Turntable Assembly

1. Print parts at and clean up supports.
2. Slide a length of rail into all mouldings in plastic to clean them out
3. Slide 2 lengths of rail into turntable top. Some filing will be required to ensure wheel flanges clear.
4. Cut and form 2 contacts from brass/copper foil and solder to the underside of each turntable rail. Bent guitar string will also work.
5. Cut 2 commutator semicircles and glue to printed commutator ring. Solder leads to track power.
6. Fill insulating gap between commutator rings with glue or filler and file flat.
7. Glue ring into the turntable outer so that the insulating gap does not fall between the rails of any main or branch track..
8. Check that contacts and commutator ring align and maintain electrical contact when rotated.
9. Screw motor mount to turntable outer with brass nuts and bolts
10. Make 2 x 40mm long springs from electric guitar string wound around a 5mm drill bit
11. Place springs over studs in mag mount and underside of turntable.
12. Ensure magnet mount slides freely on turntable axle and springs back without excessive force.
13. Insert servo motor into motor mount with a single horn to push the mag mount up
14. Glue magnets to the top face of the mag mount and screw servo to mount so that they make contact with the underside of turntable when the servo horn is vertical, and return under spring force when horizontal
15. Check turntable rotates freely with magnet raised and lowered.
16. NOTE the servo home position will not be known until the motor is energised.
17. Insert stepper spindle into the turntable axle. It should be a tight fit.
18. Screw motor to mount using washers between to align rail heights.
19. Drill 1mm hole through axle and spindle flat and insert a track pin and bend over or miniature screw to lock spindle height.
20. Push a hot header pin into the outer turntable ring outside of any track rails, so that it protrudes 2mm above rail level
21. “Z” or dogleg bend a header pin and sit one end of the dogleg into the turntable top so the other end protrudes 1 mm above track level. (see diagram). This provides a rotation “home” stop for the stepper motor.
22. Wire up modules. There are many ways of achieving this, but none without some degree of soldering. I soldered flying wires to strip of female headers and hot glued this header to the back of the switch panel. The headers support the modules.
23. Upload the sketch to the Arduino. There are many tutorials covering how to do this on the internet. If using a Arduino pro mini, a FTDI or similar USB to TTL 232 serial adaptor will be required. The sketch uses the encoder library which can be downloaded here: https://www.pjrc.com/teensy/td_libs_Encoder.html other required libraries are built into the Arduino IDE. See online tutorials for adding libraries to the Arduino IDE.
24. Power up and set the servo horn position.

Operation

- When powered up the turntable should first rotate counter clockwise against the stop. This sets position count to “0” and then accelerates slow quick slow clockwise to whatever position count is stored for button 1. There are about 2200 position counts in one revolution. The LED lights when the turntable is moving.
- Press and hold in for 1 second the encoder knob
- The turntable is now under the control of the encoder. Pressing buttons 1-4 will store the current position count to that button. When aligning positions, ensure that the final move is clockwise to eliminate any gearbox slop.
- Each time the turntable is moved counter clockwise against the stop and the count is “0” the motor will attempt to drive 100 counts past the stop and reset itself at “0”.
- NOTE if the turntable jams or is held stationary whilst the motor is moving, the count position will become misaligned. Remove and restore power to reset.
- Press in the encoder knob to exit manual control.
- Pressing button 1 – 4 will move the turntable to the position stored for that button.
- A clockwise move is a slow acceleration, medium running speed and a slow deceleration to align
- A counter clockwise move will overshoot on the deceleration and return clockwise to align. This is to ensure any gearbox slop in the motor is always the same for aligning.
- The toggle switch operates the magnet position. Switching “on” to ground raises the magnets.
- The magnets will hold a wagon in position and operate de-coupling.

Component list

- At 2018 prices it is possible to purchase the components for less than 20 UKP
- 2 x 60mm length of N or 009 rails
- 2 x 10 mm diameter neodymium disc magnets
- 4 x 10mm M3 or M4 brass nuts and bolts. Washers to adjust height
- 1 x SG90 servo
- 1 x 28BYJ-48 stepper motor (5V) and driver board
- 1 x Arduino Pro Mini & FTDI USB uploader module OR 1 x Arduino Uno
- 1 x 60mm x 50mm (approx.) piece of 0.05mm Brass or Copper Foil
- 1 rotary encoder module
- 1 LED
- 1 toggle switch (on/off)
- 4 momentary push switches.
- 1x Track pin or 10mm M1 nut and bolt.
- 1 Electric guitar string (G 3rd)
- 1 x 100 ohm resistor
- 5V regulated power supply
- Strip of 2.56mm pitch PCB male and female header pins
- Thin hook-up wire , solder, superglue, hot glue