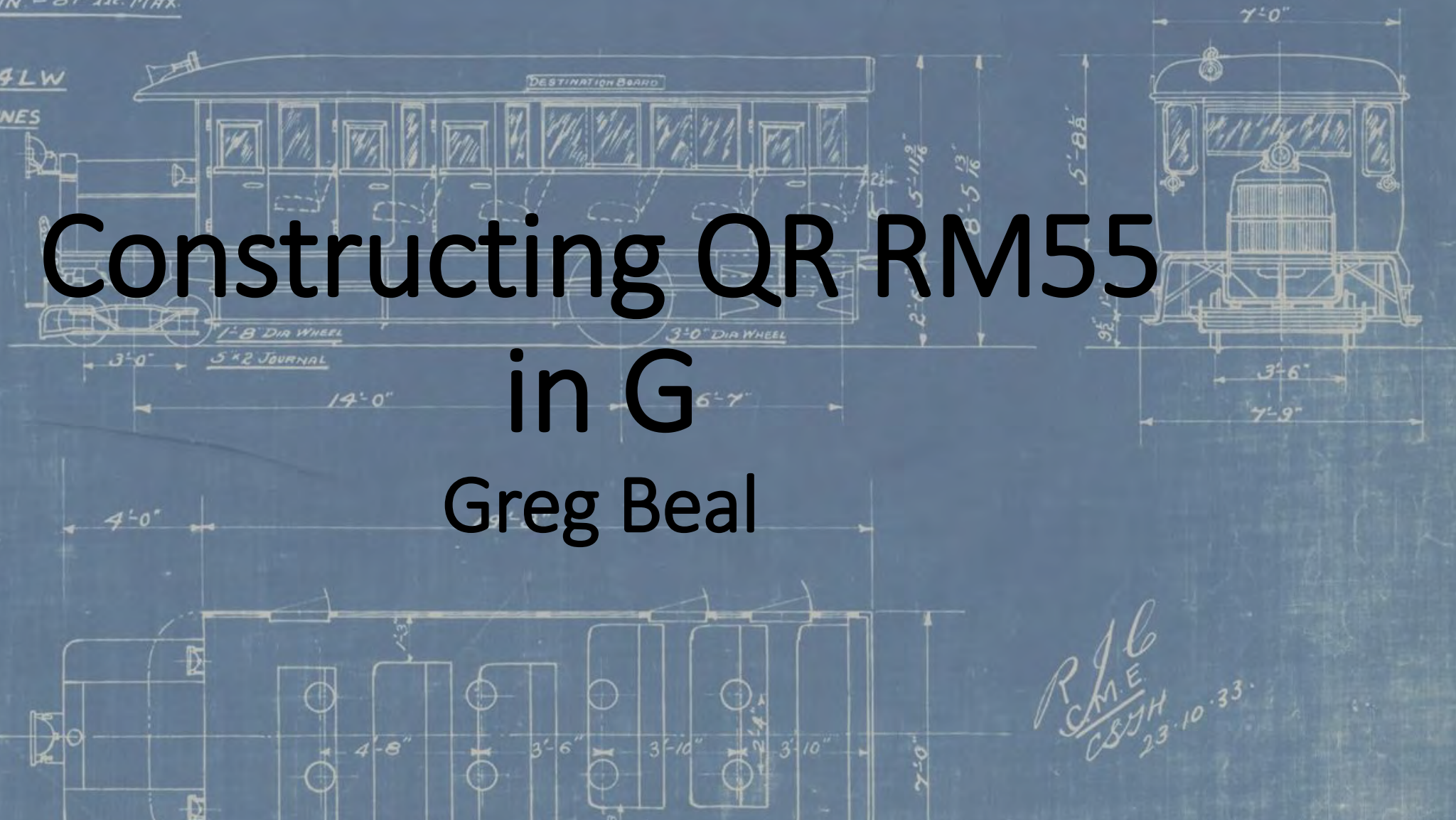
LIGHTING ELECTRIC

* CARS FITTED WITH 4LW

GARDNER DIESEL ENGINES

TARE WEIGHT 6^T 12^C

GROSS " 8^T 2^C



Constructing QR RM55 in G Greg Beal

RJB
C.M.E.
CSJH
23.10.33.



Thanks for the invitation to present

Prototype photos



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3D printing source files

- Madram.net
 - <https://www.madram.net/3d/#rm55>
 - 1:76 or 1:64, I chose the 1:76 (OO) and scaled up from there to G
- Thingiverse
 - Front bogie sides <https://www.thingiverse.com/thing:3774447/>
 - Sideframe springs <https://www.thingiverse.com/thing:3774447/>
 - Truss bar <https://www.thingiverse.com/thing:3774447/> then modified in Tinkercad to the right dimensions
 - Horn and main lamp (from another project)
- My own designs
 - Bullbar frames, cowcatcher frames, bolster and spaces, PCB standoffs, front side lamps cowls
- Creality Ender-3 printer used



Scaling

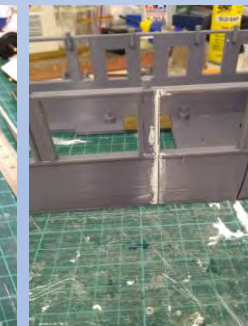
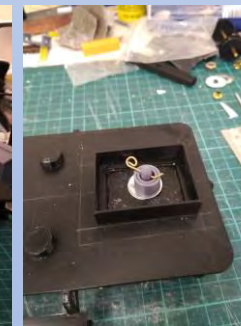
- Original STLs OO scale (1:76)
- Usual G (1:22.5) which on 45mm track
 - For **European** Narrow Gauge ~ 1 meter gauge
 - Pretty close to prototype 3'6" (QR)
- However I was looking at 1:19 (16mm = 1 foot = SM32)
 - For **English** Narrow Gauge ~ 3'
- Conversion scale OO to SM32 = 400%
- Initial sizing test prints didn't quite look right to my eye for SM45
 - Settled on 385% as a compromise between G and SM32
- At the end of the day it looks pretty prototypical

Computer applications used

- Meshmixer (free ?), installed on computer
 - used to split the OO model into 7 parts to allow 3D printing
 - each part then scaled and then printed
- Tinkercad (free online application)
 - Used to design simple objects
- Fusion 360 (hobbyist licence, installed on computer)
 - Used to design more complicated objects
- Cura Slicer (v4.12.1, free open source licence)
 - 3D slicer for FDM printing

Printed model

- 3D printed sections
- Front bogie
- Redesigned Head Lamp
- Chassis fill in
- Assembled model
- Front bogie bolster and engine cowl support
- Section bog up
- Fitted bogie and wheels



Surface Preparation

- Tamiya White Putty – finer grade than grey
- Fill in curved or large striation lines as well as bogging up any large gaps
- Sand back with Wet & Dry 240 - 1000.
- Repeat if necessary
- Septone Plastic Primer and Filler for additional filling of smaller lines
- Tamiya Surface Primer – Red used as main coat as pretty close to QR Red (to my eyes anyway !)



Painting

Component	Method	Details
All (priming)	Rattle can	Septone Plastic Primer and Filler Grey (Supercheap)
Body	Rattle can	Tamiya Red Oxide Primer
Chassis	Airbrush	Tamiya Flat Black XF-1
Roof	Airbrush	Vallejo Model Colour Ivory (70.918)
Engine Radiator	Airbrush	Vallejo Model Air Steel Grey (71.336)
Head light	Brush	Mr Hobby Super Chrome Silver (SM206 lacquer)
Pin striping & "RM55" stencil	Airbrush	Vallejo Model Colour Gold Brown (70.877)
Carriage Handles	Brush	Vallejo Model Colour Old Gold (70.878) – looks like brass
Side Lights (LEDs)	Brush	Tamiya Clear Orange X-26 – used to tone down LEDs
Dirt weathering	Airbrush	Tamiya Flat Earth XF-52 – lightly airbrushed
Surface protection	Rattle can	Micador Artists Matt Varnish Spray (purple band) – similar to Dulux

Stencil



- Printed font type and size on A4 and decided Arial 20 at 5mm height was a pretty good match to prototype lettering height
- Tamiya masking tape used over lettering on A4 to cut around
- Very sharp scalpel for cutting out letters
- Airbrushed used with Vallejo Model Colour Gold Brown (70.877) suitably thinned down to milky consistency

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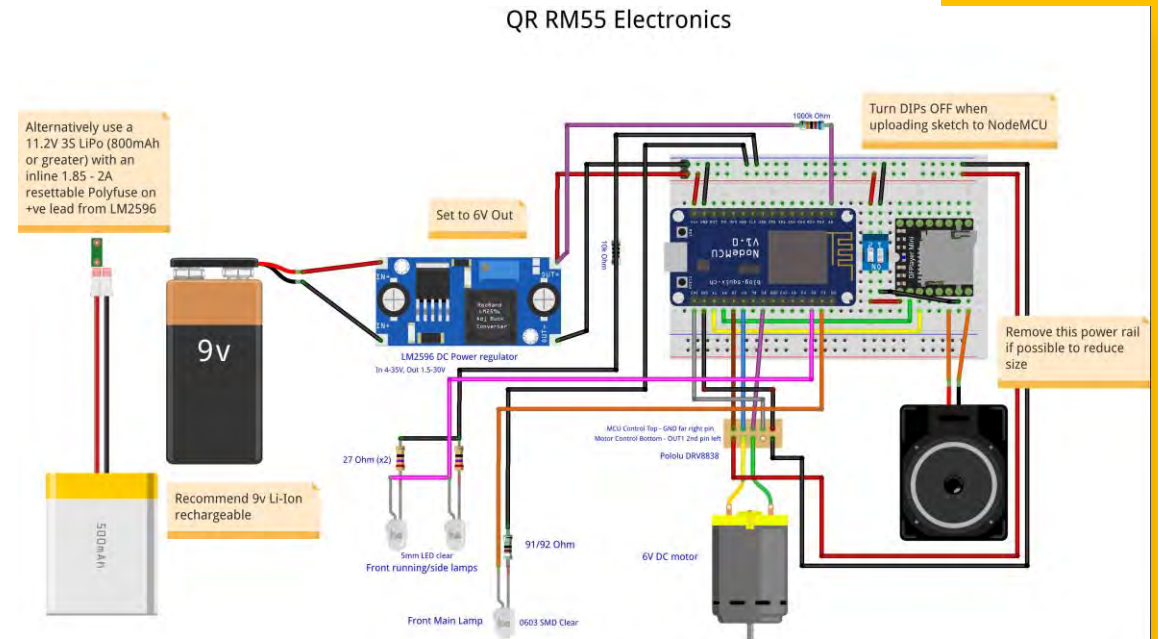
Assembled model

- Slo-Zap gel 'super glue' used in most cases
- Allows about 30 seconds or so to get the joining pieces positioned before it goes off
- Araldite used for heavy sections if required

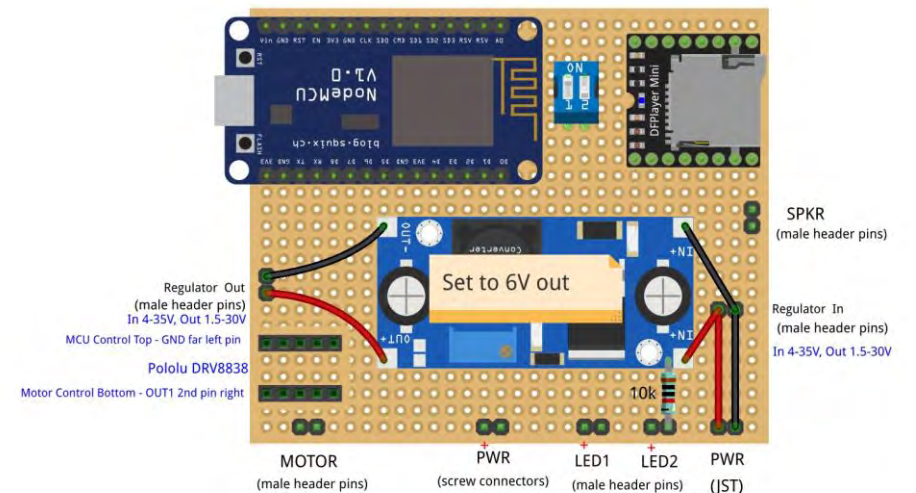


Electronics

- NodeMCU
 - ESP8266
 - Arduino-like but with onboard wifi
 - Arduino IDE to program
- Protoboard setup
- Battery – 11.1V LiPo

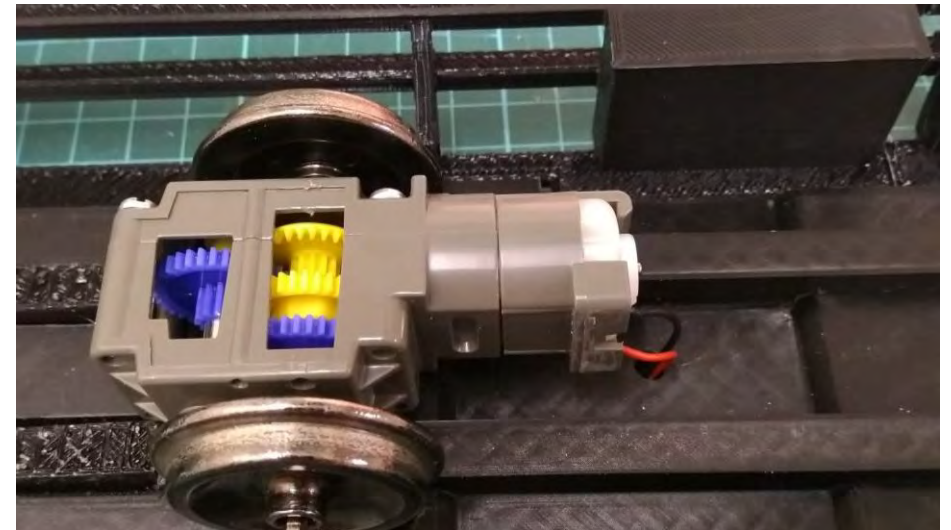
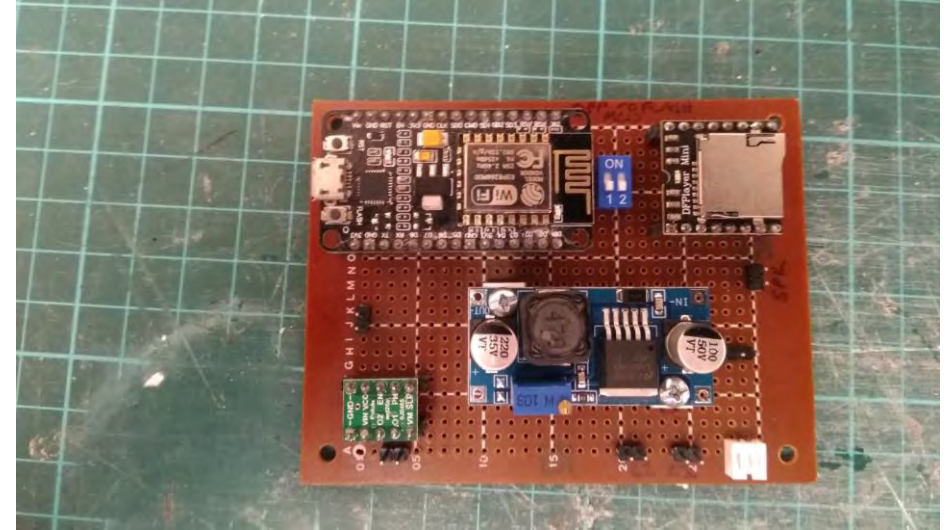


RM55 Perfboard Electronics



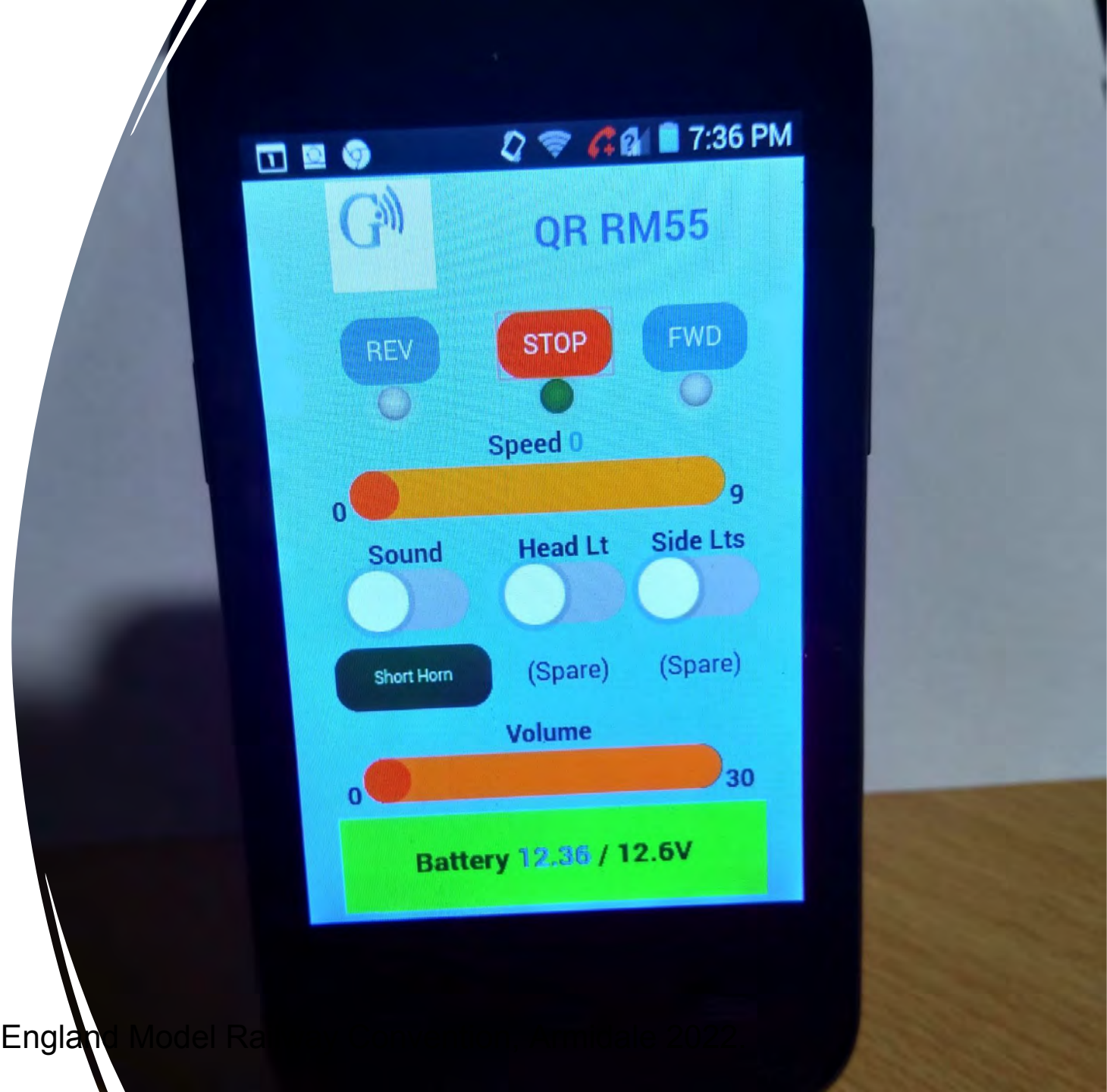
Electronics

- Protoboard setup
- Drivetrain – Tamiya gearbox kit, 6V motor
- 57mm speaker
- LEDs



Control App – ‘G Control’ (homegrown)

- I have designed, programmed, and refined the code over a couple of years starting with my first model
- Researched mostly via Google and Youtube
- Alternative proprietary product - LocoRemote from UK - <http://locoremote.co.uk/>



Statistics

- Costs
 - Plastic raw \$16.57
 - Plastic + overheads (power, replacement, etc) \$52.12
 - Electronics \$78.52
 - Steel wheels & brass bearings (IP Engineering UK) \$50
 - **Total \$128.52**
- Printing duration ~ 4 days 6 or so hours

Test run video



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Questions

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The End

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