Lazy Susan Meets M12 and the Gearhead

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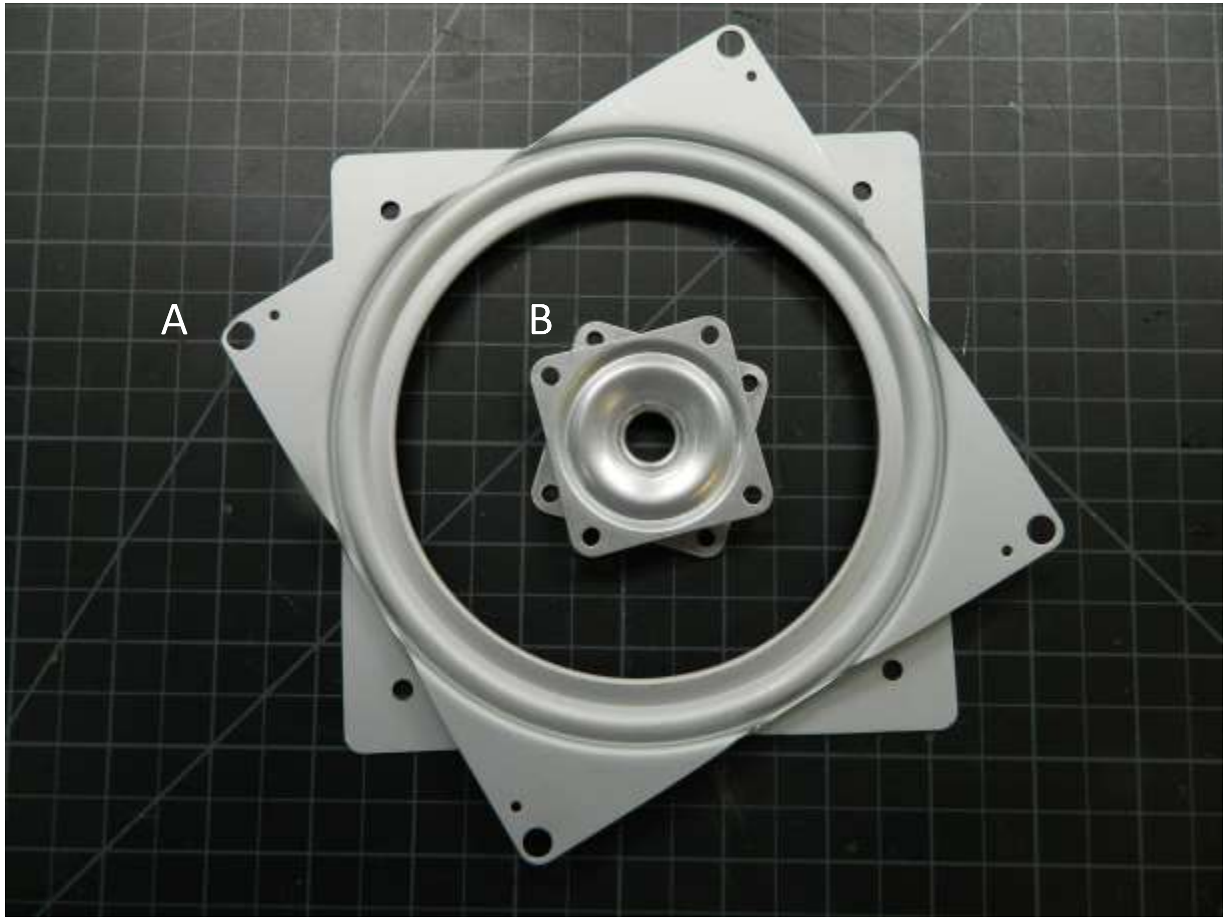
- Eating Chinese, an M12 GMC howitzer and Einstein?
- No, it’s about using a Lazy Susan bearing, an M12 metric bolt and a 1:5,000 reduction gearhead motor to make a turntable.
- Basic cost without any bells and whistles around $25.00-$30.00, with a PWM controller and an electronic current reverser around $60.00-$125.00.
- Indexing? I do not need it as the rotation speed is very low. IR or similar, or a commercial unit, if desired. The prototype never had this!

Lazy Susan meets M12 and the Gearhead

- So why did I embark on something I had never done before?
- See above, why not!
- In reality I had a bit of a challenge:
  - Small locomotives, On30 scale, around 6” long
  - Width of layout 15”
  - Turntable diameter required 7.5”
  - No commercial offerings at this diameter so some serious bashing of expensive RTR candidates or -
  - Build my own Armstrong turntable – On30, so Rule #1! (IMMR)

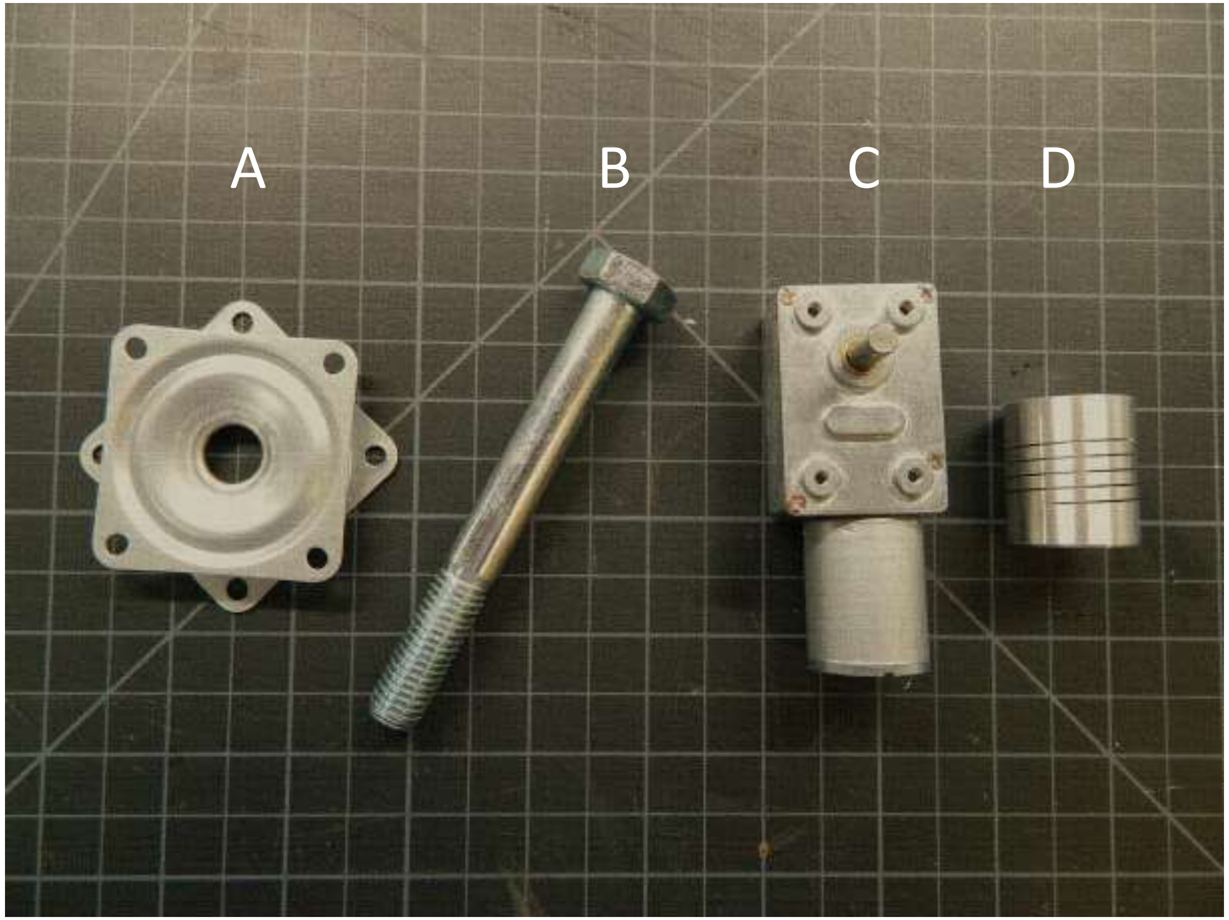
Different sizes for different style turntables



A. 8” square Lazy Susan bearing
   - Good for HO/On30 platform turntables

B. 2” square Lazy Susan bearing
   - Good for HO/On30 bridge turntables

Turntable mechanism components



A. 2” x 2” Lazy Susan bearing, 12mm center bearing
B. M12 bolt (12mm diameter shaft)
C. Gearhead motor (2 rpm at 12v DC, 0.5 rpm at ~4v DC, 6mm D-shaft)
D. 6mm to 12mm flexible coupling

Turntable wiring considerations

- Turntable motor
  - DC
  - Slow motor and or reducing gears
  - Minimal cogging at low RPM
  - Reversible

- Track
  - DC or DCC
  - Some means of transforming stationary input to rotational output
  - Some means of reversing the current (polarity swirching)

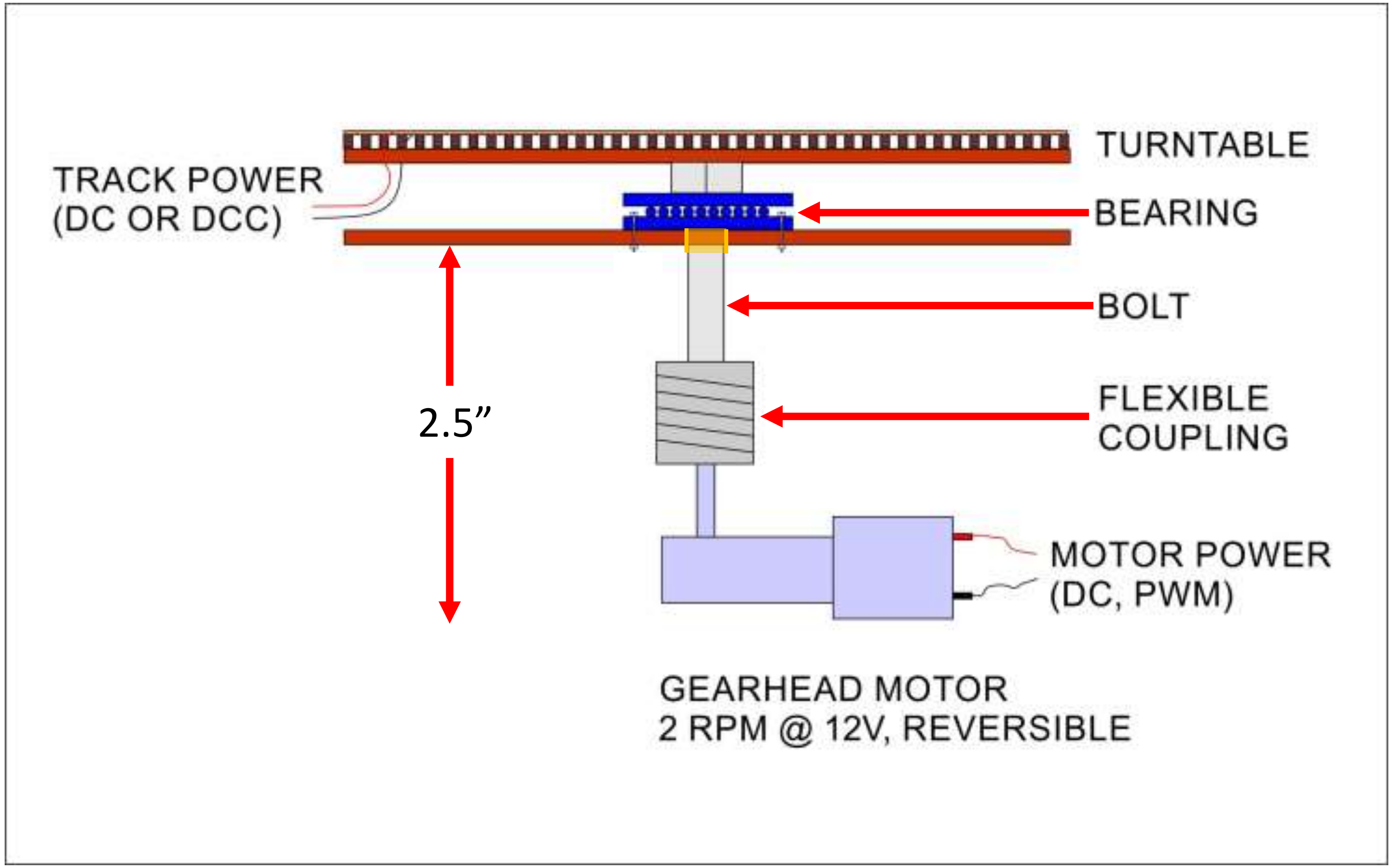
Turntable motor

- Gearhead motor, right angle output shaft to minimize height
- Rated at 2 rpm at 12v
- ~0.5 rpm at a minimum ~4v DC
- A pulse width modulated (PWM) circuit (0-12v) minimizes cogging at low voltage/RPM (armature binding)
- Reversible DPDT switch on the PWM controller (Forward-Off-Backward) to change direction

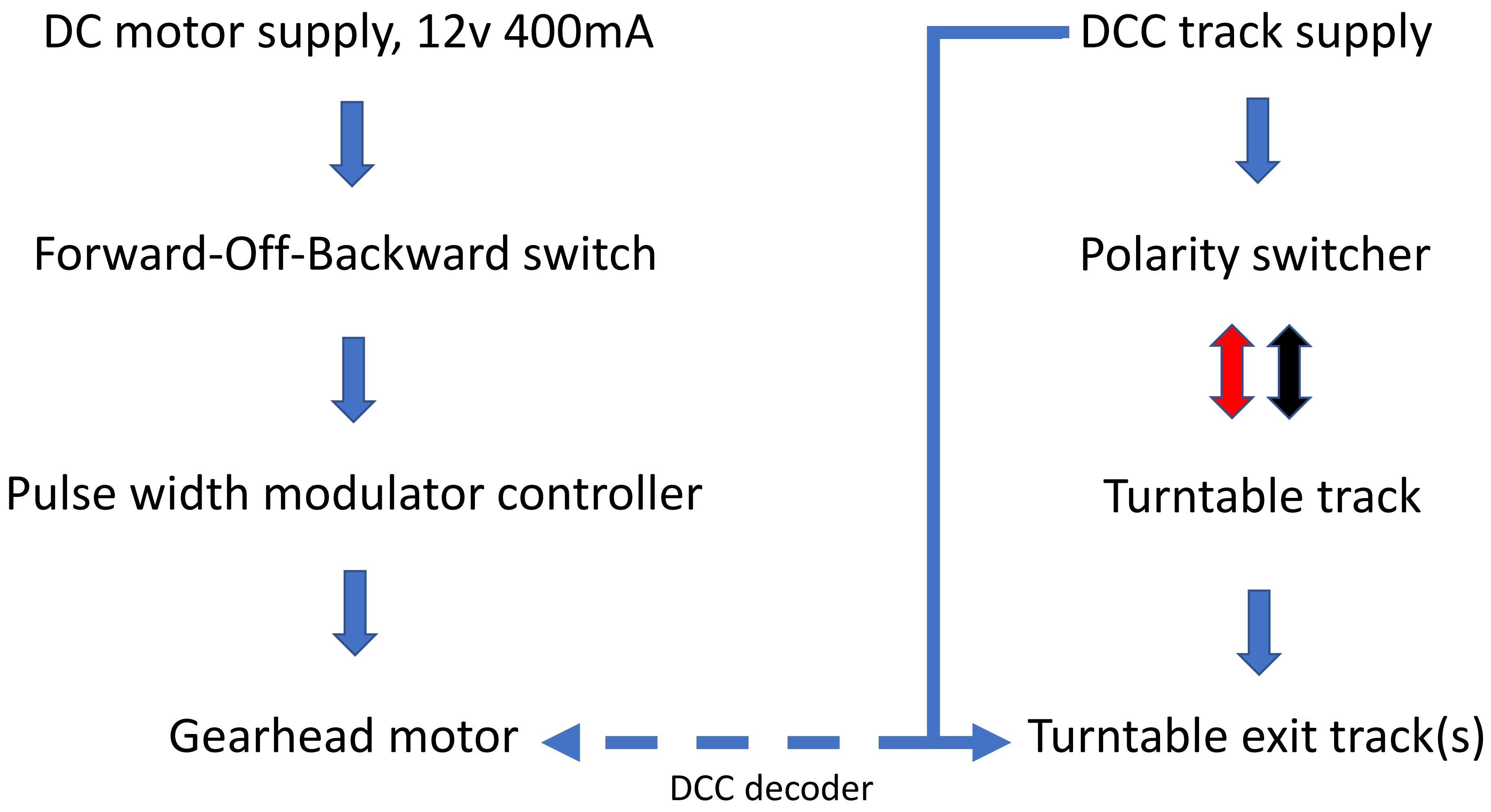
Track DCC

- DCC power supply for track (NEC)
- Fixed to rotational supply
  - Rotating slip-ring on shaft (bashed or commercial such as small wind-turbine)
  - RCA-type jack from DCC bus to rails
  - Two fixed tracks inside turntable well
  - Fixed live track inside turntable well and rotating isolated contact on shaft

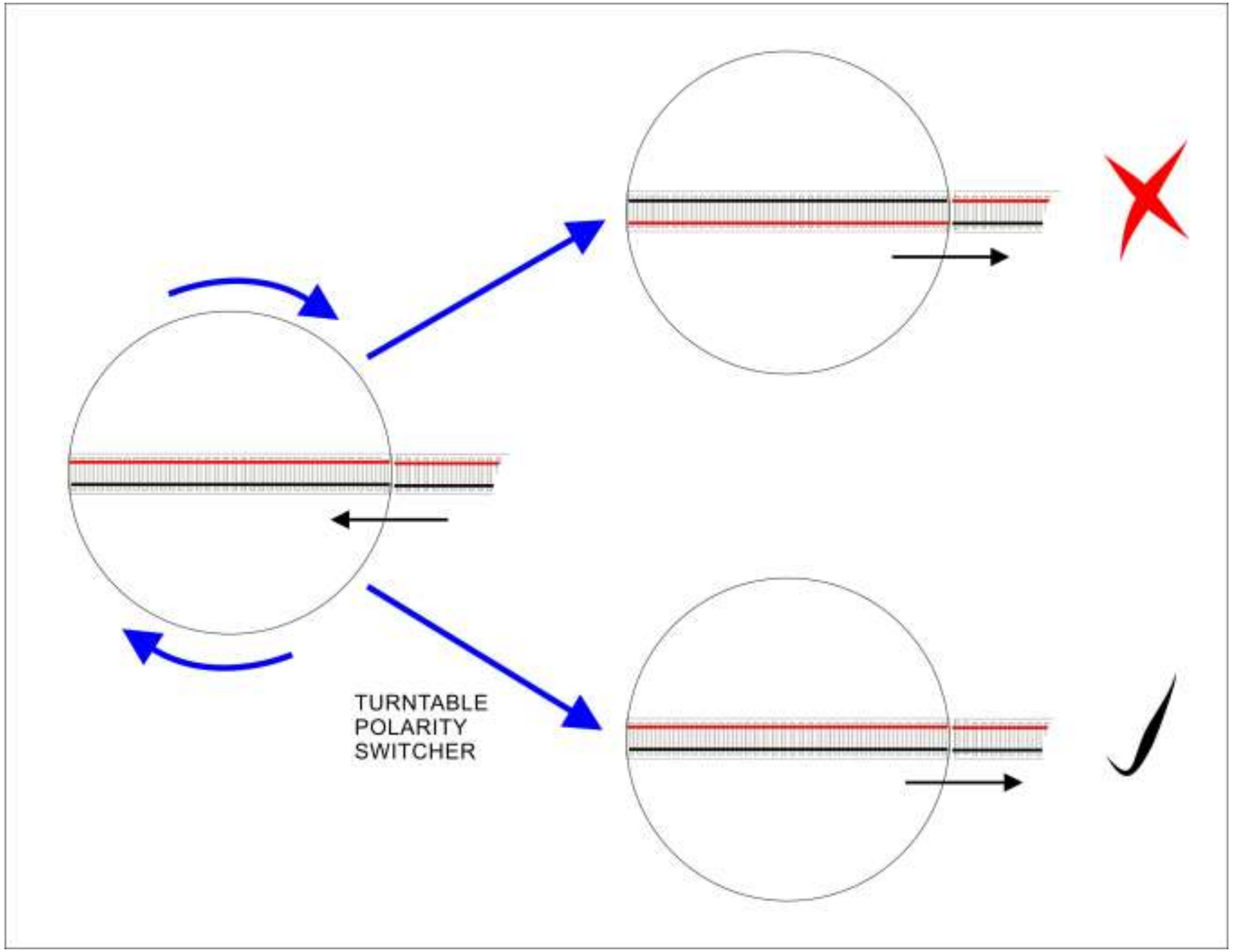
Turntable Wiring – 2 circuits



Wiring


DC motor supply, 12v 400mA
Forward-Off-Backward switch
Pulse width modulator controller
Gearhead motor
DCC decoder
DCC track supply
Polarity switcher
Turntable track
Turntable exit track(s)

Turntable Track Polarity



Turntable Polarity Switcher

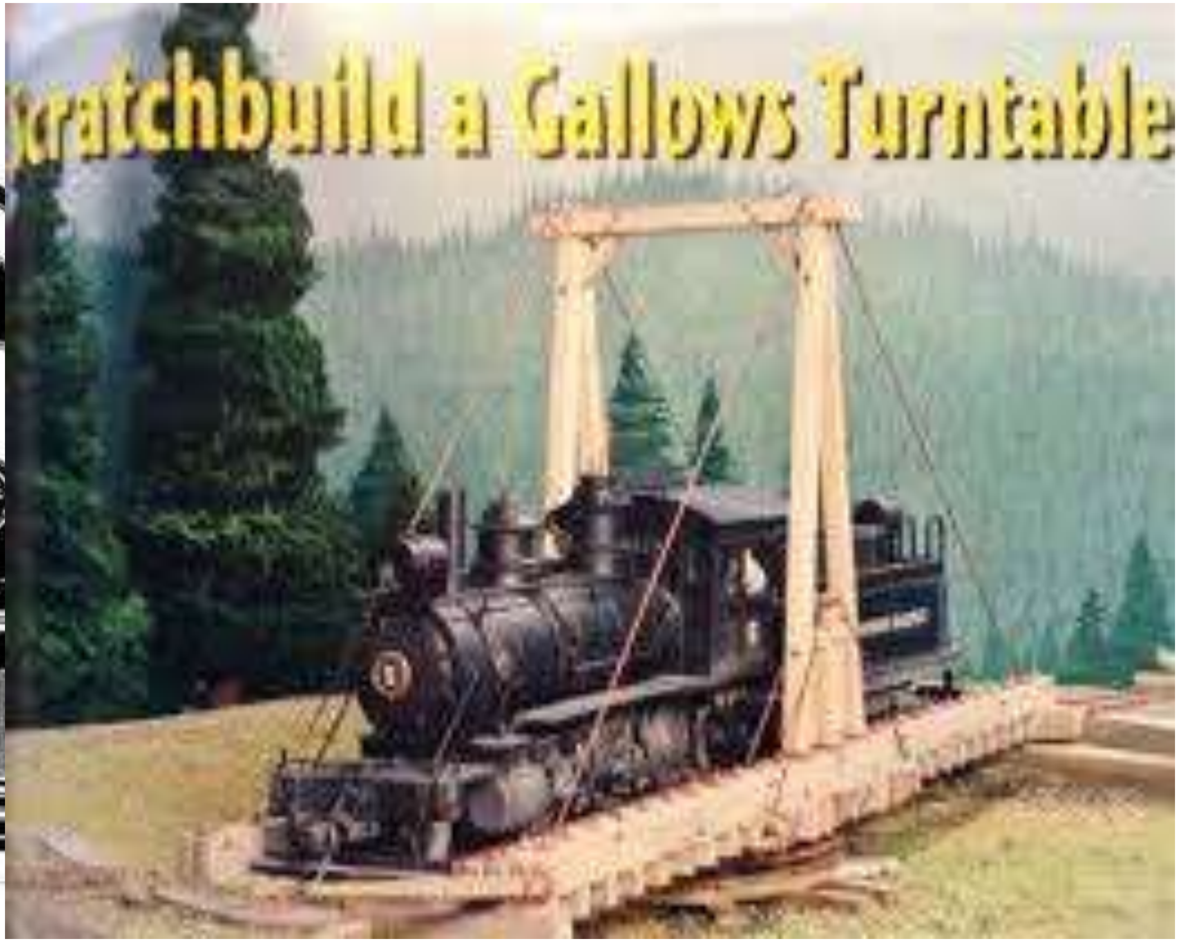
- DPDT toggle switch
- Autoreversers

  - Tam Valley frog juicer (electronic, but check trip amperage requirements)
    - 2 single or 1 double

  - Digitrax Autoreverser AR-1 (relay, adjustable trip amperage)

  - DCC Specialties PSX-AR (electronic)

Armstrong A-Frame GallowsTurntable



Turntable Bridge

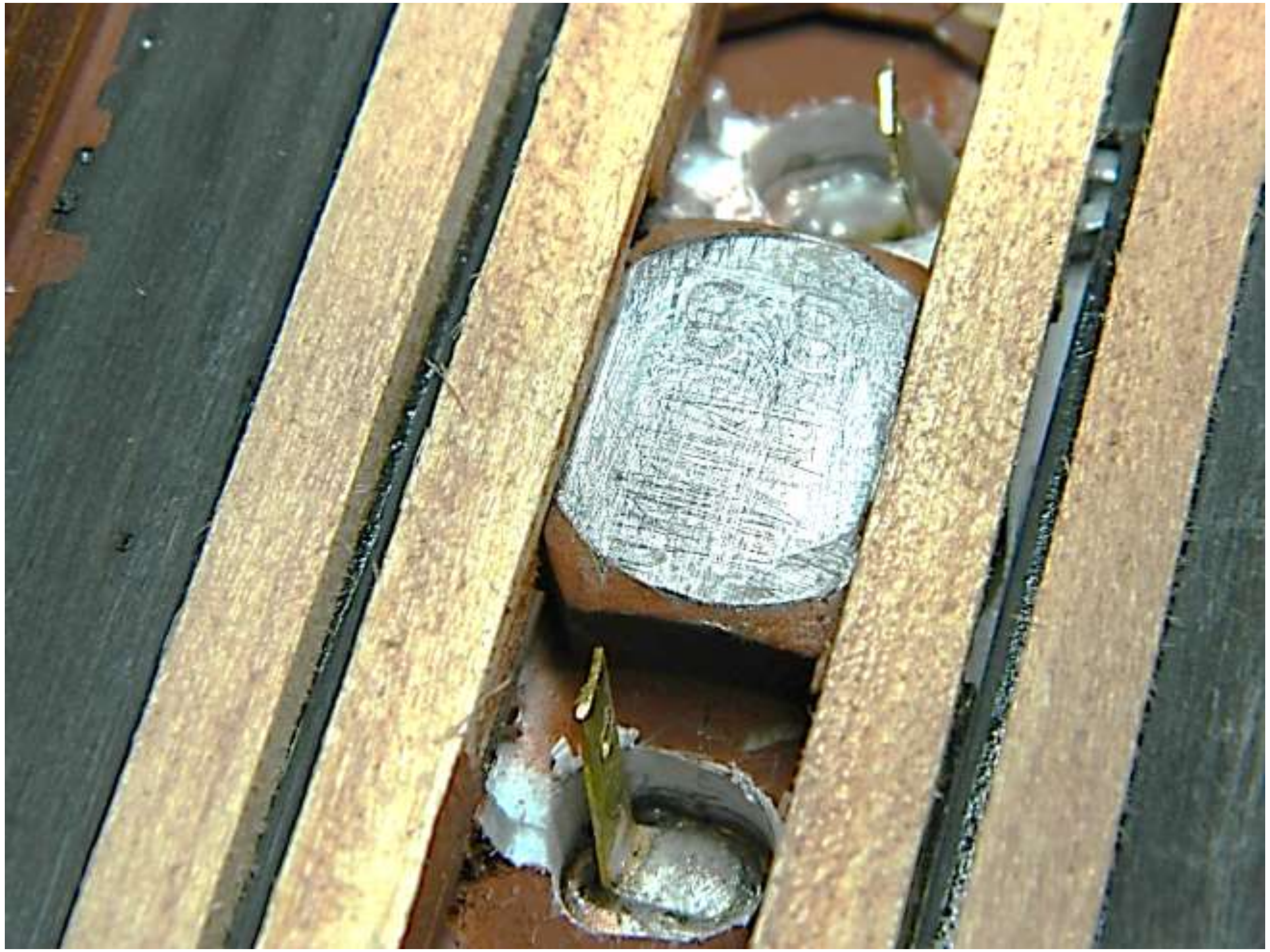
Roco HO girder bridge

Center hole for bolt

Side rails removed

Rigid structure

Turntable Bolt Location and track timbers



Bolt epoxyded to styrene plate

Holes drilled for pickup terminals
From brass disk

Bass wood track supports glued to bridge

Black styrene sheet glued
Over bridge walkways

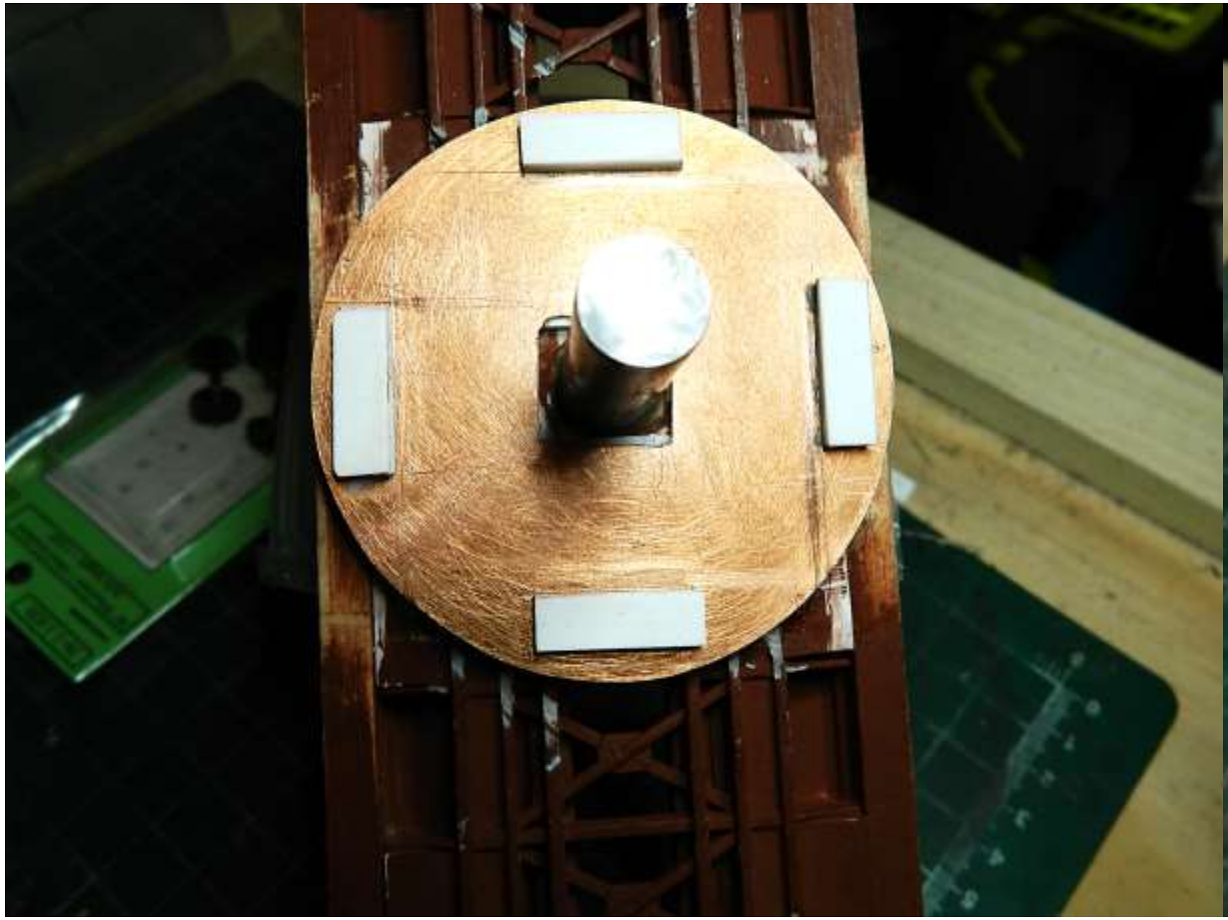
DCC Wiring for Rails - Brass Disk Pickup

2 wires for one rail soldered to disk

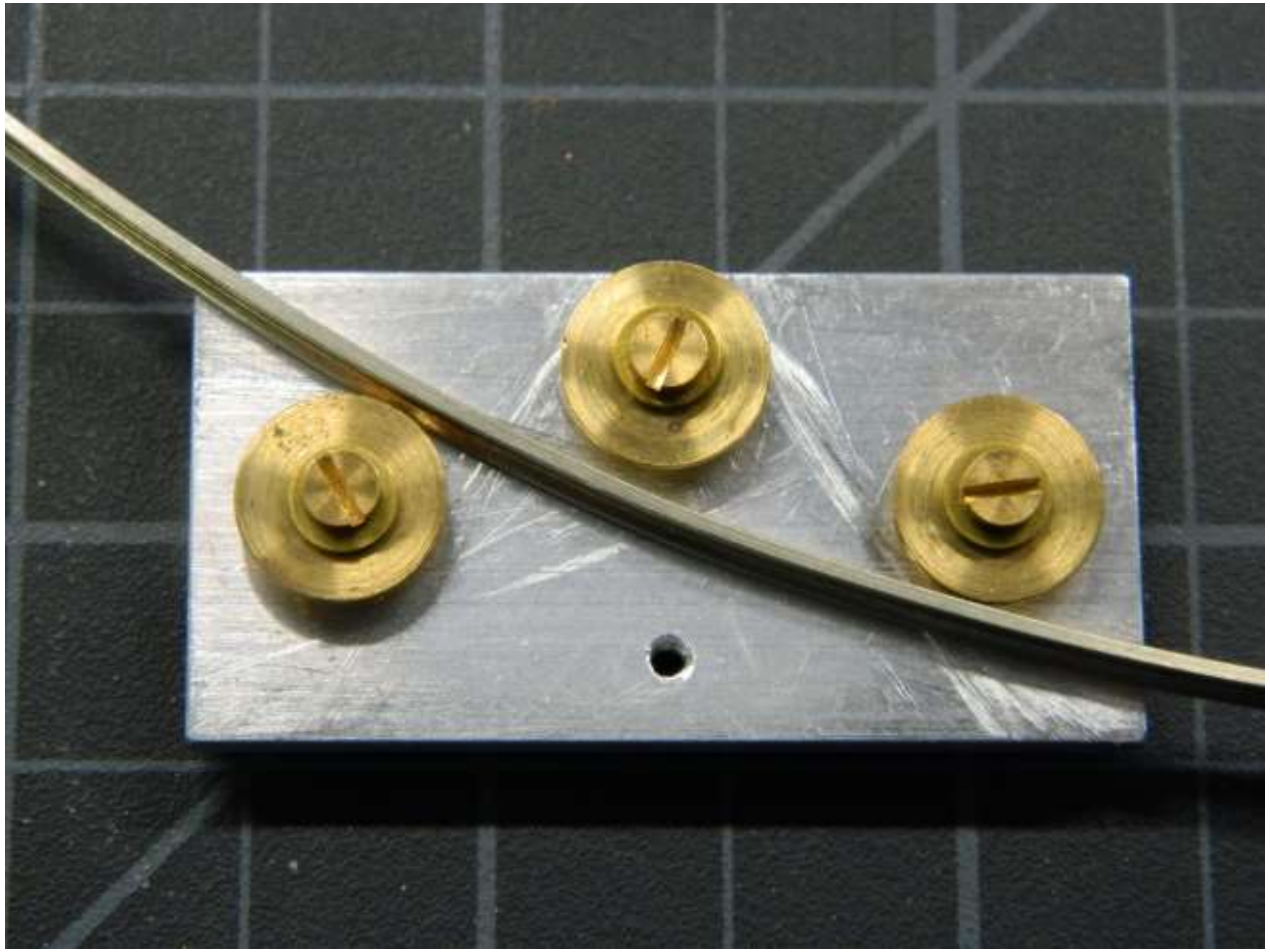
Black styrene insulator between disk and bearing plate

Attached with CA

Brass Connecting Disk and Bearing locator




Rail Bending Jig



Roller bearings

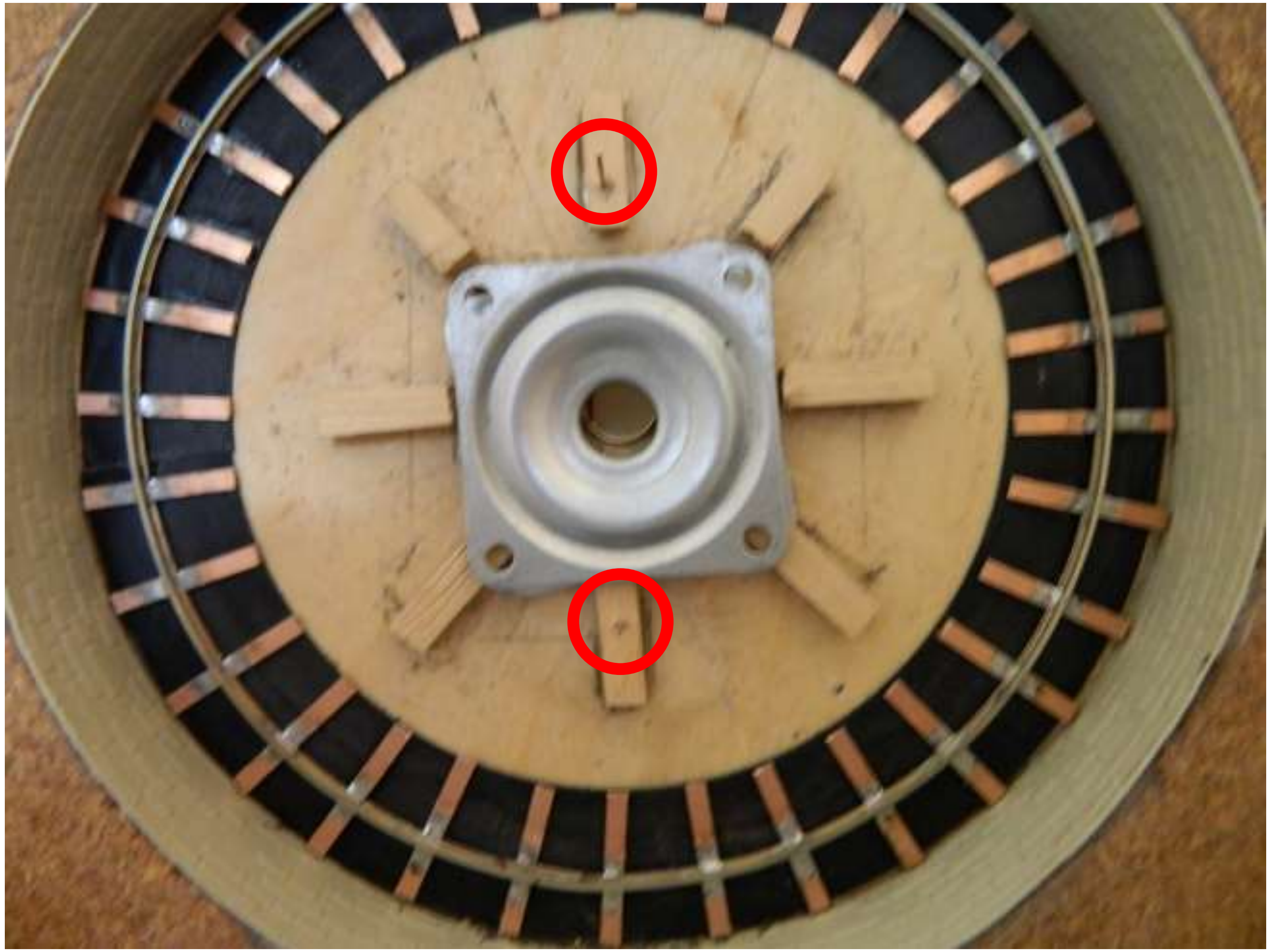
Aluminum back plate

Code 70-100 rail

Final adjustment using finger pressure and compass-drawn template

Solder up using rail joiner

Turntable well – Spider and track

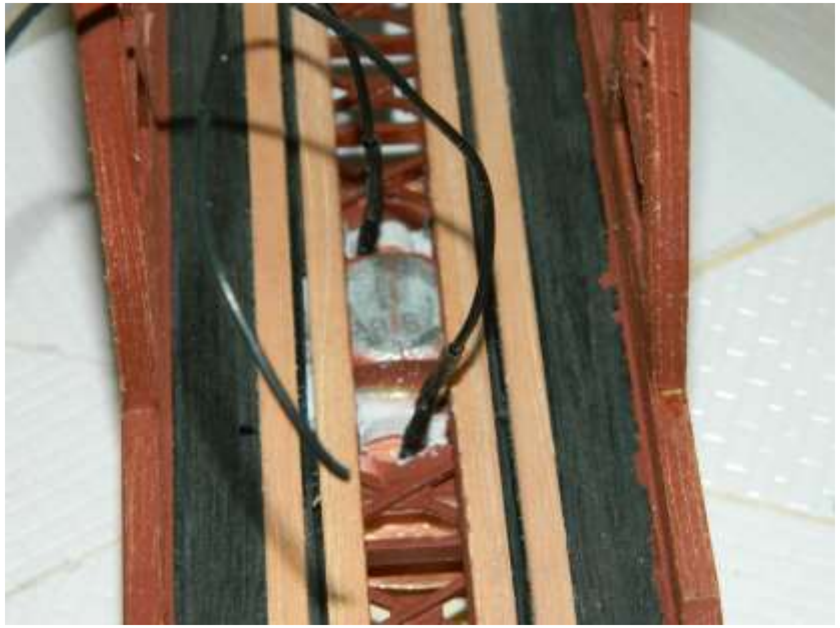


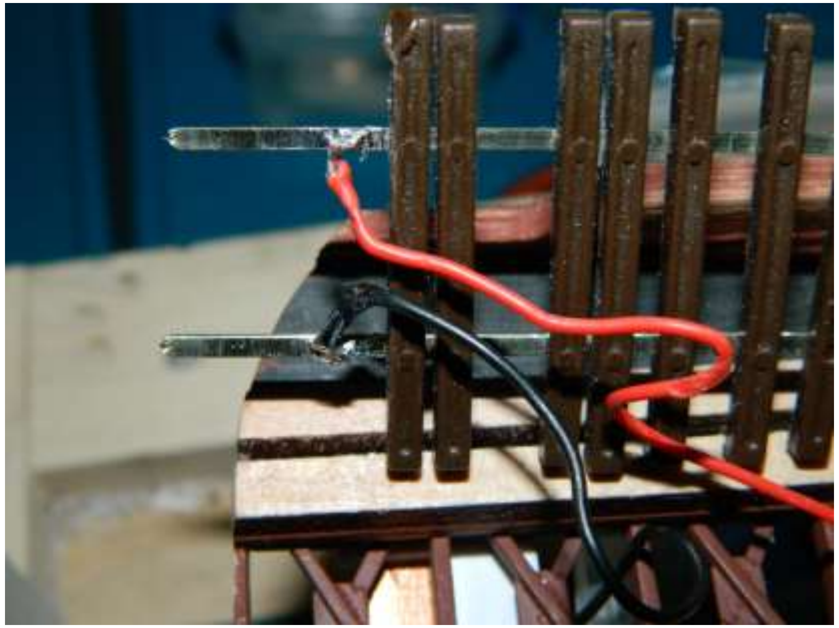
Code 100 N/S rail, copper-clad ties, wired for DCC on each side

Bass wood “Spider” legs (cosmetic)

O Phosphor bronze wire DCC contacts for brass disk

DCC Wiring for Bridge Rails

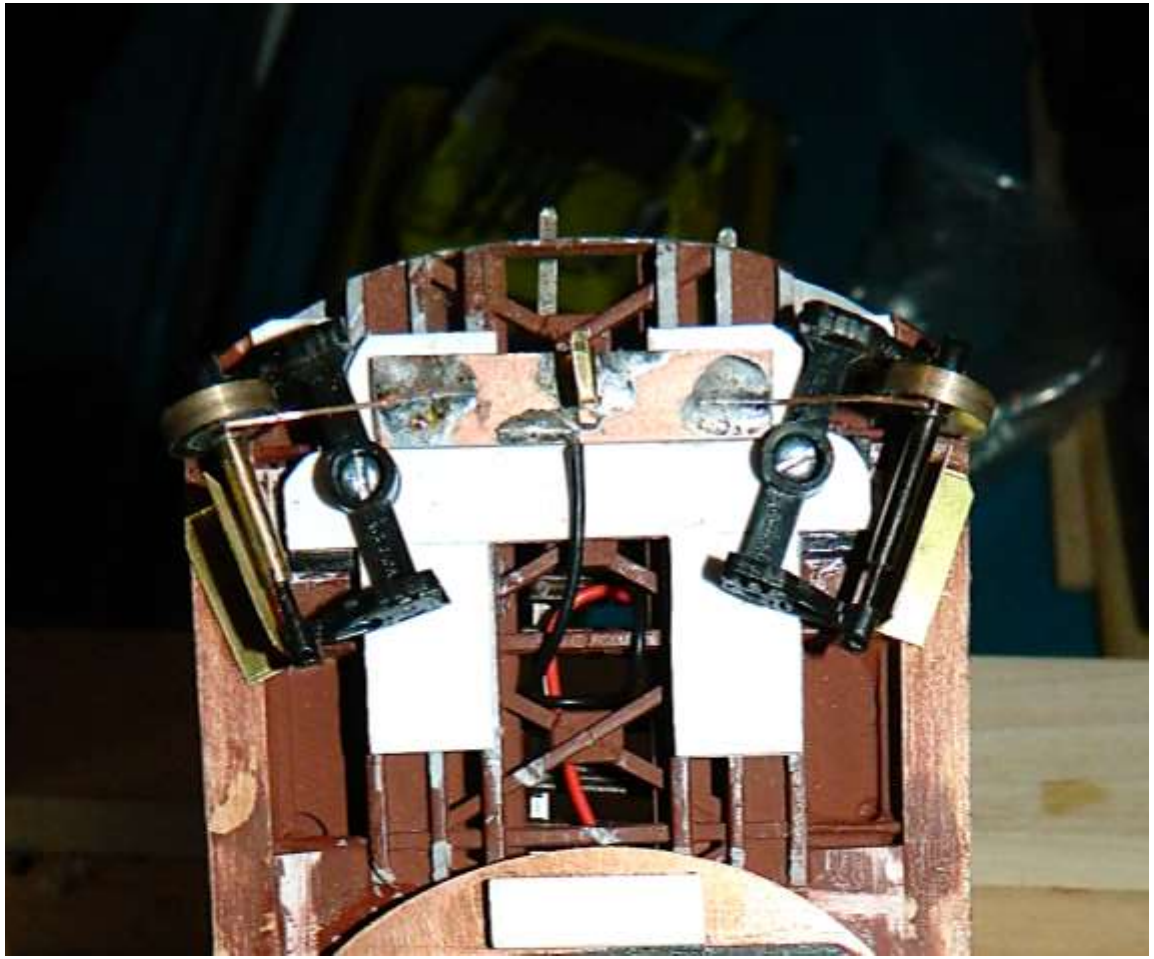




Wires soldered to lugs on disk, then attached to rail bottom at both ends of the bridge (disk)

Wires soldered to rail bottom at both ends of the bridge (rail)

Turntable Well Rail Pick-up



Support framework of styrene sheet attached to bridge bottom

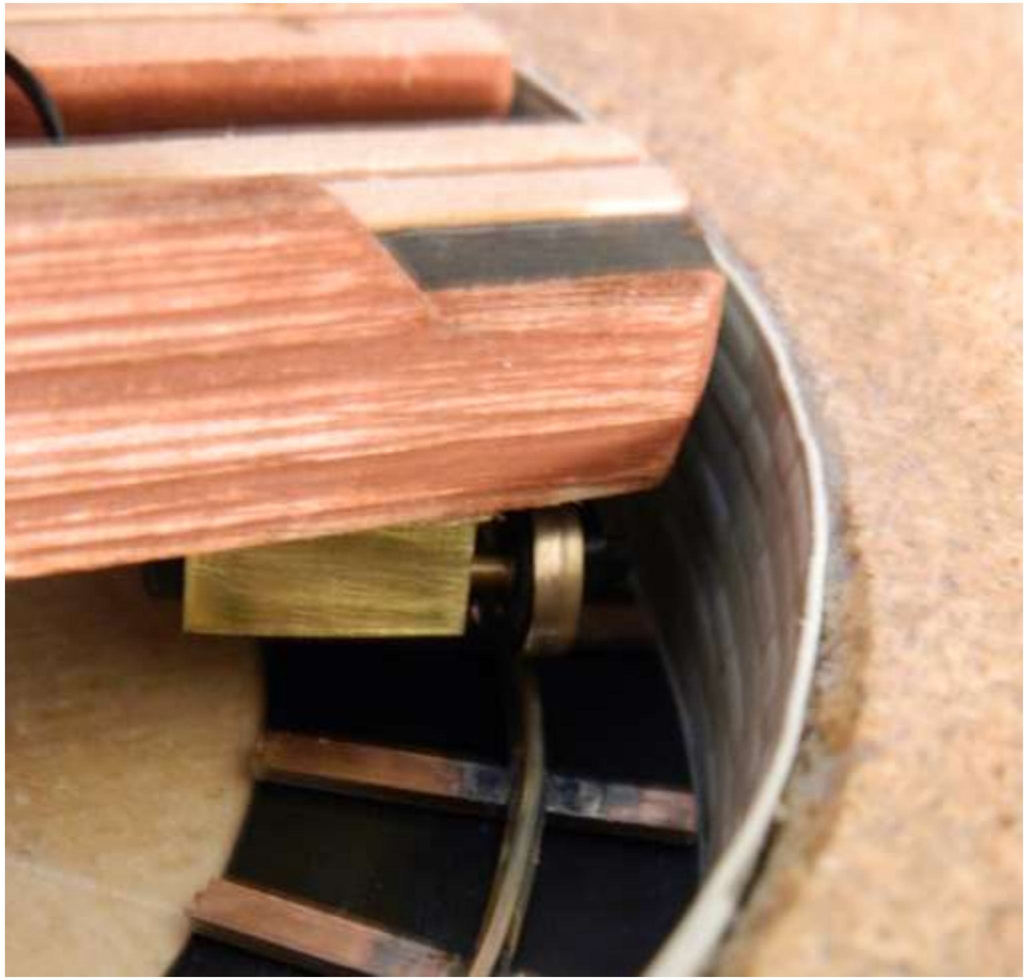
4 plastic freight car trucks cut in half, attached to frame, angle adjusted to rail radius

Metal axle wheel sets used, one wheel removed and discarded

Flange and tread turned down

Pickups made from P/B wire and copper-clad strip

Turntable Well Rail Pick-up

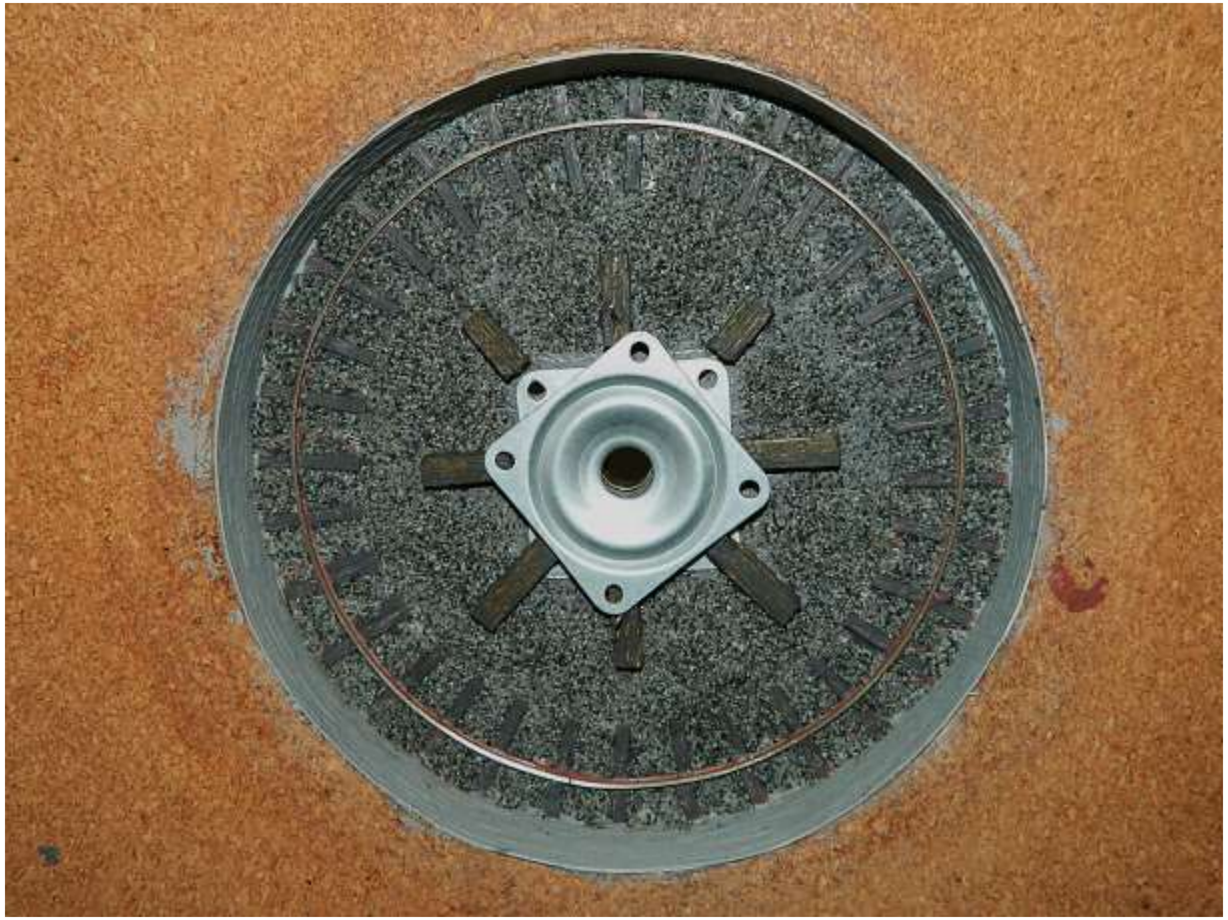


Wheel angle adjusted to match rail radius

Removal of wheel flange and flat tread allows greater contact over rail head

Cosmetic brass plate added to conceal truck

Turntable Well



Well ballasted with granite chips (Noch)

Rail ties and spider legs painted dirty brown/grey

Bearing located in middle of spider, snug fit, anchored with machine bolts through floor

Walls made from O-scale brick styrene sheet

“Under The Hood” - Turntable Power Supply

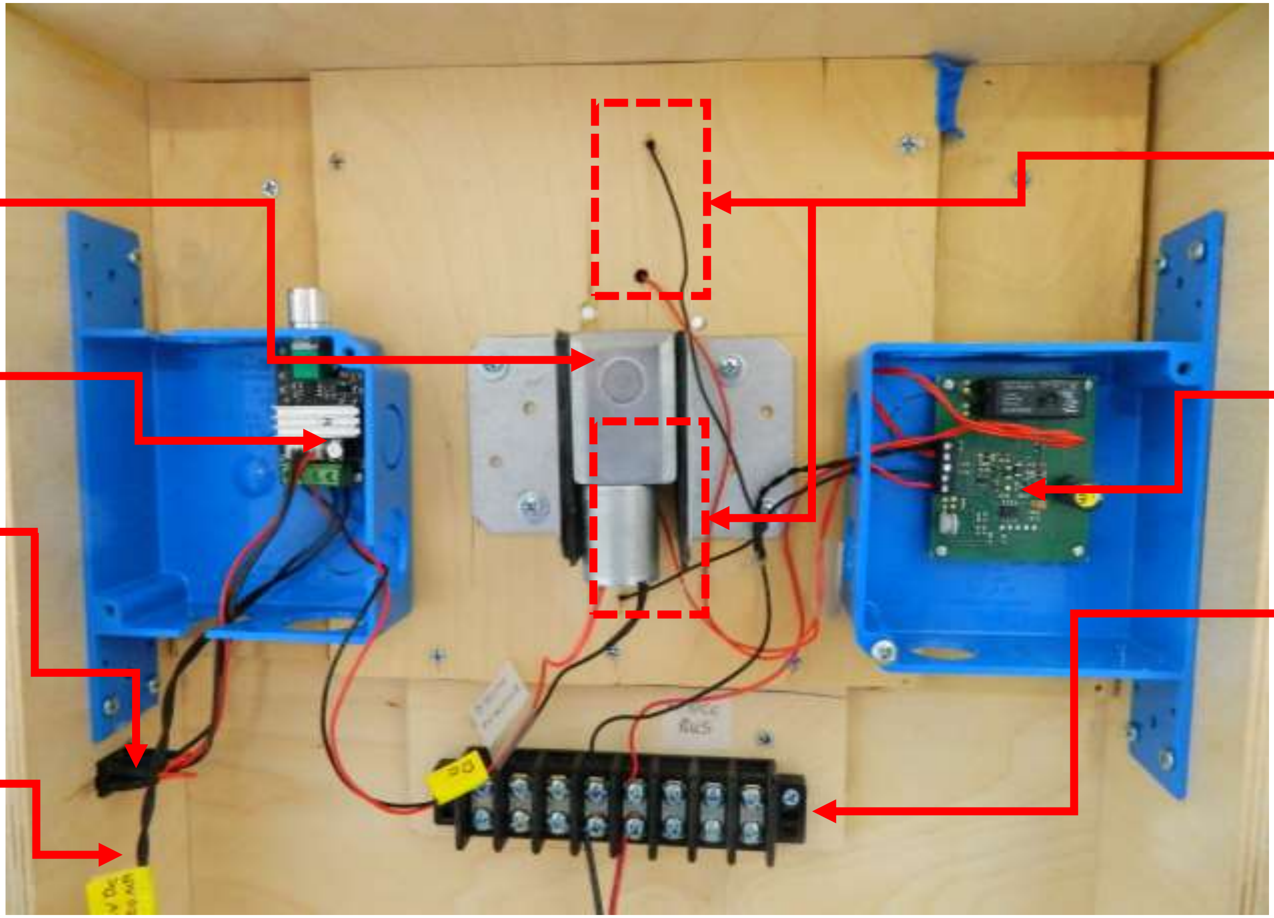
DC

Gearhead motor and torque frame

PWM, 0-12v

DPDT direction switch

12v 400 mA DC supply



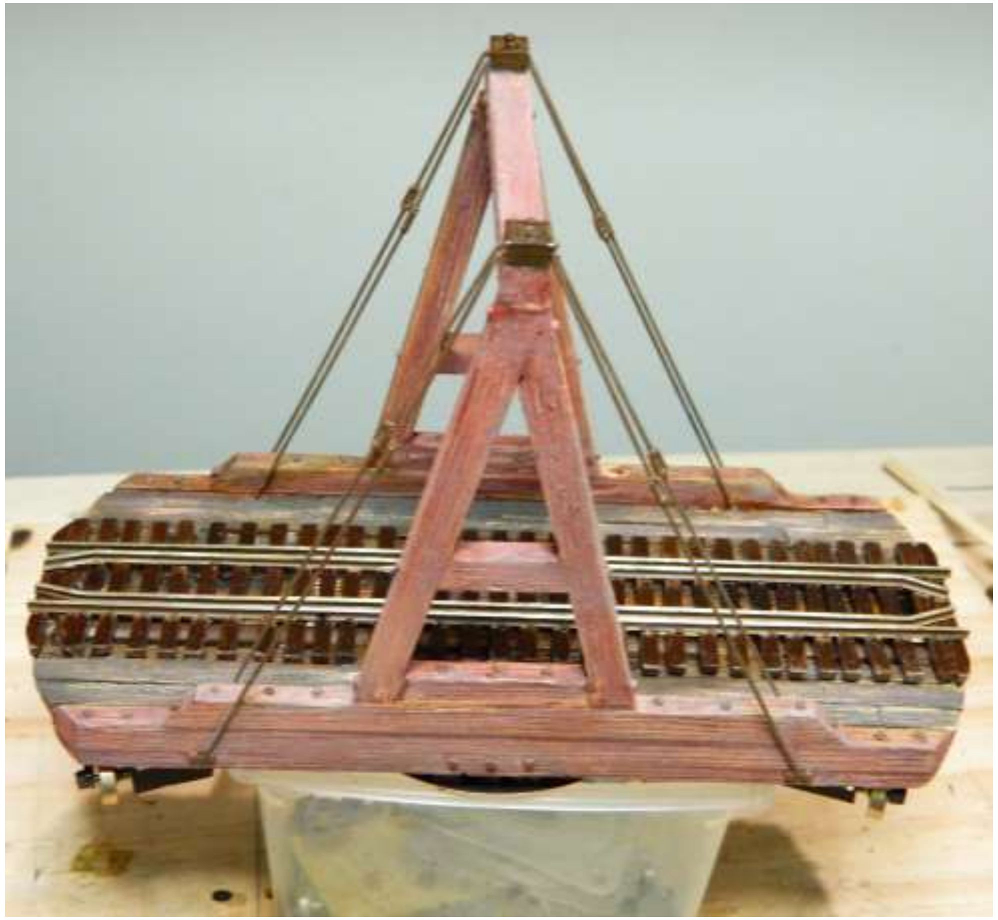
DCC

DCC feeders (rail, disk)

Automatic reverser (Digitrax AR-1)

DCC bus

Turntable Bridge Superstructure



Bass wood timbers, grained with a hacksaw blade, red oxide primer and weathering powders

Wire stays from 0.015” P/B wire

O-scale turnbuckles sized for 0.015” wire

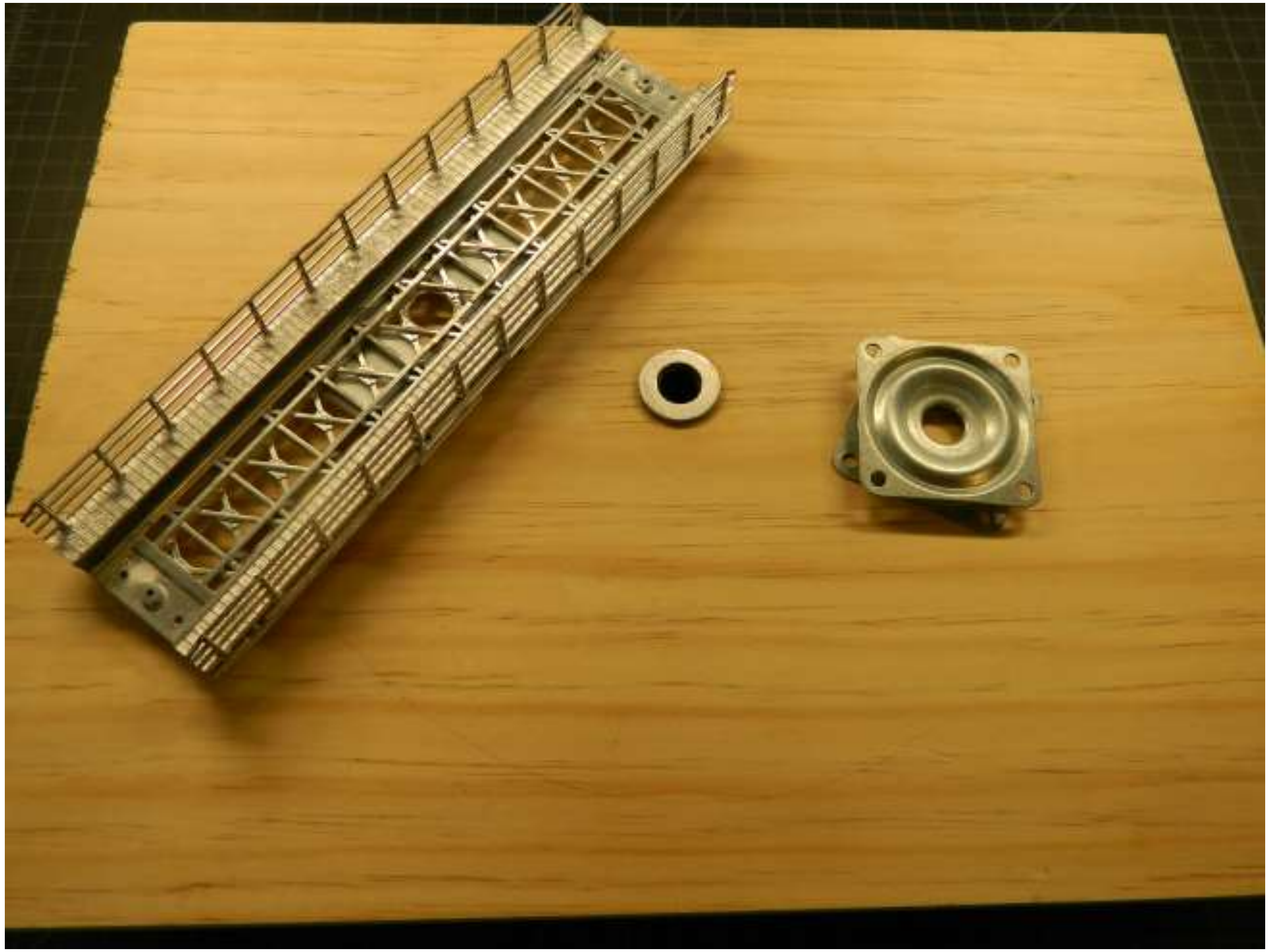
Code 83 On30 track with added guard rails and respaced ties

O-scale NBWs here and there

Turntable Bridge Superstructure

A-Frame “Armstrong” Turntable – Job Done!

Not quite!



This is my test bed – piece of pine with a hole for a 0.5" diameter brass tube sleeve bearing and washer end into which a 12mm M12 fits nicely

Currently being used for developing a platform turntable and alternate DCC wiring using the M12 bolt as one conductor

Summary

- The challenge? Wiring for bridge track power and motor power
- Measure <u>at least</u> 2 times – turntable well diameter, bearing center, bridge length, well rail height/bridge wheel height
- Basic tools are all it takes – compass, engineering ruler and square, jig saw, drill, Dremel or similar, files, box cutters
- Use CAD – cardboard-aided design!
- Amazon or eBay for electrical components, Michaels for bass wood
- Use odd items from the spares boxes (bridge, rail, old trucks, old wheel sets) or from shows