NATIONAL TRACTION ENGINE TRUST

Preserving our Heritage with Steam on the Road

ENGINE OWNER'S CODES OF PRACTICE

PART 5

MECHANICAL INSPECTION

PART 5 - MECHANICAL INSPECTION of Traction Engines and other Steam Driven Road Vehicles

5.1 INTRODUCTION

5.1.1 These recommendations are based on the requirement to maintain the traction *engine* or similar vehicle in a safe condition. Account has been taken of the fact that these vehicles are very tolerant of general wear and although they may be wasteful of steam and noisy in operation they may still be mechanically in a safe condition.

5.2 ROAD WHEELS

5.2.1 Check for loose tyres, strakes, spokes and plates securing the T iron rims. Check for cracked hubs and excessively worn driving pinholes. Check the security and condition of brake rims where fitted. Check the fit and condition of the bolts securing the differential bevel gear to the rear wheel. Check the driving pin(s) for wear and cracks and that the means of securing the pin(s) in position is satisfactory. Note that to avoid the risk of breaking the plate or stud securing the driving pin there must be looseness in the assembly under both driving and over run conditions.

5.3 DRIVING AXLE

5.3.1 Broken driving axles although rare are not unknown and the consequences can be very serious. This item should be examined very carefully whenever the opportunity arises. Crack detection methods should be employed, the most at-risk areas being at keyways and changes of diameter. If a new axle is to be made, all keyways must have a root radius and at changes of diameter the shoulder radius must be as large as possible.

5.3.2 The driving boss(es) and differential bevel gear should ideally be a press fit on to the axle but, in practice, most are a sliding fit. The keyways and keys must be a good fit and show no sign of looseness.

5.3.3 Examine the driving pinholes in the driving boss(es) for cracks and excessive wear. The collars and cross pins at the ends of the axle, which secure the driving wheels must also be checked for cracks and for wear which can result in excessive end float of the wheels and differential gear.

5.4. FRONT AXLE

5.4.1 This component is unlikely to break but wear on the wheel bearing journals and in the region of the pivot pin and the fork in the perch bracket should be checked. In the case of steam rollers the fork and headstock are usually made of cast iron and should be examined for cracks. Check that the steering fork is correctly retained in the perch bracket, or headstock, so that it cannot drop out should the front end of the *engine* or roller "rear up".

5.5 BRAKES (flywheel, drum and rim brakes)

5.5.1 Check that the friction material, which may be wood blocks or woven material is properly secured to the brake arm or brake strap and of adequate thickness. If wood blocks are used 'poplar' is very suitable. The mechanism for applying the brakes should be checked for wear, particularly the nut and screw. Dismantle and thoroughly clean the nut to check the thickness of metal left on the thread.

5.6 GEARING

5.6.1 Because the braking system on many *engine*s is not very effective it is often necessary to apply *engine* braking when stopping or for checking the speed when descending hills. For this reason it is important that the strength of the gear teeth and the security of the gears on to their shafts should be adequate.

5.6.2 Replacement of worn out gears with new ones is the ideal solution. Welding has successfully reclaimed many worn gears. Before attempting this type of repair, the procedure should be discussed with someone having sufficient metallurgical and welding knowledge and experience and a specification for the work should be set out. There are firms who specialise in reclaiming worn gears. Shafts, which carry sliding gears, either on splines or on squares, can also be refurbished provided that the same precautions are taken as with the gears.

5.6.3 Shafts should also be checked for cracks in the area of the splines or keyways and at changes of diameter. Root and corner radiuses should be checked as for the driving axle.

5.6.4 Fixed gears should be either a press fit or a light driving fit on their shafts and keys should be properly fitted over their full length.

5.6.5 Check gear selectors and levers for cracks, security of pivot pins and that the locking pins are fitted with chains so that they cannot be lost.

5.6.6 Check that all bearing caps and housings are secure.

5.7 ENGINE PARTS

5.7.1 Check all bearings, valve gear, reversing lever and regulator are securely bolted and pinned. The flywheel should be a push fit or tight sliding fit on to the crankshaft and the key should be properly fitted over its full length. Examine the flywheel hub, spokes and rim for cracks.

5.8 STEERING GEAR

5.8.1 The anchorage of the steering chains to the front axle or to the chain guides in the case of a roller should be checked. The chain should be examined on the bearing points of the links for wear. Also examine for distorted links and links, which may have been worn, thin either by contact with the front wheels or where the chain makes contact with the steering chain barrel.

5.8.2 Check that the worm wheel is securely keyed on to the steering chain barrel. Both the worm and worm wheel teeth should be strong and free from excessive wear. The worm should be well fitted onto the steering shaft and securely retained by its nut, which should also be retained by a split pin or other suitable means. As the worm is usually mounted on a steering shaft, which is overhung from its bearings, periodic crack detection of the shaft at both bearing

positions and at the keyway is recommended. Also check the security of the steering wheel and all the bearing brackets.

5.9 ALLOWANCE FOR EXCEPTIONAL STRESSES

5.9.1 Emergency stops using full reverse of the valve gear, and also rocking the *engine* backwards and forwards in an attempt to drive out of a hole into which the *engine* has sunk, lead to greater stresses on all the shafts, splines, keys and gears due to inertia loads than are present in normal driving. The inertia loads increase as the backlash in gears, splines and driving pins increase. These facts should be considered when decisions are made concerning refurbishment or replacement of these components.