

Backdrive Installation, Set-up & Faults – new standard.

A backdrive is only used on vertical switches at type 'C' switch and above or on inclined switches type 'D' and above. It is primarily used to assist the switches in fitting up to its corresponding stock rail.

The most popular type of backdrive is the single two crank driving system, but for longer switches there is the three crank system, usually accompanied by a 998 detector to detect that the whole switch rail has driven over and is at its defined position.

Installation has to be done by an S&T team with the Pway dept present. This is because the cranks are mounted on plates positioned under the point chairs rather than bolted through the sleeper as was the old method.

The track will always need to be 'kangoed' afterwards as the plates will make the points void by at least 8mm.

This informational document is for information only, it is not to be used for testing or commissioning purposes. It is also based on the most popular backdrive system; the single drive on a vertical 'C' switch.

YOU MUST GREASE ALL PARTS BEFORE INSTALLATION

POSSESSION OF THE LINE WITH A T3 OR LINE BLOCKAGE WITH ADDITIONAL PROTECTION MUST BE ARRANGED BEFORE WORK STARTS.

1. First of all check the gauge throughout the entire length of the switch in both N & R positions. An abnormally erratic gauge indifference will have an impact on how the backdrive will be set up and how it will work.
2. If the backdrive is being fitted to a set of points where the stretchers will not be altered, a large FWC will almost certainly have an impact on how much travel will be required and possibly not enough (see faults section).
3. Remove cranks from their bases and fix them to the plates and tighten to 120Nm.
4. Unscrew the chair screws, jack up the track and slide the plates under the chairs and set the distance from the centre of the crank boss to 410mm from the nearest stock rail running edge (*the inside four foot edge*).
5. Install the opposite three packing plates (these ensure that the same lift on the track formation is the same on the other stock rail, ensuring a rail twist fault is avoided).
6. Slide the rodding roller plate under the chair, but at this point do not fit the roller assembly.
7. Re-attach both crank arms (*with split pins*) – ensure they are the correct way round. (They should be at the 'quart-to-six' position [looking from the facing position]).
8. Attach front **angled** connection rod (*with split pin*) into the first hole (nearest to the point toes), this rod should be angled opposite to which side of the track the backdrive is fitted, i.e: backdrive fitted on left of track and the rod will be angled to the right.
9. Set points exactly in the Half & Half position using a ruler. YOU MUST ensure the points **DO NOT** move from this position.
10. Insert the front angled connection rod (as in step 8) through the front drive lug.

11. Set the front crank to approximately parallel with the stock rail. Use a tape measure to check actual position.
12. When crank is set, tighten the front con rod nuts tight (this shouldn't have to be moved from this point). **There MUST be no lost motion at the front lug***.
13. Attach the adjustable connection rod to the front crank using adjusting sleeve (*with split pin*).
14. Set the adjusting sleeve - measured at 275mm** from centre of crank boss to the centre of adjustable connection rod (at the grease nipple). Tighten the bolts but not the locking nuts – this may have to be adjusted later.
15. Wind the adjustable connection rod end in so that there is approximately half and half of thread showing through both ends, tighten locking nut only hand tight.
16. Install the rear **straight** connection rod into the second hole from the end of the crank (*with split pin*).
17. Insert the straight connection rod (from step above) into rear drive lug.
18. Attach rear 'tweezer type' connection rod onto rear crank using adjustable sleeve (*with split pin*).
19. Set the sleeve at 360mm** measuring from centre of crank boss to centre of sleeve (at grease nipple), this should not have to be moved so you can tighten the bolts and locking nuts.
20. Set the rear crank to approximately parallel with the stock rail. Use a tape measure to check actual position.
21. At this point do not tighten the main nuts tight on rear connection rod at drive lug, but run the nuts up to the lug by hand.
22. Attach rodding to rear connection rod using 'T' heads. Do not install roller at this point.
23. Still ensuring points are Half & Half and BOTH cranks are still parallel, position rodding over front connection rod and mark a line on top where to cut rodding.
24. Remove rodding and cut it at a slight angle so the top is slightly longer than the bottom as the connection rod is curved.
25. Punch the two new holes with rodding punch.
26. Fit the rodding roller but leave both nuts slightly loose.
27. Insert rodding through the roller and connect it to the rear crank arm first with 'T' heads and tighten.
28. Line the rodding up to the front adjustable connection rod. Adjust the 'barrel' if the rodding is slightly out. Fit and tighten both 'T' heads.
29. Tighten the adjustable connection rod locking nut ensuring the rodding is straight.
30. Set the rodding roller so that the rodding will ride straight and tighten both nuts.
31. Slacken the main nuts at rear connection rod (at rear drive lug) and leave approx 5-15mm lost motion at BOTH sides of lug. (To aid checking the lost motion gaps, a 5mm FPL gauge can be used, and also a 1.5mm FPL held flat can be used).
32. Crank/pump points over to furthest lie.
33. Adjust the rear nuts left loose to give a 1.5mm RSO at rear stretcher and also between 5-15mm lost motion.

34. Crank/pump to opposite lie and repeat step 33 for that position.
35. If the measurements stated in step 33 have been met tighten **ALL** remaining nuts and proceed to 'Final Checks' below.
36. If the measurements are not met see below.

Setting-up/installation problems and faults section:

- **Outside locking nut on connection rod at drive lug is right on the end of the rod (no thread showing) when all measurements met.**
*This should not be left in this state, all rods should have **at least** two threads showing beyond the rod. This will be caused by either the wrong rod being used or the 410mm distance from crank centre boss to running edge of running rail not being met.*
- **The front angled rod will not fit into drive lug correctly.**
Most connection rods will sometimes be a tight fit, but unnecessary force should be avoided. Ensure correct rod is being used – some rods are used for concrete sleepers for Clamplock operation and for different types of cranks. If the correct type is being used and it is a poor fit, the sleeper has most likely been drilled in the wrong position and the crank is too far forward or backwards, this will require Pway intervention.
- **It is proving difficult to insert a turnpin into hole.**
*If this still proves difficult, try a little grease. If still having problems, remove the equipment it is being fitted to and insert pin when both parts free. You **MUST** ensure the wear insert collars **DO NOT** come out, or are promptly replaced if so.*
- **On setting up, both cranks adjusting sleeves are at the end of the crank arms and more drive is still required.**
*This should be avoided at all times. It points to the FWC is much too large and the stretcher will have to be redrilled to TRK/1202. It may also indicate that the stretcher has already been set to TRK/1202 and the track is seriously wide. **STOP** and advise SSM.*
- **The backdrive is set to give a RSO of 1.5mm, but the points will not fit up at front and/or will not lock.**
*This is more likely to be a Pway issue and the switch is either crippled or is not profiled correctly. First check that the points are free from obstructions in the entire movable length. The front angled con rod will sometimes prevent the front from fitting up if the rod has been forced into the drive lug (see above). If the points operate OK at 2mm RSO, this is fine and can be left set to that, but advise Supervisor this has been done. If the points operate OK up to 4mm RSO, the Supervisor **MUST** be informed before the points are left. You **MUST** check that the FWC will still meet TRK/1202 if the RSO will be left at 4mm.*

THE 'RSO' MUST NEVER BE OVER 4mm IN ANY CIRCUMSTANCES.

REMEMBER; A MINIMUM OF 50mm FWC MUST BE ACHIEVED AT ALL TIMES.

- **RSO set correctly but the lost motion is below 5mm.**
More drive is required at front crank. Slide the sleeve out away from crank and re-adjust both sides.
- **RSO set correctly but the lost motion is above 15mm.**
Less drive is required at front crank. Slide the sleeve in towards crank and re-adjust both sides.

- **Backdrive plates are moving about when operated.**

The Pway chairs screws MUST be tight to stop this occurring, if however the sleepers are worn and the screws are not gripping, the use of Hilti plastic coil plugs are used. An alternative use of 'M' screws could be considered. Also most plates have two extra holes at the end in the four foot (depending on what length of switch they have been fitted), the option of drilling the sleepers through these holes and securing with 'AS' screws will almost certainly stop the movement.

Final Checks

1. Ensure **ALL** nuts/bolts are tightened and locked if applicable, also ensure all split pins are fitted and split.
2. Ensure all measurements are correct (**the adjusting sleeve measurements are only a guide and may be different on final check).
3. Have the points tried several times and check the plates **DO NOT** move at all and there is no binding.
4. Check the switch fits up along its entire length and that the deciding RSO is met.
5. Check the FWC, RSO & FWP meets TRK/1202 on both sides.
6. Record all set measurements on record form if applicable.
7. **Test the work to SMTH and any other current Network Rail document(s).**
8. You must make sure the Pway dept check their own work.
It is best practise to get the Pway TCM/Supv. to sign your SMTH test log.
9. You **MUST** ensure the Pway dept Lift, pack and kango the entire length before being handed back for traffic.
10. Report/record or advise SSM/NRCC any defects that cannot be undertaken on the day if they affect the safety of trains or will affect operation.

Abbreviations:

FWC: Free wheel clearance, (open side gap).

RSO: Residual switch opening (closed side gap).

FWP: Free wheel passage (gap between running edges of both switch rails).

Train operated points backdrives are set differently in which they are set back-to-front and are **NOT covered in this document.*

Equipment required:

S&T:

1. 2x large adjustable spanners
2. Medium 6" adjustable
3. Torque wrench (80-400Nm)
4. Hammer
5. Bar
6. Ruler
7. Steel tape measure
8. Gauges
9. 30mm spanner/socket
10. 24mm spanner/socket
11. Point machine handle/clamp lock handle
12. Grease and grease gun
13. Pliers
14. FWC & FWP combined track gauge
15. RSO step gauge
16. Hacksaw/12" disc cutter
17. Rodding punch with handle
18. Equipment for checking FPL & detection on points
19. SSOWPS pack and line blockage information
20. SMTH and any other relevant standards
21. The backdrive equipment and plates (not listed due to being specific on the points).

Pway:

1. Impact wrench with correct attachments
2. Slewing jacks and handles
3. Large hammer
4. Pandrol extractor
5. Pandrol inserter
6. Spare AS screws
7. Spare chair plastic inserts
8. Hilti plastic coils
9. Sleeper drill, attachment and 19mm drill
10. Petrol
11. Track gauge
12. Pway torque wrench if required
13. Shovels
14. Kango/packing equipment
15. Equipment to pull points to gauge if required.
16. Rail trolley with handle
17. Relevant standards and documents.

Safety equipment, PPE and Sentinal (PTS) cards for both disciplines.