ESR 0204

MAJOR INSPECTION FOR 48 CLASS LOCOMOTIVES

Version 1.1

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Engineering Standard

Document control

Revision	Date	Summary of change
1.0	February 2010	Based on TRS 1499
1.1	June 2010	Report sheets appended to this standard

Summary of changes from previous version

Summary of change	Section
NOTE – If the final document is small enough for the 'Contents' and 'Document control' to fit on one page remove the page break between the existing pages 2 and 3. HOWEVER if the 'Document control' page carries over to a second page separate pages must be used for 'Contents' and 'Document control'	

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1 Introduction

In order to maintain the reliability of RailCorp's 48 class locomotives the following maintenance schedules have been introduced:

Inspection	Inspection Period	RailCorp Engineering Standard
Major	9 months	ESR 0204
Interim	3 months	ESR 0205
Trip	14 days	ESR 0206
Fuel point	As required	ESR 0207

Note: There will be two Interim inspections between each Major inspection.

Maintainers carrying out inspections shall complete and sign the appropriate Inspection Report Sheet against the functioned performed. The comments section of the Inspection Report Sheet shall be used to note any repairs carried out during the inspection.

Note: Check means to visually and physically examine and to record and report a defect when located.

2 General

2.1 Safety precautions

In performing scheduled inspections and carrying out repairs:

(i) All safety regulations and procedures shall be adhered to. (eg; red flags, locomotive positioning and stabling.)

(ii) Correct safety wear and equipment shall be worn when required. (protective clothing, suitable ear and eye protection.)

(iii) Always inform other staff working on or around the locomotive of your presence and your intention.

(iv) When working or testing on or near electrically live equipment, precautions against the possibility of electric shock, burns or flash shall be taken.

(v) All precautions shall be taken to prevent the locomotive from moving, ensure that the locomotive is suitably secured with air brakes and/or hand brake and where necessary wheels chocked.

(vi) When a locomotive is to be moved, ensure it is done in accordance with locomotive movement regulations and by a qualified and authorised person.

2.2 Reliability

Serviced 48 Class Locomotives shall be required to operate reliably for a minimum period of 9 months or 50,000 km, whichever comes first.

2.3 Records

All documentation regarding the Major Inspections on 48 Class Locomotives shall be completed with one copy faxed to the Train Operation Unit on 02-9752 6171 (Internal 26 171) and one copy retained by the Maintainer.

2.4 Major Inspection Report Sheet

Report sheets shall be completed and signed off by both the Maintainer and the Supervising Officer.

A sample Check sheet is given in the appendix A.

3 Technical conditions

During all stages of Service the Maintainer shall adhere to the following conditions:

3.1 Variation

Variation from any conditions contained in this standard/instruction, or from any drawings, specifications and other documents referred to by this standard/instruction shall not be permitted without written approval from RailCorp.

Care shall be exercised in each individual case to ensure that disassembly, inspections, repairs and tests comply with all statutory requirements.

3.2 Quality control

The Maintainer shall have a quality system conforming to AS/NZS ISO 9000 Series.

4 Cleaning

The locomotive shall be cleaned prior to having an inspection. It is the responsibility of the maintenance staff to ensure that the cleaning of the locomotive is of an acceptable standard.

4.1 Engine room

All foreign materials to be removed from locomotive (eg. Rags, paper, etc).

Engine room to be cleaned to remove dirt, oil and grease from the engine block, floors, walls and walkways.

All cables, equipment, components and devices are to be clearly visible and not concealed by dirt etc.

4.2 Underbody and bogies

Before commencing cleaning of underbody and bogies, all traction motor covers shall be in place and the diesel engine shall be running in fourth throttle notch with Gen Field switch OFF.

All excessive dirt, oil, and grease shall be removed from the underframe, bogies and traction motors.

All cables, equipment, components and devices shall be clearly visible and not concealed by dirt etc.

4.3 Toilet

Ensure floor drains are not blocked.

Clean the bowl using a suitable brush.

4.4 Equipment blow out

With engine running and covers removed, blow out the following equipment with clean dry air:-

a) Traction motors

b) Control stands

c) Traction generator

d) Auxiliary generators.

4.5 Radiators

Outside of the facility service shed with engine stopped, locomotive wheels chocked, handbrake applied, blow dirt out of radiator air passages in reverse air flow direction with compressed air. Examine core for any leaks record any defects for further attention on defect sheet

4.6 Battery boxes

Wash out battery boxes using soda and hot water. Remove excess water. Record any defects for further attention on defect sheet.

Battery condition test (discharge test).

4.7 Main reservoir drain cocks

Open drain cocks on automatic drain valves of main reservoir and check for condensate.

Note: This must be done on a bunded area or drained directly into a suitable container.

4.8 Reflective delineators

Examine reflective delineators for graffiti or damage. Remove graffiti or replace damaged reflective delineators.

4.9 AEI tags

Examine AEI tags for damage. Replace defective or missing AEI tags.

5 Pre inspection

5.1 Defects examination

This is an examination of locomotive cabs, bogies, underframe equipment and brake equipment the purpose of which is to locate any defective, loose or broken equipment. The examination is intended to find minor as well as major defects, materials and items which are of the incorrect type, materials and items which are incorrectly fitted or items which should be fitted but are missing.

Particular attention must be paid to oil, fuel, water and exhaust leaks. Any leaks located which may have caused contamination of electrical equipment must be recorded for further attention on defect sheet

Where practical, all defects should be repaired prior to the locomotive being released back to service; but if this is not possible then all outstanding defects or bookings must be entered onto the locomotive's maintenance history on the computer so that these can be attended to as soon as possible. Every effort must be made to complete repairs prior to release into traffic.

5.2 Engine oil sample

Take a sample of engine crankcase lube oil for laboratory analysis. Use a clean dry sample bottle. Clearly label with locomotive number and date. Leave in designated area for dispatch to the Spectrographic Laboratory.

Note: The white sheet of the locomotive Log Book to be endorsed on the last line of the "Repairs Effected" column by the engineering operator as "Lube sample taken, fitter's name, date and depot".

5.3 Compressor

Check operation of lube oil pressure indicator or gauge. The indicator should be projected 12 mm at idle, gauge reading 35 kPa (5 psi). Must return to zero when stopped.

5.4 Low lube shutdown

Check operation of the lube oil shutdown by pulling out the shutdown button on the engine governor. After the engine has shutdown reset the governor shutdown button.

5.5 Fuel injectors

Check operation of injectors by pop testing each cylinder. Record any defects for further attention on defect sheet.

Note:- Fuel injectors to be change out every 100,000Kms or 27 months.

5.6 Overspeed trip

Check overspeed trip operation ENGINE MUST STOP AFTER TRIPPING. Overspeed range 1135 - 1175 RPM. Record any defects for further attention on defect sheet.

5.7 Cooling fan

Check cooling fan operation outside of the facility service shed. Observe for any faults record any defects for further attention on defect sheet.

5.8 Support systems leakage

With the locomotive in fourth notch, no load, check around engine room and compressor compartment and rectify any:

a. Unusual knocks or odours.
b. Engine air joint leaks.
c. Water leaks. Pay particular attention to clips, hoses, couplings, etc. Check the water drain valve ensuring the gland packing is tight and not leaking, that the valve is closed and the plug is in position.
d. Exhaust leaks. Pay particular attention to the exhaust elbows, bellows and gas inlet casing.
e. Water pump tell tail.
f. Aftercooler tell tail.
g. Fuel flow indicators for air and flow condition.

5.9 Vigilance control

Vigilance control system is to be tested to RSS 0222 - Testing of vigilance control system. Record any defects for further attention on defect sheet.

5.10 Turbocharger pressure

If turbosupercharger pressure entered in log book is consistently 75 kPa (11 psi) or below, record for further attention on defect sheet. For Napier turbos this figure is 150 kPa (24 psi).

5.11 Fuel oil pressure

If the fuel oil pressure entered into log book is 100 kPa (15 psi) or below, or shows a rapid decline of pressure over a short period record for further attention on defect sheet.

5.12 Low tension earth

While the engine is running and all equipment turned on check for low tension earths. Connect a lamp to the LH blade of the battery knife switch and the locomotive frame then the RH blade and the frame. Record any defects for further attention on defect sheet.

5.13 Air conditioner cooling test

Observe liquid line sight glass for refrigerant flow located above the High Pressure Service The air conditioning unit should be function tested to ensure correct operation. Switch unit to cool and allow to run for 2-3 minutes whilst holding in the “Cooling Test” push button.

6 Drivers cab / generator room/ control compartment

6.1 Log book report

Record any defects reported by the driver and entered in the log book for further attention on defect sheet. Sign off repairs affected and remove the PINK and GREEN log sheet from the Log Book and attach to the L3 Check Sheet. Ensure that the white log sheet remains in the log book and that the signed off bookings are legible.

Where practical, all defects should be repaired prior to the locomotive being released back to service; but if this is not possible then all outstanding defects or bookings must be entered onto the locomotive's maintenance history on the computer so that these can be attended to as soon as possible. Every effort must be made to complete repairs prior to release into traffic.

6.2 Safety labels

Ensure all safety warning labels and signs are in place and in good order.

6.3 Hasler speedometer

Set hands and wind clock if necessary. Blue dot indicates PM. Change diagram roll. Mark roll when installing and removing with the locomotive number, Hasler serial number, maintenance depot, time, date, kilometres, reason for change, employee classification and signature. Return used roll to Supervising Officer.

NOTE: Reduce brake pipe pressure to zero with automatic brake valve before closing instrument case after installing new roll to ensure stylus for brake line is correctly positioned.

6.4 Windscreen wipers

Ensure that all windscreen wipers and washers are fully operational. Record any defects for further attention on defect sheet.

6.5 Horns

Check operation of horns and associated equipment and record any defects for further attention on defect sheet

6.6 Lights

Check that all lights and switches operate. Ensure there is sufficient supply of spare lamps.

6.7 Air conditioner

1. Replace Reciever Drier if the existing one is 2 years old or a Yellow dot is visible in the sightglass.
2. Thoroughly clean both sides of Condenser and Evaporator fins of all dust and foreign matter by brushing and blowing with dry air.
3. Evaporator condensate drains should be checked and cleaned.
4. Check hoses for damage/deterioration.
5. Clean both evaporator and condenser fan blades. Ensure fans are tightly secured on shaft.
6. Check brushes on Condenser, Evaporator fan motors and replace if less than 12 mm.
7. Ensure both condenser and supply fans are rotating in the correct direction.
8. Check compressor drive belts for wear/deterioration.

6.8 Doors & windows

Check all cab, engine room and canopy doors, locks, hinges, window frames, slides and mechanisms are fully operational. Visually examine glass and seals for physical damage, Record any defects for further attention on defect sheet.

Lightly lubricate hinges, locks, slides etc with hand oiler. Use SAE 30 lube oil, item 5255C.

6.9 Fire extinguisher

Change out fire extinguisher with a re-certified one.

6.10 Hand brake operation

Test hand brake and ensure it is fully operational.

6.11 Train radio

Test the train radio is operational by establishing communications with another locomotive or a hand held radio.

6.12 Sands / desanders operation & sandpipe heights

The operation of sanding and de sanding equipment must be checked in each direction to ensure full operation and correct amount of sand is delivered to railhead (RSS 0211-Measurement of sand flow rate). Record results and any defects for further attention.

6.13 Pressure gauges

Cross reference pressure gauge readings between the two control stands. If readings do not agree record as a defect. Record any defects for further attention on defect sheet.

Refer to RSS 0225 Calibration of pressure gauges.

6.14 Cab accessories

Check for correct operation, connections for tightness and condition of equipment.

These accessories include:- cab heaters, air conditioning, hotplate and cab fans.

Record any defects for further attention on defect sheet.

6.15 Miscellaneous controls

a) Check battery charging ammeter.

b) Check Engine Control Switch.

c) Check operation and condition of start and stop buttons.

Record any defects for further attention on defect sheet

6.16 Control air

While full main reservoir air is maintained, open the drain cock on the control air reservoir and blow any moisture from the system. Close supply cock and allow system to drain. Check that air gauge registers zero. Close drain cock, open supply cock, check that pressure registers 625 kPa (90 psi). Check the locomotives control air gauge with the depot test gauge to ensure the correct reading is showing on the unit.

Record any defects for further attention on defect sheet

6.17 Miscellaneous

a) Inspect all magnet valves in the hood.

b) Inspect all pressure switches in the hood.

6.18 Controller and console (both sides)

With all covers removed:

a) Check operation and mechanical interlocking of selector, throttle and reverser handle.

b) Check all cams and contacts for condition and movement.

c) Check all connections for tightness and condition of wiring.

d) Check all gauge lights, alarms and switches.

e) Examine all alarm light fittings.

f) Examine loadmeters for obvious defects.

Record any defects for further attention on defect sheet

6.19 Traction generator

a) Remove any dirt, oil or grease from the interior of the machine. Clean brush arm insulators and vee band insulation with a suitable cleaning agent and repair as necessary. Do not use abrasives on Teflon.

b) Check for any deposits of copper or carbon from between the segments of the commutator. If present remove the deposits using a clean stiff wire brush while the engine is manually rotated. Inspect commutator for signs of out of round, burning or copper drag. If necessary, cut a light chamfer on edge of segment.

c) Inspect brushes and holders for condition, wear and freedom of movement of brushes. Replace any brushes which are broken or worn to the extent that the condemning line is no longer visible on the brush. Inspect pigtail shunts and be sure that terminals are tight under screws and positioned so that shunt is clear of hammer and armature riser bars.

d) Examine the interior of the generator for signs of burning, flashover, damaged insulation or obvious defects and give any attention necessary.

e) Check tightness of all connections.

f) Examine leads to ensure insulation damage cannot occur.

g) Clean all covers and outside of generator frame.

h) Examine waste sump and remove any foreign matter which may result in a blockage of the drain pipe. Mop up the waste sump and check that the drain pipe is clear.

Record any defects for further attention on defect sheet

6.20 Exciter and auxiliary generator

a) Remove any dirt, oil or grease from the interior of the machine. Clean brush arm insulators and vee band insulation with a suitable cleaning agent and repair as necessary. Do not use abrasives on Telfer.

b) Check for any deposits of copper or carbon from between the segments of the commutator. If present remove the deposits using a clean stiff wire brush while the engine is rotated. Inspect commutator for signs of out of round, burning or copper drag. If necessary, cut a light chamfer on edge of segment.

c) Inspect brushes and holders for condition, wear and freedom of movement of brushes. Replace any brushes which are broken or worn to the extent that the condemning line is no longer visible on the brush. Inspect pigtail shunts and be sure that terminals are tight under screws and positioned so that shunt is clear of hammer and armature riser bars.

d) Examine the interior of the generator for signs of burning, flashover, damaged insulation or obvious defects and give any attention necessary.

e) Check tightness of all connections.

f) Examine leads to ensure insulation damage cannot occur.

g) Clean all covers and outside of generator frame.

Record any defects for further attention on defect sheet

6.21 Control compartment (visual)

This is a visual examination in which all items inside the electrical compartment (both front and rear) are viewed to ascertain whether some item of equipment is faulty or out of position.

a) Examine all HT connections for signs of overheating.

b) Examine all LT connections for security.

c) Check condition and security of Hasler current apparatus.

d) Examine all resistors for signs of overheating and general condition.

e) Check condition of door seals and compartment locks.

Record any defects for further attention on defect sheet

6.22 Electro pneumatic contactors

a) Check condition and cleanliness of complete contactor.

b) Examine contacts, remove any beaded edges with a fine file.

c) Check shunts, replace any broken shunts.

d) Check condition of all connections.

e) Check arc chutes, replace if damaged or severely burnt.

f) Examine interlocks.

Record any defects for further attention on defect sheet

6.23 Electro magnetic contactors

Caution: Ensure battery switch is open when operating, filing or cleaning CK1 and CK2.

a) Check cleanliness of complete contactor.

b) Operate by hand and check alignment and wiping action.

c) Examine contacts, remove any beaded edges with a fine file.

d) Check shunts, replace any broken shunts.

e) Check condition of all connections.

f) Examine interlocks.

Record any defects for further attention on defect sheet

6.24 Reverser switch

a) Check condition and cleanliness of complete switch gear.

b) Check condition of all connections.

c) Examine auxiliary contacts.

d) Examine main contacts.

Record any defects for further attention on defect sheet

6.25 Auxiliary contactors and relays

Check condition of equipment and all connections. Record any defects for further attention on defect sheet

6.26 Automatic and A7 independent brake valve

Lightly lubricate automatic and independent brake valves. Lubricate with compressor oil.

NOTE: B7 independent not lubricated.

6.27 Radiator fan gearbox

Fill the radiator fan gearbox to the top of the filler hole using SAE 40 lube oil Item 5255E.

7 Engine and fan room

7.1 Compressor

a) Lube oil change, drain sump and remove strainer. Thoroughly clean out sump, ensuring no cleaning material is left in the sump. Clean and replace strainer. Refill sump with ISO 100 oil. Capacity 12.5 litres (22 pints).

b) Remove clean, test compressor valves and unloaders. Renew defective equipment as required.

c) Air compressor air filters, remove, clean housing and replace element.

d) Check operation all safety vales.

Record any defects for further attention on defect sheet.

7.2 Air strainers

Remove, clean and replace elements of air strainers in the vigilance control, whistle valve, compressor governor, control air and sanders.

7.3 Engine oil sample dilution test

Take an engine oil sample, while the engine is hot and idling and test for fuel oil dilution using a dilution viscometer.

Refer to ESR 0216 Testing of oil using Mobil Flostick.

7.4 Fast coupling

Check fan drive holset coupling for tightness of coupling bolts and general condition, record any defects for further attention on defect sheet.

- With engine at normal operating temperature, position either filling plug at 45 degrees to top vertical then remove BOTH filling plugs.
- Add Caltex Ultra Duty 2 grease (SC 1537422) until it flows from the lower hole. Replace BOTH filling plugs.

7.5 Lube oil filters / centrifugal cleaners

Remove oil filter elements and thoroughly clean the filter bowl with clean lint free cloth. Ensure no cloths are left in the filter bowl.

Note:- Do not change filter elements if centrifugal filter fitted.

7.6 Lube oil strainer

Remove and clean lube oil strainer. Check that the perforated ring is fitting correctly in strainer housing base. Reposition lube oil strainer in bowl. Renew strainer cover gasket. yokes and Nugent type MI 73400517, Alco type MI 73208076.

7.7 Fuel pumps and racks

Check for sticky fuel pumps. Ensure the fuel racks are free to move and all pins and lock nuts are secure. Check Banjo fittings are secure.

7.8 Inlet and exhaust valve clearance

Check and adjust inlet and exhaust valve clearances, 0.86 mm (0.34”). Check the rotation of the push rods, feel for scoring in the cup seat and on the ball.

7.9 Fuel pump timing and rack setting

Check and adjust the fuel pump timing and rack settings.

Lubricate racks and plungers with oil SAE 20W/40.

7.10 Crankcase explosion covers

Check and record any defects for further attention on defect sheet.

7.11 Crankcase inspection

Make a through inspection of the crankcase.

a) Check for discolouration on connecting rods, bearing caps etc,

b) Check for water around the liners.

c) Inspect crankshaft split gear, clamping nuts and bolts.

d) Check condition of camshaft and associated rollers.

Record any defects for further attention on defect sheet.

7.12 Holding down bolts

Check the tightness of the following

a) Engine and main generator

b) Air compressor

c) Radiator fan gearbox

d) Radiator fan shaft top bearing housing

e) Traction motor blower housing

f) Lube oil cooler, strainer and filter bowls

g) Turbosupercharger

Record any defects for further attention on defect sheet.

7.13 Primary and secondary fuel oil filters

Renew elements and cover gaskets, Record any defects for further attention on defect sheet.

7.14 Holset coupling

Check fan drive holset coupling for tightness of coupling bolts and general condition, record any defects for further attention on defect sheet.

7.15 Cooling fan gearbox

Change oil, use SAE40 lube oil, capacity 2.8 litres.

7.16 Radiator fan drive shaft

Examine spicer shaft universal joints. Lubricate the universal joints, sleeve, yoke and spline shaft with Lithium grease No 2, item 5285E.

Lubricate the radiator fan drive shaft bearings with Lithium grease No 2, item 5285E.

7.17 Body side filters

Renew body side filters.

7.18 Filter minder & engine air filters

Check filter minder for indication of engine air filter condition. If necessary change the filter.

7.19 Linkages, overspeed, control shaft and thrust collars

Lightly lubricate governor linkage, fuel pump control linkage and overspeed with hand oiler, remove any excess oil.

To lubricate the fuel pump control shaft thrust collars and bearings (except where fitted with sealed Teflon bearings), disconnect the linkage pin at the shaft by hand, at the same time applying liberally SAE lube oil, to the sides of each bearing and to the thrust collars.

Replace and secure the linkage pin.

7.20 Exhaust stack

Examine exhaust stack for foreign matter and excess carbon build up, record any defects for further attention on defect sheet.

Note:- Whilst checking exhaust stack, 320 turbos are fitted with air pressurised oil seals, check the air supply to the turbo, audible check is to be made of the air coming through the pressurised turbo seal. Observing the sound is not louder than normal as a defective choke in the air supply will effect compressor performance. Remove, clean and replace filter bowl, record any defects for further attention on defect sheet.

7.21 Batteries

a) Maintain water level 12 mm above the splash barrier.

b) Check terminals for tightness of connections.

c) Check and clean terminals and bolts and coat with petroleum jelly mixed with turps.

Record any defects for further attention on defect sheet

7.22 Waste removal & waste sumps

Ensure all waste such as rags, discarded light globes etc are removed from the locomotive engine room, in particular the waste sump area, the generator room and cab prior to the release of the locomotive.

Ensure all waste sumps are clear and drained. (Reference ESR 0215, Maintenance of Waste Sump Drains)

7.23 Traction motor blower

Add Lithium grease No. 2 into each bearing housing. Record any defects for further attention on defect sheet

7.24 Fuel pump and crankcase exhauster motors

a) Remove brushes and terminal cover.

b) Examine brushes, commutator and all connections.

c) Renew damaged or brushes worn past the condemning line. Replace brushes and cover.

Record any defects for further attention on defect sheet

7.25 Eddy current clutch

a) Clean slip rings, brush holders and inside of machine with a suitable solvent and rag.

b) Examine brushes, brush gear and slip rings for any signs of damage or fault. Renew any brushes worn to condemning line.

Record any defects for further attention on defect sheet

7.26 Governor

a) Remove plug and wash plug and receptacle with suitable cleaning solvent.

b) Check pins and sockets

c) Check tightness of centre screw of plug and receptacle block.

d) Examine plug externally for general condition of plug case and flexible conduit.

Replace plug and check for correct security.

Drain and refill using only NEW CLEAN SAE 40 lube oil, item 5255E, capacity 17 litres (3 pints). Refill to within 3 mm (l/8") below the top mark of the governor's sight glass. Check with the engine running. Ensure load regulator sight glass is full of oil.

Record any defects for further attention on defect sheet

7.27 Miscellaneous

a) Inspect all magnet valves in the engine room and fan room, including de-sanding magnet valves.

b) Inspect the pressure switch in the engine room.

c) Inspect all temperature switches in the engine room.

d) Inspect low water cut out switch and float switch.

Record any defects for further attention on defect sheet

7.28 Jumper receptacle

Check jumper receptacle for defects.

Record any defects for further attention on defect sheet.

8 Underneath locomotive

8.1 Brake block condition

Ensure all brake blocks are at least 20 mm (3/4") above condemning to ensure shoes will remain serviceable until next inspection.

Ensure brake blocks do not overhang edge of wheel. Change as required.

Where brake blocks have been changed, make sure that both bogies are cut in.

8.2 Brake cylinder travel

Brake Piston Travel to be adjusted in accordance with RSS 0224 Adjustment of Brake Piston Travel. The piston travel is not to be more than 50 mm or less than 20 mm after adjustment.

8.3 Brake cylinders

Grease all brake cylinders with grease gun, two pumps on gland end. Use Lithium grease No 3, item 5293A.

8.4 Brake rigging

Inspect all brake pullrods and rigging for wear, defects, security and freedom of movement.

Check condition of all split pins and cotters. (Reference RSS 0312 Security of brake gear)

8.5 Wheel examination

Check wheel in accordance with RSS 0330 Wheel Defect Manual. Record wheel diameter and flange thickness on wheel inspection report sheet.

8.6 Gearcase lube oil level

Add lubricant as necessary to maintain a heavy film on gear teeth. Item 5283C. Do Not Overfill. (Reference RSS 0246, Traction Motor Gearcase Lubricant level)

8.7 Suspension bearing oil level

Clean around wick carrier plate assembly, and remove the complete carrier plate and wick assembly.

Drain oil from the suspension bearing sumps. Clean each sump thoroughly, replace and tighten plug. Refill to correct level with red axle oil, Item 6482B. (Reference RSS 0401 Specification for Suspension Bearing Oil).

Check wick assembly for mechanical defects, faulty lubricator wicks and metal impregnation. Examine bearings for signs of metal burring. Change wick or report defects as required.

Note: Ensure that wicks are soaked before installation.

8.8 Traction motor nose suspension

Check the traction motor nose suspension assemblies and wear plates.

8.9 Fuel tank examination

Drain condensation from the fuel tank and clean gauge. Check fuel tank for cracks and any other defects which may impact on reliability or environment. Record any defects for further attention on defect sheet.

8.10 Hasler speedo transmitter

a) Strip and clean transmitter.

b) Inspect brushes. Renew any brushes which are broken or worn to the extent that the wear line is no longer visible on the brush.

c) Lubricate the transmitter with No. 3 Lithium base grease.

d) Reassemble the transmitter.

e) Ensure Hasler speedo transmitter is secure, free of grease leaks.

Record any defects for further attention on defect sheet

8.11 Automatic couplers and draft gear

Check auto coupler height, 865 mm +/- 25 mm (34” +/- 1”) measured from rail level to the centre of the knuckle. Check the profile of the automatic couplers. Record any defects for further attention on defect sheet.

Visually inspect the coupler shank, yolk, draft gear and pocket for signs of wear or physical damage.

8.12 Air cocks at head stock

Check all cocks for freedom of movement and that there is some resistance to movement and leaks. Grease where necessary with Lithium grease No. 2. (Only side venting cocks are allowed.)

Note:- Springs on 18 mm (3/4”) and 25 mm (1”) cocks are to have 4.5 mm (3/16”) compression. Springs on 12 mm (1/2”) cocks are to have 3 mm (1/8”) compression. Record any defects for further attention on defect sheet

8.13 Air brake coupling hoses

Check the condition of all coupling hoses. Replace any damaged hoses.

Couple all loose hoses to dummy couplings.

8.14 Dummy couplings

Examine air brake coupling hose dummy coupling chains for security of attachment. Repair or replace as required.

8.15 Bogie centre plates and loading pads

a) Check seals. Replace if damaged.

b) Loading pads, drain and add engine oil SAE 40 to filler aperture

c) Centre castings, add engine oil SAE 40, to filler aperture.

Record any defects for further attention on defect sheet

8.16 Traction motors

a) Remove any dirt, oil or grease from the interior of the machine. Clean brush arm insulators and vee band insulation with a suitable cleaning agent and repair as necessary. Do not use abrasives on Teflon

b) Inspect brushes and holders for condition, wear and freedom of movement. Replace any brushes which are broken or worn to the extent that the wear line is no longer visible on the brush. Inspect pigtail shunts and be sure that terminals are tight under screws and positioned so that the shunt is clear of hammer.

c) Examine the commutator for signs of out of round, faulty commutation, damaged segments, copper drag, contaminated equipment or other obvious defects.

d) Inspect inside of motor for signs of burning, flashover, damaged insulation or other obvious defects and give any attention necessary.

Note: Any arcing setscrew which has been hit by a flashover, MUST have both the spring and flat washer renewed.

e) Check tightness of connections, paying particular attention to the tightness of the brush holder lead connections

f) Check brush holder clearance to commutator 2.2 mm to 3 mm.

g) Examine leads and cleats to ensure insulation damage cannot occur. Clean cleats, removing if insulation degeneration is evident.

Repair any damaged felts on covers

Ensure the bottom traction motor covers on 253 traction motors have their handles closed and secured with cable ties

Record any defects for further attention on defect sheet

8.17 Axle box pedestal clearance

As per RSS 0240 Axlebox overhaul longitudinal clearances.

8.18 Axle box roller bearing

Remove front covers and with the use of a plastic or synthetic rubber spatula clean all used grease the front of the axle box and cover. Using the power operated grease gun apply Lithium No 3 base grease through the centrally located grease nipple until fresh grease is seen coming through the outer bearing, then cone the grease off from the journal end to the outside ring of the bearing, no free grease is required in the front of the axle box.

8.19 Traction motor cooling air bellows

Check traction motor air bellows for alignment, leakage or damage.

Check wear plates.

Check setscrews for security.

9 General with engine shutdown

9.1 Low tension earth

a) With battery switch closed, all circuit breakers and switches closed, connect 75 volt, 40 watt test lamp between frame and the battery switch. Test both sides of the switch for a low tension earth fault.

Record any defects for further attention on defect sheet

9.2 Megger test

a) Open the ground relay knife switch. Using a 1000 Volt Megger, connected across the open switch, test the high tension system.

b) Close the ground relay knife switch.

Record any defects for further attention on defect sheet

9.3 Propulsion control test

a) With main reservoir air at full pressure place Engine Control Switch in the run position.

b) Switch on control, fuel pump and generator field switches on control stand.

c) Place reverser handle in forward and open throttle handle to notch one. Check that the “S” contactors and the “GF” contactor have picked up.

Perform the same test with the reverser handle in the reverse position. Check that the reverser switch has thrown in the opposite position and that the “S” and “GF” contactors have picked up.

9.4 Manual transition test

- With Engine Shutdown.

9.4.1 Forward transition

Manually operate TR relay, S1 and S21 should de-energise. P1, P2 and P21 should energise.

Note: During this transition step TDR relay will be energised and then de-energised but should delay about one or two seconds on drop out. Also GF will drop out and then pick up.

9.4.2 Forward parallel field shunt

Manually operate FSCR relay whilst holding TR closed. FS1-2, 3, 4 and 5-6 should energise.

9.4.3 Backward parallel field shunt

Release FSCR. FS1-2, 3, 4 and 5-6 should be de-energised

9.4.4 Backward transition

Release TR. All parallel contactors should de-energise. S1 and S21 will energise.

10 General with engine running

10.1 Engine oil level

Check engine crankcase lube oil level with engine idling. Maintain oil level to high mark on bayonet gauge. Oil SAE 20W/40, item 5255E. Add or drain as required. DO NOT OVERFILL.

10.2 Governor oil level

Check engine governor oil level with engine idling. Maintain level to 3mm (1/8") below the high mark on the sight glass. Oil SAE 20W/40, item 5255E.

Note: If oil level has risen well above mark or oil appears "dirty", Record any defects for further attention on defect sheet

10.3 Engine coolant

Check water level in water expansion tank. Maintain level to full running mark of sight glass.

A water sample is to be taken tested and recorded on tick sheet, coolant additive to be added as required. (RSS 0253 Cooling water test procedure).

Note: Sight glass to be kept clean at all times.

10.4 Ground relay

a) Run diesel engine in sixth notch.

b) Trip relay by hand.

c) Engine should return to idle.

d) Alarm bell should operate.

e) Red alarm light on the driver’s console should illuminate.

Reset ground relay by depressing reset pushbutton.

10.5 Wheel slip

With the hand brake and locomotive air brakes applied:

a) Set up locomotive to drive against the brakes in first notch.

b) Operate WSR1, wheel slip relay, by hand.

c) Warning buzzer should operate.

d) Check that load meter indication decreases.

e) Sanding magnet valve should energise and remain energised for three to five seconds after WSR1 is dropped out.

f) Repeat steps (b) to (e) with WSR2 and again with WSR3.

g) Return controls to idle.

10.6 Compressor operation

Ensure main reservoir pressure is stable between 750 - 850 kPa (110 - 120 psi). Ensure it takes no longer than 40 seconds to pump between those pressures with engine in idle.

Visually examine compressor for defects. Listen for any unusual noises during operation.

Check air compressor lube oil level. Oil ISO 100.

10.7 Brake cylinder pressure switch

a) With engine running, increase brake cylinder pressure to 35 kPa (minimum reduction brake pipe pressure).

b) Blue warning light on the driver's console should illuminate.

c) Reduce brake cylinder pressure to below 7 kPa (release brakes).

d) Blue warning light should extinguish.

10.8 Low water

a) Place drain cock in position to drain the low water switch float chamber.

b) Diesel engine should shut down.

c) Alarm bell should operate.

d) Red alarm light on the driver's console should illuminate.

e) Close drain cock.

10.9 Low lube

a) With engine still shut down, pull out low lube button on governor.

b) Alarm bell should operate.

c) Green low lube light on the driver's console should illuminate if fitted.

d) Reset low lube button.

Hot Engine and Fan Controls

a) With engine running, operate the hot engine alarm switch, ETS, by hand.

b) Alarm bell should operate.

c) Red alarm light on the driver's console should illuminate.

d) Manually operate T1 temperature switch and ensure fan operates, manually operate T2 temperature switch and ensure fan operates faster.

Repair and\or report any defects located.

10.10 Hot engine and fan controls

A) With engine running, operate the hot engine alarm switch, ETS, by hand.

B) Alarm bell should operate.

C) Red alarm light on the driver's console should illuminate.

D) Manually operate T1 temperature switch and ensure fan operates, manually operate T2 temperature switch and ensure fan operates faster.

Repair and\or report any defects located.

10.11 Low tension voltage

Before adjustment is made, ensure voltage regulator has been operating for at least 30 minutes and that battery charging ammeter has settled back to a low value.

a) Turn off cab heaters, fans and hotplates.

b) Connect a 0-100 V voltmeter between 50 wire and 4 wire. This should read 74 V DC (+0 V, -2 V) in idle and 8th notch.

If the readings in 'b' above i incorrect carry out adjustment of voltage regulator.

10.12 Engine speeds

Check and adjust engine speeds as required. Record any defects for further attention on defect sheet.

10.13 Air conditioning

After unit has been operational for at least 10 minutes, ALL refrigeration valve glands (including the TX valve) and hoses should be tightened and the cap nuts securely replaced.

11 Operation check

Observing ALL depot safety requirements check the operation of the locomotive controls.

11.1 Engine speed control

a) With diesel engine running, place ECS in the RUN position. GF switch OFF.

b) Advance the throttle handle one notch at a time and note that the diesel engine responds.

(Notches one to eight)

11.2 Loading check

a) Ensure locomotive Air Brakes are applied and Park Brake is applied.

b) Switch GF on, place reverser handle in the forward, open throttle to notch one and ensure loadmeter registers (approximately 200 amps). Close throttle to idle.

c) Place reverser handle in reverse, open throttle to notch one and ensure loadmeter again registers.

d) Repeat test a) to c) from the other control stand.

Repair and\or report any defects located.

11.3 Ground relay test

a) Connect a one amp DC circuit breaker between generator positive and locomotive frame and perform Ground Relay Operation test.

Repair and\or report any defects located.

11.4 Wheel slip test

a) Test operation of wheel slip system by performing a wheel slip operation test in accordance with the test procedure.

Repair and\or report any defects located.

11.5 Transition test

a) Test operation of transition system by performing a transition operation test in accordance with the test procedure.

Repair and\or report any defects located.

11.6 All seals

Seal the ground relay cut out knife switch and the emergency fan switch using a standard lead seal and sealing pliers. Seal the vigilance control box.

11.7 Vigilance control

Test vigilance control equipment in accordance with RSS 0222, Testing of Vigilance Control System. Check that all seals are intact. Rectify or inform Supervisor of any defects found during the test.

Note : If any attention is given to this equipment it MUST be tested again on completion of repairs.

11.8 Air brake operation

Air brake system is to be tested to RSS 0221 A7/B7 Locomotive brake equipment test.

Record any defects for further attention on defect sheet.

12 Final running check

a) Relevant documentation completed.

b) Ensure main generator, auxiliary generator and exciter brushes are bedded in as laid down in the job procedures. (If new brushes are put in it should be noted on the defect sheet).

c) Remove rags, papers, spills, tools or any foreign materials from locomotive cabs, engine room and generator room, etc.

d) All covers are correctly positioned

e) Locomotive doors closed

f) Ready to go certificate placed on locomotive ready for service.

ENSURE RAIL SAFETY IS NOT COMPROMISED.

13 References

RSS 0210	Adjustment of sandtraps.
RSS 0211	Measurement of sand flow rates.
ESR 0215	Maintenance of waste sump drains
ESR 0216	Testing of oil using Mobil Flowstick
RSS 0221	A7/B7 Locomotive brake equipment test
RSS 0222	Testing of vigilance control equipment.
RSS 0223	Vigilance control equipment
RSS 0224	Adjustment of brake piston travel
RSS 0225	Calibration of pressure gauges
RSS 0240	Axlebox overall longitudinal clearances
RSS 0246	Traction motor gearcase lubrication levels
RSS 0253	Cooling Water Test Procedures
RSS 0312	Security of brakegear
RSS 0330	Wheel defect manual
RSS 0401	Specification for suspension bearing oil

Appendix A - Report Sheets

Major Inspection for 48 class Locomotives

Loco Number: **Date:** **kms**

Customer Order No. **Location:**

NOTE: These Report Sheets MUST be completed and faxed to the Work Train Operations:
Fax 02-9752 6171 (internal 2 6171)

Cleaning

Item No.	Item Description	Initials
4.1	Clean engine room	
4.2	Clean underbody and bogies	
4.3	Toilets	
4.4	Equipment blow out	
4.5	Radiators	
4.6	Battery boxes	
4.7	Main reservoir drain cocks	
4.8	Reflective delineators	
4.9	AEI tags	

Pre - Inspection

Item No.	Item Description	Initials
5.1	Defect examination	
5.2	Engine oil sample	
5.3	Compressor	
5.4	Low lube shutdown	
5.5	Fuel injectors	
5.6	Overspeed Trip	
5.7	Cooling fan	
5.8	Support systems leakage	
5.9	Vigilance control	
5.10	Turbocharger pressure	
5.11	Fuel oil pressure	
5.12	Low tension earth	
5.13	Air conditioner cooling test	

6 Driver's Cab

Item No.	Item Description	Initials
6.1	Log book report	
6.2	Safety labels	
6.3	Hasler speedometer	
6.4	Windscreen wipers	
6.5	Horns	
6.6	Lights	
6.7	Air conditioning	
6.8	Doors and windows	
6.9	Fire extinguishers	
6.10	Handbrake operation	
6.11	Train radio	
6.12	Sand / desander operation & sandpipe height	
6.13	Pressure gauges	
6.14	Cab accessories	
6.15	Miscellaneous controls	
6.16	Control air	
6.17	Miscellaneous	
6.18	Controller & console (both sides)	
6.19	Traction generator	
6.20	Exciter & auxiliary generator	
6.21	Control compartment	
6.22	Electro pneumatic contactors	
6.23	Electro magnetic contactors	
6.24	Reverser switch	
6.25	Auxiliary contactors & relays	
6.26	Automatic and independent brake valves (lubricate)	
6.27	Radiator fan gearbox	

7 Engine & fan room

Item No.	Item Description	Initials
7.1	Compressor	
7.2	Air strainers	
7.3	Engine oil sample dilution test	
7.4	Fasts coupling	
7.5	Lube oil filters/centrifugal oil cleaner	
7.6	Lube oil strainer	
7.7	Fuel pumps & racks	
7.8	Inlet & exhaust valve clearance	
7.9	Fuel pump timing & rack setting	

7 Engine & fan room (continued)

Item No.	Item Description	Initials
7.10	Crankcase explosion covers	
7.11	Crankcase inspection	
7.12	Holding own nuts	
7.13	Primary & secondary fuel oil filters	
7.14	Holset coupling	
7.15	Cooling fan gearbox	
7.16	Radiator fan driveshaft	
7.17	Body side filters	
7.18	Filter minder & engine air filters	
7.19	Linkages, overspeed, control shaft & thrust collars	
7.20	Exhaust stack	
7.21	Batteries	
7.22	Wast removal & waste sumps	
7.23	Traction motor blower	
7.24	Fuel pump & crankcase exhauster motors	
7.25	Eddy current clutch	
7.26	Governor	
7.27	Miscellaneous	
7.28	Jumper receptacles	

8 Underneath Locomotive

Item No.	Item Description	Initials
8.1	Brake block condition	
8.2	Brake cylinder travel	
8.3	Brake cylinders (grease)	
8.4	Brake rigging	
8.5	Wheel examination	
8.6	Gearcase lube oil level	
8.7	Suspension bearing oil level	
8.8	Traction motor nose suspension	
8.9	Fuel tank examination	
8.10	Hasler speedo transmitter	
8.11	Automatic couplers & draft gear	
8.12	Air cocks at headstock	
8.13	Air brake coupling hoses	
8.14	Dummy couplings	
8.15	Bogie centre plates & loading pads	
8.16	Traction motors	
8.17	Axle box pedestal clearance	

8 Underneath Locomotive (continued)

Item No.	Item Description	Initials
8.18	Axle box roller bearing	
8.19	Traction motor cooling air bellows	

9 General with Engine Shutdown

Item No.	Item Description	Initials
9.1	Low tension earth	
9.2	Megger test	
9.3	Propulsion control test	
9.4	Manual transition test	

10 General with Engine Running

Item No.	Item Description	Initials
10.1	Engine oil level	
10.2	Governor oil level	
10.3	Engine coolant	
10.4	Ground relay	
10.5	Wheel slip	
10.6	Compressor operation	
10.7	Brake cylinder pressure stitch	
10.8	Low water	
10.9	Low lube	
10.10	Hot engine & fan controls	
10.11	Low tension voltage	
10.12	Engine speeds	
10.13	Air conditioner	

11 Operational Check

Item No.	Item Description	Initials
11.1	Engine speed control	
11.2	Loading check	
11.3	Ground relay test	
11.4	Wheel slip test	
11.5	Transition test	
11.6	All seals	
11.7	Vigilance control	
11.8	Air brake operation	

11 Final Running Check

Item No.	Item Description	Initials
12	**Final Running Check**	

Comments:

_____

_____

_____

_____

_____

Signature of Examining / Repairing Officer: _____

Signature of Supervisor: _____ Date: _____

Defect Report

Loco Number: **Date:** **Inspector:**

Fault	Attention	Initials

Prior to release the locomotive MUST be in a clean serviceable condition, all repairs and inspection items attended to, all foreign materials and rubbish should be removed and disposed of in the correct manner.

Note: Photocopy this page if more faults need to be listed.

Signature of Examining / Repairing Officer: _____

Signature of Supervisor: _____ Date: _____

A7/B7 Locomotive Brake Equipment Test - Tick Sheet

Page 1 of 2

Refer to RSS 0221 A7/B7 Locomotive Brake Equipment Test.

[Place a tick in the boxes provided if test passed; figures in brackets indicate correct values in kPa; Numbers "1" and "2" refer to the readings at each control stand]

1 Locomotive Number:_____ Date : _____

Name of Tester: _____

2 Check Pressures:

Brake Pipe:	1._____	2._____kPa (500)
Equalising Reservoir	1._____	2._____kPa (500)
Main Reservoir	1._____	2._____kPa (750-850)
Brake Cylinder	1._____	2._____kPa (325)

3 Number 3 Pipe Leakage:

Brake Cylinder Leakage (not to exceed 7 kPa/min)	1._____	2._____kPa/min

4 Number 4 Pipe Leakage:

Blow from Independent Brake Valve	1: ❑	2: ❑

5 Brake Pipe Leakage:

Brake Pipe Leakage (not to exceed 15 kPa/min)	1._____	2._____kPa/min
Brake Pipe Build-up (none allowed)	1._____	2._____kPa/min

6 Minimum Reduction - Automatic Brake:

Equalising Pressure Drop	1._____	2._____kPa (50)
Brake Pipe Pressure Drop	1._____	2._____kPa (50)
Brake Cylinder Rise	1._____	2._____kPa (50-125)
Brake Cylinder Lamp Working	1: ❑	2: ❑

7 Independent Release:

Equalising Pressure Change	1._____	2._____kPa (0)
Brake Pipe Pressure Change	1._____	2._____kPa (0)
Brake Cylinder Pressure	1._____	2._____kPa (0)

8 Full Service Automatic Brake:

Brake Cylinder Pressure	1._____	2._____kPa (350)

A7/B7 Locomotive Brake Equipment Test - Tick Sheet **Page 1 of 2**

9 Dynamic /Regenerative Brake Test:

(a) Braking:

Diesel Engine Speed increases	1: ❑	2: ❑
Brake Cylinder Pressure:	1._____	2._____kPa (0)

(b) Independent Full Application:

Brake Cylinder pressure	1._____	2._____kPa (325)

(c) Handle Off:

Diesel engine returns to idle	1: ❑	2: ❑
Brake Cylinder pressure (reapplied)	1._____	2._____kPa

10 Full Release - Automatic Brake Release:

Equalising Reservoir Pressure (pressure increased)	1._____	2._____kPa
Brake Pipe Pressure (pressure increased)	1._____	2._____kPa
Blow of air at Warning Port	1: ❑	2: ❑
Brake Cylinder retarded release	1: ❑	2: ❑

Running:

Brake Cylinder quickly released	1: ❑	2: ❑

11 Emergency - Automatic Brake:

Equalising Reservoir Pressure	1._____	2._____kPa (0)
Brake Pipe Pressure	1._____	2._____kPa (0)
Brake Cylinder	1._____	2._____kPa (350 - 400)

12 Flowmeter Operation:

Audibly and Visibly Operating	1: ❑	2: ❑

13 Emergency Cock:

Brake Pipe reduced quickly and applied brakes	1: ❑	2: ❑

14 Power Knockout Switch (PCS) Test:

Engine speed reduced to idle or loadmeter registers zero	1: ❑	2: ❑

Sand Examination Return

Loco Number: Date: Inspector:

Delivery rate should be 0.5 – 0.7 kg/minute

Measured delivery rate

Axle	Left	Right
1		
3		
4		
6		

Equipment Check – initial if correctly operating.

Equipment	Initials
Isolating cock	
Magnet valve	
Sand trap	
Sand control valves, if applicable	
Nozzles	

Note: If not operating correctly, please give full details of corrective action/s taken.

Defect	Repairs

Signature of Examining / Repairing Officer: _____

Signature of Supervisor: _____ Date: _____

Wheel Inspection Report

Loco Number: Date: kms

A end bogie number: B end bogie number:

Please report any of the following: flange widths of 25 mm or less, arrises, or any measurements approaching condemning to Train Operations Unit on 02-9752 6100 (Internal 26100)

Wheel numbers	R1	R2	R3	R4	R5	R6	
A end (cab end)							B end
Wheel numbers	L1	L2	L3	L4	L5	L6	

Wheel No.	Rim thickness (25 mm min)	Flange width (20 mm min)	Flange height (35 mm max)	Wheel Dia mm	Condition	Remarks
L1						
L2						
L3						
L4						
L5						
L6						
R1						
R2						
R3						
R4						
R5						
R6						

Coupler & Pilot

	Coupler height above rail (890 to 910 mm)	Pilot height
A end		
B end		

OK to Run

The locomotive is fit to run Yes ❑ No: ❑

Actions

Wheel turn Yes ❑ No: ❑ by when _____ Remarks _____

Other Yes ❑ No: ❑ by when _____ Remarks _____

Signature of Examining / Repairing Officer: _____

Signature of Supervisor: _____ Date: _____

Locomotive Ready to Go Certificate

Loco Number: Odometer kms

Arrival Date Arrival Time

Reason for Maintenance:

CCO	❑	Major Inspection	❑
Unscheduled repairs	❑	Interim Inspection	❑
Bogie change	❑	Trip Inspection	❑

Brief description of repairs completed:

_____
_____
_____
_____
_____
_____

The following have been checked:

Item	OK for service	Initials	
Locomotive fuel level checked			litres added
Sand boxes full			
Sander system operating			
Service water level			
Engine lubricating oil level			litres added
Engine coolant level			
Compressor oil level			
Pilot height within specification			
Brake blocks checked and travels adjusted			
Log book repairs completed & signed off			
Cab cleaned			

Fuel Fill date: _____ Fuel Docket No: _____

I certify that this locomotive has been inspected and is in a good safe working condition and is ready for operational service.

Signature of Examining / Repairing Officer: _____

Signature of Supervisor: _____ Date: _____

Delivery date: _____ Time: _____